



EN

Horizon 2020

Work Programme 2018-2020

10. Secure, clean and efficient energy

IMPORTANT NOTICE ON THIS WORK PROGRAMME

This Work Programme covers 2018, 2019 and 2020. The parts of the Work Programme that relate to 2020 (topics, dates, budget) have, with this revised version, been updated. The changes relating to this revised part are explained on the Funding & Tenders Portal.

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Introduction

The Energy Union, one of the ten priorities of the Juncker Commission, is the EU's major vector for and contribution to a global transition to a climate-neutral economy. The 2015 Paris Agreement, which the EU helped broker, set a clear and ambitious direction of travel for investment into low-carbon innovation. The clean energy transition will help modernise the European economy and thus contribute to both growth and job creation. The Commission has proposed a number of measures to achieve this goal, most recently the 'Clean Energy for all Europeans' package of measures of November 2016 which pursues three overarching goals: (i) energy efficiency first, (ii) Europe as a leader in renewables, and (iii) a fair deal to consumers. The Research, Innovation and Competitiveness component of this package is presented in the Communication on "Accelerating Clean Energy Innovation" (ACEI)¹.

This work programme part supports research, demonstration, innovation and market-uptake actions across different low-carbon energy sectors, notably in the core priorities identified in the Energy Union Strategy²: renewable energy; smart energy systems; energy efficiency; and, as an additional priority, Carbon Capture Utilization and Storage (CCUS). Within these areas, a special focus is put on three of the four strategic research and innovation priorities highlighted in the ACEI Communication which are primarily addressed by the "Secure, Clean and Efficient Energy" Societal Challenge of Horizon 2020 – decarbonising the EU building stock by 2050; strengthening EU leadership on renewables; and developing affordable and integrated energy storage solutions³. The context for operationalising and implementing these priorities, as well as other relevant issues addressed in this work programme part, is the EU Strategic Energy Technology Plan (SET Plan). It seeks to maximise synergies between EU and national public R&I support for clean energy, and to leverage private funding, for priorities across 10 key actions which cover those identified in the ACEI Communication.

At the international level, the Commission pushes the acceleration of energy innovation through the Mission Innovation Initiative⁴ which was launched at COP21 and currently comprises 24 members which together account for the largest part of the global CO₂ emissions and clean energy R&I efforts. This work programme part includes a number of specific actions⁵ which directly target an increased international cooperation of EU Member States and Associated Countries in the context of Mission Innovation. This also includes, in line with the spirit of the Paris Agreement which emphasises the need for global cooperation on technology development and transfer, cooperation with African countries on renewable

¹ COM (2016) 763

² COM (2015) 80

³ In line with the commitment in that Communication, more than EUR 2 billion are earmarked across different work programme parts (mainly Societal Challenge 3, LEIT-NMBP and Societal Challenge 4) for a great number of topics which address these four priority areas in a comprehensive way.

⁴ <http://mission-innovation.net/about/>

⁵ E.g. topics LC-SC3-RES-1-2019, LC-SC3-RES-3-2020, LC-SC3-RES-4-2018, LC-SC3-RES-5-2018, LC-SC3-RES-25-2020, LC-SC3-RES-29-2019, LC-SC3-RES-30-2019, LC-SC3-RES-36-2020, LC-SC3-RES-37-2020, LC-SC3-ES-1-2019, LC-SC3-ES-6-2019, LC-SC3-NZE-2-2018, LC-SC3-NZE-5-2019-2020

energies⁶. In this context, active participation of Outermost Regions could facilitate such cooperation given their strategic position close to the African continent. A number of topics included in this work programme are also in line with priorities of IEA Technology Collaboration Programmes (TCPs)⁷ and proposals are invited to explore collaboration and synergies with TCPs.

In addition to the Energy Union, this work programme part takes into account and contributes to, inter alia, the long-term EU greenhouse gas emissions reduction strategy⁸, the EU digital single market, the EU transport policy (see the Commission's "Europe on the move" package, adopted on 31 May 2017), Commission's "Jobs, Growth and Investment" agenda, its "Blue Growth" initiative, as well as to the EU's research and innovation policy. As regards the latter, this work programme part fully embraces the "Open Innovation, Open Science, Open to the World". Activities target a more bottom-up, user-centred energy system which is a driver for more innovation and made possible thanks to other innovations, notably the digitisation of core aspects of the energy market. A greater emphasis on open innovation and open science should lead to more opportunities, especially for smaller companies, to bring research results to the marketplace.

This work programme part addresses research, innovation and market uptake activities in and across specific energy sectors as well as activities to maximise synergies between EU and national public support for clean energy R&I, aiming also at increasing leverage of private funding. It contributes in its entirety to the Horizon 2020 spending targets on climate action and sustainable development, addressing in particular the Sustainable Development Goals (SDGs) 7 ("Ensure access to affordable, reliable, sustainable and modern energy for all"), 11 ("Make cities inclusive, safe, resilient and sustainable") and 13 ("Take urgent action to combat climate change and its impacts").

Efforts to secure Europe's technological leadership must be complemented by substantial production capabilities and technology supply chains across Europe. Industrial participation in the programme is therefore crucial.

The transformation of the energy system encompasses technological, societal, cultural, economic and environmental aspects. In line with the policy priorities, this work programme part puts a particular emphasis on enabling consumers to actively participate in the energy transition which is facilitated through the progressing digitisation. In this context, the integration of different social sciences and humanities fields, as well as a responsible research and innovation approach⁹, is of high importance.

The huge majority of activities included in this work programme part contribute to the focus area "Building a low-carbon, climate resilient future" which pools relevant activities across different work programmes with the objective to stimulate the development of solutions capable of achieving carbon neutrality and climate resilience. As regards energy storage, the

⁶ Topics LC-SC3-RES-20-2020, LC-SC3-RES-34-2020, LC-SC3-JA-4-2018, LC-SC3-JA-5-2020

⁷ <https://www.iea.org/tcp/>

⁸ https://ec.europa.eu/clima/policies/strategies/2050_en

⁹ http://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

Energy Challenge contributes to the call for proposals "Building a low-carbon, climate resilient future: Next-generation Batteries" (call identifier H2020-LC-BAT-2019-2020) which is part of the same focus area. In addition, this work programme part also includes activities which contribute to the focus areas "Connecting economic and environmental gains – the Circular Economy" and co-funds activities of the focus areas "Digitising and transforming European industry and services" and "Boosting the effectiveness of the Security Union".

This work programme part incorporates the findings of the Horizon 2020 Interim Evaluation¹⁰ - for example, it focusses resources on a more limited number of activities, steps up the involvement of civil society in R&I activities, and strengthens activities as regards breakthrough, market-creating innovations.

Project proposers should consider and actively seek synergies with, and where appropriate possibilities for further funding from, other relevant EU, national or regional research and innovation programmes (including ERDF/ESF+ or the Instrument for Pre-accession Assistance [IPA II]), private funds or financial instruments (including EFSI).

Examples of synergies are actions that build the research and innovation capacities of actors; mutually supportive funding from different Union instruments to achieve greater impact and efficiency; national/regional authorities actions that capitalise on on-going or completed Horizon 2020 actions aimed at market up-take/commercialisation.

In order to explore options for synergies, project proposers could seek contact with national/regional managing authorities and the authorities who developed the Research and Innovation Smart Specialisation Strategies (RIS3)¹¹. For this purpose the 'Guide on Enabling synergies between ESIF, H2020 and other research and innovation related Union programmes'¹² may be useful. Horizon 2020 project proposals should outline the scope for synergies and/or additional funding, in particular where this makes the projects more ambitious or increases their impact and expected results. Please note, however, that while the increase in the impact may lead to a higher score in the evaluation of the proposal, the reference to such additional or follow-up funding will not influence it automatically.

The activities in this work programme part will also make the best use of the services offered by the EU Flagship Programmes on Earth Observation (Copernicus) and on Satellite Navigation (Galileo and EGNOS¹³).

The priorities taken up in this work programme part are based on a broad stakeholder consultation, notably in the context of the SET-Plan 10 key actions¹⁴ and the Communication "Accelerating Clean Energy Innovation", but also through a targeted consultation on policy supporting actions and market uptake, or inputs from stakeholder associations (e.g. Strategic Research Agendas of Technology and Innovation Platforms).

¹⁰ https://ec.europa.eu/research/evaluations/index_en.cfm?pg=h2020evaluation

¹¹ <http://s3platform.jrc.ec.europa.eu/map>

¹² http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_en.pdf

¹³ Geostationary Navigation Overlay Service

¹⁴ <https://setis.ec.europa.eu/>

Activities specifically targeting Fuel Cells and Hydrogen are not supported under this work programme part, but through calls for proposals of the Fuel Cells and Hydrogen JU¹⁵. However, as regards topics included under the areas "Energy Efficiency", "Smart citizen-centred energy" and "Smart Cities and Communities", system costs related to the integration of mature hydrogen based technologies for the purpose of integrated demonstration in a topic are eligible.

Open research data

Grant beneficiaries under this work programme part will engage in research data sharing by default, as stipulated under Article 29.3 of the Horizon 2020 Model Grant Agreement (including the creation of a Data Management Plan). Participants may however opt out of these arrangements, both before and after the signature of the grant agreement. More information can be found under General Annex L of the work programme.

Contribution to focus area(s)

Focus Area 'Building a low-carbon, climate resilient future' (LC): EUR 2006.04 million

Focus Area 'Connecting economic and environmental gains - the Circular Economy' (CE): EUR 12.00 million

¹⁵ <http://www.fch.europa.eu/>

Call - BUILDING A LOW-CARBON, CLIMATE RESILIENT FUTURE: SECURE, CLEAN AND EFFICIENT ENERGY

H2020-LC-SC3-2018-2019-2020

This call includes the contribution of the Horizon 2020 Societal Challenge "Secure, clean and efficient energy" to the focus area "Building a low-carbon, climate resilient future" which underpins the goals of the Paris Agreement and the "Clean Energy for all European" package, including the Communication "Accelerating Clean Energy Innovation" (COM (2016) 736) and the SET-Plan priorities, with concrete R&I actions focussing on the accelerated transformation of the energy system, and other sectors, towards carbon neutrality and climate resilience. Activities also fully contribute to the Sustainable Development Goals and the Horizon 2020 spending targets on Sustainable Development and climate action.

Achieving climate neutrality in the energy sector – while ensuring at the same time a more efficient energy use, a secure supply of energy, affordable prices and low environmental impact – is a complex endeavour which requires R&I activities on multiple fronts. Activities supported in this call should deliver:

- on the supply side, cheaper and more performant generation technologies (e.g. renewable energy technologies) which are better integrated in various levels of the energy system;*
- a smarter, more flexible and resilient energy system (including affordable and integrated energy storage solutions), taking into account current and future climate change adverse impacts;*
- on the demand side, increased overall energy efficiency (e.g. in the EU's building stock) and provision of means to enable consumers to play a more active role in the energy transition;*
- a better understanding of the specific socio-economic contexts in which the energy transition takes place which will allow to address obstacles in a more effective way;*
- increased market-uptake of innovations, including the implementation of energy policy, the preparation for rolling-out investments, and the support for capacity-building.*

Energy efficiency

Energy efficiency needs to be considered as a source of energy in its own right. It is one of the most cost effective ways to support the transition to a low carbon economy, to prompt further investment opportunities and to create growth and employment. Putting energy efficiency first will bring down costs for consumers, reduce our import dependency and redirect investments towards the kind of infrastructure that are smart and sustainable.

An ambitious approach to energy efficiency is needed across all the sectors, but the major challenge of the next decade – in line with the ACEI priority to decarbonise the EU building stock by 2050¹⁶ – lies in buildings. Buildings represent 40% of energy used in the EU and the construction industry provides 18 million direct jobs in Europe, while SMEs contribute to 70% of the value added in the EU building sector. Renovating buildings adds almost twice as much value as the construction of new buildings and represents multiple benefits for building owners, occupants and the whole society. Proper valuation of these multiple benefits, supported under this call, will help to change business approach to buildings renovation ensuring flows of financing and massive investments. This, in turn, will improve living/working conditions of the Europeans, spur economic growth and create jobs.

In 2020, a dedicated area “Buildings in energy transition” is created, bridging to Horizon Europe and addressing forward-looking R&I challenges linked to buildings' energy efficiency and decarbonisation and their new role in the energy system.

With the transition to a decentralised and decarbonised energy system, digital smart technologies will be playing an increasingly important role. Not only that they will enable buildings and equipment in buildings to become interactive elements by optimising energy consumption, distributed generation and storage in the home and vis-à-vis the energy system. They will also trigger new business opportunities and revenue streams for up-graded, innovative energy services which valorise energy savings and flexible consumption. This call supports both technology and business development and test it in real market & regulatory conditions to pave the way towards the uptake of innovative energy services enabled by energy decarbonisation, decentralisation and digitalisation. That way, active consumers will not only be able to benefit from cost reductions but also from a bigger variety of services that bring along a more comfortable, convenient and healthier living environment.

Innovation is however also needed in the financing of energy efficiency where innovative financing schemes and approaches can help bridge the gap between project development and financing.

Actions included in this call contribute to the specific objectives, targets and relevant Implementation Plans¹⁷ of the SET Plan action 5.1 and 5.2. In particular, topic LC-SC3-EE-1-2018-2019-2020 aims at development and deployment of the materials and technologies for energy efficiency solutions for buildings renovation including renovation of buildings heating and cooling systems. As regards industrial energy efficiency, topic LC-SC3-EE-6-2018-2019-2020 has been designed to address the cross-cutting priority of SET Plan Action 6: maximising the recovery of industrial excess heat/cold in a cost efficient manner. The choice of a cross-cutting priority rather than a sector-specific one has been taken in order to maximise EU added value of the funded projects.

¹⁶ COM (2016) 763

¹⁷ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

Upgrading buildings' energy performance and smartness

Proposals are invited against the following topic(s):

LC-SC3-EE-1-2018-2019-2020: Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation ¹⁸

Specific Challenge: The market for deep renovation of buildings needs to be transformed in terms of technologies, processes and business models. The multiple benefits of improved energy efficiency are well known, but more action is needed for Europe to achieve the higher rates of renovation that would reduce energy use and decarbonize the building stock in order to meet long-term climate and energy targets. In particular, deep renovations need to become more attractive to all relevant stakeholders, more reliable in terms of performance, less disruptive for occupants (especially in residential buildings), less time-consuming, less energy-intensive from a life cycle perspective, more environmentally friendly regarding applied materials and more cost-effective. There is a need to demonstrate and roll out holistic consumer-centred solutions that involve the whole value chain, ensuring high levels of comfort and a high quality of the indoor environment.

Scope: Proposals should demonstrate solutions addressing building fabric and/or technical systems that ensure faster and more cost-effective deep renovations that result in high energy performance. Proposals should include innovations in technology and in design and construction methods with low embodied energy and on-site works organisation, industrialization and lowering cost of energy retrofitting and they should take into account any architectural constraints. They should also include innovations in business models and the holistic integration of disciplines across the value chain. Proposals should also consider energy efficient and low carbon solutions to retrofit building-level heating and cooling systems and the integration of on-site renewable energy generation¹⁹, energy storage systems which allow for optimisation and flexible consumption, and, if relevant, integration with district heating and cooling systems. Proposals could address drivers of building renovation that go beyond a desire to reduce energy consumption and related energy costs. For example, decisions to renovate may sometimes coincide with structural repairs. They could also consider further development and improvement of hybrid energy systems using fossil fuel based heating systems coupled with RES based heating systems as well as the integration of highly-efficient buildings and local energy system solutions such as District Heating and Cooling, including hybrid solutions.

Solutions should include quick and simple installation of components and systems, minimizing disruption for building occupants and the time spent on site. Proposals should include monitoring and displaying of real time energy performance and other relevant data

¹⁸ This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call, specifically topic LC-SC3-B4E-1-2020.

¹⁹ possible synergies with RES-3-2018: Renewable energy system integrated at a building or an industrial site, RES-4-2018: Increased performance of technologies for shallow geothermal heating and cooling solutions and their integration in the energy system, RES-5-2018: Demonstrate significant cost reduction for built-in PV solutions for "(nearly) Zero Energy Buildings"

and consider the ways in which consumers and others could access and make use of such information. Solutions should ensure high levels of occupant comfort (thermal, visual and acoustic) and indoor environmental quality (e.g. air quality, humidity) if possible based on bio-based materials, as well as low risk of moisture-related problems, summer overheating and other harmful unintended consequences, and should address the multiple benefits of energy efficiency. Proposals should demonstrate solutions that aim for large scale roll-out according to defined business models and financial schemes for owners.

Projects are expected to bring the technology to TRL level 8-9 (please see part G of the General Annexes).

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- High energy performance in the renovated buildings;
- Measurable cost reduction compared with a typical renovation (i.e. a renovation that meets current minimum requirements of existing building regulations) or major energy performance improvement at comparable cost;
- Reduction of time needed on site for renovation works by 20% compared to current national standard practice;
- Demonstration of the effectiveness and replicability of the proposed solutions to lead to an increased rate of renovation for defined building typologies in several districts/cities/regions.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-2-2018-2019: Integrated home renovation services

Specific Challenge: Many project promoters – public authorities, individuals or businesses – lack the skills and capacity to set up, implement and finance ambitious low-energy and clean energy building projects. In addition, many project developers still face obstacles in raising the necessary up-front costs for their projects – particularly as the small-size of investments and the lack of turnkey solutions increase implementation cost – and lack access to attractive and adequate financing products from the market.

Scope: This topic aims at creating or replicating innovative local or regional "integrated home renovation services". The developed services should cover the whole "customer journey" from technical and social diagnosis, technical offer, contracting of works, structuring and provision of finance (e.g. loans or EPCs), to the monitoring of works and quality assurance. Such integrated services should be operational at the end of the project and create more demand for holistic approaches as a result of improved offer by trustful market operators and better awareness from homeowners. They should also support the streamlining of standards and practices into consistent and transparent processes investors can rely on, and by doing so help connect the supply of finance with demand for it.

Proposals should build upon the promising experiences of integrated renovation services emerging in Europe²⁰ and aim at developing / improving economically viable business models, ultimately running without the need for public subsidies.

Projects funded under this topic will optimise the services required along the renovation process (based on a thorough analysis of the local needs and actors in place), improve trust and awareness of homeowners towards such services, reduce renovation costs and time on-site through standardised approaches (e.g. optimized business processes, standardised contractual arrangements, branding of the proposed services etc.), mainstreaming innovative technical solutions adapted to the local context, help improve their legal and regulatory environment, and overall improve financing conditions for energy renovation.

The services can be developed through dedicated operators (new public or public/private entity or mandated private operator) and/or through an improved co-ordination between existing local actors.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

²⁰ Please see the examples of good practice in chapter 3 of the Commission Staff Working Document 'Good practice in energy efficiency' (SWD(2016) 404 final)

- Implementation and upscale of economically viable business models, ultimately running without the need for public subsidies. Data evidence made available to market actors. Proof of the replication of these initiatives by other market actors;
- Availability of adequate financing offer for integrated renovation services;
- Strong and trustworthy partnerships with local actors (e.g. SMEs, ESCOs, financial institutions, energy agencies, NGOs) and quality of the proposed services recognized by market actors;
- Development of large, locally-developed investment pipelines for home renovation, connecting the supply of finance with demand for it (in million Euro of investments within the first 5 years);
- Uptake of home energy renovation at local level and corresponding primary energy savings triggered (in GWh/year).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-3-2019-2020: Stimulating demand for sustainable energy skills in the construction sector²¹

Specific Challenge: Based on results of the BUILD UP Skills initiative, in particular the National Qualification Platforms and Roadmaps, as well as the qualification and training schemes developed in various Member States, the challenge is now to act at market level and to support legislative changes that will stimulate the demand for energy skills.

The objective is to increase the number of skilled building professionals and/or blue collar workers across the building design, operation and maintenance value chain (designers, architects, engineers, building managers, technicians, installers, blue collar workers including apprentices, and other building professionals), with a specific focus on the engagement of SMEs. Recourse to skilled professionals/workers both for renovations and new constructions of buildings and district scale solutions should be made more attractive and easier for companies and home owners alike.

²¹ This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call, specifically topic LC-SC3-B4E-2-2020.

Scope: The focus of submitted proposals should be on the direct stimulation of demand for energy skills in construction. This is calling for the development, up-scaling and combination of a range of tools and initiatives, e.g.:

- Tools facilitating the mutual recognition of energy skills and qualifications in the construction sector: development of sustainable energy skills passports/registers for workers at regional/national level and support for their take up at EU level, mobile applications facilitating the comparison of workers' skills and qualifications between countries (e.g. by enabling the direct comparison of learning outcomes);
- National, regional or local initiatives raising awareness of home and building owners and tenants about the benefits of sustainable energy skills and providing financial incentives for renovations done using skilled workers/professionals;
- Support to public authorities for the development of new legislative frameworks, e.g. requirements for skilled workers in public procurement;
- Partnerships with producers and retailers of construction products (e.g. DIY stores) to raise awareness of the salesforce and of consumers about energy efficient products, skilled workers and good practice in construction/renovation;
- Initiatives reinforcing the link between skills/education and energy performance/quality of construction e.g. tools showing the reduction of the performance gap as result of an increase quality of the works.

Proposals need to be focused and are not necessarily required to address the whole range of professions and crafts involved in the building sector. They may however consider the entire design chain (e.g. manufacturers). If the proposal addresses specifically design, material life cycles and embodied energy shall be considered. Adequate consideration should also be given to improved appreciation of the end user's needs including the quality of indoor environment (thermal and visual comfort, acoustics, air quality, etc.) as well as improved operation and maintenance.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Measurable energy savings and/or renewables production resulting from improved skills;
- Investments in sustainable energy triggered by the project (in million Euro);
- Increased number of certification schemes for energy efficiency skills;

- Improved mutual recognition of sustainable energy skills between Member States and neighbouring countries;
- Improved collaboration and understanding across different trades and professional groups;
- Increased market acceptance of sustainable energy skills;
- Legislative changes stimulating the demand for energy skilled construction workers/professionals;
- Demonstrated reduction in the gap between designed and actual energy performance through improved quality of construction.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-4-2019-2020: Upgrading smartness of existing buildings through innovations for legacy equipment²²

Specific Challenge: An essential part of Europe's clean energy transition is the changing role of buildings from consuming energy to actively controlling and optimising indoor environment while contributing to energy system flexibility by ensuring distributed energy generation from renewable energy sources, energy storage, facilitate smart charging of EVs, load reduction through energy efficiency and load shifting through demand response. Innovative technologies will enable smart buildings to interact with their occupants and the grid in real time and to manage themselves efficiently, so as to become an active element of the energy system. Intelligent and connected devices, smart sensors and controllers, supported by the development of new business models for new energy services, will create new opportunities for energy consumers.

Today in the EU, the existing building stock represents the main challenge for a more efficient energy use, in buildings as well as across the whole energy system. The smart readiness of buildings may evolve faster for devices and systems easily replaced and installed, than for other parts of the building's equipment such as HVAC and DHW systems due to higher costs of replacement, longer lifecycles and difficulties related to integration in buildings. This installed equipment remains highly relevant for buildings interactions with the

²² This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call, specifically topic LC-SC3-B4E-3-2020.

energy system, making its upgrade to higher levels of smartness an essential step. The revised Energy Performance of Buildings Directive introduces a Smart Readiness Indicator (SRI) to reflect the level of services offered by a smart building. Once established, this indicator will give a framework to assess the smart readiness of buildings and building units to adapt operation to the needs of the occupant and the grid and to improve energy efficiency and overall performance.

Scope: Proposals should develop and demonstrate cost-effective technological solutions to manage energy within existing buildings and interact with the grid providing energy efficiency, flexibility, generation and storage, based on user preferences and requests. These solutions should be aimed to upgrade existing buildings, either residential or tertiary, using automation and IT to offer new services and control to the building users, thereby improving their comfort and increasing their satisfaction. This upgrade should translate into improvements in the areas put forward by the revised EPBD, in relation to the smart readiness indicator.

Proposals should demonstrate how the smart systems, smart controls and smart appliances can be integrated seamlessly in existing buildings to interface and/or to control the major energy consuming domestic appliances that are already installed. These pilots should involve several types of domestic appliances and technical building systems with longer lifecycles (boilers, radiators, DHW preparation, motors for ventilation, windows opening and shading; lighting etc.) and with shorter lifecycles (dryers, washing machines, fridges, etc.), testing several types of control modes (ON/OFF, power modulation, etc.) possible for a given type of appliance. Recharging points for electric vehicles and other forms of energy storage should also be incorporated in the pilots. The proposed solutions should not adversely affect the original functionalities, product quality, lifetime, as well as warranties of the appliances.

Besides the pilot demonstrations, proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

These business models and exploitation strategies should target the broad uptake of the proposed smart systems into specific building typologies in Europe and their integration with evolving electricity markets, e.g. dynamic pricing or other services and information offered by energy suppliers and/or aggregators. Integrations with other energy networks (e.g. DHC) can also be considered.

The solutions should focus on cost-effectiveness and user-friendliness: easy installation and maintenance, maximising consumer comfort (e.g. self-learning) and information on own consumption (e.g. recommendations to the user in order to maximise savings) as well as on gains from its contribution to grid operation.

These solutions should build on innovative technologies, initiatives and approaches contributing to building smartness: semantics, data models, data layers, protocols, software building blocks, APIs, middleware, solutions for smart services, standards, relevant industrial

consortia or technology initiatives, etc. Interoperability is essential to ensure the required smart readiness, in particular integration with legacy equipment, user-friendliness and broad market uptake.

A realistic estimate should be provided on the total energy savings/year and on the impact of the innovations demonstrated in the project on the total power available for cost effective demand response actions. The projects should involve technology providers (e.g. manufacturers of appliances, movable envelope components, smart control/ home systems providers), energy services providers (aggregators and/or suppliers and/or ESCO's), user representatives, electricity system operators and other actors as relevant.

The activities are expected to be implemented at TRL 6-8 (please see part G of the General Annexes).

The Commission considers the proposals requesting a contribution from the EU of between 3 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Upgrade of existing buildings to higher smartness levels, including a significantly enlarged base of existing building equipment and appliances monitored by energy management systems and activated through demand response actions;
- Reduction in energy consumption and costs, exceeding the additional consumption from IT and its cost.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gas emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-5-2018-2019-2020: Next-generation of Energy Performance Assessment and Certification²³

Specific Challenge: Under the Energy Performance of Buildings Directive²⁴, all EU countries have established independent energy performance certification systems supported by independent mechanisms of control and verification. However, current practices and tools of energy performance assessment and certification applied across Europe face a number of challenges.

Assessment processes and certificates have to become more reliable, user-friendly, cost-effective, have comparable good quality and be compliant with EU legislation in order to instil trust in the market and incite investments in energy efficient buildings. They have to increasingly reflect the smart dimension of buildings and at the same time, facilitate convergence of quality and reliability of Energy Performance Certificates (EPCs) across the EU. The building energy performance methodologies should also ensure a technology neutral approach, be transparently presented making use of International and European standards, in particular the ISO/CEN standards developed under Commission mandate M/480²⁵ aimed at enabling the presentation of national and regional choices on a comparable basis.

Next-generation energy performance assessment schemes will value buildings in a holistic and cost-effective manner across several complimentary dimensions: envelope performances, system performances and smart readiness (i.e. the ability of buildings to be smartly monitored and controlled and, to get involved in demand-side management strategies). The assessment should be based on an agreed list of parameters/indicators, such as e.g. calculated annual final energy use, share of renewable energy used, past (climate corrected) final energy consumptions and energy expenditure, comfort levels or the level of smartness. The assessment methods should increasingly take into account output measures of performance (actual measured data) making use of available and increasing number of building energy related data from sensors, smart meters, connected devices etc.. These new schemes should contribute to improving the effectiveness of certificates, by demonstrating how these could be strengthened, modernised and best linked to integrated national/regional certification schemes within a framework that aids compliance checking and effectiveness of financial support.

Scope: 2018 (Coordination and support action):

Proposals should involve relevant stakeholders (including national and regional certification bodies) to stimulate and enable the roll-out of next-generation of energy performance

²³ This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call, specifically topic LC-SC3-B4E-4-2020.

²⁴ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

²⁵ ISO/EN 52000-1, 520003-1, 520010-1, 52016-1, 52017-1, and 52018-1. 52022-1, EN 12098-1, EN 12098-3, EN 12098-5, EN 12831-1, EN 12831-3, EN 15232-1, EN 15316-1, EN 15316-2, EN 15316-3, EN 15316-4-1, EN 15316-4-2, EN 15316-4-3, EN 15316-4-4, EN 15316-4-5, EN 15316-5, EN 15378-1, EN 15378-3, EN 15459-1, EN 15500-1, EN 16798-3, EN 16798-5-1, EN 16798-5-2, EN 16798-7, EN 16798-9, EN 16798-13, EN 16798-15, EN 16798-17, EN 16946-1, EN 16947-1, EN ISO 10077-1, EN ISO 10077-2, EN ISO 10211, EN ISO 12631, EN ISO 13370, EN ISO 13786, EN ISO 13789, EN ISO 14683 and EN ISO 6946, ISO/EN 52017-1 and ISO/EN 52022-1.

assessment and certification, with a view to achieve enhanced reliability, cost-effectiveness and compliance with relevant EU standards and the Energy Performance of Buildings Directive. Proposals should develop strategies to encourage convergence of EPC practices and tools across the EU so as to ensure a comparable level of high quality, independent control and verification. The applicability of assessment and the certification schemes should be assessed through a broad set of well-targeted and realistic cases, featuring various locations, building types, climatic conditions and field practices including existing national EPC schemes. The assessment will aim at demonstrating the potential of an EU-wide uptake of the proposed assessment and certification schemes, along well-defined criteria. Embedding the EPCs and their recommendations in broader concepts such as energy audits, wider-buildings related databases (e.g. national EPC databases, national housing surveys, EU Building Stock Observatory) and one-stop-shops including administrative, financial and supply side information and linking EPCs to related concepts such as buildings renovation passports, individual buildings renovation roadmaps or building logbooks should also be considered.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019 (Innovation action):

Proposals should address the definition and demonstration of innovative approaches for the assessment of building energy performance, focusing at first on the reliable assessment of building intrinsic performances (e.g. using inverse modelling) but working also towards output-based assessments using available building energy related data²⁶. Proposals should involve relevant stakeholders (including national and regional certification bodies). The proposed approaches should be more reliable as well as cost-effective and compliant with relevant EU standards²⁷, in order to allow for an EU-wide deployment. Such approaches should rely on the combination of existing and proven technology components (starting from TRL 6-7, please see part G of the General Annexes) with well-structured methodologies and protocols that can lead to the definition of new certification schemes. They could also consider implications when using EPCs in building passports and renovation roadmaps.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 2.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

²⁶ The projects relevant for building energy data gathering and computing will be funded through: 1) large scale IoT pilot DT-ICT-10-2018: Interoperable and smart homes and grids; 2) big data pilot DT-ICT-11-2019: Big data solutions for energy.

²⁷ CEN standards (provide ref) and EN ISO 52000-1CEN (provide ref) standard, EN ISO 52000-1.

Expected Impact: 2018 (Coordination and support action):

Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Increased convergence of good quality and reliable energy performance assessment and certification and uptake and compliance with EU Directives and related standards;
- Increased rate of application and compliance of EPCs and independent control systems with the provisions of EU and national legislation, in a defined region;
- Increase of EPCs databases for compliance checking and verification, linking with financing schemes and building stock characteristics research etc.

2019 (Innovation action):

Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Improved user-friendliness of EPCs in terms clarity and accuracy of the information provided;
- Enhanced user awareness of building energy efficiency;
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Energy efficient industry and services

Proposals are invited against the following topic(s):

LC-SC3-EE-6-2018-2019-2020: Business case for industrial waste heat/cold recovery²⁸

Specific Challenge: Energy and fuels represent an important part of the production costs in several Resource and Energy Intensive Industries (REII). While a lot of technical progress has already been done in REII to reduce the energy consumption of the main industrial processes, significant parts of the input-energy are still lost in the form of waste heat/cold by gas, liquid or solid streams. Wide-scale deployment of industrial waste heat/cold recovery is hindered, among others, by the lack of financial/ economic justification for the required equipment and, at times, by the limited industrial applicability (i.e. process re-integration). Often, it is forgotten that directly or after an intermediate transformation step, the sources of heat/cold losses of a given industry can be a valuable resource for other industries and buildings/ District Heating and Cooling operators and that they could be of commercial interest for the waste heat/cold producer. Furthermore, other energy cooperation activities between industries can also contribute to increase their energy efficiency. Thus physical clustering (e.g., of buildings and processes, energy exchange, collective production) and/ or service clustering (e.g., joint contracting) can deliver a more stable cumulative demand, economy of scale for larger installations with higher efficiencies and smaller spatial footprint and an optimised demand response.

Scope: **2018 (Innovation action):**

Cost-benefit models for industrial waste heat/cold recovery:

Proposals should develop integrated cost-benefit simulation tools that, based on the characterization of processes, heat/cold streams and other relevant variables, can determine the best utilisation options of recovered waste heat/cold and/ or surplus renewable energy from industrial and eventual other sources (when available). Proposals should also consider the possibility to contribute to efficient use/system integration of renewable energy sources through e.g. heat/cold storage and flexible production.

The proposals are expected to put forward simulation tools that would allow industrial sites/parks to determine the most financial attractive option for using their recovered waste heat/cold and/or surplus renewable energy. This should be based on, inter-alia, waste heat/cold recovery (and storage if necessary) costs (including equipment and process adaptation), retail and/ or whole sale energy prices, (new contracts) administrative and legal costs, (external connecting) infrastructure costs, internal and external demand, waste heat/cold as source of flexibility in electricity system. Other relevant variables should also be included, inter-alia, characterisation of barriers and opportunities on the DHC side (e.g. competition with other heat/cold sources, thermal storage, regulatory conditions). The simulation tools are expected to be flexible enough to allow a large number of different types of industrial sites/parks to use it, i.e. should allow many energy intensive process characterizations irrespective of the industrial sector and geographic location, and should also take into account supply-demand dynamics.

²⁸ This topic will not be continued in 2020.

The simulation tools should be validated through demonstration in real operating conditions in industrial facilities.

Proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

Proposals are expected to look at relevant business models for the collaboration outside the plant/industrial park and have strong communication and dissemination components in order to reach many industries, large private facilities and public authorities.

This topic contributes to the roadmap of the Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) cPPP.

The activities are expected to be implemented in the range of TRL 4-8 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019 (Coordination and support action):

Symbiosis in industrial parks and clusters- non-technological barriers

Proposals should improve the energy efficiency of industrial parks districts and clusters by unlocking the market potential and supporting the demand and offer of high-quality energy services by addressing at least one of the following points:

- The development and testing of instruments facilitating, at customer/ business level, the actual implementation of energy cooperation such as setting up appropriate process and business organisation, operation and plant design, cooperation mechanisms, related contractual and financial arrangements, better planning, good practices. Proposals need to include capacity building activities such as skills development and engagement of senior and executive management (e.g. CEO, CFO, energy managers) of companies from industrial parks and other related stakeholders.
- The development and testing of replicable business models and service concepts, at service provider level (i.e. ESCOs or other relevant 3rd party organisations such as DHC operators), for joint energy services such as identification of horizontal energy services attractive for businesses, identification of the most relevant innovative technical solutions, setting up contractual and financial arrangements, best practices, cost-reduction models. Proposals need to include capacity building activities such as sharing skills, know-how and specific expertise of ESCOs or other 3rd party organisations that would boost the market uptake for such joint energy services contracting in industrial parks.

This topic contributes to the roadmap of the Sustainable Process Industry through Resource and Energy Efficiency (SPIRE) cPPP.

Proposals need to also address legal issues in order to adapt regulatory and legal frameworks at local, regional and national level. Issues related to the sustainability of the proposed symbiosis in case one or more of the involved parties are changing activity (including leaving the park) should be taken into account. Proposals are expected to ensure applicability of the solutions to other industrial parks/ business sectors while strong communication and dissemination components will be needed in order to reach many industries, industrial park managers and ESCOs.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: 2018 (Innovation action):

Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Accurate prediction and holistic modelling of industrial waste heat/cold and/or surplus renewable energy from industrial or other sources from different geographical and market settings;
- Better impact of the various factors/ variables on the cost-benefits of industrial waste heat/cold and/or surplus renewable energy from industrial or other sources;
- Valorisation in assessments of cost-benefit of industrial waste heat/cold and/or surplus renewable energy from industrial and eventual other sources;
- Number of industrial sectors/ sites/ parks, public authorities (including energy agencies), large private facilities (e.g. sport and shopping centres, non-energy intensive industrial parks) and DHC operators aware, interested and supporting the implementation of waste heat/cold and/or surplus renewable energy from industrial and eventual other sources recovery/use for process re-integration or commercial use, depending on the outcome of the simulations;
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

2019 (Coordination and support action):

Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Number of (operational and organisational separated) plant sites (within one industrial park) and the number of industrial parks where businesses commit to energy cooperation;
- Number of relevant stakeholders (e.g. ESCOs, industrial park managers) aware of and/or interested in/ implementing joint energy services;
- Number of policies and legal frameworks created and/ or adapted to facilitate energy cooperation among businesses.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action, Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-8-2018-2019: Capacity building programmes to support implementation of energy audits

Specific Challenge: The Energy Efficiency Directive, in its art.8, requires Member States to develop programmes encouraging SMEs to undergo energy audits and to implement the recommended energy-saving measures. SMEs represent enormous energy saving potential. However, the lack of expertise, time and capital, including energy audit supporting scheme, often prevents SMEs from implementing energy conservation measures or from getting access to the energy services market.

The effectiveness of energy audit recommendations is influenced by people's behaviours and the improvement of enterprises' energy cultures. The availability of reliable energy consumption data is of utmost importance to monitor the impact of energy saving measures and behaviours. The actions should lead SMEs to become fully aware of the multiple benefits resulting from energy audits as well as facilitating their actual implementation. Moreover, capacity building programmes should also support implementation of the recommended energy-saving measures both for small and large enterprises.

Scope: Proposals should focus on one, or more, of the following issues:

- Staff trainings and capacity buildings programmes, facilitating SMEs to undergo energy audits and to implement the recommended energy-saving measures, shall be developed according to SMEs specificities (size, sectors, lifetime of the company etc.) and highlighting the financial aspects. Programmes should aim at bridging the gap between demand and supply side (SMEs, auditors, finance institutions, managing authorities of supporting schemes). An active participation of both managerial and operational staff must be ensured. The proposed solution should be tailored to national/local conditions in order to ensure the effective uptake by the SMEs.
- Capacity building to support the take-up of audits recommendations and undertake the actions necessary to reduce energy consumption (maintenance or investments in new equipment but possibly also behavioural actions) in the companies required to undergo energy audits (large enterprises). Development and implementation of corporate policy measures involving all actors (from decision makers/corporate board members to employees in each department) willing to undertake more efficient energy-related actions (motivations, behaviour change, mitigation of perceived risks and barriers). Evaluation of the total costs of building investments, in terms of financial, environmental and health impact.
- Initiatives supporting Member States in empowering or establishing national supporting schemes for SMEs providing appropriate incentives to undergo energy audits and/or to implement the recommended energy-saving measures.

Proposals should demonstrate how the proposed activities will be continued commercially beyond the project lifetime. Involvement of relevant multiplier organisations is also encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Market stakeholders with increased skills/capability/competencies (to be measured in number of people with increased capacity) and long-lasting training schemes;
- Number of people/enterprises with enhanced energy culture documenting why and how changes are an effect of particular measures taken as consequence of energy audits, as well in terms of the sustainability of the behavioural change;

- Policies and strategies created/adapted at national level (to be measured in number of initiatives/actions taken to improve/create audit supporting schemes and/or number of SMEs supported in the implementation of energy audit).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Energy efficiency is an investment

Proposals are invited against the following topic(s):

LC-SC3-EE-9-2018-2019: Innovative financing for energy efficiency investments

Specific Challenge: There is a need to set up innovative financing schemes at regional or national level in order to create the conditions for adequate supply of private finance for energy efficiency investments. Innovative financing schemes for energy efficiency aim to progressively maximise the leverage ratio of public funds to private finance. This is in line with the "Smart Finance for Smart Buildings"²⁹ initiative that aims at using public funds more effectively.

Scope: Proposals should address the development or replication and implementation of innovative financing schemes for energy efficiency investments. They can involve different types of organisations, ownership structures and financing models such as dedicated credit lines; guarantee facilities; factoring/forfaiting schemes; on-bill (e.g. utility-financed) or on-tax financing schemes; citizen financing (e.g. crowd-funding) for energy efficiency; finance models for the deep renovation of buildings, addressing both property and rental markets; finance models for different industry sectors and cross-sectorial initiatives; financing solutions integrating existing market-based instruments relevant for energy efficiency (e.g. carbon finance instruments, including those under the European Emissions Trading System; energy efficiency obligations, including white certificates; etc.); or schemes based on project aggregators or clearing houses at regional or national level, which should support project development and match demand and supply of energy efficiency finance. These schemes should address the provision of finance as well as the structuring of demand, in particular at regional/national level, and target specific areas (e.g. energy-intensive industries, buildings etc.). Proposals should justify how the proposed schemes complement already available funding and how they are tailored and innovative for the targeted regions and market segments; as well as clearly demonstrate the market potential, as well as business case and

²⁹ https://ec.europa.eu/energy/sites/ener/files/documents/1_en_annexe_autre_acte_part1_v9.pdf

financial viability of the scheme (including investment sizes targeted, expected savings, transaction and management costs, expected returns etc.).

Proposals should address one or more of the following points:

- Establishment of new innovative, operational financing schemes;
- Replication of previously successful solutions e.g. developed and implemented under various project development assistance (PDA) facilities under the Horizon 2020 and Intelligent Energy Europe programmes (including MLEI PDA or ELENA);
- Establishment of regional/national aggregators which are able to develop large (standardized) project pipelines;
- Creation of EU or regional/national energy efficiency investment roundtables/platforms to organise dialogue with and between the relevant stakeholders and (among others) develop roadmaps, propose improvements in the legal frameworks and develop and validate template documents and contracts leading to a better understanding of the market. Proposals should include a clear action plan to communicate across Europe towards potential replicators.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Delivery of innovative financing schemes that are operational and ready to finance energy efficiency investments;
- Regional/national aggregators with demonstrated/traceable capacity to set up large-scale pipeline of (standardized) sustainable energy investments (in terms of number of and/or amount of investment);
- EU or regional/national energy efficiency investment roundtables/platforms providing a comprehensive range of support and/or services to facilitate access to energy efficiency finance.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-10-2018-2019-2020: Mainstreaming energy efficiency finance³⁰

Specific Challenge: Energy efficiency is not yet considered as an attractive investment by the financial sector which limits the possibility to use external private finance on top of equity of project owners and available public funding. The lack of statistical data on the actual energy and costs savings achieved by energy efficiency investment projects, as well as on payment default rates, results in financial institutions attributing high risk premiums to energy efficiency investments.

Energy efficiency represents high transaction costs for rather small investments, which is not financially very attractive. Technical and legal standardisation is highly needed at all steps of the investment value chain in order to simplify transactions and increase the confidence of financial institutions. The lack of standardisation of projects also prevents securitisation of energy efficiency assets (loans or equity) so that financial institutions are not able to refinance their debt on the capital markets³¹.

Whereas energy efficiency investments are usually expected to be paid back exclusively through the reduction of the energy bill, there is increasing evidence that non-energy benefits play a key role in the decision to invest in energy efficiency. This includes for instance increased building value, lower tenant turnover or vacancy rates etc. These benefits need to be quantified through data collection and monetised in order to evolve the parameters used by financiers to assess an energy efficiency investment.

Scope: Proposals should address at least one of the following issues:

- Development, demonstration and promotion of frameworks for the standardisation and benchmarking of sustainable energy investments. This could include for example, but not exclusively, labelling schemes, project rating methodologies and risk assessment tools, standardised legal and financial structures of assets (loans, guarantees, energy performance contracts etc.) in order to develop securitisation for energy efficiency based financial products. Proposals integrated in a broader approach such as socially responsible investment should focus on the energy component;
- Capacity building for banks and investors at the national and local level, in particular on underwriting sustainable energy investments;

³⁰ This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call, specifically topic LC-SC3-B4E-11-2020.

³¹ A successful example of standardisation enabling securitisation is the PACE market in the USA

- Gathering, processing and disclosing large-scale data on actual financial performance of energy efficiency investments, in order to create a track record for energy efficiency in different sectors (buildings, industry, transport, etc.) Proposals should build upon or complement the work of the Energy Efficiency Financial Institutions Group (EEFIG) e.g. the De-risking Energy Efficiency Platform³²;
- Further integration of non-energy benefits in project valuation, in particular in the building sector, leading to evolution of existing financial products or creation of new targeted products;
- Targeting institutional investors (e.g. public pension schemes) in order to increase the share of their funds invested in energy efficiency, or to develop specific funds or investment products. Supporting the integration of energy efficiency in portfolio management strategies for institutional investors and/or fund managers, including through re-definition of fiduciary duties;
- Exploring the impact of revised risk ratings and requirements for energy efficiency on financial regulations (Basel III, Solvency II).

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Number of financial institutions and other stakeholders reached as well as their potential volume of investment concerned;
- Frameworks, standardisation, benchmarking, standardised descriptions and data evidence of financial returns of energy efficiency investments agreed and accepted by the market;
- Higher allocation of institutional investments to energy efficiency; standardisation of assets enabling securitisation; development of a secondary market for energy efficiency assets (in million Euro of investment within 5 years after the end of the project);
- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (million Euro).

Additional positive effects can be quantified and reported when relevant and wherever possible:

³² <https://deep.eefig.eu/>

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-11-2018-2019-2020: Aggregation - Project Development Assistance³³

Specific Challenge: Investors and lenders need to gain more confidence on investment projects related to energy efficiency which are still seen as risky and fragmented. EU added value can be realised in particular where projects introduce innovation to the market regarding project aggregation and financing solutions minimising transaction costs and engaging the private finance community. EU added value could also be realised where projects demonstrably remove legal, administrative and other market barriers for mainstreaming large scale sustainable energy investment schemes.

Scope: Project Development Assistance (PDA) will be provided to public and private project promoters such as public authorities or their groupings, public/private infrastructure operators and bodies, energy service companies, retail chains, large property owners and services/industry. The action will support building technical, economic and legal expertise needed for project development and leading to the launch of concrete investments, which are the final aim and deliverable of the project.

Proposals should focus on one or more of the following sectors:

- existing public and private buildings including social housing, with the aim to significantly decrease energy consumption in heating/cooling and electricity;
- energy efficiency of industry and service;
- energy efficiency in all modes of urban transport (such as highly efficient transport fleets, efficient freight logistics in urban areas, e-mobility and modal change and shift); and
- energy efficiency in existing infrastructures such as street lighting, district heating/cooling and water/wastewater services.

The proposed investments will have to be launched before the end of the action which means that projects should result in signed contracts for sustainable energy investments to that effect, e.g. construction works, energy performance contracts, turnkey contracts.

³³ This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call, specifically topic LC-SC3-B4E-13-2020.

Whilst proposals may address investments into distributed, small-scale renewable energy sources in combination with energy efficiency, the main focus should lie on capturing untapped high energy efficiency potentials.

Proposals should include the following features:

- an exemplary/showcase dimension in their ambition to reduce energy consumption and/or in the size of the expected investments;
- deliver organisational innovation in the financial engineering (e.g. on-bill financing schemes, guarantee funds, or factoring funds) and/or in the mobilisation of the investment programme (e.g. bundling, pooling or stakeholder engagement);
- demonstrate a high degree of replicability and include a clear action plan to communicate experiences and results towards potential replicators across the EU;
- build on the experiences from previous PDA projects³⁴.

This PDA facility focuses on small and medium-sized energy investments of at least EUR 7.5 million to EUR 50 million. Large scale investments are covered by the ELENA facility.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, the impacts listed below, using quantified indicators and targets wherever possible:

- Delivery of a series of sustainable energy investment projects and innovative financing solutions and/or schemes;
- Every million Euro of Horizon 2020 support should trigger investments in sustainable energy worth at least EUR 15 million;
- Primary energy savings, renewable energy production and investments in sustainable energy triggered in the territory of participating parties by the project (respectively in GWh/year and in million Euro of investments);
- Demonstration of innovative and replicable investment financing solutions, documenting feedback/uptake from potential replicators.

Additional positive effects can be quantified and reported when relevant and wherever possible:

³⁴ Records of all PDA projects can be found in CORDIS under the topics EE-20-2014/2015 and EE22-2016/2017. All fact sheets can also be retrieved directly from: https://ec.europa.eu/easme/sites/easme-site/files/20160805_mlei_projects-factsheets_final.pdf

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Energy efficiency is an energy source

Proposals are invited against the following topic(s):

LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource³⁵

Specific Challenge: Energy Efficiency services (e.g. Energy Performance Contracting (EPC)) are available on the market already for quite some time. However, there is a big untapped potential in sectors and with actors not yet engaged in services triggering energy, CO₂ and cost savings. At the same time, new technologies have emerged opening the door for new types of services which use ICT to better control and steer energy consumption according to market and system needs and to the availability of renewable energy; others are able to integrate energy services with non-energy benefits such as comfort. By bundling various services and benefits, additional target groups, sectors and financial resources can be accessed. Actions are also needed to structure and label the quality of demand side service providers (like ESCOs aggregators and energy cooperatives) and improve their accessibility for end energy users.

Finally, ICT-tools and big data generated by smart meters, smart devices and sensors will help monitor and verify energy savings and flexibility and thus provide for appropriate remuneration of optimised consumption. A particular challenge for energy services of this kind is that while they aim to involve different services (e.g. system services) and benefits (e.g. comfort) towards increasing their viability, they should nevertheless result in real, measurable energy savings and performance improvements of the overall energy system.

Scope: 2018 (Coordination and support action):

Actions should allow different market actors to get together and focus on developing integrated concepts and models which

- enhance and refine successful energy performance contracting models and/or;
- include pay-for-performance schemes and/or;
- include customer individualized energy services as a result of better understanding of customer behaviour and needs derived of new data analytics tools;

³⁵ This topic will not be continued in 2020. A corresponding topic is included in section "Buildings in energy transition (B4E)" of this call.

- engage new sectors and actors and/or;
- integrate energy efficiency services with other energy services like distributed generation and demand response and including storage/hybrid energy systems and/or non-energy related services; these should be endorsed by relevant stakeholders and validated (for example tested around existing projects or projects under development);
- factor in potential legal and contractual aspects (e.g. in relation to existing contracts or warranty, safety and data security issues linked to existing and newly deployed equipment).

Proposed actions should cover at least two (but not necessarily all) of the relevant areas and aspects identified below:

- Energy service models (like EPC) and services that target new sectors and new actors;
- Business models which work equally for energy efficiency and other services, building on contractual arrangements across different actors (ESCOs, aggregators, DSOs, energy cooperatives, obliged parties under the Energy Efficiency Obligation Schemes implementing art 7 EED and eventually the consumers) which traditionally cover different use cases business interests and different revenue;
- "Pay for performance"-schemes which focus on permanently reducing power consumption in particular at peak times, thus attracting new sources of financing;
- The use of 'big data' generated by smart meters, equipment, sensors and tools for standardised processes enabling a more accurate and dynamic measurement and verification of energy savings and flexible consumption, also in order to ex-ante identify and develop business opportunities;
- Additional non-energy features that support the up-take of innovative energy efficiency services and technologies;
- Improving the accessibility and quality of demand side service providers while enhancing their access to the market.

Proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

The Commission considers that proposals for Coordination and Support Actions requesting a contribution from the EU of between EUR 1 million and 2 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019 (Innovation action):

Projects should focus on demonstrating and testing innovative energy services in a real environment, across several market segments and across different actors in the value chain. To be economically viable, these services need to be able to rely on sound measurement and verification methodologies. They should cover several but not necessarily all of the relevant areas and aspects identified above, blending in innovative manner different revenue streams coming from different market segments and they should in all cases include innovative verification and monitoring measures. Moreover, they should demonstrate how potential legal and contractual aspects (e.g. in relation to existing contracts or linked to the use of equipment) have been accounted for.

Proposals should demonstrate that the tested business models and services are self-sustainable after the end of the project. The upfront investments in energy efficiency measures (e.g. upgrading of building energy performance) and in smart building systems should be paid back at least in part by revenues coming from energy savings and remunerated flexibility.

The Commission considers that proposals for Innovation Actions requesting a contribution from the EU of between EUR 3 and 4 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Where possible and appropriate, the actions should cooperate with the projects funded under the topics: DT-ICT-10-2018: Interoperable and smart homes and grids, DT-ICT-11-2019: Big data solutions for energy in the WP 5.i ICT, and LC-SC3-ES-6-2018-2020: LC-SC3-ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Improved viability of innovative energy services.

In addition, proposals are expected to demonstrate, the impacts listed below, using quantified indicators and targets wherever possible:

- A growing offer and up-take of services that combine energy efficiency with other energy services, technologies and non-energy benefits;
- A growing up-take of innovative data gathering and processing methods in the monitoring and verification of energy savings and flexibility;
- The application of methods and concepts to ensure that: (i) innovative energy services are reliable and verifiable, (ii) service providers are trustworthy and accessible.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-14-2018-2019-2020: Socio-economic research conceptualising and modelling energy efficiency and energy demand³⁶

Specific Challenge: In the Energy Union Strategy, Energy Efficiency was recognised as a resource in its own right which should be enabled to compete on equal terms with generation capacity and to have primary consideration across all policies³⁷. However, the structure of energy demand as well as the real value beyond the fuel's cost and the (energy and non-energy) impacts of energy efficiency are still not well understood with the effect that benefits of energy efficiency are not sufficiently taken into account in financial and political decision making, and planning, while prices of fossil fuels remain relatively low.

The topic addresses three different dimensions of this challenge with the aim to trigger actions which

1. make the energy efficiency first principle more operational (2018);
2. substantiate the demand side aspects in energy modelling (2019).

Scope: 2018:

The research projects should help to make the Energy Efficiency First principle more concrete and operational and to better understand its relevance for energy demand and supply and its broader impacts across sectors and markets. In particular, it needs to be analysed how energy efficiency programmes along the efficiency chain, i.e. end-use, operation, transmission and generation/utilisation of resources, can compete in reality with supply side investments (e.g. additional generation capacities or import capacities) including at the level of countries and having in mind limited public budgets. It would also be necessary to describe and assess how it interacts with and correlates to other policy objectives, at a policy level as well as at the level of implementation.

Actions which conceptualise and assess the impacts and model the energy efficiency first principle, in particular as regards:

³⁶ This topic will not be continued in 2020. A corresponding topic is included in section "Smart and clean energy for consumers", specifically topic LC-SC3-EC-4-2020.

³⁷ Communication from the Commission A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy /* COM/2015/080 final

- its role and value in the energy system (e.g. for planning of generation assets and networks adequacy etc.) and the energy market (participation in capacity market, participation and impact on prices and costs on wholesale and balancing/reserve markets);
- its role and value in financing decisions (considering as well that in some Member States retail prices do not reflect real costs);
- its economic and social impacts;
- its correlation and interaction with other policy objectives (e.g. renewable energy, demand response);
- existing best practices worldwide where energy efficiency projects are given priority over additional supply side measures.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and 1.5 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2019:

The aim of the action is to deepen the demand side-related parameters in existing models and to include new aspects and data sources (e.g. by tapping DSOs modelling for forecasting of distributed loads). In general, it is to be expected that the introduction of smart meters and smart equipment will lead to more accurate consumption data providing for a more holistic mapping of the demand side and thus for better projections inside energy policy development and a more effective regulatory framework.

The action should complement the existing demand side energy models by developing multiple-agent energy models and/or modelling segments and/or developing methodologies on how to improve and enhance the demand side aspects in modelling.

These models and/or methodologies should:

- be compatible with the energy models most commonly used at European level;
- model more accurately those aspects not yet sufficiently considered in the existing models;
- make use of new data sources, including big data as for example generated by smart meters, smart buildings and smart equipment;
- identify and refine the structure and patterns of demand and how it will develop;
- contribute to an enhanced demand-side model to be consistently used at European level.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and 2 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: **2018:**

Actions are expected to support policies aiming to promote and implement the "energy efficiency first-principle" based on a sound assessment of the concept and its impacts. To this end, actions should lead to a better understanding of:

- all relevant aspects linked to the "energy efficiency first-principle";
- its impacts (e.g. technical, economic, socio-economic, and ecological etc.) on the relevant sectors and markets;
- its potential across the different policy areas and sectors;
- its consideration and valorisation in modelling and assessments; and
- its interaction with other policy objectives both at policy level (e.g. climate and renewable policies, circular economy) and at the level of concrete application (e.g. design of buildings).

2019:

Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible

- More accurate and holistic mapping and modelling of the demand side and to a better assessment of energy consumption trends for different categories of economic agents.
- More accurate follow-up of energy efficiency measures implemented at the demand side;
- Better assessment of demand-side policy needs at European level.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Support for policy-driven innovations

Proposals are invited against the following topic(s):

LC-SC3-EE-15-2018: New energy label driving and boosting innovation in products energy efficiency

Specific Challenge: The energy label is a key driver for innovation in the energy efficiency area. For more than 20 years the tangible results of the transformation of the European market are being observed, where only the products with the highest energy efficiency parameters and innovative solutions to save energy are being commercialised. The energy label stimulates a real competition in innovation among product manufacturers. However the current energy label has a closed scale from A+++ to D, so once the majority of products reach the highest classes, the label no longer stimulates further innovation. Therefore, the Commission has proposed that, in future, labels will be 'rescaled' (as well as go back to A-G scale), i.e. existing products will be re-categorised in lower classes so that the top classes are empty and provide new stimulus for innovation. The 'empty top-class' label will be the strongest and continuous innovation trigger. Rescaling of labels would take place approximately every ten years or faster, if technology development and innovation has been faster than expected. This rescaling, will be a challenging operation in terms of organisation and provision of information to the concerned market actors, requiring technical guidance, communication and training campaigns, including during the transitional periods³⁸ in order that the new scale is correctly applied by manufacturers leaving enough space for future innovations. Customers' confusion should be avoided by replacing labels displayed on the affected products within a short timeframe in order to ensure consumer choice to be directed to the highest class innovative products.

Scope: The proposed action should cover one or more of the following points:

1. Raise the capacity of manufacturers and, in particular, retailers (e.g. through a comprehensive training methodology, involving a series of hands-on applications in each Member State) to fulfil their obligations providing and displaying respectively the correct label at the point of sale;
2. Develop and roll out tailored and effective actions focusing on awareness-raising and information campaigns to alert market actors (businesses, public procurement personnel, consumers etc.) of label rescaling, with a view to increasing understanding of labels and routing purchase decisions towards higher efficiency products. These actions should also address any additional references that may exist on the rescaled label (e.g. QR code);
3. Exchange of best practices in relation to these campaigns, including through the recommendation of common key messages to the respective target groups.

All relevant stakeholders necessary for the successful implementation of the action should be involved (e.g. manufacturers, retailers, public procurement personnel and consumers).

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately.

³⁸ A period during which old (before the rescaling) and new rescaled labels for the same products would both be present in shops.

Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (million Euro);
- Number of stakeholders (e.g. public procurement personnel, businesses and consumers) informed by actions aiming at improving the understanding of rescaled labels, minimising any risk of confusion (at least 5 million stakeholders per million Euro of EU funding);
- Number of manufacturers, suppliers and retailers engaged by actions aiming at improving their understanding of rescaled labels, minimising the risk of confusion (at least 5 000 market actors per million Euro of EU funding);
- Reduced compliance costs, maximise legal certainty and minimise errors during the transition periods for suppliers and dealers.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-16-2018-2019-2020: Supporting public authorities to implement the Energy Union³⁹

Specific Challenge: The delivery of the Energy Union targets requires the full engagement of the public sector at all governance levels.

Local and regional public authorities have a crucial role in setting ambitious energy efficiency strategies, for instance in the framework of the Covenant of Mayors for Climate & Energy and Smart Cities & Communities or the Clean Energy for All islands initiative. The political commitment at local level should be enhanced and the focus should turn to implementation and effective monitoring of concrete energy efficiency solutions and actions, which can contribute to modernise and decarbonise the European economy. Synergies should be sought,

³⁹ This topic will not be continued in 2020. A corresponding topic is included in section "Smart and clean energy for consumers" of this call, specifically topic LC-SC3-EC-5-2020.

whenever possible, with local and regional air quality plans⁴⁰ and air pollution control programmes⁴¹ to reduce costs since these plans rely to a large extent on similar measures and actions⁴².

Support should continue and be reinforced in building capacity of public authorities and empowering them to take up their role of energy transition leaders at regional and local level, by permanently improving their skills as public entrepreneurs and supporters of market transformation towards more efficient energy systems.

At national level, the Energy Efficiency Directive has triggered numerous positive developments in the Member States by setting targets to incentivise and enable investment in energy efficiency programmes across all sectors. However, Member States have yet to fully implement the Directive and additional support in building capacity and know-how is needed.

Scope: a) *Support to local and regional public authorities*

Proposers should aim to focus their proposed action on one of the following points:

- Deliver higher quality and consistency of energy efficiency measures implemented through enhanced coordination of different administrative levels. Actions should lead to politically approved and jointly applied monitoring and verification schemes of energy efficiency measures across local and regional authorities, enhanced and better coordination of the energy efficiency measures implemented and more efficient use of public spending in energy efficiency;
- Support public authorities in the development of transition roadmaps that clearly outline the path to the European long-term 2050 targets and inform the ongoing implementation of SEAPs/SECAPs or similar plans and the development of future plans/targets for 2030 and beyond. Actions should link closely to the Covenant of Mayors and/or Smart Cities and Communities initiatives;
- Innovative ways to enable public engagement in the energy transition, developing interface capacities within public authorities to engage with civil society;
- Deliver large-scale and action-oriented peer-to-peer learning programmes targeting cities and/or regions, with a strong replication potential European-wide. Proposals should develop transparent, effective and compelling programmes, building on existing initiatives and real needs and ensure embedded conditionalities such as institutionalisation of the skill base and impact monitoring. Programmes should deliver public entrepreneurs able to drive the sustainable energy transition in their respective territories within the Covenant Mayors and beyond.

b) *Supporting the delivery of the Energy Efficiency Directive*

⁴⁰ Directive 2008/50/EC

⁴¹ Directive 2016/2284

⁴² Second State of the Energy Union, page 13.

Support will be provided to actions that are assisting Member States to fulfil their obligations under the Energy Efficiency Directive and help with its efficient implementation taking into account existing effective practices and experiences from across Europe. Actions may address, for example, the harmonisation of energy savings calculations under Article 3, implementing Energy Efficiency Obligation Schemes or alternative measures and setting up effective and consistent monitoring and verification systems under Article 7 or the removal of barriers to higher efficiency of the generation, transmission, distribution systems including demand response under Article 15.

Proposals should link into existing, relevant initiatives such as ManagEnergy and target a specific sector with high energy saving potential such as buildings, transport mobility, heating and cooling, or water infrastructure operation etc., as seen relevant by applicants.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings, renewable energy production and investments in sustainable energy triggered in the territory of participating parties by the project (respectively in GWh/year and in million Euro);
- Number of public officers with improved capacity/skills;
- Number of policies influenced through the action;
- Number of Member States with improved implementation of Art 7. (Energy Efficiency Obligation schemes or alternative measures) / Energy savings achieved through successfully implemented Energy Efficiency Obligation schemes or alternative policy measures;
- Number of Members States with improved and consistent monitoring and verification systems for energy savings across governance levels.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-17-2019: European City Facility - European cities as key innovation hubs to unlock finance for energy efficiency

Specific Challenge: Mobilising investment in energy efficiency and renewables is key for Europe's energy transition. The European Commission proposed the Smart Financing for

Smart Buildings (SFSB) initiative in the recently published Clean Energy for All Europeans winter package.

For the SFSB to succeed it is essential to boost project aggregation and build a substantial pipeline of energy efficiency investment projects across Europe. Cities and communities are the place where economic, social and environmental transformation actually happens. Cities and communities play a key role in aggregating smaller projects into sizable packages and in mobilising the significant amount of finance needed for the energy transition.

However, despite a tremendous potential, too few cities and communities in Europe succeed in developing and scaling up investment packages. A high degree of organisational, technical and financial innovation is needed to reach significant scale. A key gap is the lack of capacity of public authorities, especially of small and medium-sized municipalities to transform their overall long-term strategies, e.g. Sustainable Energy Action Plans (SEAPs) or similar, into credible investment concepts. Public authorities have limited resources, in particular, to access financial, technical and legal expertise needed to collect additional data, develop an investment programme of scale (e.g. pooling projects and/or bundling with neighbouring constituencies) and design finance strategies which demonstrate sufficient maturity to enable access to different finance routes, i.e. to develop their 'investment concept'.

These concepts would allow a large number of cities and communities to start the process for mobilising the investments in sustainable energy. When relevant, such concepts could be combined with other EU financing streams and services to trigger the expected investment (e.g. EFSI⁴³, ESIF⁴⁴, PDA⁴⁵, National Investment Platforms).

Scope: Proposals are expected to set up and run a 'European City Facility' which offers financial support and services to cities and municipalities or their groupings:

- The European City Facility should offer financial support to develop innovative investment concepts within a limited period of time, covering, inter-alia: a clear identification of the potential project pipeline, legal analysis, governance analysis, a description of how the investments will be financed and a design of the process to launch the investments.
- Proposals should foresee to provide support to third parties ('support scheme') as described in part K of the General Annexes of the Work Programme. At least 80% of the budget should directly benefit cities, municipalities or their groupings.
- Proposers should demonstrate the ability to run a support scheme at large scale in accordance with Horizon 2020 standards and that they are able to select the most cost-efficient and appropriate city and community applications taking account, inter alia, the scale of the potential investment and the number of inhabitants covered.

⁴³ European Fund for Strategic Investments

⁴⁴ European Structural and Investment Funds

⁴⁵ Project Development Assistance, e.g. ELENA-EIB, EASME PDA

- Proposers should be deeply rooted in the ecosystems of municipal sustainable energy planning and the challenge of finance of energy efficiency. Proposers should demonstrate that they are able to mobilise a critical mass of cities/municipalities or their groupings and have a sound and inclusive outreach strategy to cities and communities across Europe.
- Proposals should foresee services to underpin European added value and earmark appropriate resources (maximum 10% of the requested EU contribution) for common actions that will underpin European added value.
- In order to qualify for support through the European City Facility, cities and communities or their groupings should provide proof of political commitment, demonstrate, additionally to existing planning processes and resources, a minimum population covered (single or in groupings of municipalities) and an ambitious scale of potential investment and level of energy savings based on politically approved SEAPs, SECAPs⁴⁶ or plans of similar ambition, describe the investment sectors targeted, the type of financial solutions envisaged, the governance to develop the investment concept, and include a plan for long-term capacity building within the public administration, a plan on how they will engage with representatives of the key segments and citizens and a commitment for monitoring for 2 years.

The Commission considers that proposals requesting a contribution from the EU of around EUR 16 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Demonstration and documentation of increased leveraging of finance into energy efficiency investments by public authorities;
- Overall, the action should trigger for every million Euro of Horizon 2020 support sustainable energy investments worth at least EUR 20 million;
- Number of investment concepts delivered, and number of concepts that turned into tangible investments after the provided support;
- Number of public authority staff with increased capacity for developing investible energy efficiency projects;
- Innovation uptake by potential replicators;

⁴⁶ Sustainable Energy and Climate Action Plan

- Primary energy savings, renewable energy production and investments in sustainable energy triggered by participating public authorities after the support of the action (respectively in GWh/year and in million EUR of investments).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EE-18-2019: Bioclimatic approaches for improving energy performance in buildings in Africa and Europe

Specific Challenge: Africa is going through a rapid urbanisation phase and it is anticipated that, by 2030, there will be more people living in urban than rural areas. On the other hand, the housing supply is already far from meeting the highly growing demand in cities and the expectations of home owners, in terms of performance, comfort and health. One of the reasons for this situation is the insufficient use of construction materials and technologies, which are adapted to local climate and economic contexts. Imported materials and technologies, which are not always suitable for local conditions, are replacing the traditional and local building designs, construction techniques and materials. Poor indoor thermal conditions, in particular overheating, and high demand for expansive active cooling, are often the result together with an increased buildings' energy footprint. Use of cheap and low-quality materials to cut down construction costs and lack of knowledge about their performance are other problems related to this issue. There is a need to increase the knowledge about the benefits of using bioclimatic buildings design approaches, local materials, and construction techniques suitable to local contexts.

Scope: Proposals should study the performance of a selection of European and African local bioclimatic building designs, local construction materials and techniques to determine how they could be utilized to increase the energy performance, living quality and sustainability of buildings in targeted geographical zones in Africa and their climatic and socio-economic conditions. Proposals should promote innovations, including bioclimatic approaches, to enable adaptation of local materials and techniques to current building design and construction practices and lifestyles. They should include maximizing passive cooling, passive ventilation, natural light gains and suitability for specific local climate conditions (e.g. stark rains). They should investigate how sustainable supply chains of local materials could be established or improved to cope with fast paces of construction, contributing to the support of local businesses. They should foster exchange and mutual learning between European and African stakeholders (policy-makers, architects, auditors, building sector private companies)

for better regulation and implementation of locally adapted bioclimatic construction approaches.

Proposals should include the following activities:

- Identification and documentation of African and European affordable buildings designs, construction techniques and materials suitable for a selection of local climatic and socio-economic contexts in Africa, based on bioclimatic construction approaches.
- Exchange activities around the topic of fostering low-cost, high performance, locally adapted bioclimatic construction approaches for African and European policy-makers and on the development of building policies, standards, regulations, certificates and other relevant instruments and support measures in a selection of geographical zones in Africa.

They could also include the organization of one or several study visits to demonstration sites for African policy-makers and other key stakeholder including the construction sector. South-south cooperation is also encouraged.

- Investigation of the measures (in particular policy ones) that could effectively support the development of sustainable and cost-effective supply chains of local construction materials, in order to enhance their competitiveness and contribute to the growth of local businesses.

The Commission considers that proposals requesting a contribution from the EU of around EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate that they will trigger as many as possible of the impacts listed below:

- Increased use of affordable, locally-adapted bioclimatic construction approaches in buildings in Africa with high energy performance and increase living comfort;
- Expected (potential for) energy savings (kWh) in buildings thanks to the improved techniques;
- Number of documented locally-adapted bioclimatic affordable building design, construction techniques and materials;
- Number of participating policy-makers and other key stakeholders with increased knowledge;
- Number of exchange meetings and/or study visits;
- Number of new legislative, regulatory, standardisation, certification schemes or other support measures launched or under preparation;

- Investments aiming to develop or deploy affordable, locally-adapted bioclimatic buildings design, construction techniques and materials;
- Promotion of effective sustainable supply chains of local construction materials;
- Number of workers with increased related skills in the bioclimatic construction sector.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Buildings in energy transition (B4E)

Buildings can effectively support the clean energy transition while reducing the environmental footprint. Innovation in technology and business will change the traditional functions of buildings, which will play an active role in the energy system. Smartness of buildings and the underlying data will be the pivotal component of the digital transformation in the energy sector, changing the role of the energy consumers and activating the demand-side assets.

In this intervention area the focus is put on the R&I challenges in the buildings sector, which will shape the energy transition in the next decade and will be followed in Horizon Europe:

- Energy-efficient and renewable-intensive buildings renovation (e.g. technology and business-related innovation to decrease the costs of renovation);
- Digitalisation of building energy, in connection with the energy system and the grid (e.g. active buildings in neighbourhood energy management);
- Optimizing energy in buildings and creating new value streams (new energy services).

Proposals are invited against the following topic(s):

LC-SC3-B4E-1-2020: Towards highly energy efficient and decarbonised buildings

Specific Challenge: The market for deep renovation of buildings needs to be transformed in terms of technologies, processes and business models. More action is needed for Europe to achieve the higher rates of buildings renovations and spread clean energy technologies in the existing European building stock in order to meet long-term climate and energy targets. In particular, deep renovations need to become more attractive to all relevant stakeholders, more reliable in terms of performance, less disruptive for occupants (especially in residential buildings), less time-consuming, less energy-intensive from a life cycle perspective, more environmentally friendly regarding applied materials and more cost-effective, but also enabling new functions the buildings will play in the energy system of the future (flexibility, storage and RES generation). There is a need to demonstrate and roll out holistic consumer-centred solutions that involve the whole value chain, ensuring high levels of comfort and a high quality of the indoor environment.

Scope: Projects are expected to increase the depth and breadth of renovations, while integrating clean energy technologies into the building envelop and/or systems.

Proposals are expected, as a minimum, to include the following activities:

- Demonstrate deep and/or NZEB renovation approaches more reliable, faster, cheaper and easier to implement than standard practices while avoiding other harmful unintended consequences (e.g. on environment or health);
- Demonstrate seamless and cost-effective integration of clean energy solutions in the building envelop and/or systems enabling buildings to play an active role in the energy system (RES generation, flexibility, storage)
- Demonstrate a high replication, as much as possible across regions and climatic zones, different economic and social conditions, sustainability and market change potential of the proposed solutions including viable concepts for financing the renovation;
- Tackle all relevant barriers (e.g. uptake by the professionals, financing, legal/regulatory framework, decision-making etc.) and suggest solutions to the relevant stakeholders;
- Demonstrate effective involvement of, and communication and dissemination to the buildings supply chain, and to the building owners/tenants and other relevant stakeholders.

In addition, proposals should, as much as possible:

- Include convincing business models (e.g. combination of smart energy services);
- Offer guarantees of energy performance and consumer service;
- Employ innovative working practices, processes and offers;
- Propose attractive package solutions which offer multiple benefits;
- Include monitoring of the real energy performance in-use before and after the renovation.

Furthermore, proposals may also, where relevant:

- Establish new or amend existing standards, certificates, protocols or other quality assurance mechanisms including for skilled workers;
- Address split incentives and/or counter-productive structures, regulations and incentives;
- Pursue step-by-step renovation approaches;
- Include one-stop-shop approaches;
- Include building logbooks/passports and/or individual building renovation roadmaps and related concepts, as well as lean production approaches;

- Offer guarantees of absence of health or environmental risks for workers and users;
- Highlight the increased market value of energy efficient property (green investments);
- Tackle peak load savings and demand response;
- Improve the Smartness Readiness Indicator (SRI) of the dwelling.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year)
- Investments in sustainable energy triggered by the project (in million Euro);
- Replication of the chosen renovation approach in specific districts/ cities/ regions/ countries to reach an increased rate of deep/nZEB renovation at large scale;
- Number of public or private renovation schemes set up;
- Building renovations triggered (in number of dwellings or square meters).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.
- Renewable energy generation triggered by the project (in GWh/year).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-2-2020: Stimulating demand for sustainable energy skills in the building sector

Specific Challenge: Based on results of the BUILD UP Skills initiative⁴⁷, in particular the National Qualification Platforms and Roadmaps, as well as the qualification and training schemes developed in various European countries, the challenge is now to act at market level and to support legislative changes that will stimulate the demand for sustainable energy skills.

⁴⁷ <http://www.buildup.eu/en/skills>

The objective is to increase the number of skilled building professionals (“blue collar” and “white collar” professions) across the building design, operation and maintenance value chain (e.g. designers, architects, engineers, building managers, technicians, installers, on-site workers and craftsmen, including apprentices, and other building professionals), with a specific focus on the engagement of SMEs. Recourse to skilled professionals for renovations and new constructions of buildings as well as district scale solutions should be made more attractive and easier for companies (e.g. ESCOs) and home owners alike.

Scope: The focus of submitted proposals should be on the direct stimulation of demand for energy skills in construction. This is calling for the development, up-scaling and/or combination of a range of tools and initiatives, e.g.:

- Tools facilitating the mutual recognition of energy skills and qualifications in the building sector: development of sustainable energy skills passports/registers for building professionals at regional/national level and support for their take up at European level; mobile applications facilitating the comparison of professionals’ skills and qualifications between countries (e.g. by enabling the direct comparison of learning outcomes);
- National, regional or local initiatives raising awareness of home and building owners and tenants about the benefits of sustainable energy skills and providing financial incentives for renovations and new constructions done using skilled professionals;
- Support to public authorities for the development of new legislative frameworks, e.g. requirements for skilled professionals in public procurement;
- Partnerships with producers and retailers of construction products (e.g. DIY stores) to raise awareness of the salesforce and of consumers about energy efficient products, skilled professionals and good practice in new constructions and renovations;
- Initiatives reinforcing the link between skills/education and energy performance/quality of construction e.g. tools showing the reduction of the building’s performance gap as result of an increase quality of the works.

Proposals need to be focused and are not necessarily required to address the whole range of professions and crafts involved in the building sector. They may however consider the entire design chain (e.g. manufacturers). If the proposal addresses specifically design, material life cycles and embodied energy have to be considered.

Adequate consideration should also be given to the multiple benefits of energy efficiency, to improved appreciation of the end user's needs including the quality of indoor environment (thermal and visual comfort, acoustics, air quality, etc.) as well as to the building’s improved operation and maintenance.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Renewable energy production triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Increased number of certification schemes for energy efficiency skills;
- Improved mutual recognition of sustainable energy skills between Member States and neighbouring countries;
- Improved collaboration and understanding across different trades and professional groups;
- Increased market acceptance of sustainable energy skills;
- Legislative changes stimulating the demand for energy skilled building professionals;
- Demonstrated reduction in the gap between designed and actual energy performance through improved quality of construction.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-3-2020: Upgrading smartness of existing buildings through innovations for legacy equipment

Specific Challenge: An essential part of Europe's clean energy transition is the changing role of buildings from consuming energy to actively controlling and optimising indoor environment while contributing to energy system flexibility by ensuring distributed energy generation from renewable energy sources, energy storage, facilitate smart charging of EVs, smart metering, load reduction through energy efficiency and load shifting through demand response. Innovative technologies will enable smart buildings to interact with their occupants and the grid in real time and to manage themselves efficiently, so as to become an active element of the energy system. Intelligent and connected devices, smart sensors and controllers, supported by the development of new business models for new energy services, will create new opportunities for energy consumers.

Today, the existing building stock represents the main challenge for a more efficient energy use, in buildings as well as across the whole energy system. The smart readiness of buildings may evolve faster for devices and systems easily replaced and installed, than for other parts of the building's equipment such as HVAC and DHW systems due to higher costs of replacement, longer lifecycles and difficulties related to integration in buildings. This installed equipment remains highly relevant for buildings interactions with the energy system, making its upgrade to higher levels of smartness an essential step. The revised Energy Performance of Buildings Directive introduces a Smart Readiness Indicator (SRI) to reflect the level of services offered by a smart building. Once established, this indicator will give a framework to assess the smart readiness of buildings and building units to adapt operation to the needs of the occupant and the grid and to improve energy efficiency and overall performance.

Scope: Proposals should develop and demonstrate cost-effective low-carbon technological solutions to manage energy within existing buildings and interact with the grid providing energy efficiency, flexibility, generation and storage, based on user preferences and requests. These solutions should be aimed to upgrade existing buildings, either residential or tertiary, using automation and IT to offer new services and control to the building users, thereby improving their comfort and increasing their satisfaction. This upgrade should translate into improvements in the areas put forward by the revised EPBD, in relation to the smart readiness indicator.

Proposals should demonstrate how the smart systems, smart controls, smart metering and smart appliances can be integrated seamlessly in existing buildings to interface and/or to control the major energy consuming domestic appliances that are already installed. These pilots should involve several types of domestic appliances and technical building systems with longer lifecycles (boilers, radiators, DHW preparation, motors for ventilation, windows opening and shading; lighting etc.) and with shorter lifecycles (dryers, washing machines, fridges, etc.), testing several types of control modes (ON/OFF, power modulation, etc.) possible for a given type of appliance. Recharging points for electric vehicles, vehicle-to-grid and other forms of energy storage should also be incorporated in the pilots. The proposed solutions should not adversely affect the original functionalities, product quality, lifetime, as well as warranties of the appliances.

Besides the pilot demonstrations, proposals are expected to include clear business model development and a clear path to finance and deployment. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients.

These business models and exploitation strategies should target the broad uptake of the proposed smart systems into specific building typologies in Europe and their integration with evolving electricity markets, e.g. dynamic pricing or other services and information offered by energy suppliers and/or aggregators. Integrations with other energy networks, e.g. DHC, or other services or IT solutions not related to energy can also be considered.

The solutions should focus on cost-effectiveness and user-friendliness: easy installation and maintenance, maximising consumer comfort (e.g. self-learning) and information on own

consumption (e.g. recommendations to the user in order to maximise savings) as well as on gains from its contribution to grid operation.

These solutions should build on innovative technologies, initiatives and approaches contributing to building smartness: semantics, data models, data layers, protocols, software building blocks, APIs, middleware, solutions for smart services, standards, relevant industrial consortia or technology initiatives, etc. Interoperability is essential to ensure the required smart readiness, in particular integration with legacy equipment, user-friendliness and broad market uptake.

Projects are required to follow the H2020 guidance on ethics and data protection⁴⁸, taking into account digital security, privacy and data protection requirements including the compliance with relevant directives/regulations (e.g. NIS⁴⁹, eIDAS⁵⁰, GDPR⁵¹) and relevant National Legislation.

A realistic estimate should be provided on the total energy savings/year and on the impact of the innovations demonstrated in the project on the total power available for cost effective demand response actions. The projects should involve technology providers (e.g. manufacturers of appliances, movable envelope components, smart control/ home systems providers), energy services providers (aggregators and/or suppliers and/or ESCO's), user representatives, electricity system operators and other actors as relevant.

The activities are expected to be implemented at TRL 6-8 (please see part G of the General Annexes).

The Commission considers the proposals requesting a contribution from the EU of between 3 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);

⁴⁸ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

⁴⁹ Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

⁵⁰ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

⁵¹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

- Upgrade of existing buildings to higher smartness levels, including a significantly enlarged base of existing building equipment and appliances monitored by energy management systems and activated through demand response actions;
- Reduction in energy consumption and costs, exceeding the additional consumption from IT and its cost.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gas emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-4-2020: Next-generation of Energy Performance Assessment and Certification

Specific Challenge: Under the Energy Performance of Buildings Directive⁵², all EU countries have established independent energy performance certification systems supported by independent mechanisms of control and verification. However, current practices and tools of energy performance assessment and certification applied across Europe face a number of challenges.

Assessment processes and certificates have to become more reliable, user-friendly, cost-effective, have comparable good quality and be compliant with EU legislation in order to instil trust in the market and incite investments in energy efficient buildings. They have to increasingly reflect the smart dimension of buildings and at the same time, facilitate convergence of quality and reliability of Energy Performance Certificates (EPCs) across Europe. The building energy performance methodologies should also ensure a technology neutral approach, be transparently presented making use of International and European standards, in particular the ISO/CEN standards developed under Commission mandate M/480⁵³ aimed at enabling the presentation of national and regional choices on a comparable basis.

⁵² Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings

⁵³ ISO/EN 52000-1, 520003-1, 520010-1, 52016-1, 52017-1, and 52018-1. 52022-1, EN 12098-1, EN 12098-3, EN 12098-5, EN 12831-1, EN 12831-3, EN 15232-1, EN 15316-1, EN 15316-2, EN 15316-3, EN 15316-4-1, EN 15316-4-2, EN 15316-4-3, EN 15316-4-4, EN 15316-4-5, EN 15316-5, EN 15378-1, EN 15378-3, EN 15459-1, EN 15500-1, EN 16798-3, EN 16798-5-1, EN 16798-5-2, EN 16798-7, EN 16798-9, EN 16798-13, EN 16798-15, EN 16798-17, EN 16946-1, EN 16947-1, EN ISO 10077-1, EN ISO 10077-2, EN ISO 10211, EN ISO 12631, EN ISO 13370, EN ISO 13786, EN ISO 13789, EN ISO 14683 and EN ISO 6946, ISO/EN 52017-1 and ISO/EN 52022-1.

Next-generation energy performance assessment schemes will value buildings in a holistic and cost-effective manner across several complimentary dimensions: envelope performances, system performances and smart readiness (i.e. the ability of buildings to be smartly monitored and controlled and, to get involved in demand-side management strategies). The assessment should be based on an agreed list of parameters/indicators, such as e.g. calculated annual final energy use, share of renewable energy used, past (climate corrected) final energy consumptions and energy expenditure, comfort levels or the level of smartness. The assessment methods should increasingly take into account output measures of performance (actual measured data) making use of available and increasing number of building energy related data from sensors, smart meters, connected devices etc. These new schemes should contribute to improving the effectiveness of certificates, by demonstrating how these could be strengthened, modernised and best linked to integrated national/regional certification schemes within a framework that aids compliance checking and effectiveness of financial support.

Scope: Proposals should involve relevant stakeholders (including national and regional certification bodies) to take on board the lessons learnt and the innovative approaches demonstrated in the previous projects as well as any developments on the use of EPCs that have taken place in the Member States, in order to further stimulate and enable the roll-out of next-generation of energy performance assessment and certification.

Proposals should develop strategies to encourage convergence of EPC practices and tools across Europe so as to ensure a comparable level of high quality, independent control and verification. The applicability of assessment and the certification schemes should be assessed through a broad set of well-targeted and realistic cases, featuring various locations, building types, climatic conditions and field practices including existing national EPC schemes. The assessment will aim at demonstrating the potential of a Europe-wide uptake of the proposed assessment and certification schemes, along well-defined criteria.

Proposals should also address issues regarding the training requirements and certification procedure for experts that are allowed to issue EPCs. Proposals should demonstrate the benefit of EPCs increasingly covering also work on inspections (Articles 14 and 15 of the Energy Performance of Buildings Directive). Embedding the EPCs and their recommendations in broader concepts such as inspections and energy audits, integrating them in wider-buildings related databases (e.g. national EPC databases, national housing surveys, EU Building Stock Observatory), in practices related to quality assurance and reducing the performance gap, and one-stop-shops including administrative, financial and supply side information and linking EPCs to related concepts such as buildings renovation passports, individual buildings renovation roadmaps or building logbooks should also be considered.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Increased convergence of good quality and reliable energy performance assessment and certification and uptake and compliance with EU Directives and related standards;
- Increased rate of application and compliance of EPCs and independent control systems with the provisions of EU and national legislation, in a defined region;
- Increased use of EPC databases for compliance checking and verification, linking with financing schemes and building stock characteristics research etc.;
- Increase convergence of training requirements and certification procedures for experts working on EPCs;
- Increased integration of inspections and energy audits in the EPCs.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the performance gap;
- Additional market value of the building (single unit) with better EPC class.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-5-2020: Integrated design concepts for energy-efficient ICT in buildings

Specific Challenge: The demand for data processing is expected to grow in the coming years. Consolidation is quickly replacing a multitude of small, remote and inefficient data centres with big and more resource and energy efficient data centres. This tendency however does not address specific delay- and security-sensitive small data centres. Moreover the emergence of edge computing, Internet of Things and Software Defined Networks (Network Function Virtualisation) will increase the amount of small data centres at the edge of the network. This is also the situation for server rooms in buildings.

These server rooms, small data centres or other ICT equipment in building (e.g. telephone cabinets) should become more energy efficient, better integrated with the buildings in which they operate, and should maximise where possible the integration of intermittent renewable energy sources, district cooling systems, and synergies with buildings' energy management systems (e.g. space heating and cooling).

Scope: Proposals should investigate innovative design concepts and advanced ICT solutions for integrated design of server rooms and small data centres in buildings (based on state-of-

the-art sustainable data centre designs such as the Open Compute Project or similar), covering as many as possible of the following areas:

- Optimal energy performance of the proposed design concepts,
- Innovative and energy efficient cooling technologies and/or solutions,
- Integration with buildings' energy management system and energy-consuming systems (using European and global communication standards such as SAREF), taking into account building usage,
- Integration with intermittent renewable energy sources
- Waste heat valorisation (e.g. recovery, conversion, usage in local low-temperature heat networks to serve urban areas), while minimising the total waste heat production,
- Geographical and temporal workload balance,
- Elimination of unnecessary repeated power conversions (AC/DC),
- Operation of ICT equipment in a wider range of temperatures (to mitigate cooling and airflow needs in data centres but also heating needs in telecommunication cabinets/booths in the field).

For the purposes of this action, proposals should address server rooms or small data centres, with an IT Equipment energy requirement of a maximum of 250 kW or lower per pilot. Proposals should focus on new and/or existing small edge or sensitive (delay and security) data centres and include at least three pilots in three different countries (one pilot in each country) in different climatic conditions.

Proposals should deliver guidelines and good practices to support building designers (architects, engineering companies, etc.) and managers (IT or facilities managers) in approaching the design of server rooms and small data centres in buildings, taking into account the characteristics of the building, the systems and the expected use.

These guidelines should include in particular flexible design concepts (including ICT solutions) for server rooms and small data centres in buildings, readily applicable to a large number of typical configurations (e.g. office buildings in urban areas). These design concepts should be optimized in terms of energy efficiency and use of intermittent renewable energy and cover building envelope, technical building systems and server room(s), and related connections / synergies. The design concepts should also include lessons learnt from the operation of systems. They should be applicable and scalable in Europe, including application under different climatic conditions.

Proposals should include an evidence-based evaluation of the impacts (in terms of energy savings, CO₂ emissions and other possible side effects, e.g. on comfort of occupants) of the proposed design concepts. This evaluation should rely on relevant indicators over a representative period of time on a limited set of buildings, systems and server configurations.

This evaluation should follow a well-defined strategy that can rely partly on modelling and simulation but should also include tests and experiments in close to real-life conditions, leading to at least TRL 7 (please see part G of the General Annexes).

Projects are required to follow the H2020 guidance on ethics and data protection⁵⁴, taking into account digital security, privacy and data protection requirements including the compliance with relevant directives/regulations (e.g. NIS⁵⁵, eIDAS⁵⁶, GDPR⁵⁷) and relevant National Legislation.

Proposals should also include convincing dissemination strategies to reach out to relevant business players (e.g. architects and engineering companies).

Proposals should include the development of business models to trade heat, cold, electricity or energy security and storage. Large and medium data centres have been addressed by different actions under H2020 or other research programmes. Proposals should benefit from the transfer of lessons learnt from these larger systems.

Proposals could build upon the results of previous and ongoing projects.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: Proposals are expected to demonstrate, using quantified indicators and targets wherever possible:

- Innovative design concepts for ICT in buildings, optimizing energy efficiency and usage of intermittent renewable energy.
- Demonstration and quantitative evaluation of impacts of innovative design concepts.
- Dissemination of the design concepts and related benefits to relevant market players.
- Bring ICT specific innovative energy efficiency technologies and solutions, already developed by research projects, to market faster and cheaper.

⁵⁴ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

⁵⁵ Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

⁵⁶ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

⁵⁷ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

- Achieve a high share of the existing ICT energy consumption covered by sustainable energy resources.
- Demonstrate lower environmental impacts in the short and long term of the installation/construction/operation/decommissioning.
- Facilitate the identification and removal of non-technical barriers to accelerate wide deployment of innovative solutions for energy efficiency in the data centre sector
- Power Usage Effectiveness (PUE) lower than the best performing small data centre solutions in a given location.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-6-2020: Big data for buildings

Specific Challenge: European buildings are producing an increasing number of data on energy generation and consumption from various sources (e.g. smart meters, building management systems). Collecting and making available reliable data on buildings is a key challenge for the European Union. Enabling big data for buildings is key to achieving the EU targets. More and better data can lead to enhanced consumer information, contribute to an effective management of energy grids and support the creation of innovative energy services, new business models and financing schemes for distributed clean energy. Data is also a key enabler for reliable and effective policy impact assessments. The collection and analysis of building data, through data analytics tools, will produce statistics, business intelligence and predictive models that will enable reliable and effective policymaking.

Scope: Actions should focus on developing and demonstrating large-scale pilot test-beds for big data application in buildings.

More specifically actions should:

- define a reference architecture for buildings data; and
- develop and pilot an open, cloud-based data analytics toolbox.

The reference architecture should ensure compatibility with existing dataset formats across Europe, allow integration with legacy architectures, encourage replication and scale-up and be compliant with applicable EU standards (e.g. privacy, security, intellectual property). The data architecture should be modular in order to accommodate data from various sources including dynamic data from Smart Meters, Sensors and other IoT devices, Building Management Systems (BMS), energy market prices, weather data, currency exchange rates, as well as static data from existing databases such as consumer consumption data, Energy Performance Certificates (EPC) repositories and Building Stock Observatory.

Proposers should perform an extensive review of existing datasets across EU and take into account ongoing initiatives such as:

- EC Directives and initiatives (e.g. EPBD, EED, Ecodesign, INSPIRE, Digital Single Market);
- Reports and studies commissioned by EC on relevant topics (e.g. EU Building Stock observatory, Data Exchange Study);
- Existing frameworks and architectures (e.g. Level(s), SAREF, BIM, legacy formats).

The data analytics toolbox should be able to process big and diverse sets of data and perform Statistical Analysis, Data Visualisation, Business Intelligence (BI) and Predictive Modelling. The tools used should enable the integration of state of the art data science technologies like Statistics, Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning (DL).

The data analytics toolbox should support third party development of a wide range of services and business models with the objective:

- to monitor and improve the energy performance of buildings;
- to facilitate the design and development of building infrastructure (e.g. district heating and cooling networks);
- to support policy making and policy impact assessment; and
- to de-risk investments in energy efficiency (e.g. by reliably predicting and monitoring energy savings).

The toolbox should foresee communication protocols to be able to pull data from and push data to existing datasets (e.g. the EU building stock observatory) in an automated way without manual intervention (e.g. using APIs). The toolbox should be built on state-of the art technologies and be hosted at a well-known, stable, secure and scalable cloud service provider (IaaS/SaaS/PaaS).

Proposed actions should demonstrate that they have access to existing large-scale real datasets and should engage as many as necessary of the following actors: national and local governments, network operators, suppliers, ESCO's, building managers & facilitators, the construction & renovation sector and software developers with proven experience in data collection and data analysis. Projects are expected to collaborate with EU-funded projects⁵⁸ on big data as well as the contractor in charge of Maintenance and Update of the EU Building Stock Observatory⁵⁹. Proposers are expected to implement large-scale communication and dissemination campaigns in order to engage public authorities and the market actors.

⁵⁸ EU-funded projects on data (<https://ec.europa.eu/digital-single-market/en/eu-funded-projects-data>)

⁵⁹ EU Building Stock Observatory (<https://ec.europa.eu/energy/en/eubuildings>)

Projects are required to follow the H2020 guidance on ethics and data protection⁶⁰, taking into account digital security, privacy and data protection requirements including the compliance with relevant directives/regulations (e.g. NIS⁶¹, eIDAS⁶², GDPR⁶³) and relevant National Legislation.

The Commission considers that proposals requesting a contribution from the EU of between 3.5 and 4 million EUR would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Significant and measureable contribution to standardisation of European buildings data;
- Demonstrated interoperability with data hubs at national or supranational level;
- Creation of new data-driven business models and opportunities and innovative energy services based on the access and process of valuable datasets;
- Better availability of big data and big data analysis facilities for real-life scale research, simulation and policy-making;
- Tangible engagement of key stakeholders in building the database and contributing with real data;
- A growing up-take of innovative data gathering and processing methods in the monitoring and verification of energy savings;
- Effective integration of relevant digital technologies in the buildings sector, resulting in integrated value chains and efficient business processes of the participating organizations;
- Strengthened links with the relevant programmes and initiatives aiming at building data collection and storage, supported by regional, national and European policies and funds;
- Emergence of sustainable ecosystems around big data platforms.

Type of Action: Innovation action

⁶⁰ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

⁶¹ Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

⁶² Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

⁶³ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-7-2020: European building stock data 4.0

Specific Challenge: There is a lack of quality data on the building stock across EU Member States and regions, in particular (but not only) on building energy. Reliable and comprehensive data is needed to enable an accurate understanding of the European building stock's trends and drivers. This particularly applies to energy-efficiency policies and related measures (e.g. market support mechanisms), which will be more effective if they are tailored based on an evidence-based, data-enabled, assessment of the building stock. For example, the revised Energy Performance of Buildings Directive (EPBD) calls for benchmarking of buildings through Building Automation and Control System. This approach would require extensive sharing of information between buildings. Data information on buildings may also be of use to building users and to the industry developing products and solutions. They may also help to adapt principles of a circular economy in the construction sector. The challenge is to establish and implement an ambitious vision for the future of data collection on buildings in Europe, enabled by a large and lasting community of data providers and stakeholders across Europe, and promoting cutting-edge technologies for data collection and processing.

Scope: Proposals should involve relevant stakeholders (national, regional and local authorities, property management companies, technology providers and stakeholder associations from relevant sectors: construction, facility management, real estate) to stimulate and enable a comprehensive and long-lasting community committed to improve, standardise and strengthen data collection on building stocks across the Europe, bringing together potential data providers and, building on technology innovation that can support wide-scale data collection and processing. Such data is useful for different purposes: for policy monitoring and development of new policies (at any level), to provide information to users or as a tool for the industry to develop new products and solutions.

To this end, proposals should develop strategies to encourage/support collection of data on buildings and convergence of data collection practices, within the community and beyond. This concerns but is not limited to the scope of data collection (which data are collected), the form of data (e.g. formatting) and the role that different actors can play in collecting and providing data (local authorities, private landlords, citizens, etc.). Proposals should also support/promote wherever possible wider availability of data (open access to data). Proposals should ensure that the scope of data collection includes, but is not limited to, data on buildings energy performance and related building characteristics (e.g. type and characteristics of building systems, type of insulation and glazing, etc.).

Projects are required to follow the H2020 guidance on ethics and data protection⁶⁴, taking into account digital security, privacy and data protection requirements including the compliance

⁶⁴ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

with relevant directives/regulations (e.g. NIS⁶⁵, eIDAS⁶⁶, GDPR⁶⁷) and relevant National Legislation.

Proposals may use the "Building Stock Observatory"⁶⁸ as an example and reference of data collection, monitoring and evaluation of the building stock. Proposals could also clarify how they would support and link to the "Building Stock Observatory" and other relevant initiatives, emphasizing how they could contribute to expanding and strengthening the data feeding of the observatory.

Proposals should also develop and disseminate a vision and roadmap for a more advanced "big data" approach to buildings data collection in Europe ("European building stock data 4.0"). The aim is to propose a roadmap towards a more dynamic and automated collection of data on buildings, eventually leading to a "live" picture of the building stock. In developing and disseminating this vision, proposals will make connections with other relevant initiatives, in particular actions aiming at developing innovative big data applications in buildings. Due to the existence of several initiatives in this area, coordination between actions should be a key element for successful proposals. In particular, proposals should liaise and coordinate with related initiatives supported under LC-SC3-B4E-6-2020 ('Big data for buildings') and LC-SC3-B4E-4-2020 ('Next-generation of Energy Performance Assessment and Certification'), also providing support to communication and dissemination activities.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1.5 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Building a large community for buildings data collection in the EU, ensuring tangible and long-lasting engagement of key stakeholders across all MSs and Associated Countries;
- Increasing/extending/strengthening data sources for buildings data collection in the Europe;
- Improving data feeding to the building stock observatory;

⁶⁵ Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

⁶⁶ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

⁶⁷ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

⁶⁸ EU Building Stock Observatory (<https://ec.europa.eu/energy/en/eubuildings>)

- Increased convergence/standardisation towards high-quality and reliable data collection practices;
- Increased data use by researchers and the general public;
- Simplified data access and sharing;
- Convincing vision and roadmap towards innovative big data approaches for the collection of buildings data in the Europe;
- Coordination with, and support for the communication and dissemination activities of related innovation actions;
- Strengthened links with programmes and initiatives, supported by regional, national and European policies and funds.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-8-2020: Renewable and energy efficient solutions for heating and/or cooling, and domestic hot water production in multi-apartment residential buildings

Specific Challenge: Taking into account that almost 50 % of Union's final energy consumption is used for heating and cooling, of which 80 % is used in buildings⁶⁹, the achievement of the Union's energy and climate goals is linked to the Union's efforts to renovate its building stock by giving priority to energy efficiency. Buildings are becoming a factor in the generation of renewable energy and energy storage, but still the process should be accelerated.

Renewable energy supply systems are not generally applied to their full potential and their application should be considered as a great opportunity to reduce fossil fuel consumption for existing multi-apartment residential buildings, regardless of their size, pursuant to the principle of first ensuring that energy needs for heating and cooling are reduced to cost optimal levels.

There is a need to demonstrate the real performance (including economic performance) of innovative renewable and energy efficient solutions for heating, cooling and domestic hot water production in multi-apartment residential buildings and to provide information on the overall system performance to the end user.

The analyses of existing building stocks demonstrate the high potential of renewable system applications in multi-apartment residential buildings, in which heating and cooling energy is currently supplied mostly with high valued energy sources e.g. electricity and fossil fuels. The

⁶⁹ DIRECTIVE (EU) 2018/844 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency)

implementation of renewable systems is lower than in single-family buildings due to several barriers.

Scope: Proposals should demonstrate the cost-effective, heating and domestic hot water production units (including cooling, and/or complementary electricity production, where appropriate) installed in a multi-apartment residential buildings (above 6 apartments) or in a group of few similar multi-apartment residential buildings. This should include an assessment of the challenges and possible solutions to mixed tenure blocks, or owner occupier blocks, where one or more owners can potentially veto a viable scheme. The building envelope should already be renovated. The cost-effective integration of high performance heating and domestic hot water production should be demonstrated, together with calculation of fossil fuel reduction and primary energy savings. It is expected that the proposed solutions with all support systems will already have been validated in an operational environment prior to submission of the proposal (finished TRL 6, please see part G of the General Annexes) and properly documented in the proposal.

The challenge is therefore to apply a new heating and domestic hot water preparation systems (optionally with additional cooling or electricity production as appropriate) and demonstrate their real performance in existing multi-apartment residential buildings with insulated walls and energy-efficient windows. A system should cover at least 70% of the total yearly energy demand of a building from renewable energy sources. In the proposal, the consortium should indicate the percentage of the total yearly energy demand of a building covered by the proposed system.

The competitiveness in the building value chain and its position in growth markets should be elaborated. Proposals should pay attention to providing solutions to eliminate the risk of legionella for domestic hot water supplying unit a part of activities.

The costs and energy benefit calculations, economic analysis including the worst case scenario, return of investment, and the comparison of the alternative solutions (including fossil fuels if used at selected demo sites) should be developed in a user-friendly manner suitable for convincing potential end users for a new system and to guarantee the project outcomes. Proposals should also contain estimates of values of capital costs, operating costs (including maintenance and inspection), pay-back time and system energy consumption. The system investment costs should be expressed in EUR, EUR/kW, and in EUR/kWh.

The system should be scalable for different types of multi-apartment residential buildings and it is expected that at least three demonstration sites are placed in at least two European countries with different climatic zones. The demo sites' energy consumption and the number of families in buildings differ at least by 80% among each successive installations to demonstrate their scalability. After the commissioning, the system should be run and monitored, for a proper time within the project duration (preferable one whole year), to assess its performance, system energy production, annual efficiency (the ratio between total system energy production and related energy consumption), etc.

The developed system should have facilities to enable remote access, control and parameter settings from end user level. A dedicated application should be available and easy accessible/installed for each family premises to control at least in-house temperature with the possibility to modify the setting points. The entire system, including its control and monitoring functionality, should already be validated in operational environment before the submission of the proposal (at least finished TRL 6, please see part G of the General Annexes)

Proposals should prepare service and repair manuals to support system assembly and installation and further end user's instructions, assuring high quality and reliability of proposed systems. Proposals should also take into account the need for high indoor environmental quality (thermal comfort, acoustics, air quality, etc.).

Proposals should aim at moving technologies from TRL 7-8 to TRL 8 (please see part G of the General Annexes). In all cases, the activities are expected to be implemented at Technology Readiness Level (TRL) 8 by the end of project activities (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2.0 and 2.5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Renewable energy production (in kWh /year);
- Primary energy savings and GHG emission savings triggered by the proposed solutions (compared to best available solution existing today);
- Competitiveness of the heat delivered by the proposed solutions (compared to best available solution existing today);
- To increase return of investment and reduce the pay-back time;
- Scale of the replicability and scalability potential of the proposed solutions.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-9-2020: Support to the coordination of European smart buildings innovation community

Specific Challenge: The revised Energy Performance of Buildings Directive (EPBD)⁷⁰ encourages the use of ICT and smart technologies to ensure that buildings operate efficiently. To this aim, the Directive further promotes smart building technologies and in particular requires the establishment of a Smart Readiness Indicator (SRI) for buildings. The SRI will allow for rating the smart readiness of buildings, i.e. their ability to adapt their operation to the needs of the occupant, to optimise energy efficiency and overall performance, and to adapt their operation in reaction to signals from the grid. The SRI will be further developed in consultation with member states and stakeholders, with a view to eventually ensure a broad uptake of a robust SRI reflecting the state of the art in the field of smart buildings.

Since 2014, the EU has been supporting at least 64 projects relevant to this new definition of smart buildings, providing near to EUR 450 million funding. This support has been spread across 35 funding topics and 29 calls for proposals, mostly Horizon 2020 Innovation Actions. Similarly, the cross-cutting issue of building smartness is often addressed as a fringe issue in media, conferences or businesses specialised in energy, IT or buildings. Despite this fragmentation, most challenges faced by smart buildings are common, such as engaging building occupants, connecting and managing various devices and systems, achieving optimal building operation, or integrating buildings to energy markets.

Scope: The proposals should focus on facilitating the flow and exchange of information between EU-funded projects in the field of smart buildings and the related business, policy and media, e.g.:

- Map out the European smart buildings innovation community, e.g. main innovators, lessons learned, success stories and potential market developments.
- Identify the main initiatives, media and events in the field of smart buildings across the EU and coordinate the European smart buildings innovation community in their communication, contribution and participation.
- Encourage and support the contribution of the European smart buildings innovation community to the promotion, experimentation and roll-out of the SRI in the EU, and to other relevant policy initiatives.
- Suggest priorities for EU support to research, innovation and market uptake in the field of smart buildings from the point of view of potential applicants and target markets

Proposals should not necessarily aim at the largest possible census of the smart buildings community or to seek participation in every possible events or initiatives, but rather focus on efficiency in breaking silos and bridging the gaps between innovation, markets and policy

⁷⁰ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast)

(e.g. sharing case studies, communicating success stories, seizing relevant contribution opportunities, etc.).

The proposed consortium may involve representatives of the target groups relevant to the EU smart buildings innovation community, e.g. specialised media, business or consumer organisation, policy or technological initiatives civil society organisations,, etc.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below:

- Draw up an overview of the main stakeholders of the EU smart buildings innovation community updated annually;
- Improve the exchange of information between R&I and market uptake projects via at least 6 workshops;
- Increase visibility of innovation in the field of smart buildings by coordinating the participation in at least 6 major events relevant to smart buildings;
- Coordinate contributions of the EU smart buildings innovation community to the SRI promotion, experimentation and implementation, and to other policy or technological initiatives.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-10-2020: Self-assessment and self-optimisation of buildings and appliances for a better energy performance

Specific Challenge: While significant progress has been made, energy efficiency in the Europe is a battle that remains to be won. Buildings, as they represent the biggest energy consumer in the Europe, have a prominent role to play. New buildings consume today much less than they used to. This is due to ambitious policies: the Energy Performance of Buildings Directive (EPBD) has set a demanding framework for energy performance of buildings, which has fostered a rapid evolution of technologies and practices towards greater levels of energy efficiency. This also applies to systems and products that are used in buildings, such as lighting, space and water heaters, domestic appliances and ICT equipment; EU-Regulations on energy-related products under the Ecodesign and Energy Labelling policies are estimated to deliver energy savings of around 175 Mtoe per year in primary energy by 2020, more than

the annual primary energy consumption of Italy. Improving skills of installers and service providers can deliver further savings.

Energy performance of buildings generally does not reflect consumption from appliances that are not part of technical building systems, such as heating, ventilation and cooling systems. At a time when the designed energy performance of buildings and appliances is improving dramatically, it would be worth gaining an accurate vision and understanding of their actual, real-life energy performance. Access to information on the actual energy performance and energy consumption is essential to help users making informed choices, both in terms of investment and in terms of usage and maintenance. In this respect, a remaining challenge is to advance the way actual energy performance and consumption is assessed and measured. For buildings, the energy performance is mainly calculated at design stage, based on the characteristics of the buildings' envelope, components and systems. Real consumption can be taken into account but to a certain degree that remains limited. For appliances, energy consumption is tested and monitored as they are placed on the market or put into service under conditions that aim to reflect real life usage. This approach is reliable but still, in-use performance may vary e.g. depending on the way buildings and products are commissioned, installed, set up and utilised, accordingly. For certain products, a specific challenge comes with the software or firmware updates of - usually connected - devices, which often change the original settings with considerable impact on the energy consumption (e.g. disabling of standby-modes). In addition, performance may evolve, i.e. decrease, over the lifetime, which is not reflected by the performance as designed or placed on the market. Addressing therefore the self-assessment of products actual energy performance to achieve or maintain better energy efficiency at appliance level and by extension a better energy management in the building is important.

Scope: Proposals should develop and demonstrate cost-effective technological solutions for the self-assessment of actual energy performance of buildings and the products which use energy in buildings. Such solutions would rely on collection of real-time data from the products installed and used in the building (within a system or stand-alone) and aggregation of this data at the building level. The aim is to follow, over time, and with the best possible granularity, the actual consumption and the evolution of energy performance of the building, individual systems and individual appliances (including those that are integrated within systems).

The solution should ensure, to a certain extent, the energy-optimisation functions executed at building, system or appliances level based on the real time and historical data of energy consumption, which can be crossed with other data as appropriate.

Proposals should demonstrate how, thanks to existing smart capabilities of appliances, systems and sensors, it would be possible for a building to self-assess its energy performance, address, to a certain extent, its underperformance (lower than the average or lower than as designed energy performance) and provide information on the level of performance and related evolution – at building-level (aggregated view), but also at system / appliance level (disaggregated view).

In the calculation of energy performance, at building and product level, proposals should ensure full knowledge of and compliance with the requirements from the EPBD (Annex I on the calculation of energy performance), related CEN standards, with energy consumption measurement approaches and related processes involving smart functionalities (Ecodesign preparatory studies on smart appliances and on Building Automation and Control Systems (BACS)). They should also take into account the technological and regulatory state-of-the-art for (smart) metering and billing. For products regulated under Ecodesign and Energy Labelling, the measured and reported energy consumption should be benchmarked against the provisions of the relevant regulations and used to create a basis for future provisions. Information additional to energy consumption where applicable (i.e. load, programme) should be recorded in order to look into providing input on usage patterns and energy savings potential at appliance level. In this respect, proposals could include activities (e.g. training) aiming at improving skills of installers and service providers, when putting products and systems into service.

Proposals should make the best use of available interoperability solutions and should seek to support the promotion of European standards and other relevant European initiatives relevant for smart buildings, smart homes and smart services (semantics, e.g. SAREF, data models, data layers, protocols, software building blocks, APIs, middleware, solutions for smart services, standards, relevant industrial consortia or technology initiatives, etc.).

Proposals should demonstrate that the solution proposed would be applicable, based on available technology, across the European building stock and products groups available on the single market and, to this end will include a set of pilots where the solution will be deployed, tested, and related impacts assessed. Pilots should involve several types of products and technical building systems with longer lifecycles (e.g. boilers and water heaters, radiators, ventilation, lighting and BACS controlling one or more of these functions etc.) and with shorter ones (domestic appliances, ICT equipment, multimedia and consumer electronics etc.), testing several types of operating modes and user settings. Recharging points for electric vehicles and other forms of energy storage should also be incorporated in the pilots. Pilots should demonstrate self-assessment and self-reporting of energy consumption at appliance level.

The proposed solutions should not adversely affect the original functionalities, product quality, lifetime, as well as warranties of the appliances. They should be cost-effective, user-friendly and not require significant development, installation or maintenance work.

Besides the pilot demonstrations, proposals are expected to include clear business model development and a clear path to finance and deployment of the proposed solution. These business models and exploitation strategies should target the broad uptake of such solutions across the Europe and clarify how, these solutions could possibly support the development of related energy service businesses, in particular ESCO's.

As part of exploitation activities, proposals should also investigate how such self-assessment solutions could support a forward-looking evolution of energy performance assessment practices, both for buildings (in relation to the EPBD and therein, in particular in relation to

Energy Performance Certificates) and for energy-related products (in relation to testing products energy performance under Ecodesign and Energy Labelling Regulations).

Projects are required to follow the H2020 guidance on ethics and data protection⁷¹, taking into account digital security, privacy and data protection requirements including the compliance with relevant directives/regulations (e.g. NIS⁷², eIDAS⁷³, GDPR⁷⁴) and relevant National Legislation.

In addition, consortia should clarify how the proposed solution could support a cost-effective, performance- and data- based assessment of the smart readiness of a building (i.e. the calculation of the 'smart readiness indicator', within the meaning of the EPBD). In relation to this, proposals will also investigate how the solution proposed could lead to the self-assessment of buildings' smart readiness capabilities beyond solely energy performance, in particular the capability of a building and its appliances to ensure the satisfaction of building users' needs and the capability of a building to adapt operations based on signals from its environment, in particular the grid (i.e. energy flexibility).

The proposals should involve appliance suppliers (e.g. heating, cooling, domestic appliances, and ICT equipment), installers and building energy management solution suppliers. Partners from the energy sectors, which can have an interest in the accurate assessment of energy performance and consumption, can also be relevant (e.g. aggregators and/or suppliers and/or ESCO's).

The activities are expected to be implemented at TRL 6-8 (please see part G of the General Annexes).

The Commission considers the proposals requesting a contribution from the EU of between 3 to 6 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

This topic contributes to the roadmap of the Energy-efficient Buildings (EeB) PPP.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);

⁷¹ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/ethics/h2020_hi_ethics-data-protection_en.pdf

⁷² Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

⁷³ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

⁷⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

- Assessing the energy performance and energy consumption of buildings and products used therein with a greater accuracy;
- Contribution to forward-looking calculation and measurement approaches under the EPBD (regulatory calculation of building energy performance, energy performance certification, and smart readiness indicator) and EU product efficiency legislation;
- Investments in smart technologies triggered;
- Reduction in energy consumption and costs, exceeding the additional energy consumption from ICT equipment and its related cost.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gas emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-11-2020: Financing for energy efficiency investments - Smart Finance for Smart Buildings

Specific Challenge: Energy efficiency is not yet considered as an attractive investment by the financial sector which limits the possibility to use external private finance on top of equity of project owners and available public funding. The lack of statistical data on the actual energy and costs savings achieved by energy efficiency investment projects, as well as on payment default rates, results in financial institutions attributing high risk premiums to energy efficiency investments.

Energy efficiency represents high transaction costs for rather small investments, which is not financially very attractive. Technical and legal standardisation is highly needed at all steps of the investment value chain in order to simplify transactions and increase the confidence of financial institutions. The lack of standardisation of projects also prevents securitisation of energy efficiency assets (loans or equity) so that financial institutions are not able to refinance their debt on the capital markets⁷⁵.

Whereas energy efficiency investments are usually expected to be paid back exclusively through the reduction of the energy bill, there is increasing evidence that non-energy benefits play a key role in the decision to invest in energy efficiency. This includes for instance increased building value, lower tenant turnover or vacancy rates etc. These benefits need to be quantified through data collection and monetised in order to evolve the parameters used by financiers to assess an energy efficiency investment.

⁷⁵ A successful example of standardisation enabling securitisation is the PACE market in the USA

Moreover, there is a need to set up innovative financing schemes at regional or national level in order to create the conditions for adequate supply of private finance for energy efficiency investments. Innovative financing schemes for energy efficiency aim to progressively maximise the leverage ratio of public funds to private finance. This is in line with the Smart Finance for Smart Buildings initiative that aims at using public funds more effectively.

Access to private finance for energy efficiency and integrated renewables remains challenging. One obstacle is the lack of common understanding of the topic between government, public sector, private sector, and the financial sector. The Smart Finance for Smart Buildings initiative⁷⁶ has proposed a comprehensive approach based on the more effective use of public funds, aggregation and project development assistance, and de-risking. However, this approach still needs to be rolled out and shared with all stakeholders at the national level. The Commission is piloting this through the Sustainable Energy Investment Forums initiative since 2016.

Scope: a) Mainstreaming energy efficiency finance

Proposals should address at least one of the following issues:

- Development, demonstration and promotion of frameworks for the standardisation, aggregation and benchmarking of sustainable energy investments. This could include for example, but not exclusively, labelling schemes, project rating methodologies and risk assessment tools, standardised legal and financial structures of assets (loans, guarantees, energy performance contracts etc.) in order to develop securitisation for energy efficiency based financial products. Proposals integrated in a broader approach such as socially responsible investment should focus on the energy component;
- Capacity building for banks and investors at the national and local level, in particular on underwriting sustainable energy investments;
- Gathering, processing and disclosing large-scale data on actual financial performance of energy efficiency investments, in order to create a track record for energy efficiency in different sectors (buildings, industry, transport, etc.). Proposals should build upon or complement the work of the Energy Efficiency Financial Institutions Group (EEFIG) e.g. the De-risking Energy Efficiency Platform⁷⁷ and the Commission's Action Plan on Financing Sustainable Growth (COM (2018) 097 final)⁷⁸ and its follow-up initiatives.
- Further integration of non-energy benefits in project valuation, in particular in the building sector, leading to evolution of existing financial products or creation of new targeted products;
- Targeting institutional investors (e.g. public pension schemes) in order to increase the share of their funds invested in energy efficiency, or to develop specific funds or

⁷⁶ COM(2016) 860 final ANNEX 1 - ANNEX Accelerating clean energy in buildings

⁷⁷ <https://deep.eefig.eu/>

⁷⁸ COM (2018) 097 final: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0097>

investment products. Supporting the integration of energy efficiency in portfolio management strategies for institutional investors and/or fund managers, including through re-definition of fiduciary duties;

- Exploring the impact of revised risk ratings and requirements for energy efficiency on financial regulations (Basel III, Solvency II).

b) Innovative financing schemes for energy efficiency investments

Proposals should address the development or replication and implementation of innovative financing schemes for energy efficiency investments. They can involve different types of organisations, ownership structures and financing models. These schemes should address the provision of finance as well as the structuring of demand, in particular at regional/national level, and target specific areas (e.g. energy-intensive industries, buildings etc.).

In this context, proposals should address one or more of the following points:

- Establishment of new innovative, operational financing schemes;
- Replication of previously successful solutions e.g. developed and implemented under various project development assistance (PDA) facilities under the Horizon 2020 and Intelligent Energy Europe programmes (including MLEI PDA or ELENA);
- Establishment of regional/national aggregators which are able to develop large (standardized) project pipelines;

Overall, proposals should justify how the proposed financing schemes complement already available funding and how they are tailored and innovative for the targeted regions and market segments; as well as clearly demonstrate the market potential, as well as business case and financial viability of the scheme (including investment sizes targeted, expected savings, transaction and management costs, expected returns etc.). In any case, proposals should include a clear action plan to communicate across Europe towards potential replicators.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

a) Mainstreaming energy efficiency finance

- Number of financial institutions and other stakeholders reached as well as their potential volume of investment concerned;

- Frameworks, standardisation, benchmarking, standardised descriptions and data evidence of financial returns of energy efficiency investments agreed and accepted by the market;
- Higher allocation of institutional investments to energy efficiency; standardisation of assets enabling securitisation; development of a secondary market for energy efficiency assets (in million Euro of investment within 5 years after the end of the project);
- Investments in sustainable energy triggered by the project (million Euro).
- Primary energy savings triggered by the project (in GWh/year);

b) Innovative financing schemes for energy efficiency investments

- Delivery of innovative financing schemes that are operational and ready to finance energy efficiency investments;
- Regional/national aggregators with demonstrated/traceable capacity to set up a large-scale pipeline of (standardized) sustainable energy investments (in terms of number of and/or amount of investment);
- Investments in sustainable energy triggered by the project (million Euro);
- Primary energy savings triggered by the project (in GWh/year).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-12-2020: National roundtables to implement the Smart Finance for Smart Buildings initiative

Specific Challenge: Access to private finance for energy efficiency and integrated renewables remains challenging. One obstacle is the lack of common understanding of the topic between government, public sector, private sector, and the financial sector. The Smart Finance for Smart Buildings initiative⁷⁹ has proposed a comprehensive approach based on the more effective use of public funds, aggregation and project development assistance, and de-risking. However, this approach still needs to be rolled out and shared with all stakeholders at the national level. The Commission is piloting this through the Sustainable Energy Investment Forums initiative since 2016.

⁷⁹ COM(2016) 860 final ANNEX 1 - ANNEX Accelerating clean energy in buildings

Scope: Proposals should set up national roundtables focused on energy efficiency investment, as permanent multilateral discussion forums gathering the relevant stakeholders, including but not limited to government, local and regional authorities, financial sector, ESCOs, homeowners, industry sector, construction sector and SME sector. The focus of the roundtables should include existing private and public buildings, industry and SME's; it could also include the renovation of street lighting, district heating and transport infrastructures. Integrated renewable energy sources can be part of the focus when combined with energy efficiency measures.

The roundtables should (among others) analyse the possibility to upscale existing best practices from the national and European level, develop strategies, roadmaps and action plans, propose improvements in the national policy frameworks and measures, and follow their implementation, develop jointly template documents and contracts leading to a better functioning of the market. The roundtables should act as a forum where all stakeholders can learn from successful market initiatives, and can provide input into the policy making process.

Proposals should build on the activities of the Sustainable Energy Investment Forums initiative⁸⁰. Proposals involving only one country are eligible; however, they should include a small share of activities to exchange with similar roundtables across Europe; those exchanges will be coordinated by the Commission services.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 million and EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Establishment of national energy efficiency investment roundtables;
- Number of national / regional policy documents resulting from the roundtables;
- Number of key stakeholders involved in the roundtables, in particular from the financial sector;
- Investments in sustainable energy triggered by the project (in million Euro);
- Primary energy savings triggered by the project (in GWh/year).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

⁸⁰ <https://ec.europa.eu/energy/en/financing-energy-efficiency/sustainable-energy-investment-forums>

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-B4E-13-2020: Aggregation - Project Development Assistance

Specific Challenge: Investors and lenders need to gain more confidence on investment projects related to energy efficiency which are still seen as risky and fragmented. European added value can be realised in particular where projects introduce innovation to the market regarding project aggregation and financing solutions minimising transaction costs and engaging the private finance community. European added value could also be realised where projects demonstrably remove legal, administrative and other market barriers for mainstreaming large scale sustainable energy investment schemes.

Scope: Project Development Assistance (PDA) will be provided to public and private project promoters such as public authorities or their groupings, public/private infrastructure operators and bodies, energy service companies, retail chains, large property owners and services/industry. The action will support building technical, economic and legal expertise needed for project development and leading to the launch of concrete investments, which are the final aim and deliverable of the project.

Proposals should focus on one or more of the following sectors:

- existing public and private buildings including social housing, with the aim to significantly decrease energy consumption in heating/cooling and electricity;
- energy efficiency of industry and service;
- urban transport and mobility such as the use and integration of innovative solutions for alternative fuels in urban mobility and more energy-efficient urban transport and mobility measures including public transport fleet, passenger and freight logistics; and
- energy efficiency in existing infrastructures such as street lighting, district heating/cooling and water/wastewater services.

The proposed investments will have to be launched before the end of the action which means that projects should result in signed contracts for sustainable energy investments to that effect, e.g. construction works, energy performance contracts, turnkey contracts.

Whilst proposals may address investments into distributed, small-scale renewable energy sources in combination with energy efficiency, the main focus should lie on capturing untapped high energy efficiency potentials.

Proposals should include the following features:

- an exemplary/showcase dimension in their ambition to reduce energy consumption and/or in the size of the expected investments;

- deliver organisational innovation in the financial engineering (e.g. on-bill financing schemes, guarantee funds, or factoring funds) and/or in the mobilisation of the investment programme (e.g. bundling, pooling or stakeholder engagement);
- demonstrate a high degree of replicability and include a clear action plan to communicate experiences and results towards potential replicators across the Europe;
- build on the experiences from previous PDA projects⁸¹.

This PDA facility focuses on small and medium-sized energy investments of at least EUR 7.5 million to EUR 50 million. Large scale investments are covered by the ELENA facility.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, the impacts listed below, using quantified indicators and targets wherever possible:

- Delivery of a series of sustainable energy investment projects and innovative financing solutions and/or schemes;
- Every million Euro of Horizon 2020 support should trigger investments in sustainable energy worth at least EUR 15 million;
- Primary energy savings, renewable energy production and investments in sustainable energy triggered in the territory of participating parties by the project (respectively in GWh/year and in million Euro of investments);
- Demonstration of innovative and replicable investment financing solutions, documenting feedback/uptake from potential replicators.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

⁸¹ Records of all PDA projects can be found in CORDIS under the topics EE-20-2014/2015 and EE22-2016/2017. All fact sheets can also be retrieved directly from: https://ec.europa.eu/easme/sites/easme-site/files/20160805_mlei_projects-factsheets_final.pdf

LC-SC3-B4E-14-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side

Specific Challenge: Energy Efficiency services (e.g. Energy Performance Contracting (EPC)) are available on the market already for quite some time. However, there is a big untapped potential in sectors and with actors not yet engaged in services triggering energy, CO₂ and cost savings. At the same time, new technologies have emerged opening the door for new types of services which use ICT to better control and steer energy consumption according to market and system needs and to the availability of renewable energy; others are able to integrate energy services with non-energy benefits such as comfort. By bundling various services and benefits, additional target groups, sectors and financial resources can be accessed.

Finally, ICT-tools and big data generated by smart meters, smart devices and sensors will help monitor and verify energy savings and flexibility and thus provide for appropriate remuneration of optimised consumption. A particular challenge for energy services of this kind is that while they aim to involve different services (e.g. system services) and benefits (e.g. comfort) towards increasing their viability, they should nevertheless result in real, measurable energy savings and performance improvements of the overall energy system.

Scope: Actions should take up and advance smart energy services concepts which have evolved in the market, in parallel with the progressive deployment of new technologies, including concepts which have been developed, proved and tested under Horizon 2020. Proposals should demonstrate that they gather and help converge innovative, successfully tested service elements which are well adapted to the needs of the market and of the potential users and which are compatible with on-going technological innovation.

While the scope is based on the areas identified in the topic **LC-SC3-EE-13-2018-2019**⁸² for the years 2018 and 2019, actions should focus clearly on new revenue streams, the use of innovative monitoring and verification schemes and the consideration of contractual aspects.

More specifically, actions should further develop, adapt and refine concepts for smart energy services that

- integrate energy efficiency services with other energy services like distributed generation, demand response, e-mobility and including storage/hybrid energy systems building on contractual arrangements across different actors (ESCOs, aggregators, DSOs, energy cooperatives, obliged parties under the Energy Efficiency Obligation Schemes implementing art 7 EED and eventually the consumers) and/or
- integrate energy efficiency services with non-energy related services such as comfort, health and safety and/or

⁸² LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource

- enhance and refine successful energy performance contracting models that engage new sectors and actors and/or include pay-for-performance schemes and/or
- factor in include customer individualized energy services as a result of better understanding of customer behaviour and needs derived of new data analytics tools.

These concepts should

- use and apply more accurate and dynamic measurement and verification of energy savings and flexible consumption, also in order to ex-ante identify and develop business opportunities; in this use 'big data' generated by smart meters, equipment, sensors and tools for standardised processes;
- address potential legal and contractual aspects (e.g. in relation to existing contracts or warranty, safety and data security issues linked to existing and newly deployed equipment).

Given that the service models will have advanced and matured, project results are, even more strongly than under the preceding calls, expected to be considered and endorsed by key market stakeholders. They should take into account any relevant results from concluded or existing projects that are (gradually) available. Projects are expected to consider those elements that promise to yield a particularly high level of business innovation. Energy efficiency should constitute a core aspect of the service models.

Projects are required to follow the H2020 guidance on ethics and data protection⁸³, taking into account digital security, privacy and data protection requirements including the compliance with relevant directives/regulations (e.g. NIS⁸⁴, eIDAS⁸⁵, GDPR⁸⁶) and relevant National Legislation.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 million and 2 million would allow this specific challenge to be addressed. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- Primary Energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Improved viability of innovative energy services.

⁸³

⁸⁴ Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

⁸⁵ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

⁸⁶

In addition, proposals are expected to demonstrate the impacts listed below, using quantified indicators and targets wherever possible:

- A growing offer and up-take of services that combine energy efficiency with other energy services, technologies and non-energy benefits;
- A growing up-take of innovative data gathering and processing methods in the monitoring and verification of energy savings and flexibility;
- The application of methods and concepts to ensure that: (i) innovative energy services are reliable and verifiable, (ii) service providers are trustworthy and accessible.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of the greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project;
- Increase of flexibility in the energy system.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Global leadership in renewables

The Energy Union Strategy has set the target for the EU to achieve global leadership in renewable energies. Increased R&I efforts for renewable energy are indispensable hence renewables are identified as a core R&I priority in the Energy Union Strategy and the "Accelerating Clean Energy Innovation" Communication. The "Clean Energy for all Europeans" package underpins the EU's ambition by a number of legislative proposals and non-legislative initiatives, notably the recast of the Renewable Energy Directive which creates the enabling framework for Member States to unlock their renewables' potential and collectively reach a share of at least 27 % in the Union final energy consumption by 2030 in a cost-effective way.

The Energy Union priorities, also in the area of renewable energy, are jointly implemented by the stakeholder community, national authorities and the Commission through the key actions of the EU Strategic Energy Technology Plan (SET Plan), notably action 1 ("Performant renewable technologies integrated in the system) and action 2 ("Reduce costs of technologies"). To attain these goals, ambitious R&I targets have been set in agreement with the sectorial stakeholders, for renewable technologies with great potential for cost-reductions, performance improvements and large-scale deployment worldwide – off-shore wind energy, the next generation of solar photovoltaics (PVs), ocean energy, concentrated solar power (CSP), deep geothermal energy and bioenergy. Furthermore, goals were set to increase renewable penetration in the heating and cooling sector and to strengthen market take-up of renewable fuels needed for sustainable transport solutions. While it is expected that the

Member States will take coordinated actions towards the priorities and targets set by the SET-Plan, a strong and concerted effort also from the EU is needed to sustain the technological and economic leading position in some renewable technologies and to catch up in areas where the EU is lagging behind. Projects supported in this area contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan actions 1, 2 and 8⁸⁷.

Activities fully reflect the "Open Science, Open Innovation and Open to the World Strategy" – supporting open science and the new approach of the European Open Science Cloud (EOSC) by providing access to relevant research results while moving up the TRL scale innovative solutions; providing support opportunities for opening markets to innovative solutions and for turning research results into successful products; being open to the world, proactively exploring international cooperation activities in the precompetitive research phase, and fostering local market adaption via frugal innovation of available technologies for emerging global markets.

The challenge is to create an EU industrial renewable energy sector which is economically sustainable and competitive in European and global markets in the long-term. For this purpose, this area supports activities across the full innovation chain, from identifying breakthrough technologies to supporting the entire portfolio of renewable energy technologies at laboratory scale, dedicating support to validation in relevant environment of most promising technologies, finally supporting market up take introduction with collaborative and not purely technological activities. It features tailored approaches, taking into account technology-specific challenges, potential, cultural aspects, levels of maturity, risk, and competitiveness aspects.

This call includes 4 lines of interventions:

1. breakthrough technology development,
2. renewable energy solutions for implementation at consumer scale (encompassing generation of energy in all its form, starting from electricity only generation to also encompass combined heating and cooling solutions, from domestic to industrial and district scale),
3. renewable energy solutions for implementation at the energy system level (oriented to reduce the costs of electricity generated, to optimise system operation and improve processes and components manufacturing, to provide flexibility to the system), and
4. renewable fuels for transport (aiming both feedstock and process improvements and supporting road, aviation and shipping sectors in particular).

In addition, specific actions with an international dimension are set out, notably in the context of the "Mission Innovation" initiative. A special focus is also on adapting emerging renewable energy technologies to the African context by fostering cooperation and concerted actions

⁸⁷ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

with the Member States and Associated countries (see area "Joint actions" of this work programme part). Activities are complemented by the Horizon Prize on Artificial Photosynthesis which is included in the "European Innovation Council (EIC) Pilot" part of the work programme.

Actions in this area aim to produce solutions to support the worldwide large-scale deployment of renewable energy, its broader penetration in the energy and transport mix to significantly contribute to the decarbonisation of the global economy of the future. Actions will make renewable energy solutions in the broader sense (i.e. including the use of the renewable source and all the features needed for performing in a complex and integrated energy system) cost competitive with their fossil equivalents, allowing them to participate in the energy and transport markets on a level playing field. They will support the transition to a decentralized energy system where the citizens are empowered to take an active role and become prosumers. In addition to the Energy Union strategy, actions will contribute to the broader EU policies and objectives of growth and jobs, promoting production of more affordable energy in Europe and sustaining European players to succeed in the global energy and transport markets, giving special consideration to cooperation with strategic partner countries/regions.

Next Renewable energy solutions

The focus of these actions is to support research activities aiming at identifying renewable energy breakthroughs that will feed the innovation cycle and become the basis of the next generation of EU technologies.

Proposals are invited against the following topic(s):

LC-SC3-RES-1-2019-2020: Developing the next generation of renewable energy technologies

Specific Challenge: The renewable energy technologies that will form the backbone of the energy system by 2030 and 2050 are still at an early stage of development today. Bringing these new energy conversions, new renewable energy concepts and innovative renewable energy uses faster to commercialisation is challenging. These new technologies must not only have a commercial potential but they should also have a lower environmental impact and lower greenhouse gases emissions than the current renewable energy technologies.

The proposed solution is expected to contribute to implementing the specific priorities for strengthening the EU leadership on renewables laid out in the Communication for Accelerating Clean Energy Innovation⁸⁸.

Due to the pre-competitive nature of the research activities of this type, particular emphasis is put on including international cooperation opportunities whenever relevant to the proposal and the domain, in particular in the context of the Mission Innovation Challenges⁸⁹.

⁸⁸ COM(2016) 763

Scope: Support will be given to activities which focus on converting renewable energy sources into an energy vector, or the direct application of renewable energy sources.

This topic calls for bottom-up proposals addressing any renewable technology currently in the early phases of research. Activities also might include energy materials, catalysts, enzymes, microorganisms, models, tools and equipment, as long as those are strictly connected to the energy conversion process.

Developments in sectors other than energy may provide ideas, experiences, technology contributions, knowledge, new approaches, innovative materials and skills that are of relevance to the energy sector. Cross-fertilisation could offer mutually beneficial effects.

Proposals are expected to bring to TRL 3 or TRL 4 (please see part G of the General Annexes) renewable energy technologies that will answer the challenge described. Beside the development of the technology, the proposal will have to clearly address the following related aspects: lower environmental impact, better resource efficiency than current commercial renewable technologies, issues related to social acceptance or resistance to new energy technologies, related socioeconomic and livelihood issues.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The concepts proven or validated within the projects are expected to contribute to accelerating and reducing the cost of the next generation of sustainable renewable energy generation. In addition, the project is expected to advance the knowledge and scientific proofs of the technological feasibility of its concept including the environmental, social and economic benefits. The proposal should show its contribution towards establishing a solid European innovation base and building a sustainable renewable energy system.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-2-2018: Disruptive innovation in clean energy technologies⁹⁰

Specific Challenge: The challenge is to take exceptionally promising and innovative energy solutions with high potential impact to real breakthrough and market application. Boosting the breakthrough of particular promising technologies requires both a focused and adaptive approach, to secure that investment brings innovation that is taken up by the market - or discontinues an investment that has too limited expected impact. Specific fields where disruptive rather than incremental innovation is needed are the integration of renewable

⁸⁹ <http://mission-innovation.net/our-work/innovation-challenges/>

⁹⁰ This pilot is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

energy into smart buildings, and sustainable fuels. A specific challenge is to develop efficient fully transparent photovoltaic (PV) cells that only absorb light in the non-visible part of the spectrum, so that they can be integrated on a wide scale as windows in buildings. Another specific challenge is to enable production of sufficient quantities of liquid fuels that do not compete with food for land, do not displace land uses, are cost competitive to fossil fuels and substantially reduce greenhouse gas emissions.

Scope: Proposals are invited in (only) one of the following two sub-topics:

- Photovoltaic windows ('transparent' solar cells): development of transparent and economically viable PV cells for integration in building applications. Projects should demonstrate a prototype 'PV window' which allows the visible light to pass through unhampered, and has the potential to achieve the lifetime and conversion efficiency of commercial PV modules (resp. 25 years and at least 12%).
- Bionic leaf technology: advanced renewable fuel production through biological conversion of CO₂ and renewable hydrogen in the presence of inorganic catalysts. The process is based on first using solar energy to split water molecules and then using bacteria to consume the hydrogen together with CO₂ to produce fuel, and currently has an efficiency of 10%. Projects should advance the overall efficiency of the process for existing or new biosynthetic systems up to 15% under ambient air conditions by enhancing the water splitting efficiency and improving the engineering of bacteria and their interface with the catalysts in order to boost their growth at all conditions.

Proposals are expected to bring the technologies from TRL 3 to at least 5. Proposals need to demonstrate a clear technology development roadmap for their solutions, including a strong exploitation plan presenting their business opportunities and impact potential. The technological development risks need to be clearly identified and relevant mitigation measures given. Life cycle analysis shall be considered.

Projects selected under this pilot will follow a stage-gate approach based on milestones and periodic reviews. A first review by the Commission - with the help of independent experts - will take place after 6 months, based on an assessment by InnoEnergy⁹¹ of the feasibility and innovation potential of the proposed solution or application, analysing a.o. the business and innovation strategy, the technology readiness level of the proposed application, the consortium's freedom to operate (e.g. background, foreground, IP), and the market. This review will lead to a first go/no go decision.

Throughout the duration of the Grant Agreement, and agreed therein, Inno Energy will be involved in providing support to innovation and business development, including completing the market uptake supply chain, using external expertise, with the aim to strengthen the consortium's innovation performance.

⁹¹ <http://www.innoenergy.com/>

The Commission considers the proposals requesting a contribution from the EU of between 2 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Transparent, visually non-intrusive PV windows have a significant market potential, because they could be fitted to existing buildings, without the need to cover large new areas to collect solar energy; every glass surface could produce solar power. As such PV windows block much of the infrared radiation, they would cut down on air conditioning needs, further reducing energy use and operating costs in buildings.

An economically viable bionic leaf technology with increased efficiency well beyond the state-of-the-art has significant market potential and environmental impact, because it will enable development of sustainable fuel for transport that will completely replace fossil fuels and their best alternatives. Converting 50% of all industrial CO₂ emissions into fuels using this process at an efficiency of only 15% would avoid half of today's transport GHG emissions. Moreover, this will improve Europe's energy security while at the same time create economic growth.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-29-2019: Converting Sunlight to storable chemical energy

Specific Challenge: To replace fossil energy with sustainable alternatives that provide the same flexibility and convenience of use, we need to store sustainable energy on a large scale and for a long time in new kind of energy storage compounds. This can be done by direct conversion of sunlight into storable chemicals that can be stored for a virtually unlimited time. At present, these processes can be performed at the level of small prototype devices at high cost. Therefore, research and innovation are needed to bring these approaches from infancy to maturity. The production of clean forms of storable chemical energy from direct sunlight is the next step.

Performance breakthroughs, including day and night continuous processes, and cost reductions are a must in order to unlock the potential of technologies converting sunlight to storable chemical energy.

This challenge is fully aligned to the "Converting Sunlight Innovation Challenge"⁹² identified as a priority in Mission Innovation.

Scope: Proposals are expected to address renewable energy technologies that will answer the challenge described in the "Converting Sunlight Innovation Challenge" of Mission Innovation, bringing them up to TRL 4 or 5. Beside the technological development, the proposal will have to clearly address the following related aspects: the potential lower

⁹² <http://mission-innovation.net/our-work/innovation-challenges/converting-sunlight-challenge/>

environmental impact than the current technologies, possibly through a LCA analysis, the better resource efficiency, issues related to social acceptance or resistance to new energy technologies, related socioeconomic and livelihood issues, and prospective market analysis. The proposal needs to consider all three dimensions of sustainability, resource efficiency and scalability, i.e. not using materials which are uncommon, dangerous or scarce that could disable its future concept to be used at large scale.

At least one of the following technology-specific challenges has to be addressed:

- Improved light-harvesting and efficient charge separation in photocatalytic systems;
- Photoelectrochemical cells – PECs and catalyst development;
- Thermochemical pathways to energy rich chemicals (using concentrated solar light); and
- Design and engineering of devices, systems or prototypes integrating together the different processes, with day and night control and applicability for the production of chemical energy rich carriers.

The area of electrolyzers efficiently utilizing a renewable electricity input, such as provided by photovoltaics, wind turbines or other sustainable means, is not covered by this challenge.

The proposal must have a plausible pathway to scale the technology to the terawatt scale by 2050, a plausible potential for an EROI > 10 (EROI: Energy returned on energy invested) and the full recyclability of the conversion devices in the context of a circular economy must be ensured.

As part of Mission Innovation actions, the project will be required to contribute towards the activities of the "Converting Sunlight Innovation Challenge". Beside solving the technical challenge, the consortium is expected to budget the participation in the development of the Challenge work plan through activities such as dissemination, exchange of researcher and networking as well as through contributing in official meetings.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 3 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects will not only contribute to mitigating climate change through the production of storable chemical energy from the sun, but also enhance energy security and provide opportunities for economic development across the globe.

Projects should show its contribution towards establishing a solid European innovation base and building a sustainable renewable energy system.

Contributing to Mission Innovation aims, projects will deepen the international collaboration in clean energy research and development.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-3-2020: International Cooperation with USA and/or China on alternative renewable fuels from sunlight for energy, transport and chemical storage

Specific Challenge: Decarbonisation of the energy and transport systems requires the ultimate replacement of fossil fuels in the long-term and the flexibility to store sustainable energy on a large scale and for a long time in new kind of energy storage compounds. To achieve this goal, the production of clean forms of storable chemical energy carriers from direct sunlight will be necessary.

International collaboration is mutually beneficial in strategic areas where knowledge can be exchanged. The specific challenge is for Europe to precede together with its international partners in global development of specific disruptive technologies for the ultimate replacement of fossil fuels.

Scope: Proposals will aim at international cooperation with the USA and/or China on targeted research activities for obtaining advanced biofuels and alternative renewable fuels for energy and transport through photochemical/ photobiological or electrochemical reaction. The ranking of the successful proposals will ensure that a balanced portfolio of activities is covering both cooperation with USA and China (please see call conditions).

The proposals will develop breakthrough artificial photosynthesis technologies in terms of sunlight conversion efficiency for the production of energy carriers (other than electricity) with either de-novo synthetic biological and artificial/biochemical hybrid systems or novel photo-catalysis or photo-electro catalysis coupled with CO₂ reduction.

At least one of the following technology-specific challenges has to be addressed:

- Improved light-harvesting and efficient charge separation in photocatalytic systems;
- Photoelectrochemical cells – PECs and catalyst development
- Improved light harvesting coupled with improved CO₂ reduction efficiency in synthetic biological systems

Use of external renewable electricity or electricity generated by sunlight with PV or CSP to produce the carriers is excluded from this topic.

Proposals are expected to bring technologies to TRL 3-4 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that the exchange of knowledge through the targeted research activities with USA and/or China will progress the scientific understanding and the technology state-of-the-art and in addition strengthen the European and international partners' technology base. At the same time, it is expected that the development of renewable fuels that outperform the best fossil fuel alternatives is accelerated.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to implementing Mission Innovation Challenge⁹³ 4 and 5.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Renewable energy solutions for implementation at consumer scale

The focus of these actions will vary, depending on the number of consumers involved, from individual and residential buildings, to industrial sites and district systems. Solutions explored under this line of intervention consider holistically the consumer energy needs, from electricity generation to heating and cooling services, aiming to develop near-zero fossil energy solutions for buildings and districts. The solutions should allow for a significant part of the energy to be consumed at the place of production, fostering the emergence of the energy prosumers and therefore enabling the consumer participation into the energy transformation.

Energy generation at building scale

Proposals are invited against the following topic(s):

LC-SC3-RES-4-2018: Renewable energy system integrated at the building scale

Specific Challenge: An increased penetration of renewable energy in the energy mix and the decarbonisation of the heating sector are amongst the most important priorities set in the Energy Union Strategy⁹⁴. To this aim, solutions that integrate several technologies based on one or more renewable energy sources (and their combination with energy storage systems where necessary) should be made available and the highest possible share of renewable energy should be achieved. This integration requires innovative approaches, due consideration of the implications for the user and a proper assessment of the cost-effectiveness. This specific challenge is in line with the objectives of the SET-Plan, of Innovation Challenge n. 7 ("Affordable Heating and Cooling of Buildings") of Mission Innovation and the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Scope: The proposal will provide a combination of different renewable energy technologies to cover the highest possible share of electricity, heating and cooling needs of a multi-family

⁹³ <http://mission-innovation.net/our-work/innovation-challenges/sustainable-biofuels-challenge/>
⁹⁴ COM(2015) 80

residential or commercial or public or industrial building (in the case of the industrial building, the project is not expected to address the energy needs of the industrial process).

Since the final application will be operated by users and installed by installers, their needs and requirements (e.g. in terms of space that the users are willing to provide for the installation of the different components of the system) shall be taken into account and the relevant expertise in terms of social sciences and humanities has to be included in the consortium.

Attention should be paid to reducing emissions of air pollutants.

Proposals are expected to bring the integrated technologies solutions from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to develop solutions that will reduce the dependence on fossil fuels for providing electricity, heating and cooling in buildings. Cost competitiveness with traditional solutions is expected to be achieved by 2025 considering also the effect of economies of scale.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-5-2018: Increased performance of technologies for local heating and cooling solutions

Specific Challenge: Renewable, local energy sources have a great potential to drastically reduce the use of primary energy for both heating and cooling in residential and commercial buildings. In order to stimulate the uptake of solutions that harness these sources, it is necessary to make existing technologies more performant and therefore more cost-efficient and attractive for the market. In addition, innovation in resource mapping, monitoring and control tools have the potential to improve the design and the operation of heating and cooling systems thus reducing investments and operation costs and increasing the systems' performance. This specific challenge is in line with the objectives of the SET-Plan, of Innovation Challenge n. 7 ("Affordable Heating and Cooling of Buildings") of Mission Innovation and the roadmap of the Energy-efficient Buildings (EeB) cPPP.

Scope: The proposal is expected to address one or more of the following aspects:

- Optimisation of the different components of a renewable heating and cooling system;
- Development of tools and systems to optimize the design and monitoring of the different components of a heating and cooling system;

- Development of integrated control systems for the smart operation of a heating and cooling system.

The proposed systems will harness renewable local energy sources to supply heating and cooling in residential and small and larger commercial buildings as they have different heat/cold needs. The definition of residential building includes single houses and apartment blocks.

Attention should be paid to reducing emissions of air pollutants.

Proposals are expected to bring the technologies from TRL 5-6 to 6-7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to lead to either a significant performance increase, in the order of 10-20%, in terms of available heat/cold or to a reduction in the investment and operation costs or to a combination of both aspects, reducing the dependence on fossil energy for heat and cooling in buildings.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-6-2018: Demonstrate significant cost reduction for Building Integrated PV (BIPV) solutions

Specific Challenge: BIPV need to satisfy multiple building functions such as mechanical rigidity and structural integrity; primary weather impact protection including rain, snow, wind, etc.; energy economy, such as shading, daylighting, thermal insulation; fire protection, noise protection, in addition to architectural and aesthetic considerations, so as to replace roofs, facades and shading devices. At the same time, a control system for building management functions, grid-feeding, self-consumption and local storage needs to be considered.

Scope: Support will be given to solutions that address: a) new BIPV product concepts to meet these requirements and cost-efficient production techniques reducing their additional cost by 75% by 2030 compared to 2015 levels (⁹⁵ *Annex I. BIPV detailed targets*) and; b) demonstration of these concepts into a BIPV energy system that guarantees the building functionalities and energy needs on a life-cycle basis. Proposals will involve multidisciplinary consortia including the PV manufacturing industry. The building materials industry, certification bodies and market actors who are committed to adopting/implementing the results will also be included where relevant.

⁹⁵ https://setis.ec.europa.eu/system/files/integrated_set-plan/declaration_of_intent_pv.pdf

Proposals will also address standardization issues.

Proposals are expected to bring the technology from TRL 5-6 to 6-7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to contribute to the implementation of policies towards Zero-Energy Buildings. By achieving a substantial reduction of the BIPV costs which would trigger the penetration of BIPV in the building sector, they are also expected to contribute to the creation of new opportunities and the diversification of the European PV manufacturing industry.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Renewable energy solutions at the district level and for industrial processes
Proposals are invited against the following topic(s):

LC-SC3-RES-7-2019: Solar Energy in Industrial Processes

Specific Challenge: The potential of applying solar energy for industrial purposes is still largely untapped. Using solar energy to provide the heat or cooling necessary to industrial processes that need high reliability and high quality heat and cooling and continuous operation requires innovative advances in solar energy technology. Also, industrial processes might need to be adapted to the use of the solar resource. Industrial actors expect solutions with limited installation, maintenance and operation requirements and which are easy to operate. This challenge is also in line with the roadmap of the SPIRE cPPP.

Scope: Support will be given to solutions that cover by means of solar thermal energy the highest possible share of the heating and/or cooling demand of one or more industrial processes. In the case of heating, the process temperature shall be higher than 150°C. Individual industrial sites and/or industrial parks (coupled to a district heating and/or cooling network) are in the scope.

Proposals are expected to bring the technologies to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: An increased decarbonisation of the industrial sector, a reduced dependency on fossil fuels and a reduction of emission of air pollutants are expected. Furthermore, the

project should create significant visibility to the potential of applying solar thermal energy in industrial processes, especially in those EU countries where such systems currently have very limited or no application. The knowledge generated by the project should contribute to the development of relevant BREFs under the Industrial Emissions Directive.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-8-2019: Combining Renewable Technologies for a Renewable District Heating and/or Cooling System

Specific Challenge: There is a large potential to integrate substantial shares of renewable energy generation in district heating and/or cooling systems. Innovative approaches are needed to exploit this potential in the different geographical regions of Europe, also considering the options of combining two or more renewable energy technologies and integrating excess heat. The operators and users expect the systems to be reliable and to have limited installation and running costs. This challenge is in line with what identified priorities in the context of the SET-Plan.

Scope: Support will be given to cost-effective solutions for district heating and/or cooling systems which allow satisfying at least 50% of the energy demand of the system by the use in the district of one or more renewable energy technologies. The integration of sources of otherwise wasted excess heat is in the scope.

The solutions should be demonstrated in real conditions within an operational district heating and/or cooling system.

The consortium is expected to engage operators and final users (in particular if the users need different supply temperatures) so that they can contribute for an optimal and cost-effective design. The requirements of the final users (e.g., in terms of metering) for the day-to-day operation shall be taken into account.

Proposals are expected to bring the technologies to TRL 6 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 15 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: A reduced dependency of district heating and/or cooling systems on fossil fuels and reduced greenhouse gas emissions are expected, as well as reduced emissions of air pollutants. Furthermore, the project should improve the attractiveness of "renewable" district heating and/or cooling systems, especially in those EU countries where such systems currently have very limited or no application.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-9-2020: Next generation of thin-film photovoltaic technologies

Specific Challenge: The rapid expansion of photovoltaic solar energy conversion based on thin films of semiconductors could become subject to constraints arising from materials availability and security. For this reason, the development of alternative thin-film technologies based on earth-abundant elements has become a priority.

Scope: Proposals will demonstrate alternative thin-film (including multilayer) technologies that can yield high-efficiency devices with expanded lifetime, through simple fabrication processes and the use of earth-abundant, low-cost materials complying with the RoHS guidelines.

Proposals are expected to bring the technologies from TRL 4-5 to TRL 6-7 (please see part G of the General Annexes).

Article 30.3 of the Horizon 2020 model grant agreement on IPR protection in EU – “EU right to object to transfer or licencing” is compulsory for successful proposals – see call conditions.

The topic is particularly suitable for SMEs.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the Introduction to the LEIT part of this Work Programme⁹⁶.

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 7 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The projects are expected to lower the cost and environmental impact (measured through a life-cycle assessment) of innovative thin film devices and to significantly increase their efficiency, stability, device life time (>35 years) and performance, reliability and recyclability. The cost reduction should be demonstrated and backed-up with credible data and be significantly below the cost levels at call publication date. This will allow for novel PV applications and will open new routes for strengthening the European PV manufacturing industry. The outcome of successful projects will contribute to the Implementation Plan established in the context of the SET-Plan and in particular to the Initiative for Global Leadership in PV⁹⁷. Therefore, relevant indicators and metrics will be presented in the proposal.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

⁹⁶ http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-leit_en.pdf

⁹⁷ https://setis.ec.europa.eu/system/files/set_plan_pv_implementation_plan.pdf

LC-SC3-RES-10-2020: Pre-Commercial Procurement for a 100% Renewable Energy Supply

Specific Challenge: The integration of technologies to achieve a 100% share of renewable energy generated and consumed in existing public buildings requires innovative approaches in order to develop efficient and low-cost systems that are easily run by operators and occupants. Furthermore, existing public buildings should be in line with the requirements of the Energy Performance of Buildings Directive, including national definitions of Nearly Zero-Energy Buildings (NZEBs).

This specific challenge targets consortia of procurers with similar procurement needs of common European interest, to drive innovation from the demand side and reduce fragmentation.

Scope: The objective is to bring radical improvements to the quality and energy performance of existing public buildings by encouraging the development and validation of breakthrough solutions through Pre-Commercial Procurement. Support will be given for developing novel components and configurations to generate in an existing public building energy from renewable sources so that 100% of the energy consumption of the building (electricity, heat and cooling) is fulfilled by means of renewable energy and the yearly energy demand is followed to the largest extent possible. In order to achieve such an ambitious integration of renewable energy, buildings should start from a high level of energy efficiency.

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 15 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Please see part E of the General Annexes for a description of the specific requirements for PCP actions.

Expected Impact: The expected impacts are, on the one side, an effective integration of renewable energy technologies, and on the other side a reduced fragmentation of demand for renewable energy solutions in public buildings. In particular, procurers will be enabled to implement PCPs in areas which - due to their nature - are better addressed jointly, or which they would not have been able to tackle independently.

Type of Action: Pre-Commercial Procurement

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Renewable energy solutions for energy system level implementation

The focus of these actions is to reduce capital and operational costs, to increase reliability and to provide flexibility to the energy system. Solutions should be implemented at the system level, namely in those cases where the renewable energy that is inserted into the network, is to

be transmitted and distributed to the end user and not, or only in minimal part, used for self-consumption.

Reduce costs of key technologies for renewable energy conversion

Proposals are invited against the following topic(s):

LC-SC3-RES-11-2018: Developing solutions to reduce the cost and increase performance of renewable technologies

Specific Challenge: Achieving or maintaining global leadership in renewable energy technology requires that the innovative solutions are also affordable. Therefore cost reductions remain a crucial necessity for existing or new technologies. This specific challenge is in line with the sectorial cost reduction targets stated in the respective Declarations of Intent of the SET Plan⁹⁸, where applicable.

Scope: Proposals will address one or more of the following issues:

- a. *Floating Wind* – Technology development including reliable, sustainable and cost efficient anchoring and mooring system, dynamic cabling, installation techniques, and O&M concepts;
- b. *Onshore Wind* - Disruptive technologies for the rotor, generator, drive train and support structures for the development of the advanced or next generation wind energy conversion systems;
- c. *Ocean*: New integrated design and testing of tidal energy devices with behavioural modelling to achieve extended lifetime and high resistance in marine environment;
- d. *Geothermal*: Novel drilling technologies need to be developed to reach cost-effectively depths in the order of 5 km and/or temperatures higher than 250°C;
- e. *CSP*: Novel components and configurations for linear focusing and point focusing technologies need to be developed and tested;
- f. *Hydropower*: Novel components for hydropower hydraulic and electrical machinery which allow efficient utilization also in off-design operation conditions, especially during ramp up and ramp down phases and reduce related machinery wear and tear;
- g. *Bioenergy*: Improve small and medium-scale combined heat and power (CHP) from biomass to reduce overall costs of investments and operation through achieving at the same time high resource efficiency and high overall and electrical conversion performance.

Proposals are expected to bring technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes). Beside the development of the technology, the proposal will have to clearly address the following related aspects where relevant: potentially lower environmental

⁹⁸ <https://setis.ec.europa.eu/implementing-integrated-set-plan/no-1-renewables-ongoing-work>

impacts, issues related to social acceptance or resistance to new energy technologies, related socioeconomic issues.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The proposed solution will reduce the CAPEX and/or OPEX of energy generation from any of the mentioned renewable sources making it comparable to generation costs from competing fossil fuel sources.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-12-2018: Demonstrate highly performant renewable technologies for combined heat and power (CHP) generation and their integration in the EU's energy system

Specific Challenge: Progressive replacement of fossil fuels used in the heat and power sectors by means of renewable energy sources can increase energy security, energy price stability as well as independence from imported sources. However, to unlock the full potential of renewable heat and power solutions to significantly contribute to the energy system, improvement of individual technologies performance and their incorporation into the energy system is needed.

Scope: Proposals will address one of the following sub-topics:

- a. *Biomass based combined heat and power (CHP)*: Demonstration of technically feasible and cost-effective installation of medium to large-scale CHP through retrofitting of existing fossil-fuel driven CHP or power plants, as such plants are already integrated in the energy grid. Project will address the transformation of existing fossil fuel power plants >10 MW electrical to CHP plants with the use of sustainable biomass feedstock. Transformations have to demonstrate their overall cost benefits over new biomass-based CHP installations and show at least their state-of-the-art requirements for continuous operation and prove advances in combustion emission reduction. Commercial operation of the plant with biomass after the end of the project is to be envisaged.
- b. *Geothermal*: Allowing geothermal plants to respond cost-effectively to the heat and to the power demand of the network would facilitate the integration of RES in the energy system. Flexible geothermal units are needed to respond to the demand. In addition, adding heat storage to geothermal plants and/or adding other auxiliary heat sources (e.g. sustainable biomass, solar thermal) to geothermal sources, might be important to increase flexibility and allow for better response to variable heat and power demand. Proposals are expected to propose technologies for either more flexible geothermal plants or more efficient geothermal plants or a combination of these two aspects.

Associating other renewable heat sources to geothermal and adding storage is not a necessary condition.

The proposals are expected to bring the technology from TRL 5 to TRL 7-8 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The successful demonstration of the proposed solutions will reduce the cost of combined heat and power generation from renewable sources, making it competitive to alternative fossil fuel based solutions. The proposed solutions are expected to lead to subsequent commercial industrial projects, thus increasing the EU industrial capacity for renewable power and heat generation at a lower installation cost. This will allow decarbonisation of the power and heat sector.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-13-2018: Demonstrate solutions that significantly reduce the cost of renewable power generation

Specific Challenge: The cost of electricity generation from renewable sources has significantly come down in the recent years, often putting PV and onshore wind at parity with fossil fuel generated electricity. However, additional efforts are needed to bring the costs of electricity generation from other renewable sources to a competitive level and allow their broader penetration in the EU energy mix, as agreed with the sectorial stakeholders in the context of the SET-Plan.

Scope: Proposals will address one of the following sub-topics:

- a. *Offshore wind:* Focus will be on the development and validation of new manufacturing, installation and/or operation and maintenance techniques, introduction of new materials. The whole value chain, including dismantling, recycling and retrofitting procedures, will be involved to avoid over-engineering. Issues for improved production will be identified. All aspects of health and environmental impact issues will be taken into account.
- b. *Deep geothermal:* Focus will be on the demonstration of cost efficient technologies to limit the production of emissions and/or to condense and re-inject gases, Turning the emissions into commercial products could contribute to cost reduction but it is not a necessary condition.
- c. *CSP:* Focus will be on the demonstration in operational environment of CSP solutions based on novel heat transfer fluids and/or of solutions which make an innovative use of a heat transfer fluid that is already used in other CSP applications.

The proposals are expected to bring the technology from TRL 5 to TRL 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The successful demonstration of the proposed solutions will make electricity generation from renewable sources capable to compete in the electricity market on a level playing field.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-31-2020: Offshore wind basic science and balance of plant

Specific Challenge: The contribution of offshore wind power to the energy mix is expected to increase significantly by 2030. Better knowledge of basic wind energy science and related areas contributes to the cost reductions required to achieve that goal.

Scope: Proposals are expected to address one or more of the following research areas for offshore wind which have been identified in the SET-Plan Implementation Plan⁹⁹:

- Atmospheric multi-scale flow modelling (from meso-scale to wind farm flows);
- Understanding and modelling key uncertainties and physical phenomena of offshore wind energy design and operation (e.g. fluid-structure, soil-structure and electro-mechanical interaction, large motion prediction, turbulence, wave modelling, mooring line behaviour);
- High performance computing and digitalisation (e.g. data processing, machine learning and data analytics methods for implementation in data-driven design, digital twins and control and monitoring for O&M);
- Development and validation of models of structural damage and degradation for offshore wind turbines and/or for their components as functions of loads and environment;
- Numerical and test methods for accurate assessment of system and component reliability when introducing new materials and technologies;
- Other offshore balance of plant aspects related to the manufacturing, construction, installation and/or decommissioning of large-scale wind turbines.

⁹⁹ https://setis.ec.europa.eu/system/files/setplan_wind_implementationplan_0.pdf

While offshore wind must be the cornerstone of the proposal addressing any bullet point above, onshore wind may also be covered when synergies may be exploited from including both. This is just a possibility and not a requirement.

‘Materials science’, which is also mentioned in the SET-Plan Implementation Plan, is outside the scope of this topic, but is addressed under topic LC-NMBP-31-2020.

The proposals are expected to bring new technologies/models/methods to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals should lower the Levelized Cost of Energy (LCOE); those addressing any of the first four bullet points above should also aim to increase the market value of wind power¹⁰⁰

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-32-2020: New test rig devices for accelerating ocean energy technology development

Specific Challenge: By 2050 ocean energy can contribute significantly to the renewable energy mix in Europe. As stated in the SET-Plan Ocean Energy Implementation Plan¹⁰¹ ocean energy costs must be reduced through, but not only, increased performance and reliability in order to meet its full potential. Researchers and industries are presenting innovative solutions, but to accelerate the development pathway to the market, new testing methodologies will help industries to take more quickly go/no-go decisions. For this a better understanding of basic ocean energy sciences is required to develop the research competences and the underpinning scientific knowledge for the testing methodologies.

Scope: The actions should generate one or more new test rig prototype devices including novel test procedures that should be used by multiple ocean energy technology developers, and facilitate design convergence. This will support improved testing of low TRL wave or tidal device components or sub-systems – e.g. facilities, tools and procedures - and make accelerated life testing possible, considering for instance efficiency, reliability, survivability and/or environmental impact.

¹⁰⁰ This recent concept becomes increasingly important as wind power is often exposed to merchant prices which can be very low. Formally, it represents the average revenue per energy unit of wind produced. See, for example, Riva (2016, p. 15). *System value of wind power - an analysis of the effects of wind turbine design*. Available at http://www.ea-energianalyse.dk/reports/student-reports/system_value_of_wind_power.pdf.

¹⁰¹ https://setis.ec.europa.eu/system/files/set_plan_ocean_implementation_plan.pdf

Proposals are expected to connect and integrate the various capacities and resources of the beneficiaries and other ongoing European and national projects in the proposed research areas.

Proposals are expected to clearly indicate how the science is contributing to accelerated cost reductions in ocean energy.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that this action will accelerate and reduce the cost of the ocean energy technology development pathways. It should contribute to the exchange of knowledge and will progress the scientific understanding of ocean energy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Optimize processes and manufacturing

Proposals are invited against the following topic(s):

LC-SC3-RES-14-2019: Optimising manufacturing and system operation

Specific Challenge: Renewable electricity technologies still require optimisation in several key processes of the respective value chains in order to achieve a more efficient conversion of their primary energy source into electricity, as agreed with the sectorial stakeholders in the context of the SET-Plan and stated in the respective Declarations of Intent.

Scope: Proposals will address one of the following sub-topics:

- *Monitoring system for marine energy (ocean and offshore wind):* New intelligent sensors, fault detection and communication systems for accurate condition and structural health monitoring will enable predictive and preventive Operation and preventive Maintenance processes, crucial for innovative wind and ocean farm control and the realization of virtual power plants. Sufficient knowledge of potential failures and the right tools to detect and locate failures are crucial.
- *Geothermal fluids:* Better understanding of the chemical and physical properties of these fluids (including super-hot and hot fluids) as transport media is necessary to optimize site development and operation.
- *Photovoltaics:* Development of innovative crystalline silicon wafer growth techniques to produce high-efficiency solar cells and modules.

Proposals are expected to bring the technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The improved performance of manufacturing processes and system operation is expected to lead to increased efficiency of the system and/or reduced operational costs of the renewable technologies.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-15-2019: Increase the competitiveness of the EU PV manufacturing industry

Specific Challenge: The EU PV manufacturing industry has faced strong foreign competition in the last years, which has led to a dramatic reduction of its production capacity. The challenge is to develop innovative manufacturing solutions, spanning the entire production chain, that substantially improve competitiveness of the EU PV manufacturing industry and help regain a part of the potentially increasing worldwide PV market, while creating more secure and sustainable supply chains for the EU PV market. This challenge is in line with the priority identified in SET-Plan for an Initiative for Global Leadership in PV¹⁰².

Scope: Demonstrating manufacturing innovation as well as product innovation for highly performing PV technologies (e.g. crystalline-silicon, thin-film and concentration PV). Innovative solutions will be demonstrated at pilot-line level, showing the potential to be scaled up to GW-size, high-yield-throughput and cost-effective industrial production of high-efficiency cells and modules. Possible examples range from the optimization of one or more steps in the value chain (by e.g. increased automation, laser processing, etc.) to the tailored development of production equipment, to the enhanced durability and/or recyclability of the final product, to the demonstration of production routes for cells and modules based on innovative materials and/or architectures (e.g. perovskite/crystalline-silicon tandem cells).

Proposals are expected to bring the technology from TRL 5-6 to 6-7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 10 to 13 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Successful projects are expected to trigger new investments in the EU PV industry, via the establishment of pilot lines which target innovative/optimised production processes and/or tailored development of equipment for mainstream power PV technologies.

¹⁰² <https://setis.ec.europa.eu/implementing-integrated-set-plan/no-1-renewables-ongoing-work>

The proposed solutions are expected to show the potential for cost and performance competitiveness of the final product.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Provide flexibility to the energy system

Proposals are invited against the following topic(s):

LC-SC3-RES-16-2019: Development of solutions based on renewable sources that provide flexibility to the energy system

Specific Challenge: Supporting the balancing of the power grid and increasing the flexibility of the energy system is possible through dispatchable renewable energy sources, such as for example bioenergy and hydropower. The specific challenge is to increase the potential and performance of dispatchable technologies to provide flexibility services to the energy system by improving their technological characteristics.

Scope: Proposals will address one of the following sub-topics:

- *Bioenergy carriers:* Development of intermediate bioenergy carriers for energy and transport from biogenic residues and wastes and energy crops from marginal lands not applicable to food or feed production through feedstock flexible technologies at a conversion cost reduced by at least 25% from the state-of-the-art, excluding the feedstock cost, and with increased energy density, storage and trade characteristics, where relevant, and improved GHG performance. The state-of the art for conversion costs per technology will be clearly presented in the proposal with cost figures and versatility of use where appropriate.
- *Hydropower:* Development of low and ultra-low head and sea water resistant equipment (such as for example bulb-pump turbines) guaranteeing at least 70% round-trip efficiency and making low-head seawater storage and other low head applications of hydropower viable, for example at unexplored locations (e.g. like at coastal dams and islands), by minimising at the same time potential impacts on fish.
- *Virtual Power Plant:* Increase the performance of an integrated portfolio of renewable energy sources (namely a combination of variable output and dispatchable renewable sources) to operate together as a Virtual Power Plant, capable of providing flexibility and ancillary services to the energy system. The solution has to be competitive compared with solutions combining variable output renewables with electrochemical storage.

Proposals are expected to bring the technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The increased flexibility of the energy system will allow the penetration of a higher share of variable output renewables in the energy mix without affecting system stability.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-17-2019: Demonstration of solutions based on renewable sources that provide flexibility to the energy system

Specific Challenge: : Supporting the power grid balancing and increasing the flexibility of the energy system is possible by means of dispatchable renewable energy sources. The specific challenge is to increase the potential of renewable dispatchable technologies in providing flexibility to the energy system. Different technologies are suitable to address this challenge.

Scope: Proposals will address one of the following sub-topics:

- a. *Intermediate bioenergy carriers:* Focus will be on the demonstration of the most cost-efficient intermediate bioenergy carrier pathways for energy and transport, which improve the economic viability of the subsequent energy production by addressing solid, liquid and gaseous intermediate bioenergy carriers from biogenic residues and wastes with increased energy density, storage and trade characteristics where relevant. Reduced conversion costs and improved energy efficiency and GHG performance of the intermediate bioenergy carrier pathway will be demonstrated. Production at a scale of up to 5000 tons and process feasibility through applications to fuel production including for the heavy duty, maritime and aviation sectors, as well as to combined heat and power generation, are to be included.
- b. *Hydropower:* Focus will be on the improvement of the average annual overall efficiency of hydroelectric machinery. Projects are expected to provide high availability of hydropower plants and to maximise performance of hydropower plants of all sizes. The aim is adapting to variable speed generation the hydropower plants (new, refurbished and uprated and especially existing ones); it is important that by optimising maintenance intervals for all hydro plants (especially those delivering balancing power because of the related dynamic operation, dynamic loads and increased wear and tear) the outage time will be minimised. Digitalisation measures to increase the potential of hydropower in providing flexibility to the energy system can be included.
- c. *Thermal energy storage in Concentrated Solar Power (CSP) plants:* The focus will be on the demonstration of innovative storage systems for CSP plants. The thermal energy storage solutions proposed will have to achieve much higher storage densities than

current mainstream solutions (i.e. at least two times higher) while guaranteeing similar performance in terms of cycles.

Proposals are expected to bring the technology from TRL 5 to TRL 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 12 to 15 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The developed technologies will allow plant and system operators to operate successfully in the modern power markets and to make a significant contribution to European renewable energy objectives and policies.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-18-2020: Advanced drilling and well completion techniques for cost reduction in geothermal energy

Specific Challenge: To achieve or maintain global leadership in geothermal energy technology cost reductions are crucial for existing and new technologies. In particular, well construction represents a considerable component of geothermal power plants' overall investment. Consequently, lowering well cost (in terms of €/MWh) and reducing drill time or non-productive time would greatly facilitate their development. Advanced drilling technologies, currently not used in geothermal well construction, should therefore be developed and optimized.

This specific challenge is in line with the deep geothermal cost reduction targets stated in the SET-Plan Deep Geothermal Energy Implementation Plan¹⁰³.

Scope: Proposals will address novel non-mechanical drilling technologies required for applications on all types of geological formations and with the ability to reach cost-effectively greater depths and higher temperatures (i.e. beyond 5 km and 250°C) or develop new mechanical-drilling operation technologies making use of digitisation, automation, machine learning, and innovative instrumentation.

Risk assessment and lifetime analysis of new technologies are expected to be part of the work. Innovative systems to avoid and/or reduce discharge of geothermal fluids into the environment should be considered, as well as horizontal - multilateral wells clusters in various geological formations. For this reason, appropriate technology transfer from the oil and gas sector on horizontal well drilling is encouraged, although it is not compulsory.

¹⁰³ https://setis.ec.europa.eu/system/files/setplan_geoth_ip.pdf

Proposals are expected to bring technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

Finally, proposals will have to clearly address relevant social acceptance and related socioeconomic issues.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Please note that this topic is part of the lump sum funding pilot scheme. Funding for grants awarded under this topic will take the form of lump sums as defined in the Commission Decision C(2017)7151 of 27 October 2017¹⁰⁴. Details of the lump sum funding pilot scheme are **published on the Funding & tender opportunities** website¹⁰⁵ together with the specific Model Grant Agreement for Lump Sums¹⁰⁶ applicable".

Expected Impact: The proposed solution will contribute to meet key targets for drilling of the Deep Geothermal Implementation Plan of the SET-Plan¹⁰⁷: reducing the unit cost of drilling (€/MWh) by 30% by 2030 and reducing drill time or non-productive time by 20% by 2025 and a total cost reduction on well completion of 20%.

Type of Action: Research and Innovation action Lump Sum

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-19-2020: Demonstration of innovative technologies for floating wind farms

Specific Challenge: The first commercial-scale floating wind farm has recently come into operation and other floating wind farms initiatives are ongoing. Floating wind farms have significant potential but further efforts are needed to drive the costs down and to fully commercialise and industrialise the technology.

Scope: Proposals will focus on the demonstration of floating offshore wind innovations (such as blades, floaters, moorings, electrical subsystems and cabling, monitoring systems, and/or integrated systems, including whole wind turbines specifically conceived for floating offshore), in view of scaling-up power rating to >10 MW. Different sea and weather conditions shall be considered. Proposals shall improve industrial design and manufacturing processes, installation methods and operation & maintenance.

Proposals are expected to bring the technology(ies) to TRL 6-8 (please see part G of the General Annexes).

¹⁰⁴ http://ec.europa.eu/research/participants/data/ref/h2020/other/legal/lump_sum/lumpsumdecision_en.pdf

¹⁰⁵ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/home>

¹⁰⁶ http://ec.europa.eu/research/participants/data/ref/h2020/mga/lumpsum/h2020-mga-lumpsum-pilot-multi_en.pdf

¹⁰⁷ https://setis.ec.europa.eu/system/files/setplan_geoth_ip.pdf

The Commission considers that proposals requesting a contribution from the EU of up to 25 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Decrease the Levelized cost of Energy (LCOE) and environmental impacts while increasing market value of floating wind power¹⁰⁸.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-20-2020: Efficient combination of Concentrated Solar Power and desalination (with particular focus on the Gulf Cooperation Council (GCC) region)

Specific Challenge: Several arid and semi-arid regions of the world are highly dependent on desalination and the demand for desalination is projected to grow. Many of these regions have also an abundant solar resource, which is suitable for the application of Concentrated Solar Power (CSP). Several technical aspects need to be addressed to match the thermal cycle of a CSP plant to the energy needs of a desalination system in an effective way.

Scope: Support will be given to demonstrate efficient solutions that couple the thermal cycle of a CSP plant to a water desalination system.

The proposals are expected to bring technologies to TRL 6 (please see part G of the General Annexes) at the end of the project activities.

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The participation of organisations from these countries as partners in the project will be positively evaluated.

Expected Impact: The expected impacts are a substantial reduction of CO₂ emissions from desalination and strengthened international cooperation. This will support the objectives of the many international initiatives that are currently addressing the crucial nexus between energy and water systems.

Type of Action: Innovation action

¹⁰⁸ This recent concept becomes increasingly important as wind power is often exposed to merchant prices which can be very low. Formally, it represents the average revenue per energy unit of wind produced. See, for example, Riva (2016, p. 15). *System value of wind power - an analysis of the effects of wind turbine design*. Available at http://www.ea-energianalyse.dk/reports/student-reports/system_value_of_wind_power.pdf.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-30-2019: Demonstration of plug and play solutions for renewable off-grid electricity

Specific Challenge: For off-grid communities, research and development is needed to bring down the cost of renewable electricity solutions in diverse geographic and climate conditions by improving at the same time their performance in respect of robustness, reliability, network stability and autonomous operation. Existing micro-grid solutions do not fully respond to the needs of communities in respect of investment costs, versatility, plug and play capabilities, easy installation and connection to the renewable energy source, easy and cost-saving logistics as well as maximisation of the renewables share.

Scope: Container-based integrated solutions for sustainable and long-term renewable electricity production, storage and distribution which demonstrate better performance than state-of-the-art solutions with respect to the overall installation, commissioning, operation and maintenance costs. The following parameters and features are expected to be optimised:

- Versatility of renewable energy sources to utilise (e.g. photovoltaics, wind, micro-hydropower, bioenergy);
- Plug and play capabilities towards the external electricity sources as well as storage options;
- Maximising the share of renewable electricity sources vis-à-vis diesel generation;
- Demonstrated solutions should support power demand of decentralised communities up to 100 kW, in line with targets of Mission Innovation Challenge Nr. 2.

A plug and play prototype should be fully demonstrated, including single shipment of the core system in an intermodal container. Local installation of the fully operational system by the local community should also be demonstrated. Demonstrations shall take place in at least two communities with diverse physical landscape and climate conditions, which are located in different continents. Those demonstrations should use different renewable energy sources locally available. Necessary power generation equipment shall be shipped together with the container; nevertheless, the project should also allow for integration of existing renewable electricity installations in loco by also providing necessary hardware and software interfaces, including those for remote operation and maintenance training. The container should include equipment for energy management and metering as well as system monitoring for demand response optimisation. Renewable drop-in solutions for commercially available equipment developed primarily for fossil fuel use (e.g. biodiesel in combination with diesel generators) are not in scope of the demonstration.

Furthermore, projects proposals should foresee to exchange information with the BRIDGE project¹⁰⁹ and to elaborate on the suitability of the demonstrated solutions for crisis intervention after disasters.

This topic will contribute to the Challenge #2 (Off-grid access to electricity) of Mission Innovation.

Proposals are expected to bring the technology from TRL 6-7 to 7-8.

The Commission considers that proposals requesting a contribution from the EU of about EUR 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Successful projects will demonstrate the attractiveness of renewable integrated container solutions for off-grid communities in diverse physical landscape and climate conditions by lowering the overall costs of the renewable energy generation and energy system components while ensuring their robustness, reliability, sustainability and autonomous operation.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-33-2020: Increase performance and reliability of photovoltaic plants

Specific Challenge: To accurately predict and measure the contribution of PV systems (including floating PV) to the power network, and to increase their lifetime, reliability and profitability, it is necessary to establish accurate operation (and fault diagnostic) models in both "utility - large commercial" and "medium-size commercial - residential" scale plants. Reliability assessment and improvement (with all it entails for the distribution network reliability) can be achieved by identifying and minimising risk factors and failure rates of the PV system and its components.

This challenge contributes to the Implementation Plan for PV¹¹⁰ established in the context of the SET-Plan and in particular to the Initiative for Global Leadership in PV.

Scope: Proposals will develop and demonstrate technical solutions, processes and models, which increase a PV system's operational stability and reliability, allowing for higher PV penetration levels. Proposals are expected to address specific objectives such as the reliability of system components, advanced and automated functions for data analysis, diagnosis and fault detection, forecasting and model-predictive control frameworks, ancillary services for the stability of the network; maintenance planning and/or reporting; interoperability of plants and components; business models; etc.

¹⁰⁹ <https://www.h2020-bridge.eu>

¹¹⁰ https://setis.ec.europa.eu/system/files/set_plan_pv_implmentation_plan.pdf

Proposals are expected to bring the technologies from TRL 6-7 to TRL 7-8 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects are expected to increase utility-friendly integration of PV generation at high-penetration levels and the performance and profitability of PV systems.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-34-2020: Demonstration of innovative and sustainable hydropower solutions targeting unexplored small-scale hydropower potential in Central Asia

Specific Challenge: The challenge is to demonstrate innovative solutions targeting unexploited small-scale hydropower potential in Central Asia that will contribute to solve the particular cross-border water and energy management challenges in the region. Therefore, the hydropower technological solutions will need to be socio-economically and environmentally sustainable and embedded in a forward-looking cross-border Water/Food/Energy/Climate nexus concept for this region.

Scope: Projects will demonstrate innovative hydropower equipment exploiting unexplored small-scale hydropower potential in Central Asia up to 10 MW installed capacity by means of sustainable and cost-effective small-scale hydropower solutions. The demonstration will provide solutions for realising innovative and sustainable hydropower, based on synergies between innovative European hydropower technology, research and industry partners, and the Central Asian hydropower sector. Therefore, the demonstration activities shall take place in Central Asia (Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan or Uzbekistan), with participation of local partners¹¹¹.

The project should also fulfil the highest standard in terms of socio-economic and environmental sustainability and impact, and engagement of local civil society. It should also demonstrate how it will contribute positively to the regional cross-border Water/Food/Energy/Climate nexus and refer to embedded sustainable hydropower auxiliary services.

Proposals are expected to bring the technology from TRL 6-7 to 7-8 (please see part G of the General Annexes).

¹¹¹ Roles of local partners can include for example innovation activities, involvement of communities, dissemination, sustainability assessment etc.

The Commission considers that proposals requesting a contribution from the EU of between EUR 7 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The action is expected to support the competitiveness of the European hydropower technology sector as a responsible actor in global markets in the long-term, with a strong focus on overall sustainability of the provided hydropower solutions within the Water/Food/Energy/Climate nexus in Central Asia. The expected outcomes will strengthen the worldwide leadership of the European hydropower industry in providing innovative and sustainable hydropower solutions and will support international cooperation with developing countries. Expected are outcomes which are in line with UN sustainable development goals

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-35-2020: Reduce the cost and increase performance and reliability of CSP plants

Specific Challenge: Several research and innovation activities are set out in the SET Plan's Implementation Plan for Concentrated Solar Power (CSP)¹¹² to reduce the cost and increase performance and reliability of CSP plants. Promising innovative solutions that have been already validated in laboratories and/or in relevant environment need to be developed further to bring them to a higher TRL.

Scope: The proposals will demonstrate innovations that reduce the cost and/or increase the performance and/or the reliability of CSP plants, in relation to any of the plant subsystems.

The proposals have to state clearly to which R&I Activity (or Activities) of the Implementation Plan for CSP they contribute. The possible impacts on the environment of the proposed innovations shall be assessed during the execution of the project.

Proposals are expected to bring the solutions to TRL 6-8 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The project is expected to improve the competitiveness of the CSP technology, by demonstrating cost reductions and increased performance and reliability of CSP plants, therefore strengthening the European industrial sector and improving the prospects for CSP deployment in Europe. The project will contribute to executing the SET Plan's Implementation Plan for CSP.

¹¹² Link to the web page of the Implementation Plan in SETIS.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Renewable Fuels for transport

The actions address the competitiveness of the next generation of biofuels and renewable fuel technologies as well as the up-scaling of advanced biofuels for specific transport needs in a cost-effective way. Furthermore, they aim at achieving European leadership in global development of specific disruptive technologies for a complete ultimate replacement of fossil fuels.

Drop-in renewable fuel solutions for fossil-fuel substitutions

Proposals are invited against the following topic(s):

LC-SC3-RES-21-2018: Development of next generation biofuels and alternative renewable fuel technologies for road transport

Specific Challenge: Current biofuel and renewable fuel technologies are still not competitive compared to technologies of fossil fuel alternatives. This impedes their further development and market penetration. The specific challenge is to increase the competitiveness of next generation biofuel and renewable fuel technologies while diversifying the fuel supply pathways.

Scope: Support will be given to next generation non-food/feed drop-in biofuel and alternative renewable fuel technologies for energy and transport, which improve substantially beyond the state-of-the-art the performance as regards conversion efficiency, cost and feedstock supply, as well as end use compatibility. Proposals have to address one of the following:

- liquid diesel- and gasoline-like biofuels from biogenic residues and wastes through either chemical, biochemical and thermochemical pathways, or a combination of them;
- liquid gasoline-like biofuels through biogenic upgrading of biogas.

Proposals are expected to bring the technology from TRL 3-4 to 5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects are expected to reduce costs and improve performance of renewable fuels, notably as regards the efficiency, the environment and the society. The proposed solution will contribute to strengthening the EU leadership in this area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-22-2018: Demonstration of cost effective advanced biofuel pathways in retrofitted existing industrial installations

Specific Challenge: Commercialization of advanced biofuels depends on up-scaling of the technologies. The specific challenge is to overcome the high cost and high risk of the installation of industrial plants for advanced biofuels. This challenge is in line with priorities identified in the context of the SET-Plan¹¹³ for commercialization of advanced biofuels.

Scope: Proposals will demonstrate cost-efficient advanced biofuel pathways which improve the economic viability and reduce capital expenditure (CAPEX) and operating expenses (OPEX). This is to be done through retrofitting of existing industrial installations with necessary innovation specific to the proposed advanced biofuel pathway. Proposals will address integration in first generation biofuels sites, in pulp and paper industry or in existing fossil refineries with production of advanced biofuels at a scale of a few thousand tons through upgrading the existing sites with innovative installations. The economic feasibility and other socio-economic benefits including the impact on current first generation sites will be included and clearly demonstrated. Proposals will provide information about the expected CAPEX and OPEX improvements.

Proposals are expected to bring the technology from TRL 5 to 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 10 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to increase the industrial installed capacity for advanced biofuels, and show the socio-economic benefits.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Upscaling renewable fuels production

Proposals are invited against the following topic(s):

LC-SC3-RES-23-2019: Development of next generation biofuel and alternative renewable fuel technologies for aviation and shipping

Specific Challenge: Decarbonising the aviation and shipping transport sectors, which are expanding fast and increasing the overall fossil fuel consumption, relies on biofuel and

¹¹³ <https://setis.ec.europa.eu/implementing-integrated-set-plan/renewable-fuels-and-bioenergy-ongoing-work>

renewable fuels. The specific challenge is to increase the competitiveness of next generation biofuel and renewable fuel technologies in aviation and shipping, compared to fossil fuel alternatives.

Scope: Proposals will develop next generation non-food/feed drop-in biofuel and alternative renewable fuel technologies for aviation and shipping transport, which improve substantially beyond the state-of-the-art the performance regarding conversion efficiency, cost and feedstock supply by addressing:

- liquid jet-like biofuels and alternative renewable fuels from biogenic residues and wastes through chemical, biochemical and thermochemical pathways, or a combination of them; and
- bunker fuel-like biofuels for shipping uses.

Proposals are expected to bring the technology from TRL 3 to 5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to reduce costs and improve performance of renewable fuels for aviation and shipping regarding the efficiency, the environment and society. The proposed solution is expected to contribute to achieving European leadership in this area.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-24-2019: Boosting pre-commercial production of advanced aviation biofuels

Specific Challenge: The aviation transport sector is growing fast and is expected to be responsible for more than 10% of the global greenhouse gas emissions by 2050. Advanced biofuels achieve direct emission reductions and, as drop-in fuels, are the most attractive alternatives for reducing the carbon foot-print of aviation in the long-term. Due to the absence of a market, the specific challenge is to boost commercial availability of advanced biofuels for aviation. This challenge is in line with the specific targets for commercialization of advanced biofuels identified in the Declarations of Intent in the context of the SET-Plan¹¹⁴.

Scope: Proposal will demonstrate pre-commercial production of sustainable and cost-competitive advanced biofuels for aviation for boosting their market up-take. Proposals will

¹¹⁴ <https://setis.ec.europa.eu/implementing-integrated-set-plan/renewable-fuels-and-bioenergy-ongoing-work>

address large-scale production of aviation biofuels from non food/feed sustainable feedstock and through certified pathways according to international aviation fuel standards and thus suitable for commercial flight operations. 30 to 50 thousand tonnes of aviation biofuel and continuous plant operation of 1000 hr within the project will be included.

Proposals are expected to bring the technology from TRL 5 to 7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to facilitate the market entry and increase the commercial capacity of advanced biofuels for aviation. In particular, it is expected that pre-commercial plant(s) for advanced biofuels for aviation will be accomplished and the deployment of their technologies will allow the competitive production of biojet fuels on a commercial scale.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-25-2020: International cooperation with Japan for Research and Innovation on advanced biofuels and alternative renewable fuels

Specific Challenge: Disruptive conversion technologies are needed for replacing completely the use of fossil fuels in the transport and heating sectors with advanced biofuels and alternative renewable fuels. International collaboration is mutually beneficial in strategic areas where knowledge can be exchanged and Europe can obtain leadership together with its international partners.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to the Mission Innovation Challenge 4¹¹⁵.

Scope: Proposals will aim at international cooperation with Japan¹¹⁶ involving Japanese organisations in the consortia for the development of disruptive catalytic technologies, by developing novel catalysts and linked lab-scale components/systems with significantly improved performance for conversion efficiency and specific marginal cost reduction for obtaining low-cost bioenergy carriers, non-food/feed based advanced biofuels and alternative renewable fuels (excluding hydrogen) and maximizing GHG abatement.

Proposals are expected to bring technologies to TRL 3 (please see part G of the General Annexes).

¹¹⁵ <http://mission-innovation.net/our-work/innovation-challenges/sustainable-biofuels-challenge/>

¹¹⁶ The Japan Science and Technology Agency (JST) is the expected funding Japanese authority

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that the exchange of knowledge through the targeted research activities with Japan will progress the technology state-of-the-art and in addition it will strengthen the European and Japanese technology base. At the same time, it is expected that the development of renewable fuels that outperform the best fossil fuel alternatives is accelerated.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-26-2020: Development of next generation renewable fuel technologies from CO₂ and renewable energy (Power and Energy to Renewable Fuels)

Specific Challenge: Renewable energy is expected to grow faster than the capacity of the grid, thereby creating storage needs. The energy required to produce current renewable fuels reduces their competitiveness as alternatives to fossil fuels. The specific challenge is to increase the competitiveness of next generation renewable fuels through efficiently integrating unexploited renewable energy sources in their production process and to foster their use as a renewable energy storage option taking advantage of the existing infrastructure for gaseous and liquids fuels.

Scope: Proposals will develop next generation renewable fuels for energy and transport, which improve substantially (beyond the state-of-the-art), the performance regarding energy efficiency as well as cost of the conversion of direct renewable energy (e.g., sunlight) or renewable electricity and /or heat to liquid or gaseous renewable fuels from CO₂. Targeted fuels should also provide very low engine-out emissions.

Proposals are expected to bring the technology from TRL 3-4 to 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to reduce conversion energy losses and production costs of algal fuels/power to gas/liquid and heat to gas/liquid renewable fuels respectively, as well as improving performance of these fuels as regards the efficiency, the environment and society.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-36-2020: International cooperation with Canada on advanced biofuels and bioenergy

Specific Challenge: The optimisation of advanced biomass supply chains and overcoming specific conversion technology barriers are needed to improve the market up-take of sustainable advanced biofuels and bioenergy and accelerate their deployment for replacing the use of fossil fuels in the transport, power and heating sectors. International collaboration is mutually beneficial in strategic areas where knowledge can be exchanged and Europe can obtain leadership together with its international partners.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), actions will contribute to the Mission Innovation Challenge 4¹¹⁷.

Scope: Proposals will aim at international cooperation with Canada for fostering the deployment of advanced biofuels and bioenergy while substantially decreasing the costs of the feedstock supply or the conversion process.

Proposals should address at least one of the following issues:

- Development of the full supply chain of biomass-to-bioenergy applications including intermediate bioenergy carriers, advanced biofuels, heat and power generation. Sustainable biomass production and collection strategies that facilitate sustainable bioenergy production and decrease feedstock supply costs will be included. All types of non-food/feed biomass including forestry, agricultural and their residues, organic fractions of municipal and industrial wastes can be targeted.
- Thermochemical, biochemical and chemical processing of sustainable biomass to advanced biofuels focusing on the pre-treatment and the conversion process and in particular on reducing the respective marginal cost.

Proposals are expected to bring the technology from TRL 3 to TRL 5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that the exchange of knowledge through the targeted research activities with Canada will progress the technology state-of-the-art, strengthen the European and Canadian technology base and accelerate the development of sustainable fuels to replace the fossil fuel alternatives. At the same time, it is expected that the development of secure, long-term supply of sustainable feedstock and/or the technology advances will also significantly contribute to increase the viability of advanced biofuels and bioenergy in the EU and Canada.

Type of Action: Research and Innovation action

¹¹⁷ <http://mission-innovation.net/our-work/innovation-challenges/sustainable-biofuels-challenge/>

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Diversifying feedstock

Proposals are invited against the following topic(s):

LC-SC3-RES-27-2020: Demonstration of advanced biofuels production from aquatic biomass

Specific Challenge: The security of feedstock supply is essential for the large-scale production of advanced biofuels which is a prerequisite for improving their competitiveness. The specific challenge is to increase the reliability of processes through diversifying and securing the sustainable supply of seaborne feedstock at large scale.

Scope: Proposals will demonstrate aquatic advanced biofuel pathways which improve the economic viability of the subsequent energy production, including the upgrading technologies and valorisation of co-products. Proposals will address processes and technologies for advanced biofuels at a scale of 100-1000 tonnes from seaborne aquatic biomass such as macro-algae and/or fish residues in an energy-driven integrated biorefinery concept. Projects will demonstrate the full value chain with achievement of at least 70% energy output (fuel, heat and power) and environmental sustainability based on a life-cycle assessment. Long-term potential for large scale biofuel production should be considered.

Proposals are expected to bring the technology from TRL 5 to 6-7 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of EUR 6-10million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Supported projects are expected to enlarge the feedstock basis and improve the viability of technologies for sustainable fuels and energy production.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-RES-37-2020: Combined clean biofuel production and phytoremediation solutions from contaminated lands worldwide

Specific Challenge: Dedicated biofuel production at large scale depends on sustainable land availability that does not compete with other uses. Phytoremediation is a holistic approach that best de-contaminates lands from a vast variety of pollutants. The challenge is to bridge the gap between phytoremediation strategies and clean biofuel production in a sustainable and optimum manner that will overcome the indirect land use change (iLUC) issue for biofuels and restore lands for agricultural uses.

The proposed solution will contribute towards the Mission Innovation Challenge 4¹¹⁸.

This is a global challenge that calls for international cooperation.

Scope: Proposals will bridge the gap between phytoremediation strategies and clean liquid biofuel production. They will optimise energy crops for phytoremediation by targeting different classes of known soil pollutants and integrate in the conversion process to biofuels a strategy to extract these pollutants in concentrated form. The overall process will be optimized in terms of cost and sustainability. Pilot-scale, small trials are expected for both clean biofuel production and phytoremediation processes.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), and given the world-wide applicability of this specific challenge, international cooperation is encouraged.

Proposals are expected to bring technologies from TRL 3-4 to TRL 4-5 (please see part G of the General Annexes).

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that a win-win situation will be created for bringing polluted land back to agricultural production and for low-iLUC risk liquid biofuel production from energy crops. Through cost reduction and improved phytoremediation, contribution to several sustainable development goals (SDGs) beyond the Energy is anticipated.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Market Uptake Support

Proposals are invited against the following topic(s):

LC-SC3-RES-28-2018-2019-2020: Market Uptake support

Specific Challenge: Since the adoption of RES Directive in 2009, most Member States have experienced significant growth in renewable energy production and consumption, and both the EU and a large majority of Member States are on track towards the 2020 RES targets. At the same time the cost of energy from renewable energy sources has decreased significantly and the performance and market penetration of these sources has increased. Nevertheless, there is still a lot of market potential to be exploited. This potential is recognised in the "Clean Energy for all Europeans" package adopted at the end of 2016, which sets renewable energy targets for 2030 and introduces modifications in the energy market design, while empowering

¹¹⁸ <http://mission-innovation.net/our-work/innovation-challenges/sustainable-biofuels-challenge/>

individuals or communities to participate actively to the energy system transformation. Furthermore, in June 2018 member states agreed to set an overall EU renewable energy target of 32% by 2030. Challenges exist for renewable energy to realise its full potential in all sectors and accelerate the clean energy transition, playing a crucial role in leading to an increased share of renewable energy consumed in the EU and to a more active role for the consumers.

The introduction and deployment of renewable energy at large scale requires overcoming a number of barriers. These cover issues such as consumer acceptance, legal and financial challenges related to the introduction of novel solutions into a technical and business environment with incumbent established solutions in place, necessity of making renewable energy solutions compliant with the new legislations, facilitation of legislative and regulatory aspects limiting innovative energy solutions implementation at the grid levels and also at the community or citizen level. Improving existing tools for better assessing the environmental, economic and social impact of renewable energy solutions is challenging due the breadth and scope of the different renewable technologies. The challenges are also related to creating a renewable energy sector fit for massive deployment in the market, which means ensuring that complete value chains for a broad range of renewable energy technologies are in place, not only covering raw materials (such as e.g. bioenergy feedstock) logistics but also components availability and operational reliability; and ensuring that renewables are fit to the market and capable to provide additional services to the grid. The energy markets outside the EU must not be forgotten, as they represent the most significant long term opportunity growth of the sector, but the penetration of these markets is a challenge in itself too.

Scope: The proposal will develop solution(s) addressing one or more of the identified challenge(s), for the entire renewable energy sector or focusing on a specific energy market, such as electricity, heating, cooling or renewable fuels. The proposed solution can be developed to address a local challenge but should have wide potential for reapplication. The solution must have a long term viability and not be limited to an ad-hoc fix. The methodologies applied may be inspired by successful approaches already tested in other fields or contexts.

For all actions, the consortia have to involve and/or engage relevant stakeholders and market actors who are committed to adopting/implementing the results. The complexity of these challenges and of the related market uptake barriers may call for multi-disciplinary approaches, which should include contributions from the social sciences and humanities. Where relevant, regional specificities, socio-economic, gender-related, spatial and environmental aspects will be considered from a life-cycle perspective.

Where relevant, proposals are expected to also assess the legal, institutional and political frameworks at local, national and European level and examine how, why and under what conditions these (could) act as a barrier or an enabler.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 to 3 million would allow this specific challenge to be addressed appropriately.

Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: It is expected that the solution proposed will facilitate the wider uptake of renewable energy generation in the energy and industrial sectors leading to an increase share of renewable energy in the final energy consumption by 2030. The solution will contribute to substantial and measurable reductions in the project development timings and efforts, whilst fully addressing the needs for environmental impact assessments and public engagement. It will also contribute to provide a basis for the development of more informed policy, market support and financial frameworks, notably at national, regional and local level, leading to more cost effective support schemes and lower financing costs for RES facilities.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Smart and clean energy for consumers

The Clean Energy for all Europeans package places consumers firmly at the centre of the energy transition, with consumers considered as active market players in the energy system. The future consumer should be better informed and more aware, and have an increased capacity to fully engage in energy markets.

Such a transition requires consumers to change their energy consumption behaviour and increase their uptake of different forms of active demand solutions and services, including collective actions. To this end, remaining regulatory and market barriers for consumers should be addressed and innovative engagement and support schemes should be made more readily available to consumers, allowing for improved understanding of the benefits of engaging actively in the energy system. At the same time, it is important to develop a better understanding of the drivers of consumer acceptance and behaviour change in relation to energy efficiency.

Although the energy transition is expected to lead to a number of benefits for consumers, energy poverty continues to affect the quality of life of a significant number of European citizens. In combination with financial interventions and building retrofitting, low-cost measures at the household level and use of renewable energy are key solutions in alleviating energy poverty. Energy distributors under the energy efficiency obligation schemes, and public authorities play a central role in delivering energy efficiency measures and providing sustainable solutions to affected households.

Consumers may also play in the future an important role in engaging in clean energy, in particular in the decarbonisation and decentralization of the electricity system which currently integrates 30% of production from renewable energy sources. We should therefore already test today what are the right incentives that can be put in place so as to reward them when playing a role in increasing the share of variable renewables in the electricity mix by, for example, by differing their consumption depending on the availability of this 'green'

electricity. To be successful, the R&I community should not look only at consumers from an electricity grid perspective but make particular effort to understand how consumers consider, use and value the electricity grid and the services it provides to them.

Activities supported in this area contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan action 3¹¹⁹.

Proposals are invited against the following topic(s):

LC-SC3-EC-1-2018-2019-2020: The role of consumers in changing the market through informed decision and collective actions

Specific Challenge: A precondition for active demand is for consumers to be aware of their own potential to permanently or temporarily reduce energy consumption; and moreover, for them to know how to offer this potential to the market and what it would represent in terms of monetary value by bringing benefits to the energy system.

Different forms of collective action have the potential to assist consumers in forming critical mass and to facilitate increased uptake of energy efficiency & active demand solutions and services. Although collective actions on energy efficiency have emerged in recent years, a lack of awareness on the potential benefits of such actions, together with regulatory barriers, continues to hamper their full development and uptake.

Finally, important challenges involve installed appliances (such as boilers for space and/or water heating) of which a big share is inefficient and fossil-fuel based, resulting in increased fuel consumption and fuel costs for households. Informing consumers of the potential energy savings and their monetization, as well as other benefits such as increased comfort and improved air quality, can result in increased motivation for replacing inefficient appliances, thereby permanently reducing consumption.

Scope: 2018:

The proposed action should develop activities informing and motivating consumers to change old and inefficient installed appliances with the highest energy saving potential (e.g. boilers, local space heaters, air heaters) to more efficient and clean energy heating and/or cooling solutions. While financial aspects (cost savings, payback period) would be the main motivating factor and therefore should be presented in a precise and credible manner, other aspects such as increased comfort and aesthetics, safety, improved air quality, or possible participation in demand-response should be the integral part of the actions in order to unlock the full potential of multiple benefits of energy efficiency improvements.

2019 and 2020:

The proposed action should set up and/or support energy communities (consumer cooperatives, consumer collective purchase groups, and/or other consumer driven collective

¹¹⁹ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

actions) to increase energy efficiency and/or optimise energy management to integrate a higher share of renewable energy (generated locally or provided from the grid) within the community by, for example, combining collective solutions to distributed generation, distributed storage, and/or demand-response aggregation. The focus of the proposed action should be on households, however, this does not preclude the complementary involvement of non-residential buildings.

The proposed action should cover the following points:

- Identify and address regulatory barriers and contractual conditions with utilities, suppliers, grid operators, technology providers etc. for cooperative actions, possibly linking activities with structural solutions involving public authorities;
- Demonstrate that collectively organised energy-related actions are financially viable and attractive to the consumer-members of the energy community.

In addition, the proposed action could cover the following points, as relevant:

- Identify and implement solutions to address split incentives (e.g. allowing tenants to set up/join the consumer driven collective action);
- Demonstrate collective actions of energy consumers based on the solutions and business approaches using digital tools and technologies (such as digital platforms or blockchain transactions). If the proposed action includes smart home/IoT solutions, it should link to the developments under the call DT-ICT-10-2018: *Interoperable and smart homes and grids*.

Relevant for the three years:

The proposed actions should address the risk of "rebound effects" and propose measures to counteract them, where relevant. All relevant stakeholders necessary for the successful implementation of the action should be involved and relevant consumer organisations, in particular, should be either directly involved or their support demonstrated in the proposal. Proposed actions should also take issues of consumer data ownership and data privacy into account, where relevant. The proposed actions are invited to build on experiences and lessons learned in other relevant projects and programmes¹²⁰.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets, wherever possible:

¹²⁰ This should include e.g. LIFE projects, the implementation of Air Quality Plans and the implementation of Operational Programmes under ESIF, H2020 projects, Intelligent Energy Europe projects, and other relevant national, local, or regional initiatives.

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project (in million Euro);
- Contribution to reducing regulatory barriers and improving contractual conditions;
- Increase domestic uptake of energy efficient products and services;
- Involvement of at least 5.000 consumers per million Euro of EU funding.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EC-2-2018-2019-2020: Mitigating household energy poverty

Specific Challenge: European households continue to spend an increasing share of income on energy, leading to higher rates of energy poverty and negatively affecting living conditions and health. Recent estimates suggest that more than 50 million Europeans are affected by energy poverty¹²¹. Although roots of this phenomenon lie mainly in low incomes and poor thermal efficiency of buildings, energy efficiency measures at the household level and increased use of renewable energy are key tools in addressing energy poverty and can bring energy savings, leading to lower fuel costs and improved living conditions. The issue is in part exacerbated by a lack of sufficient knowledge on how to identify energy poor households.

In this context, the role of local and national authorities, related networks and initiatives¹²², and availability of support schemes are important to ensure the sustainability and larger scale uptake of the measures.

Energy Efficiency Obligation Schemes¹²³ can also be used to promote social aims, such as tackling energy poverty. The obligated parties (utilities) have potentially at their disposal the necessary data and means to identify energy poverty among their customers and effectively address it by fulfilling in this way the energy efficiency obligation. Building the capacity of the obligated parties is needed in order to spread such schemes across the EU.

¹²¹ Energy poverty generally refers to 'a situation where individuals or households are not able to adequately heat or provide other required energy services in their homes at affordable cost'

¹²² E.g. Covenant of Mayors, European Energy Poverty Observatory, SEAPs.

¹²³ Stemming from art 7 of the Energy Efficiency Directive

Scope: Actions should contribute to actively alleviating energy poverty and developing a better understanding of the types and needs of energy poor households and how to identify them, taking into account gender differences where relevant, building on any existing initiatives such as the European Energy Poverty Observatory.

The proposed action should cover one or more of the following:

- Facilitate behaviour change and implementation of low-cost energy efficiency measures tailored for energy poor households (e.g. provision of information and advice, energy efficiency services such as draught proofing or optimisation of existing building technology systems, as well as energy efficiency devices & kits such as low-energy lighting);
- Support the set-up of financial and non-financial support schemes for energy efficiency and/or small scale renewable energy investments for energy poor households. These actions should be embedded in, and add value to, structural frameworks and activities involving local, regional, and national authorities, and/or networks such as the Covenant of Mayors;
- Develop, test and disseminate innovative schemes for energy efficiency/RES investments established by utilities or other obligated parties under Article 7.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

The proposed actions are invited to build on experiences and lessons learned in other relevant projects and programmes¹²⁴.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below using quantified indicators and targets, wherever possible:

- Primary energy savings triggered by the project (in GWh/year);
- Investments in sustainable energy triggered by the project in (million Euro);
- Contributions to policy development and to best practice development on energy poverty;
- Support schemes established for energy efficiency and/or small-scale renewable energy investments and to be sustained beyond the period of EU-support.
- Involvement of at least 5.000 consumers per million Euro of EU funding.

¹²⁴ This should include e.g. LIFE projects, the implementation of Air Quality Plans and the implementation of Operational Programmes under ESIF, H2020 projects, Intelligent Energy Europe projects, and other relevant national, local, or regional initiatives.

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EC-3-2020: Consumer engagement and demand response

Specific Challenge: To put consumers / prosumers at the heart of the energy market and to develop and test new cost-effective solutions for consumers based on the next generation of energy services for consumers that are beneficial to the integration of RES into an efficient operation of the grid and of the power system, that will allow to better predict and incentivise consumer behaviour. Engaging consumers and prosumers in demand-response mechanisms and other energy services - based on dynamic prices as well as on incentives from grid operators to adjust energy consumption or production to help maintain frequency stability, manage congestion or address other grids constraints - has the potential to bring benefits to consumers and to the energy system.

Decentralised (renewable) energy production and digitalisation allow for new ways for consumers to engage in the energy transition, for example through energy cooperatives, peer-to-peer trading and citizen energy communities. Building and home automation allows for the integration of services to consumers and the creation of value by combining data and services across different sectors for example combining energy services (electricity, heat) with mobility (electric cars), health (assisted living).

Scope: The proposals will develop and test novel solutions and tools for demand response and energy services, using real consumption data and feedback from the testing of services with the objective to improve predictability of consumption and consumer behaviour (aiming to create a digital twin of the consumer). The main focus will be on households, but other types of consumers (residential, industrial, commercial and tertiary, including prosumers who are self-consuming part of the energy they produce) may be included. Proposals will demonstrate services that bring a fair share of benefits to consumers and to the energy system, in particular the electricity grid. The proposals should take into account the existing EU framework and the proposed measures under the Clean Energy for all Europeans Package, including the relevant measures on demand response, active customers, energy communities and dynamic price contracts.

Proposals can target one or multiple types of loads (e.g. appliances, electric vehicles, power to heat / cool, etc.) as well as (small-scale) production (e.g. PV), include energy storage and one or several methods of aggregation (e.g. citizen energy communities). Preferably they should

rely on advanced automation, advanced ICT tools and approaches (e.g. IoT, Big Data, AI, blockchain, etc.), communication protocols and interoperability.

Proposals are encouraged to include energy vectors other than just electricity (e.g. heating, cooling, water, wastes, etc.) , and are encouraged to include other services than energy (e.g. mobility, health, etc.).

Proposals should not only bring a perspective from the grid and the power system on consumers but also a perspective from consumers on the grid and the power system. For this purpose, social science and humanities-related work will be closely associated with the development of technological solutions from the beginning of the project (e.g. co-creation process involving both technology/ service providers and consumers) and not as an isolated task/work-package.

Privacy, consumer and personal data protection and cybersecurity should be addressed by the proposed solutions.

Proposals will demonstrate how they will use interoperable digital communication solutions, make use of existing standards, study what is the information that shall be exchanged and contribute to open platforms and market places that can be integrated with other services based on platforms.

Services, customer information, engagement strategies and contracts should be designed, tested and conclusions should be drawn to improve predictability of consumption and consumer behaviour, based on the different types of consumers (e.g. segmentation along different categories, e.g. social category, age, technology literacy, gender, etc.) on the considered location and climatic conditions and on the type and magnitude of incentives, putting the citizen at the centre of the proposed approach.

The participation of local energy communities, energy cooperatives, aggregators and local actors is encouraged. The participation of consumer associations in the project is an added value.

Proposals are expected to include clear business model development and a clear path to finance and deployment as a dedicated task, which confirms delivery of affordable energy in no more than 5 years, as well as a clear strategy for managing cybersecurity. Key partners should have the capability and interest in making the developed solution a core part of their business/service model to their clients. Proposals are expected to demonstrate knowledge of the relevant EU's policies on smart homes and buildings, interoperability, Internet of Things and platforms for data exchange.

Proposals should include tasks or a specific work-package on the analysis of obstacles to innovation under the current context but also under the future market design context and foresee the coordination on policy relevant issues and obstacle to innovation (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-

funded projects through the BRIDGE initiative¹²⁵. An indicative budget share of at least 2% of the EU contribution is recommended for the research work associated with these issues.

Proposals should build upon the insights and results of projects that have already been selected in this field under Horizon 2020 (information can be found on the BRIDGE web site¹²⁶) and demonstrate their innovative character.

Projects will cooperate with at least one of the projects supported under the topic LC-SC3-ES-5-2018-2020 that approach the challenge more from a grid perspective. Therefore, proposals will foresee a work package for cooperation with other selected projects and earmark appropriate resources (indicatively 5-10% of the requested EU contribution) for coordination and communication efforts and research work associated with cross-cutting issues¹²⁷. Regarding data handling, data management and standardisation issues, proposers should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

TRL will range between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 to 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to contribute to the following impacts:

- Increased use of demand response across the European energy system;
- Increased number and types of consumers engaged in demand-response across Europe;
- Demonstrated and improved viability of innovative energy services, best practices and effective incentives that can be replicated at large scale;
- Increased uptake of services that combine energy efficiency with other energy services, technologies and non-energy benefits;

¹²⁵ <http://www.h2020-bridge.eu/> Where relevant, proposals should consider cooperating also with projects funded under complementary topics, in particular LC-SC3-ES-1-2019: Flexibility and retail market options for the distribution grid, LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource, DT-ICT-10-2018: Interoperable and smart homes and grids and DT-ICT-11-2019: Big data solutions for energy in the WP 5.i ICT

¹²⁶ <http://www.h2020-bridge.eu/>

¹²⁷ <http://www.h2020-bridge.eu/> Where relevant, proposals should consider cooperating also with projects funded under complementary topics, in particular LC-SC3-ES-1-2019: Flexibility and retail market options for the distribution grid, LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource, DT-ICT-10-2018: Interoperable and smart homes and grids and DT-ICT-11-2019: Big data solutions for energy in the WP 5.i ICT

- Increased reliability of innovative energy services and accessibility to them Developed and demonstrated viable solutions for customers: best practices and effective incentives that can be replicated at large scale;
- Increased predictability of consumption patterns and consumer behaviour;
- Increased data protection and privacy for customers;
- Improved modelling of the flexibility levers from the new energy services;
- Increased share of energy or power that can be mobilised to provide flexibility to the grid and increase the hosting capacity for RES.

Proposals are invited to address at least 7 of the above impacts, substantiate them and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life. Indicators are expected to have clear and measurable targets.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EC-4-2020: Socio-economic research: non-energy impacts and behavioural insights on energy efficiency interventions

Specific Challenge: In the Energy Union Strategy, Energy Efficiency was recognised as a resource in its own right, which should be enabled to compete on equal terms with generation capacity and to have primary consideration across all policies¹²⁸. However, two additional aspects need to be taken into consideration in order to create effective future policy scenarios and allow for financial and political decision making, while prices of fossil fuels remain relatively low:

- the real value beyond the fuel's cost and the (energy and non-energy) impacts of energy efficiency;
- psychological and contextual features (such as consumers' behavioural biases, superfluous complexity of alternative options or external barriers to energy efficiency) which can negatively impact the quality of consumers' decision-making.

Scope: a) *Modelling multiple non-energy impacts*

Actions are required to explain the transition of energy efficiency from a "hidden fuel" to the "first fuel" and make the value of the externalities triggered by energy efficiency investments more visible across a variety of areas. The analysis should go beyond the traditional measures of reducing energy demand and greenhouse gas (GHG) emissions; it should include positive

¹²⁸ Communication from the Commission A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy /* COM/2015/080 final

and negative externalities relating to other policies such as public health, air quality, impact on ecosystems, etc.

Actions should build upon the existing methodological frameworks and the work already developed in this field in order to:

- create econometric models and other instruments able to quantify and when possible monetise direct and indirect non-energy impacts (both positive and negative) of energy efficiency investments, taking into account all possible challenges (e.g. rebound effect, double counting, etc.);
- provide a simplified and evidence-based tool which can help policy makers at local, regional, national and European level in defining optimised short-term cost-effective policies and measures as well as long-term strategies in the energy domain;
- disseminate the concept to households, businesses and financing institutions in order to increase awareness, information level, and investments in energy efficiency improvements.

b) Behavioural insights for energy efficiency interventions

Actions should test energy efficiency behavioural change interventions through field trials informed by behavioural science. These trials should be aimed at selecting effective approaches to deliver the largest impact and should be targeted to specific energy behaviours.

Research may involve a mix of methodologies including different qualitative and quantitative research methods (e.g. RCTs¹²⁹, A/B testing, before-and-after trials, observation, focus groups, surveys, exploitation of existing datasets, quasi-experiments, etc.).

Consortia should include, on the one hand, behavioural experts and, on the other, public authorities, DSOs and/or relevant civil society organizations (NGOs, associations, local energy communities, etc.) implementing energy efficiency related interventions.

Proposals should describe how the role and tasks of the various Consortia's members will be coordinated. They should place emphasis on the European added-value of their outputs and the comparability of the results of different pilots in order to be relevant for European policy makers. The theoretical and empirical research chosen by the consortium should allow to draw conclusions regarding the best policy instruments (e.g. push and pull measures, price mechanisms, incentives, the leveraging on social norms, the provision of simplified real-time and possibly comparative information about one's own consumption pattern, etc.), the relevant contextual aspects determining the efficiency of the intervention and, where possible, the long-term impacts of behaviourally informed policy interventions.

Proposals should build on relevant national and international projects and initiatives.

¹²⁹ Randomised Controlled Trials (RCTs) are an experimental technique that randomly assigns the participants under study to different conditions. In its simplest form, a group receiving the experimental treatment is compared with a control group receiving no treatment.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately¹³⁰. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Depending on the scope addressed, proposals are expected to identify the impacts listed below using quantified indicators and targets, wherever possible:

- Support policies, at all governance levels, aiming to foster investments in Energy Efficiency improvements and best practice development (scope a and b);
- Increased awareness among households, businesses and financing institutions (scope a and b);
- Number of public officers, private actors and other stakeholders involved and reached out to, number of peer-reviewed articles produced, or references to impact assessments, strategy papers or other policy documents (scope a and b);
- Increase awareness on multiple benefits among policy makers in other-than-energy policy departments e.g. using a simplified language in order to allow their inclusion in future policy developments and monitoring, impact assessments and policy evaluations (scope a);
- Number of analysed scenarios, energy efficiency measures and of non-energy benefits (scope a);
- Number of interventions designed using behavioural levers¹³¹ and relevant behavioural biases and elements identified (scope b);
- Number of consumers adopting a more sustainable energy consumption behaviour (scope b);
- Primary energy savings triggered by the project (in GWh/year – scope b);
- Investments in sustainable energy triggered by the project (million Euro – scope b).

Additional positive effects can be quantified and reported when relevant and wherever possible:

- Reduction of greenhouse gases emissions (in tCO₂-eq/year) and/or air pollutants (in kg/year) triggered by the project (scope b).

Type of Action: Research and Innovation action

¹³⁰ The funding shall cover the expenses of the research project (design, roll-out, monitoring, *data analysis, reporting*, communication and dissemination) but by no means any substantial economic or in-kind incentive being tested as part of the intervention.

¹³¹ See the glossary of Joana Sousa Lourenço, Emanuele Ciriolo, Sara Rafael Almeida, and Xavier Troussard; Behavioural insights applied to policy: European Report 2016. EUR 27726 EN; doi:10.2760/903938

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-EC-5-2020: Supporting public authorities in driving the energy transition

Specific Challenge: The delivery of the Energy Union targets requires the full engagement of the public sector at all governance levels.

Local and regional public authorities have a crucial role in setting ambitious energy efficiency strategies, for instance in the framework of the Covenant of Mayors for Climate & Energy and Smart Cities & Communities or the Clean Energy for EU islands initiative. The political commitment at local level should be enhanced and the focus should turn to implementation and effective monitoring of concrete energy efficiency solutions and actions, which can contribute to modernise and decarbonise the European economy. Synergies should be sought, whenever possible, with local and regional air quality plans¹³² and air pollution control programmes¹³³ to reduce costs since these plans rely to a large extent on similar measures and actions¹³⁴.

Support should continue and be reinforced in building capacity of public authorities and empowering them to take up their role of energy transition leaders at regional and local level, by permanently improving their skills as public entrepreneurs and supporters of market transformation towards more efficient energy systems.

At national level, the Energy Efficiency Directive¹³⁵ has triggered numerous positive developments in the Member States by setting targets to incentivise and enable investment in energy efficiency programmes across all sectors. However, Member States have yet to fully implement the Directive and additional support in building capacity and know-how is needed.

Scope: a) *Support to local and regional public authorities*

The Commission considers it to be equally relevant to address one or more of the following bullet points, as appropriate:

- Enhance decision-making processes of regional and local authorities, to deliver a higher quality, coherence and consistency of energy efficiency measures - and accelerate reaching targets. Actions should foster horizontal and vertical integration of different governance levels, joint application of the energy efficiency measures across local and regional authorities, improved monitoring and verification schemes, and more efficient use of public spending. Proposals should demonstrate political commitment and lead to subsequent institutionalisation of the improved processes in support of the Energy Union Governance Regulation.

¹³² Directive 2008/50/EC

¹³³ Directive 2016/2284

¹³⁴ Second State of the Energy Union, page 13.

¹³⁵ To be added

- Support public authorities in the development of policy scenarios and transition roadmaps that clearly outline the path to the European long-term 2050 targets and inform the ongoing implementation of SEAPs/SECAPs or similar plans and the development of future plans/targets for 2030 and beyond. Actions should link closely to the Covenant of Mayors initiative and the Energy Union Governance Regulation, where relevant.
- Innovative ways to enable public engagement in the energy transition, developing interface capacities within public authorities to engage with civil society.
- Deliver innovative capacity-building programmes for cities and/or regions to step up their capacity to drive the sustainable energy transition in their respective territories. Proposals should foster a sustained increase in the skill base of public authorities, adapted to their needs and challenges, and support the diffusion of the learning within participating organisations and beyond. The proposed actions should include a strategy to replicate results across Europe and a solid impact monitoring.

Proposals should build on existing initiatives such as the Covenant of Mayors¹³⁶, ManagEnergy¹³⁷ or any other relevant initiative as appropriate.

b) Supporting the delivery of the Energy Efficiency Directive

Proposers should focus their proposed action on:

Actions assisting Member States to fulfil their obligations under the Energy Efficiency Directive (EED) and – where relevant to the implementation of the EED – under the Energy Union Governance Regulation. Proposals should support efficient implementation by taking into account existing effective practices and experiences from across Europe. Proposals may address, for example, the harmonisation of energy savings calculations under Article 3, the effective implementation of Article 7 including consistent monitoring and verification systems, higher efficiency of the generation under Article 14 and of transmission or distribution systems under Article 15 or an efficient development and continuous reporting of Integrated National Energy and Climate Plans.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate, depending on the scope addressed, the impacts listed below, using quantified indicators and targets wherever possible:

- Primary energy savings, renewable energy production and investments in sustainable energy triggered in the territory of participating parties by the project (respectively in GWh/year and in million Euro);

¹³⁶ www.eumayors.eu

¹³⁷ www.managenergy.eu

- Number of institutionalised collaborations on the energy transition between public authorities;
- Numbers of stakeholders active in delivering the energy transition;
- Number of public authorities and public officers with improved capacity/skills in delivering the energy transition;
- Number of policies influenced through the action;
- Number of Member States with improved implementation of the EED and linked Energy Union Governance Regulation, clearly attributable to project activities.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Smart citizen-centred energy system

The EU's energy policy package "Clean Energy for all Europeans" (adopted by the Commission on 30 November 2016) puts the citizen in the centre of the EU's energy system. Actions are needed to support the best implementation of this ambitious legislative proposal. Therefore this section of the Work Programme on Integrated Energy Systems aims, among others, at preparing and testing solutions to support the new proposals for directives and regulations which are shaping the energy system of the future. In addition, the energy transition proposed in "Clean Energy for all European" insists on the importance to decarbonise heating and cooling, electricity and transport.

Therefore two main lines of actions are proposed:

1. Electricity markets and consumers, interacting with other energy vectors with topics LC-SC3-EC-3-2020 (in the "Smart and clean energy for consumer" area) as well as topics LC-SC3-ES-1-2019, LC-SC3-ES-2-2019, LC-SC3-ES-5-2018-2020 and LC-SC3-ES-6-2019;
2. Decarbonisation of local energy systems whether on islands or on the continent with topics LC-SC3-ES-3 2018-2020, LC-SC3-ES-4-2018-2020 and LC-SC3-ES-8-2019.

These two lines of actions also contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan action 4.1 on 'An optimised power grid' and 4.2 on 'Integrated local and regional energy systems'¹³⁸.

Common requirements regarding proposals relevant to "Electricity markets and consumers, interacting with other energy vectors" (topic LC-SC3-EC-3-2020 of the previous section, as

¹³⁸ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

well as topics LC-SC3-ES-1-2019, LC-SC3-ES-2-2019, LC-SC3-ES-5-2018-2020 and LC-SC3-ES-6-2019)

Since the associated directives and regulations were negotiated with the Parliament and the Council in 2018, it is important to ensure coherence and organise a feedback from the R&I projects towards policy makers. We will therefore pursue the BRIDGE initiative¹³⁹ which integrates and structures feedback of projects along, for the time being, four lines:

1. Business models
2. Customer engagement
3. Data management
4. Regulation

Ongoing projects of the 2014, 2015 and 2016 calls have delivered first results and the relevant Innovation Actions from the 2018 to 2020 will also be asked to contribute (i.e. topic LC-SC3-ES-6-2019-2020 is a priori not concerned). Relevant regulatory issues should be analysed also in the context of the future electricity market design.

Proposers should demonstrate in the content of their proposal a good knowledge and compatibility with current regulations, available or emerging standards and interoperability issues applying to their technologies, in particular in connection to ongoing work in the Smart Grid Task Force and its Experts Groups in the field of Standardization (e.g. follow-up activities to the CEN-CLC-ETSI M/490), regulatory environment for privacy, data protection, data management and alignment of data formats (e.g. the work of the ad-hoc group on “My Energy Data” and its respective follow-up), cyber security, smart grid deployment, infrastructure and industrial policy (<http://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force>).

Projects dealing with data handling and management should comply with the provisions of the General Data Protection Regulation¹⁴⁰ and industry standards, e.g. the Data Protection Impact Assessment Template¹⁴¹. A high level of cyber security should be guaranteed in compliance with relevant EU security legislation¹⁴² and with due regard of best available techniques for ensuring the highest level of protection¹⁴³.

The topics in this area should contribute to test a certain number of approaches proposed in the legislative package 'Clean Energy for All European' and develop technologies and solutions which will enable these approaches to be implemented under economic conditions.

¹³⁹ <http://www.h2020-bridge.eu/>

¹⁴⁰ Regulation (EU) 2016/679

¹⁴¹ Supported by the Commission Recommendation 2014/724/EU

¹⁴² Directive (EU) 2016/1148

¹⁴³ Best Available Techniques for data protection and security regarding the ten minimum functional requirements for smart metering which were proposed in the Commission Recommendation 2012/148/EU.

Overall, the topics proposed should also contribute to the 2030 Climate-Energy objectives (40% GHG reduction with respect to 1990, at least 27% of renewables by 2030).

A first group of topics (LC-SC3-ES-1-2019, LC-SC3-ES-2-2019 and ES-5-2018-2020) is expected to increase the capacity of the European electricity grid to host a larger share of variable renewables so as to accelerate its decarbonisation. For this purpose, stronger engagement of consumers is needed, more flexibility services for both distribution and the transmission grids, higher levels of regional cooperation (i.e. cooperation between a group of neighbouring countries) at transmission levels and well-functioning retail and wholesale markets that are capable of financing necessary investments.

A second group of topics (LC-SC3-ES-3-2018-2020, LC-SC3-ES-4-2018-2020 and LC-SC3-ES-8-2019) is expected to impact on the decarbonisation of energy systems on geographical islands and at local levels on the mainland taking advantage of the availability of local renewables resources, the specificity of the demand and of the local energy networks to design and demonstrate low carbon local energy system.

Proposals are invited against the following topic(s):

LC-SC3-ES-1-2019: Flexibility and retail market options for the distribution grid

Specific Challenge: Today, a large share of variable generation electricity sources are connected to distribution grids that were originally designed to distribute electricity supplied by large centralised power generation plants through the transmission grid. In view of the expected growth of variable electricity production, and a shift towards more electrified heating, cooling and transport sectors, new approaches have to be found for managing electricity distribution grids in order to ensure affordability of energy, security and stability of supply, while avoiding massive investments in infrastructures. Electricity storage, in particular relying on batteries, power to heat/cold, power to X, vehicle to grid and other storage solutions will play a key role in providing services to the grid and improve and reinforce the networks capacities.

Scope: Proposals will develop and demonstrate integrated solutions which will allow the distribution grid to function in a secure and stable manner with large shares of variable renewables. A combination of at least two of the following elements will be tested:

- Flexibility measures and electricity grid services provided by storage of electricity (including batteries and vehicle to grid technologies), power to-X (in particular power to heat), demand response¹⁴⁴ and variable generation enabling additional decarbonisation;
- Smart grids technologies for an optimum observability and tools for higher automation and control of the grid and distributed energy sources, for increased resilience of the electricity grid and for increased system security, including under extreme climate events;

¹⁴⁴

Proposers who want to address specifically demand-response should consider topic LC-SC3-EC-3-2020

- Market mechanisms incentivising flexibility or other market tools should be defined and tested, for mitigating short-term and long-term congestions or other problems in the network (e.g. dynamic network tariffs and solutions to reduce the costs of energy transition, non-frequency ancillary services). Solutions should demonstrate the necessary cooperation with other system operators and particularly TSOs by facilitating the integration of wholesale and retail markets.

Replicability and scalability of solutions is desirable to ensure the maximum impact of the use of the project results.

Proposals should include a task on the analysis of obstacles to innovation under the current context but also under the future market design context and foresee the coordination on policy relevant issues and obstacle to innovation (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative¹⁴⁵. An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort.

Proposals should build upon the insights and results of projects that have already been selected in this field under H2020 (information can be found on the BRIDGE web site¹⁴⁶) and demonstrate their innovative character.

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

Proposers can apply under the following two sub-topics:

1. Flexibility and retail market options for the distribution grid
2. Flexibility and retail market options for the distribution grid: International cooperation with Canada.
In several international contexts such as the Clean Energy Ministerial, the Mission Innovation initiative launched at COP21, the International Energy Agency Implementing Agreement on Smart Grids (ISGAN), bi-lateral discussions between Canada and the EU identified this topic as being of common interest owing to its potential for decarbonisation. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation with Canada is required under this topic. The cooperation must be under the form of a Coordination Agreement between the Horizon-2020-funded project with a project with similar scope and sizeable efforts supported by Canadian funding authorities (see also Eligibility and admissibility conditions).

Proposals must clearly indicate to which sub-topic they apply.

TRL will range typically between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimated levels of TRL at the beginning and at the end of the project.

¹⁴⁵ <http://www.h2020-bridge.eu/>

¹⁴⁶ <http://www.h2020-bridge.eu>

The Commission considers that proposals requesting a contribution from the EU of between EUR 6 to 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Projects are expected to develop and demonstrate solutions which contribute to at least 2 of the following impacts:

- Enhance flexibility of distribution grids which are expected to operate in an overall context of 50% electricity production from renewables in 2030 (EU28 average, see¹⁴⁷);
- Contribute to define the conditions of a well-functioning electricity market which creates business case for stakeholders willing to provide such flexibility and allow to sustain the necessary investments (e.g. variable price strategies);
- Improve the capability to manage future energy loads including electrical vehicles;
- Improve distribution grid operations which guarantee security of supply and the use of flexibility products while integrating large shares of variable renewables avoiding unnecessary investments by solving congestion.

In the case of sub-topic 2) International cooperation with Canada, the expected impacts of the cooperation to be substantiated in the proposal are to deliver mutual benefits and added value (i.e. in addition of the sum of the results of the two projects).

Proposals are invited to identify and substantiate to which of the above impacts they contribute and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-2-2019: Solutions for increased regional cross-border cooperation in the transmission grid

Specific Challenge: Today wholesale prices may vary significantly across the different market zones in Europe showing that the wholesale market is not operating under optimal conditions while some interconnectors are underutilised. More cooperation between TSOs and between TSOs and energy producers who are providing cross-border services, in particular at regional level (i.e. involving a group of countries), is an element that is promoted in the future market design to contribute to improving this situation.

Scope: Proposals will demonstrate integrated hardware and software solutions for cross border flows in the transmission grid in a regional context.

¹⁴⁷ EU Reference Scenario 2016: Energy, transport and GHG emission trends to 2050

Proposals are required to integrate at least four of the following points:

- Improvements of the tools for communication and grid operations, in particular for intraday and real-time markets involving several TSOs in the context of regional cooperation; tools to analyse and simulate risks of the system at regional level;
- Better prediction of production from variable renewables and demand response forecast at regional level;
- Definition and testing of new cross border grid services called by an increasing share of renewables (flexibility, balancing, decrease of system inertia, congestion, etc.);
- Mechanisms to ensure a well-functioning wholesale market, efficient techniques for coupling real time markets;
- Enhance cross border flow and trading, enhanced exploitation of assets such as large bulk storage systems, hydropower plants, large scale batteries installations, etc;
- Demonstration in a regional context. Priority should be given to regions where this cross-border cooperation between TSOs is being less effective. The demonstration should be supported by the experience of more advanced regions (intra-EU and inter-EU); when dealing with EU-border countries, special attention should be paid to reduce external energy dependence through more efficient cooperation;
- Develop guidelines to avoid distortion resulting from the non-harmonisation of regulations between countries.

Proposals should include a task on the analysis of obstacles to innovation under the current context but also under the future market design context and foresee the coordination on policy relevant issues and obstacle to innovation (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative¹⁴⁸. An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort are recommended.

Proposals should build upon the insights and results of projects that have already been selected in this field under H2020 (information can be found on the BRIDGE web site¹⁴⁹) and demonstrate their innovative character.

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

TRL will range typically between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.

¹⁴⁸ <http://www.h2020-bridge.eu>

¹⁴⁹ <http://www.h2020-bridge.eu>

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to contribute to enhance regional cooperation:

- in the operation of transmission grids so as to bring additional flexibility in the context of an increasing share of variable renewables;
- in optimising infrastructure investments and making best use of large scale assets that are bringing flexibility;
- in an improved functioning of the wholesale market across borders;
- in the development of future common approaches to grid services.

Proposals are invited to identify and substantiate to which of the above impacts they contribute and include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-3-2018-2020: Integrated local energy systems (Energy islands)

Specific Challenge: The fast growth of energy production from renewable energy sources offers new and economically attractive opportunities for decarbonising local energy systems (e.g. isolated villages, small cities, urban districts, rural areas with weak or non-existing grid connections). It is also a technological and financial challenge for the electricity network to integrate more renewables, but it is also an opportunity to optimise the electricity system operation in synergy with other energy carriers/vectors to increase the hosting capacity for renewables, not just for electricity but also for heating/cooling, transport and/or industry in a sector coupling approach. Novel approaches to optimize network architecture, planning and development based on the opportunities offered by integrated local energy systems and enabled by digitalisation and power electronics can contribute to addressing the challenge, as can storage of electricity in all energy vectors (e.g. electricity, heating, cooling, water, wastes, etc.), including possibilities offered by batteries and electric vehicles.

Integrated local energy systems can be used to create economically attractive conditions to boost local energy sources and activate local demand-response. Innovative approaches, for example based on Renewable Energy Communities, in line with the recently adopted Renewable Energy Directive (EU) 2018/2001 can result in attractive business cases for local investments in smart integrated energy systems with weakly or non-existing grid connections.

At the same time, decarbonisation can go hand-in-hand with the improvement of local air quality and citizens' engagement.

Scope: Proposals will develop and demonstrate solutions which analyse and combine, in a well delimited system, all the energy vectors that are present and interconnect them, where appropriate, to optimise their joint operation that is demonstrated by an increased share of renewables in and higher energy efficiency of the local energy system.

Proposals should present a preliminary analysis of the local case as part of the content of the proposal and propose to develop solutions and tools for the optimisation of the local energy network, that also have a high replication potential across Europe.

Local consumers, small to medium industrial production facilities and/or commercial buildings should be involved in the projects from the start, preferably by creating energy renewable energy communities¹⁵⁰.

TRL will range between 5 and 8 (see part G of the General Annexes). Proposals will indicate the estimated levels of TRL at the beginning and at the end of the project.

Proposals will include a task on the analysis and communication of obstacles to innovation and foresee the coordination on policy relevant issues (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative and, if relevant to the project, the Clean Energy for EU Islands initiative¹⁵¹. An indicative budget share of at least 2% of the EU contribution is recommended for the research work associated with these issues and an additional 2% of the EU contribution for the coordination effort.

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to contribute to all the following impacts:

- validate solutions for decarbonisation of the local energy system while ensuring a positive impact on the wider energy infrastructure, on the local economy and local social aspects, and local air quality;
- enhance the involvement of local energy consumers and producers, preferably by creating energy communities in the development and the operation of local energy systems and test new business models;

¹⁵⁰ 'renewable energy community' as defined in DIRECTIVE (EU) 2018/2001 on the promotion of the use of energy from renewable sources.

¹⁵¹ <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-eu-islands>

- validate approaches, strategies and tools to safely and securely operate an integrated local energy system across energy vectors (electricity, heating, cooling, water, wastes, etc.) so that it is able to integrate higher shares of renewables (than it would in case of separate operation of infrastructures);
- benchmark technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens.

Proposals are invited to include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life. Indicators are expected to have clear and measurable targets.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands

Specific Challenge: Energy production costs on geographical island are up to ten times higher than on the mainland; therefore the large-scale deployment of local renewable energy sources and storage systems brings economic benefits and, at the same time, contributes to decarbonising the energy system of the island, reducing greenhouse gases emissions and improving, or at least not deteriorate, air quality.

Scope: The proposed solutions will contribute to high levels of local renewable energy and a very significant reduction of the use of fossil fuel based energies (ideally achieving full decarbonisation for the whole island), covering also:

- Improve integration and use of digitalised smart grids and/or thermal networks based on high flexibility services from distributed generation, local power balancing, demand response and storage of electricity, heating and cooling, water, etc.; including innovative approaches to energy storage at different scales.
- Improved forecasting through comprehensive modelling of demand and supply (e.g. based on weather, wind, sun, etc.).

Projects should also deliver:

- Effective business models for sustainable solutions for Renewable Energy Communities, in line with the recently adopted Renewable Energy Directive (Directive (EU) 2018/2001);
- Practical recommendations arising from project experience on:
 - o regulatory and legal aspects;
 - o gender and socio-economics (Social Sciences and Humanities);

- o storage and flexibility solutions (from short to seasonal timescales);
- o data management, data processing and related cyber security;
- Contributions to environmental sustainability, in particular in view of the specificities of islands ecosystems;
- Large scale implementation of self-consumption solutions in households, buildings and/or districts, supported by microgrids and decentralised small-scale storage systems.

Proposals will involve at least two Follower islands (geographical islands). The follower islands are to be members of the consortium although their participation in the project can be limited to actions allowing them to develop plans to adapt similar solutions to their islands in a cost-efficient way. The size of the budget allocated to Follower islands should be clearly correlated to their level of involvement in the project's activities. Follower islands participation will focus on exploring, planning and initiating the replication of the deployed solutions adapted to the different local conditions. This has to take the form of a detailed replication plan delivered by the end of the project.

The TRL will range between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.

Proposals will include a task on the analysis of obstacles to innovation under the current context and foresee the coordination on policy relevant issues (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative¹⁵². An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort.

If relevant, projects should cooperate with the European Islands Facility (LC-SC3-ES-8-2019), and aim to establish synergies with ongoing and planned work on islands in the 'Clean Energy for EU islands' initiative¹⁵³. To support this, an indicative budget share of at least 2% of the EU contribution is recommended, which for example could include the development of practical training material and courses for island inhabitants, based on the chosen objectives and deliverables.

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 to 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The projects are expected to contribute to all the following impacts:

¹⁵² <http://www.h2020-bridge.eu/>

¹⁵³ <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-eu-islands>

- reduce significantly fossil fuel consumption, by developing renewable energy-based systems (including heating and cooling and storage) that allow the island to go towards full decarbonisation goals in a shorter time frame;
- large-scale uptake of validated solutions on the same geographical island and/or on other geographical islands with similar problems;
- Facilitate the creation and/or increase the number of renewable energy communities¹⁵⁴;
- enhance stability of the power network for islands that are grid connected with the mainland.

Proposals are invited to include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life. Indicators are expected to have clear and measurable targets. Proposals are also invited to identify if they impact on future investment perspectives (see also topic LC-SC3-ES-8-2019).

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation

Specific Challenge: The legislative proposals on the energy market that the Commission adopted on 30 November 2016 (the Clean Energy for all Europeans Package) and for which political agreement has been reached last year, in particular the revised Electricity Directive and the revised Electricity Regulation, promotes that network operators procure services (such as balancing, congestion management and ancillary services) from assets connected to the network both at transmission and at distribution level, in a coordinated way¹⁵⁵. This will enable more efficient and effective network management and optimisation, for the benefit of increased demand response and the ability to integrate increasing shares of renewables. The same pool of resources will be used by Transmission System Operators (TSOs) and Distribution System Operators (DSOs): actions by both can mutually affect each other. In cooperation with market participants and national authorities, they have to define the services they want to procure, and have to set up ways to procure them in a coordinated, transparent and non-discriminatory manner.

¹⁵⁴ 'renewable energy community' as defined in DIRECTIVE (EU) 2018/2001 on the promotion of the use of energy from renewable sources.

¹⁵⁵ see a.o. the proposed Guideline on Electricity Balancing, Article 31 and 32 of the Directive on the internal electricity market, COM(2016)864, 2016/0380(COD), Article 53 of the proposal for a Regulation on the internal electricity market, COM(2016)861, 2016/0379(COD) [to be updated when legal texts are adopted

Scope: The focus is on one project that demonstrates the setting-up of markets and digital platforms where electricity TSOs and DSOs can procure grid services from suppliers, aggregators and possibly individual consumers. The focus is also on demonstrating how suppliers, aggregators and possibly individual consumers can use large-scale and small-scale assets/devices owned by consumers and connected to the electricity network to deliver such services to TSOs and DSOs, at a large-scale, i.e. at a size that has a systemic relevance for TSO and DSO operations. The aim is to demonstrate how such markets and platforms will increase cost-efficiency in (future) network operations and create consumer benefits by rewarding them for flexibility in energy (production or consumption) or power through the delivery of grid services, and to facilitate the implementation of the demonstrated markets and platforms by other TSOs and DSOs. Therefore, the markets and platforms should enable the integration of relevant digital technologies like Internet-of-Things, Artificial Intelligence, cloud and big data services.

The selected project should build on experience and best-practices from previous and ongoing projects (in particular those supported under the call LC-SC3-ES-5-2018-2020 in 2018), and aim to deliver one set of protocols and standards with respect to platforms for the procurement of grid services. Building on existing projects, the project will define, test and demonstrate in real-life the operation of integrated, system-based and coordinated markets and platforms, that TSOs and DSOs jointly set up with suppliers and aggregators (but that can also be operated by other parties), for (a set of) grid services, in particular balancing, congestion management, ancillary services. The selected project will also define, test and demonstrate how DSOs and TSOs procure and use these services in a coordinated, transparent and non-discriminatory manner for grid management purposes, in a way that:

- will contribute to the development of a seamless pan-European electricity market that makes it possible for all market participants (if necessary via intermediaries such as energy suppliers or aggregators) to provide grid services in a market that is transparent and non-discriminatory;
- enables TSOs and DSOs to improve predictability and anticipate network problems, through the procurement of services via markets that incentivise connected consumers, buildings, devices (including small-scale generation) to adapt their energy (consumption or production) or power;
- facilitates scaling up the platforms and markets to spread its use by making it as easy as possible for suppliers, aggregators or consumers directly to offer grid services based on other or new small-scale and large-scale assets/devices on these markets, if necessary through as easy and automated pre-qualification processes as possible, Facilitating scaling up can also be done through integrating new services into existing platforms and/or links new services to existing markets as much as possible, by taking into account the ability to integrate future network services that support the energy network transition (e.g. those needed in scenarios with large RES penetration) and by being compatible across borders in line with EU rules, including applicable rules on market coupling and balancing;

- demonstrates scalability to deal with the increasing amount of data coming from more and more connected assets/devices that can provide grid services and requires near real-time big data processing, by developing and testing the appropriate ICT infrastructure;
- allows procurement based on the specific location and grid conditions (if necessary);

The selected project also will:

- Define the needs of network operators for system operation, and turn these into services and products, based on interaction with suppliers, aggregators and energy service companies, that test what services can be provided by what assets;
- define and test 1) standardised products and key parameters¹⁵⁶ for grid services; 2) the activation process for the use of assets for these services; 3) the settlement process for payment related to these services; 4) simultaneous procurement of these services by a TSO and a DSO from assets in the DSO network that are connected to that TSO's network;
- recommend a limited set of standardised products and key parameters¹⁵⁷ for grid services that as reference for any TSO or DSO in the European electricity market;
- Verify the effectiveness of the services and products with respect to the technological capabilities of the assets (e.g. duration, ramp-up/ramp-down, islanding), including to ensure reliability of supply under different network conditions;
- Design and develop ICT systems and infrastructure that will facilitate open (non-proprietary) standardised and interoperable multi-party data-sharing and facilitate scaling-up, including across borders (at least in the EU), between all actors that use the markets and platforms for grid services. This shall be based on a description of the technical requirements and the specifications at the level of the interfaces required for the markets and platforms for grid services (e.g. between DSOs and TSOs; TSOs and TSOs; DSOs and DSOs; TSOs and suppliers/aggregators/consumers/prosumers; DSO and suppliers/aggregators/consumers/prosumers) and shall include ways to effectively address cyber-threats.
- make use as much as possible existing open reference architectures, such as FIWARE, and ongoing developments, in particular through a close cooperation with the projects selected under the call 'DT-ICT-11-2019: Big data solutions for energy';
- Aim to deliver one set of protocols and standards with respect to platforms for the procurement of grid services;
- Identify the relevant system data that enable market participants to better assess and forecast the need for grid services and publish such data (as much as possible);

¹⁵⁶ where such parameters don't exist yet at EU level

¹⁵⁷ where such parameters don't exist yet at EU level

- Test innovative ways to promote consumer participation, engagement and perception, such as peer-to-peer trading, and innovative ways to secure transactions, such as via distributed ledgers and blockchain;
- investigate the possibilities for innovative pricing and compensation (including through local markets) for consumers that own or use the assets that provide the grid services, taking into account tariff and tax systems;
- Provide recommendations to TSOs and DSOs for improvement paths in system operation to enable the integration of new services and products in system operation;
- Include a credible business plan to ensure that the tested and demonstrated platforms and markets will continue operation (and further will be further replicated/developed by as many other TSOs and DSOs as possible) in real-life after the project ends;

In relation to the organisation, the selected project is expected to:

- Make use of financial support to third parties for at least 2.5% of the EU contribution to the project for the incorporation of developers (SMEs and start-ups) of innovative energy services (in particular for household consumers).
- Cooperate with projects supported under the topic LC-SC3-EC-3-2018-2020 that approach the challenge more from a consumer's perspective and work with Digitisation of Energy projects, funded under the following topics:
 - o SC3-ES5-2018, and ensure that selected projects build on the ongoing work of those selected in 2018;
 - o SU-DS04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks;
 - o DT-ICT-10-2018: Interoperable and smart homes and grids;
 - o DT-ICT-11-2019: Big data solutions for energy; as well as with the projects funded under topic LC-SC3-EE-13-2018-2019-2020: *Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource* where innovative consumer energy services will be developed and tested regarding their business viability and consumer acceptance. For this purpose, proposals must foresee a work package for cooperation with other selected projects and earmark appropriate resources (5-10% of the requested EU contribution) for coordination and communication efforts and research work associated with cross-cutting issues. This collaboration will be formalized in a dedicated work package.
- Coordinate their work with NRA's, ENTSO-E, the DSO organisations and other stakeholders and take into account the experience from other projects through

cooperation in the BRIDGE initiative¹⁵⁸. An indicative budget share of at least 2% of the EU contribution is recommended for the cooperation activities under the BRIDGE initiative.

TRL will range between 5 and 8 (see part G of the General Annexes).

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

The Commission considers that proposals requesting a contribution from the EU of between EUR 20 to 22 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Solutions will demonstrate how markets and platforms for grid services will enable cost-efficient model(s) for electricity network management and integrate higher shares of renewables to support the energy transition. Solutions will also demonstrate how markets and platforms for grid services can be implemented at systemic level in real-life and how they can be scaled up and are replicable across the EU energy system. Solutions will also contribute to opening up significant new revenue streams for consumers and (small-scale) producers to provide grid services, and increase the hosting capacity of RES in the electricity system through smart grid management. They will provide the foundations for new network codes, for example on demand-response.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-6-2019: Research on advanced tools and technological development

Specific Challenge: A number of tools and future technologies need to be developed, matured and tested to cover gaps and/or to prepare the energy system of 2030 and beyond.

Scope: Proposals must address only one of the 4 following sub-topics whereby not necessarily all points listed in a sub-topic need to be addressed:

1. Advanced modelling tools for:
 - o the modelling of the future electricity market to study and analyse the impact and the design of electricity pricing structure from the wholesale markets, to real time markets (balancing and congestion management) and retail markets;
 - o modelling and forecasting energy production from variable renewables, associated frequency and voltage controls issues in the electricity grid and benefits associated with the use of storage.

¹⁵⁸ <http://www.h2020-bridge.eu/>

2. Advanced tools for

- o the design and planning and operation of electricity grid infrastructure including distribution and transmission level, taking into account environmental concerns, such as air quality, and footprints and the new constraints from variable renewable generation, the place and role of storage and flexibility; the optimisation of the use of existing electricity assets and network capacity;
- o the development of grid predictive management strategies with uncertainty (forecasting plus stochastic grid management tools), improving the maintenance of electricity assets (distribution and transmission) as well as the associated data management;
- o Enhanced TSO / DSO collaboration and coordination tools, secure data exchange across networks along whole the value chain, ICT tools for cross-border trading for nearly real-time balancing; definition of minimum set of specifications to allow automated digital cross-border electricity market.
- o Enabling technologies for reliable and resilient interconnected European electricity grids, making use of the specific features and the strategic role of the European Global Navigation Satellite Systems Galileo and EGNOS.

3. Technological developments:

- o Develop a new generation of reliable, robust and cost-effective energy storage technologies, storage management systems, in particular batteries, able to provide high specific energy rates, large number of life cycles, fast response to the electrical network demands and low maintenance;
- o Power electronics for batteries and software to manage combined or hybridised decentralised energy systems, also combining several energy vectors: a key focus is on significant cost reduction of these key components for homes, districts and larger systems which have the potential to accelerate significantly the energy transition of the electricity network.

4. International Cooperation with non-EU/Associated country member of Mission Innovation¹⁵⁹ on Mission Innovation Challenge 7 on Affordable Heating and Cooling for Buildings:

- o Develop compact thermal energy storage for electricity load shifting that will take up electricity from the grid at the peak times, to be used for heating, cooling or hot tap water at later times. Typical required charging power is 3 kW, for periods of up to three hours. Integration into the building heating system and in the smart

¹⁵⁹ Australia, Brazil, Canada, Chile, People's Republic of China, India, Indonesia, Japan, Mexico, Republic of Korea, Saudi Arabia, United Arab Emirates, United States

electricity grid is a key development element together to the storage materials and technologies.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Proposal must clearly indicate which sub-topic 1, 2, 3 or 4 they are targeting.

Proposals should comply with the requirements stated in the section 'Common requirements' of the introduction to the part on the Smart citizen-centred energy system.

1. Expected Impact: Advanced modelling tools are expected to: increase the knowledge on how to design of price structure and magnitude in order to be able to finance e.g. infrastructure and research and innovation; enhance the accuracy of the prediction of electricity production from variable renewables and better qualify and quantify associated issues and remedies
2. Advanced tools are expected to develop new approaches to electricity grid planning, monitoring and maintenance that are better suited to today's future characteristics of the grid and enable savings on infrastructure costs.
3. The technological developments are expected to reduce costs of key technology components to allow European Industry to keep and extend its leadership in power electronics for stationary battery systems of all sizes (from home to utility scale) and the integration of battery systems with high shares of renewable electricity and eventually also heating and cooling.
4. Contribute to the objectives of mission innovation and provide efficient innovative small scale power to heat/cool flexibility measures that can be deployed in a large number of buildings so as to enable the grid to operate with large share of variable renewable energy

Proposals are invited to include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-7-2018: Pan-European Forum for R&I on Smart Grids, Flexibility and Local Energy Networks¹⁶⁰

Specific Challenge: According to the JRC Smart Grid Projects Outlook 2014¹⁶¹, the majority of cooperation takes place between organisations from a limited number of Member States while 15 analysed countries (NO, CH, IE, PL, HU, SK, LT, RO, LV, HR, BG, LU, CY, EE, MT) account for less than 5 % of the R&I funds altogether.

Scope: The action should set-up a European Forum composed of R&I policy makers, R&I actors and experts ('community') in the field of smart grids / storage and local energy systems that is representative of the EU-28 energy system. The goal is to evolve towards a truly integrated pan-European R&I community with a high level of synergies, spread and representativity over a recommended duration of 4 years.

Actions should be proposed to establish and spread the state of the R&I in the field in Europe. A number of regional workshops where exchanges of experience and capacities between members of R&I community that are not used to collaborate will be organised where the key R&I challenges will be identified, discussed and structured. Advantage should be taken of other events and conferences, preferably well-known and occurring on a regular basis, to organise such workshops.

Beyond workshops, a methodology should be put in place that will allow developing the elements stated in the paragraph above on a long term perspective relying on diversified but combined means (virtual meeting, use of social media, setting up discussion groups, establishing collaborative working spaces). These new links, new knowledge and potential future collaboration should materialise through the delivery of reports (e.g. at regional and EU level).

The European Technology and Innovation Platform Smart Networks for Energy Transition (ETIP SNET), ongoing Horizon 2020 projects (e.g. the BRIDGE project¹⁶²) in the field, and existing associations with a true pan-European dimension will have an important role to play. This action should also contribute to widen the representativity of European associations in the field which have weaknesses in their EU coverage.

The consortium should be composed of a limited number of relevant beneficiaries offering the possibility to invite ad-hoc R&I policy makers, actors and experts when needed. The consortium should achieve a well-balanced representation at EU level.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 4 million would allow this specific challenge to be addressed appropriately.

¹⁶⁰ This activity directly aimed at supporting public-public partnerships with Member States and Associated Countries, technology platforms with industrial partners is excluded from the delegation to INEA and will be implemented by the Commission services.

¹⁶¹ http://ses.jrc.ec.europa.eu/sites/ses.jrc.ec.europa.eu/files/u24/2014/report/ld-na-26609-en-n_smart_grid_projects_outlook_2014_-_online.pdf

¹⁶² <http://horizon2020-story.eu/contact/>

Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported project is expected to contribute to:

- Building a true pan-European R&I community in the field of smart grids & associated flexibility measures / energy systems;
- Establish new collaboration on a long-term perspective which has a potential to develop into industrial collaborations;
- Building, in the long-term, solidarity and trust for a well-functioning and resilient pan-European energy system (e.g. contributing to risk preparedness).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-8-2019: European Islands Facility - Unlock financing for energy transitions and supporting islands to develop investment concepts

Specific Challenge: Mobilising investment in energy efficiency and renewables is key for Europe's energy transition. In 2017 the European Commission and 14 EU Member States signed a political declaration to launch the new 'Clean Energy for EU Islands' initiative. Its aim is to help islands reduce their dependency on energy imports by making better use of their own renewable energy sources and embracing more modern, socially inclusive and innovative energy systems.

Europe's more than 2200 inhabited islands can be considered living-labs which can deliver a pipeline of energy investment projects across Europe. Energy transitions on islands often benefit from low opportunity costs due to the existing high prices of conventional liquid fuels in contrast to the variety of renewable sources they may have available.

However, despite tremendous potential, too few islands in Europe succeed in developing and scaling up investment packages. A high degree of organisational, technical and financial innovation is needed to reach significant scale. A key gap is the lack of capacity for islands to transform their overall long-term ambitions into a credible set of plan(s) and project outlines, i.e. investment concepts, that serve as the basis for concrete projects. In particular, local initiatives and/or public authorities on islands have limited resources to access the analytic, financial and legal expertise needed to collect additional data and develop an investment programme of scale i.e. pooling projects and/or developing financing strategies which demonstrate sufficient maturity to enable access to different sources of finance often mobilised locally on the island.

In order for islands to be microcosms of economic, social and environmental transformations they may often require assistance in designing coherent set of projects and selecting the most

cost-effective option from the life-cycle perspective, aggregating smaller projects into island-size packages and in mobilising the significant amount of finance needed for a full energy transition. This may also include communication and engagement actions among island inhabitants to identify acceptable projects, which also can lead to projects co-ownership and mobilisation of local financing.

The investment concepts would allow a large number of islands and regions to access the various innovative financing streams which are being structured (e.g. PDA, ESIF Financial Instruments, National Investment Platforms), to increase the absorption rates of EFSI and to access private finance.

Scope: Proposals are expected to set up and run a 'European Islands Facility' which offers expertise and/or financial support and services to islands:

- The Islands Facility should offer expertise and/or financial support to develop, within a limited period of time, innovative cost-effective investment concepts based on (or the development of – if they do not yet exist) a transition plan and a coherent set of projects that will lead to a decarbonised, efficient and resilient island energy system using local energy flows and resources;
- The Islands Facility should be able to provide, inter-alia: translation of ambitions into a holistic energy transition plan, assistance in modelling of the energy transition on the island(s), a clear identification of the individual potential project pipeline(s), legal analysis and support, a description of how the investments will be financed and, if relevant, how the financing will be mobilised locally, advice on available funds and a design of the process to launch the investments. It can also cover the support for information and engagement actions among the islands inhabitants in the view of ensuring their acceptance, projects participation and co-ownership, also mobilising local financing;
- The Islands Facility should develop in-house expertise to coordinate, support the implementation and critically evaluate the outcomes on the above-mentioned issues, i.e. preparation of energy transition plans, modelling of the energy transition on the islands, identification and financing of project pipelines, legal analysis, so that it will create synergies between requests for assistance from different islands;
- Besides the technical assistance, the Islands Facility will maintain a public, searchable portal with the energy transition plans and project proposals that it has supported and developed, share and spread knowledge and best practices based on a sound and inclusive outreach strategy, with the aim to engage as many islands as possible in the energy transition;
- Proposals should foresee to provide support to third parties ('support scheme') as described in part K of the General Annexes of the Work Programme. At least 30%, and up to 70%, of the budget should be directly allocated for spending to island cities, municipalities or their groupings;

- Proposals should demonstrate that they are deeply rooted in the ecosystem of island communities, of sustainable energy planners and project initiators, and of the financing community of energy efficiency and energy system transformations;
- Proposals should include a strategy to include contributions from 3rd parties to its funding such as local, regional or national authorities (while maintaining autonomy in its activities), and a strategy to continue its work after the granted budget is finished;
- Proposals should demonstrate that they are able to mobilise a critical mass of islands and set up the support scheme of the Islands Facility in accordance with H2020 standards;
- Proposals have to foresee services to underpin European added value and earmark appropriate resources (at least 30%, and up to 70%, of the requested EU contribution) to make experts available directly to the islands, provide the necessary quality control over the experts' outputs, and ensure that the results are used by other islands;
- Proposals should demonstrate how they are able to select and prioritise islands for support under this facility, based on the following requirements: in order to qualify for support through the Islands Facility, islands must demonstrate proof of political commitment, an ambitious scale of potential investment and level of energy savings relevant to the island, investment sector targeted and type of financial solution envisaged, governance to develop the investment concept, a plan for long-term capacity building within the public administration, a plan on how they will include citizens and other stakeholders, and a commitment for monitoring for 2 years;
- Proposals should include a task to establish links and synergies with R&I projects selected under LC-SC3-ES-4-2018-2020: Decarbonising energy systems of geographical Islands under the BRIDGE initiative.

The Commission considers that proposals requesting a contribution from the EU of 10 million EUR would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals are expected to demonstrate the impacts listed below using quantified indicators and targets wherever possible:

- Demonstration and documentation of increased leveraging of finance into energy transition investments by public authorities;
- Overall, for every million Euro of Horizon 2020 support the action should trigger energy transition investments worth at least EUR 10 million;
- Number of investment concepts delivered, and number of concepts that turned into tangible investments after the provided support;
- Number of public authority staff with increased capacity for developing investible energy transition projects;

- Innovation uptake by potential replicators;
- Primary energy savings, GHG reductions, renewable energy production and investments in sustainable energy triggered by participating public authorities after the support of the action (respectively in GWh/year and in million EUR of investments).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-9-2019: ERA-NET Co-Fund Enhanced cooperation in Digitalisation of Energy Systems and Networks¹⁶³

Specific Challenge: Beyond direct efficiency gains and cost savings, digitalization holds the potential to catalyse fundamental, system-wide changes in Energy Systems and Networks. As digitalisation advances, a highly and cross-sectoral interconnected system of energy systems and infrastructures can emerge, with increasing opportunities for integration of renewables and efficient energy management. Electricity is likely to be the first energy sector impacted, digitisation enabling stronger connections to the heating and cooling sector, in particular in buildings and the mobility sector.

Digitalisation can also foster enhanced the participation of stakeholders in local, regional and European value chains. Local communities and prosumers may gradually begin to leverage the opportunities for their involvement in energy communities and energy transactions and boost European innovation and businesses.

In order to achieve this, energy stakeholders must work hand in hand with highly innovative newcomers and lateral thinkers that have a “digital mindset” (e.g.: the block chain community) and also integrate the know-how and experience from other sectors. The approach should also engage potential customers such as infrastructure operators, local industries or communities and end-users in value chains from the local and regional up to the European and global levels.

Therefore, support is needed for the development of future digital platforms, applications and business which maximize benefits for European citizens while incentivising a sustainable, secure and resilient energy system where data protection is guaranteed. Coordinated transnational Research, Demonstration and Innovation actions has the potential to make a large impact.

Scope: Proposals should coordinate national (or regional) energy and Information and Communication Technology (ICT) research, demonstration and innovation programs and pool the necessary financial resources with a view to implementing joint calls for proposals resulting in grants to third parties with EU co-funding in this area.

¹⁶³ This activity directly aimed at supporting public-public partnerships with Member States and associated countries, technology platforms with industrial partners and earth observation networks is excluded from the delegation to INEA and will be implemented by the Commission services.

The scope of activities should include

- The establishment of transnational innovation ecosystems for technology, systems and services that support designing, implementing and testing technical and business services for the future energy systems, building on available ICT platforms and tools; these should enable the participation of SME's and start-ups and develop scalable, customizable and replicable solutions applicable from local through interregional and up to global level.
- The coordination and linking of living labs¹⁶⁴ that facilitate the development and testing of prototypes, bringing innovative solutions from TRL4 (proof of concept) to TRL7. This shall enable the sharing of development and test facilities, allowing testing with hundreds of nodes representing real life operating conditions including failures, behaviour and misuse of the solution, as well as gaining experiences for the design of new market and business models.
- Connect networks of procurers in different countries and regions, which gather potential buyers and users of the solutions at an early stage, in order to help to understand the needs and requirements for more and more software dominated solutions.
- Activities to connect start-ups and investors to reflect on market driven applications.
- Establish methodologies and transnational process chains in conformance with European standards, such as SGAM/M490 and ISO/TR 28380, to implement and achieve interoperability of electronic data exchanges in heterogeneous energy-related ICT systems.
- Coordinate their work with NRA's, ENTSO-E, the DSO organisations and other stakeholders and take into account, build on, and work with Digitisation of Energy projects, funded under the following topics:
 1. LC-SC3-ES-5-2018-2020: TSO – DSO – Consumer: Large-scale demonstrations of innovative grid services through demand response, storage and small-scale (RES) generation
 2. DT-ICT-11-2019: Big data solutions for energy;
 3. DT-ICT-10-2018: Interoperable and smart homes and grids;
 4. SU-DS04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks;

¹⁶⁴ A living lab is a user-centered, open-innovation ecosystem often operating in a territorial context (e.g. city, agglomeration, region), integrating concurrent research and innovation processes (co-creation), potentially relying on a public-private-people partnership.

5. LC-SC3-EE-13-2018-2019-2020: Enabling next-generation of smart energy services valorising energy efficiency and flexibility at demand-side as energy resource.

Proposals should make use of state of the art innovation methodology (such as co-creation, design thinking, policy lab) to the community of solution designers to ensure high quality and highly dynamic communication between involved stakeholder groups. Proposals should include the set-up of a knowledge platform and promote transnational mutual learning.

Requirements in terms of funding rates for the ERA-NET Co-fund instrument can be found in the General Annexes of the work programme.

The Commission considers that proposals requesting a contribution in the range of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Overall, proposals are expected to enhance the collaboration of regional and national ICT and energy programs and their stakeholder communities, to leverage associated research and innovation / development funds and existing tools and outcomes from former European initiatives like e.g. the Internet of Energy projects FINSENY¹⁶⁵ and FINESCE¹⁶⁶ and contribute to the objectives of SET-Plan Action 4 on 'Increasing the resilience and security of the energy system'¹⁶⁷. Proposals should also contribute to develop need driven implementation environments on regional and local levels.

More specifically, proposals are expected to:

- Accelerate the development of transnational innovation ecosystems, promote the engagement of innovative SME's and start-ups in digital energy systems and solutions, contribute to create new business opportunities, growth and jobs in European regions;
- Foster the emergence of transnational initiatives and living labs, rationalise the use of test facilities, produce robust approaches to the use of digital systems;
- Activate networks of procurers so as to reach the critical mass needed to develop global solutions that can be customised to local / regional needs;
- Emulate local innovation forces and close to market thinking of start-ups and investors;
- Promote the development of interoperable solutions enabling wider impact and use of applications, systems and services.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

¹⁶⁵ <http://www.fi-ppp-finseny.eu/>

¹⁶⁶ <http://www.finesce.eu/>

¹⁶⁷ <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan/implementation-plans>

LC-SC3-ES-10-2020: DC – AC/DC hybrid grid for a modular, resilient and high RES share grid development

Specific Challenge: The increase of renewable energy generation in the electricity grid necessary to meet the EU's decarbonisation objectives represents a complexity for the management of the electricity grid based on Alternating Current (AC). At the same time, cyberattacks are difficult to fight due to the real-time requirements, the cascading effects, and the coexistence of legacy and state of the art technologies within a digitalised electricity system with an increasing number of access points.

Direct Current (DC)-based systems may provide a flexible, secure and reliable way forward. Many renewables generate in DC and much of the loads and equipment are already in DC. At the same time DC-based converters have become more efficient with the result that DC-based systems could be considered as viable solutions to tackle the aforementioned challenges.. The potential DC grid technologies for the development of the electricity grid thus need to be demonstrated, the barriers to be overcome identified and the business models for further exploitation developed. Exploiting these technologies will contribute to increasing European knowledge and leadership in these areas.

Scope: Proposals will address solutions for the design, modelling, simulation, development, demonstration, test and validation of new DC-based grid architecture(s) including a MV - LV DC - AC/DC hybrid grid architecture based on a DC underlay grid interconnecting micro/nano-grids. The modular grid planning and development, the “firewall” effect against faults or cyberattacks and the accommodation of higher shares of renewables in a DC-based system will be part of the demonstration and validation exercise.

Different types of generation and loads, including RES, battery storage and electric vehicle (EV) will be part of the demonstrations, which will be tested in interconnected as well as in isolated mode. Each solution proposed has to be demonstrated in at least two Members States or Associated Countries. Each demonstration has to include at least two micro/nano-grids (AC or DC), of which at least one with low-voltage DC infrastructure. Each demonstration has to be interconnected with at least one point of common coupling (PCC) to the existing grid through medium-voltage DC.

TRL will range between 5 and 8 (see part G of the General Annexes). Proposers will indicate the estimated levels of TRL at the beginning and at the end of the project.

In addition to the demonstration activities, proposals should include a task on the identification of the barriers to innovation and market uptake of the proposed architectures (e.g. technical (including, low-cost DC breakers, WBG¹⁶⁸), regulatory, standards, safety, acceptance and suitable business models) and pathways to overcome them (e.g. standardisation, such as of voltage levels), including recommendations.

Proposals should foresee the coordination on policy relevant issues (e.g. regulatory framework, business models, data management, and consumer engagement) with similar EU-

¹⁶⁸ Wide Band Gap components

funded projects through the BRIDGE initiative¹⁶⁹. An indicative budget share of at least 2% of the EU contribution is recommended for the research work associated with these issues and an additional 2% of the EU contribution for the coordination effort.

The Commission considers that proposals requesting a contribution from the EU of approximately EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The proposed solution(s) will contribute to

- facilitating planning and targeting investments in the sector;
- increasing resilience of the electricity grid to faults and cyberattacks;
- increasing penetration of RES in the power network;
- increasing the efficiency of the electricity system.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-11-2020: Rapid Relief through Transitions on Islands

Specific Challenge: Climate change, vulnerable interconnections, imported fuels and seasonal fluctuations in tourists' energy demands have all reduced the reliability of islands' energy systems, causing blackouts. At the same time the decreased cost of renewable energy and energy storage means that these problems can potentially be solved without generating power from fossil fuels or upgrading or installing new interconnectors. Exploiting these opportunities to both rapidly reduce electricity generation costs and fight against climate change is essential. It is also a significant business opportunity for European energy technology providers.

Scope: Proposals will demonstrate a solution or solutions on one island that is over 90% reliant on fossil fuels for generating its electricity. The solution or solutions should significantly reduce the annual fossil fuel demand and related GHG emissions thereby demonstrating the potential for wider deployment in other islands. In order to aim for maximum decarbonisation, islands with a population of between 5,000 and 100,000 are particularly encouraged.

Solutions will be developed involving all relevant local stakeholders and, where possible, a high involvement of Renewable Energy Communities¹⁷⁰. At the end of the project, the

¹⁶⁹ <http://www.h2020-bridge.eu/>

¹⁷⁰ 'renewable energy community' as defined in DIRECTIVE (EU) 2018/2001 on the promotion of the use of energy from renewable sources

installed solution would ideally be effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects.

Solutions will be cost-competitive with current local electricity prices and be able to be installed within 3 years of the project beginning. A minimum of 1 year monitoring post installation should be included within the project duration. Proposals should contain a sound business plan defining ownership and beneficiaries, as well as the forecast return on investment. The social impact of switching production from fossil fuels should be mitigated, for example, through education and training measures.

Proposals are expected to bring the technology from TRL6 to TRL7-8 by the end of the project.

Projects should cooperate with the European Islands Facility (LC-SC3-ES-8-2019), and aim to establish synergies with ongoing and planned work on islands in the 'Clean Energy for EU islands' initiative¹⁷¹). To support this, an indicative budget share of around 2-4% is recommended for cooperation and collaboration with other EU projects.

The Commission considers that proposals requesting a contribution from the EU of around EUR 2-3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The technologies developed are expected to contribute towards a significant increase in the number of islands of EU and Associated Countries that have a stable energy system generating at least 90% of their annual electricity demand from renewable energy sources. At the same time it is expected to contribute to the creation of new opportunities for the European renewable energy production industries.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-ES-12-2020: Integrated local energy systems (Energy islands): International cooperation with India¹⁷²

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

¹⁷¹ <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-eu-islands>

¹⁷² This topic is cancelled and replaced by topic LC-SC3-ES-13-2020. Topic LC-SC3-ES-13-2020 is similar in terms of thematic scope, but has different requirements as regards the international cooperation aspects.

LC-SC3-ES-13-2020: Integrated local energy systems (Energy islands): International cooperation with India

Specific Challenge: The fast growth of energy production from renewable energy sources offers new and economically attractive opportunities for decarbonising local energy systems (e.g. isolated villages, small cities, urban districts, rural areas with weak or non-existing grid connections). It is also a technological and financial challenge for the electricity network to integrate more renewables, but it is also an opportunity to optimise the electricity system operation in synergy with other energy carriers/vectors to increase the hosting capacity for renewables, not just for electricity but also for heating/cooling, transport and/or industry in a sector coupling approach. Novel approaches to optimize network architecture, planning and development based on the opportunities offered by integrated local energy systems and enabled by digitalisation and power electronics can contribute to addressing the challenge, as can storage of electricity in all energy vectors (e.g. electricity, heating, cooling, water, wastes, etc.), including possibilities offered by batteries and electric vehicles.

Integrated local energy systems can be used to create economically attractive conditions to boost local energy sources and activate local demand-response. Innovative approaches, for example based on Renewable Energy Communities, in line with the recently adopted Renewable Energy Directive (EU) 2018/2001, can result in attractive business cases for local investments in smart integrated energy systems with weakly or non-existing grid connections. At the same time, decarbonisation can go hand-in-hand with the improvement of local air quality and citizens' engagement.

Scope: Proposals will develop and demonstrate solutions which analyse and combine, in a well delimited system, all the energy vectors that are present and interconnect them, where appropriate, to optimise their joint operation that is demonstrated by an increased share of renewables in and higher energy efficiency of the local energy system.

Proposals should present a preliminary analysis of the local case as part of the content of the proposal and propose to develop solutions and tools for the optimisation of the local energy network, that also have a high replication potential across Europe and India.

Local consumers, small to medium industrial production facilities and/or commercial buildings should be involved in the projects from the start, preferably by creating energy renewable energy communities¹⁷³.

In bi-lateral discussions between India and the EU, as well as in several international contexts such as the Mission Innovation initiative launched at COP21, the Clean Energy Ministerial and the International Energy Agency Implementing Agreement on Smart Grids (ISGAN), this topic was identified as being of common interest owing to its potential for decarbonisation. In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation with India is promoted under this topic.

¹⁷³ 'Renewable energy community' as defined in DIRECTIVE (EU) 2018/2001 on the promotion of the use of energy from renewable sources.

The cooperation must be under the form of a proposal demonstrating a local energy system (or several local energy systems) in either the EU/Associated Countries or India or both, and through a project work programme with meaningful contributions by entities from the EU/Associated Countries and India.

Mutual learning and extensive exchange between demonstrations in European and Indian contexts is encouraged under this topic. Accordingly, the notion of 'first application/deployment in the market' as specified in the definition of an Innovation Action applies reciprocally to India and thus 'first' means new also in India.

For this topic India-based legal entities¹⁷⁴ in selected proposals have to apply for funding under the Indian co-funding mechanism with the Indian Department of Science and Technology (DST)¹⁷⁵.

TRL will range between 5 and 8 (see part G of the General Annexes). Proposals will indicate the estimated levels of TRL at the beginning and at the end of the project.

Proposals will include a task on the analysis of obstacles to innovation in both the EU and Indian context and foresee the coordination on policy relevant issues (e.g. regulatory framework, business models, data management, consumer engagement) with similar EU-funded projects through the BRIDGE initiative as well as with similar India-funded projects. Coordination and synergies will be explored and, if relevant to the project, may be established with the Clean Energy for EU Islands initiative¹⁷⁶. An indicative budget share of at least 2% is recommended for the research work associated with these issues and an additional 2% for the coordination effort.

It is considered that proposals requesting a contribution from the EU of between EUR 2.5 to 3.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. This contribution will be combined with a contribution from the Indian DST.

Sharing of Information for the Eligibility Checks and Evaluation:

For applicants from EU and associated countries, the eligibility conditions for Horizon 2020 apply as set out in the General Annexes to the work programme. The eligibility conditions for the Indian applicants will be published in due time by the DST. The eligibility of the applicants will be checked shortly after the closure of the call. For this purpose, the Commission may share a list with project names, proposal numbers and acronyms as well as the names of beneficiaries and international partners per proposal with the DST.

The DST will base their funding decision on the evaluations organised by the European Commission. For this purpose, the Commission may share the evaluation summary reports of all proposals with the DST. Moreover, the evaluation process will be attended by

¹⁷⁴ Article 14a of the Horizon 2020 Model Grant Agreement

¹⁷⁵ <https://dst.gov.in/>

¹⁷⁶ <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-eu-islands>

representatives of the DST. The DST representatives will be bound to confidentiality and have declared the absence of any conflict of interest.

Confidential information will only be shared with the DST under a confidentiality agreement.

Expected Impact: The supported projects are expected to contribute to all the following impacts:

- validate solutions for decarbonisation of the local energy system while ensuring a positive impact on the wider energy infrastructure, on the local economy and local social aspects, and local air quality;
- enhance the involvement of local energy consumers and producers, preferably by creating energy communities in the development and the operation of local energy systems and test new business models;
- validate approaches, strategies and tools to safely and securely operate an integrated local energy system across energy vectors (electricity, heating, cooling, water, wastes, etc.) so that it is able to integrate higher shares of renewables (than it would in case of separate operation of infrastructures);
- benchmark technical solutions and business models that can be replicated in many local regions and that are acceptable by local citizens.

Proposals are invited to include ad-hoc indicators to measure the progress against specific objectives of their choice that could be used to assess the progress during the project life. Indicators are expected to have clear and measurable targets.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Smart Cities and Communities

Proposals are invited against the following topic(s):

LC-SC3-SCC-1-2018-2019-2020: Smart Cities and Communities

Specific Challenge: The COP21 Paris Agreement recognises the role of cities and calls on them to rapidly reduce greenhouse gas emissions and adapting to climate change. The EU is committed to implementing the 2030 Agenda for Sustainable Development, including Sustainable Development Goal 11 ("Make cities inclusive, safe, resilient and sustainable"). Many forward-looking cities have set themselves climate goals whose achievement rests on wide scale roll out of highly integrated and highly efficient energy systems.

To achieve the necessary energy transition in cities, it is essential to increase energy systems integration and to push energy performance levels significantly beyond the levels of current

EU building codes and to realize Europe wide deployment of Positive Energy Districts by 2050¹⁷⁷.

This call will also contribute to the specific objectives of the SET Plan action 3.2 - Smart cities and communities - focussing on positive-energy blocks/districts¹⁷⁸.

Scope: Integrated innovative solutions for Positive Energy Blocks/Districts will be developed and tested and performance-monitored in the Lighthouse Cities. Projects will consider the interaction and integration between the buildings, the users and the larger energy system as well as implications of increased deployment of electro-mobility, its impact on the energy system and its integration in planning.

Lighthouse Cities will closely collaborate with Fellow Cities¹⁷⁹ and should act as exemplars helping to plan and initiate the replication of the deployed solutions in the Fellow cities, adapted to different local conditions.

As a sustainable energy transition will see increased electro-mobility, its impact on the energy system needs to be understood and well integrated in planning.

Definition: Positive Energy Blocks/Districts consist of several buildings (new, retro-fitted or a combination of both) that actively manage their energy consumption and the energy flow between them and the wider energy system. Positive Energy Blocks/Districts have an annual positive energy balance¹⁸⁰. They make optimal use of elements such as advanced materials (e.g. bio-based materials), local RES, local storage, smart energy grids, demand-response, cutting edge energy management (electricity, heating and cooling), user interaction/involvement and ICT.

Positive Energy Blocks/Districts are designed to be integral part of the district/city energy system and have a positive impact on it (also from the circular economy point of view). Their design is intrinsically scalable and they are well embedded in the spatial, economic, technical, environmental and social context of the project site.

To increase impact beyond the demonstration part of the project, each Lighthouse City and Fellow City will develop during the project, together with the consortium partners, its own bold city-vision for 2050¹⁸¹. The vision should cover urban, technical, financial and social aspects. Each vision will come with its guide for the city on how to move from planning, to implementation, to replication and scaling up of successful solutions.

¹⁷⁷ See also: *Communication on Accelerating Clean Energy Innovation* – http://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v6_0.pdf

¹⁷⁸ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

¹⁷⁹ Formerly called Follower cities

¹⁸⁰ *The data filled in the BEST table (available on the 'Funding & tender opportunities' portal) will be used by the evaluators to assess and compare the level of ambition of the technical measures for Positive Energy Blocks/Districts of the project proposals.*

¹⁸¹ Building on and further concretising their i) Sustainable Energy Action Plans (SEAP) or ii) Sustainable Energy (and Climate) Action Plans (SECAP) or iii) a similar, at least equally ambitious plan. These shall be approved by the corresponding authorities by the end of the project.

Proposals should also:

- Focus on mixed use urban districts and positively contribute to the overall city goals;
- Develop solutions that can be replicated/gradually scaled up to city level. The technical, financial, social, environmental and legal feasibility of the proposed solutions should be demonstrated in the actual proposal.
- Make local communities and local governments (particularly city planning departments) an active and integral part of the solution, increase their energy awareness and ensure their sense of ownership of the smart solutions. This should ensure sustainability of Positive Energy Blocks/Districts;
- Promote decarbonisation, while improving air quality, also assessing the benefits of the implemented solutions by means of Life Cycle Assessment and air quality modelling.

Projects will incorporate performance monitoring of at least 2 years of deployed solutions from the earliest feasible moment¹⁸². All relevant performance data must be incorporated into the Smart Cities Information System database (SCIS)¹⁸³.

Projects should also deliver:

- Effective business models for sustainable solutions;
- Practical recommendations arising from project experience on:
 - o regulatory, legal aspects and data security/protection;
 - o gender and socio-economics (Social Sciences and Humanities);
 - o storage solutions (from short-term to seasonal);
 - o big data, data management and digitalisation;
 - o electro-mobility: i) its impact on energy system and ii) appropriate city planning measures to support large scale roll-out;

Eligible costs are primarily those that concern the innovative elements of the project needed to:

- connect and integrate buildings;
- enable Positive Energy Blocks/Districts;
- foster innovative systems integration;

¹⁸² In case of the same solution being implemented in different buildings, monitoring for 2 years must be done at least for one building of each category in the same city. Monitoring must in all cases be at least one year.

¹⁸³ <http://www.smartcities-infosystem.eu/>

- complement the wider energy system.

Costs of commercial technologies are not eligible, for example:

- Buildings: purchase, construction, retrofitting and maintenance;
- Electric vehicles and charging stations: purchase, installation and maintenance;
- City-level ICT platforms: purchase, development and maintenance;
- Standard, commercially-available RES: purchase, development and maintenance.

Projects are expected to cooperate with other Smart Cities and Communities projects funded under Horizon 2020¹⁸⁴ in the Smart city Lighthouse group as well as the European Innovation Partnership on Smart Cities and Communities (EIP-SCC)¹⁸⁵.

Therefore, proposals will foresee a work package for cooperation with other selected projects and earmark appropriate resources (5% of the requested EU contribution) for coordination and communication efforts and research work associated with cross-cutting issues.

Projects can make use of financial support to third parties for up to 5% of the EU contribution to the project for the incorporation of relevant innovation boosting activities/actions (e.g. SMEs, start-up competitions, Prizes, etc).

The Commission considers that proposals requesting a contribution from the EU of between EUR 15 to 20 million¹⁸⁶ would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Typically, projects should have a duration of 48 to 60 months.

Expected Impact: Projects should contribute to:

- Meeting EU climate mitigation and adaptation goals and national and/or local energy, air quality and climate targets, as relevant;
- Increased share of i) renewable energies, ii) waste heat recovery and iii) storage solutions (including batteries) and their integration into the energy system;
- Lead the way towards wide scale roll out of Positive Energy Districts;
- Significantly improved energy efficiency, district level optimized self-consumption, reduced curtailment;
- Increased uptake of e-mobility solutions;

¹⁸⁴ See also <https://www.smartcities-infosystem.eu/scc-lighthouse-projects>

¹⁸⁵ <http://ec.europa.eu/eip/smartcities/>

¹⁸⁶ Indicatively, EUR 6 to 8 million for a Lighthouse city and between EUR 0.5 and 1.0 million for a Fellow city.

- Improved air quality.

The higher the replicability of the solutions across Europe, the better.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-SCC-2-2020: Positive Energy Districts and Neighbourhoods for urban energy transitions

Specific Challenge: The ambition of the SET-Plan Action 3.2 is the planning, deployment and operation of 100 Positive Energy Districts/Neighbourhoods (PED/PEN) in Europe by 2025. This requires integrated and holistic sustainable system approaches including technological, social, urban planning, economic, financial and legal/regulatory perspectives. Tackling such challenges, calls for integrated and innovative solutions to spur the implementation of Positive Energy Districts and Neighbourhoods on larger scale. The aim is to accelerate the ongoing energy transition and to support the parties to the Paris Agreement to reach their national greenhouse gas emissions targets, and so contribute to achieve sustainable urban transformation process to decrease greenhouse gas emissions and ensure high liveability and affordability for citizens.

Scope: Proposals will mobilise networks of national (and/or regional) research, innovation and demonstration programmes in the field of smart and sustainable cities and sustainable decarbonised integrated energy systems. They will pool the necessary financial resources with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding in this area, and for related programme management, synthesis and dissemination of the results. Activities funded through the joint calls should focus on a circular, resource efficient and low carbon integrated system perspective. The joint calls should include the following three formats, which should be interlinked and integrated to achieve highest impact.

The joint calls will firstly include **applied research, strategic innovation and demonstration projects** to develop specific innovative approaches and solutions for the planning, implementation and operation of PED/PENs, which are relevant in many European cities and urban areas. Strategic innovation projects resulting from the joint calls should create opportunities for cross-linking and collaboration and target more than one of the following aspects:

- **increasing energy efficiency of neighbourhoods and reduction of performance gaps, reducing climate impact and facilitating energy transition at urban scale promoting integrated and holistic approaches** through optimization of the energy system in the built environment, innovative building solutions and innovative approaches for interoperability of new and existing technologies;
- **integrating renewable energy production and transformation technologies to support and optimize** storage and transfer of locally produced energy to other parts of

the districts for synthetic on-site energy production and supply, **including flexibility and resilience of PED/PENs** through concepts for seasonal transferability of energy as well as PED/PEN integration in regional energy systems through flexible and optimised energy consumption within the district and through compensation measures and smart interfaces to balance real time energy supply and promotion of the prosumer concept;;

- **support integration and development of integrated and smart solutions for sector-coupling in PED/PENs** with focus on innovation need across energy, mobility, and ICT in a systemic setting, including user involvement and different socio-cultural target groups, local governance aspects and balancing urban green-blue-grey infrastructures;
- **streamlining and alignment of the spatial planning processes** and developing **digital planning strategies and optimization tools** (e.g. using building/neighbourhood information modelling (BIM)) along the entire life cycle of PED/PENs;
- **developing societal innovation, social entrepreneurship and citizen participation** aiming to integrate all relevant stakeholders to spur the implementation of PED/PENs within an integrated urban transformation process, where relevant, aspects of gender and diversity, inclusiveness and accessibility should be addressed and
- **developing business models for implementing and operating** PED/PENs on full scale that consider the whole process of planning, operation and operation of PED/PENs; as well as for refurbishment of existing housing stocks to safeguard accessible and affordable housing and sustainable mobility; engaging all actors such as users, owners, city authorities, real estate developer, operators of the energy infrastructure, and investors to create economically viable models for all parties.

The joint calls will secondly include the establishment of transdisciplinary and **transnational innovation labs, innovation platforms and experimental areas for PED/PENs** that facilitate the testing of prototypes, the co-creation and piloting of new concepts, approaches and urban designs, innovative formats and services in the planning, implementation and operation and replication phase of PED/PENs covering TRL 3-7. This should enable feasibility studies, field testing, sharing of test facilities, development of use cases and replication profiles for different PED/PEN types (e.g. new construction and retrofitting of neighbourhoods) to speed up the technology and service learning curves over the whole value chain. Particularly the PED/PEN innovation labs, innovation platforms and experimental areas shall bring together city administrations, PED/PEN business and industry, service developers/providers, and research organisations tying together actors bridging the whole value chain in different countries and regions.

The joint calls will thirdly include the development of **formats to build local capacity and institutional learning** in PED/PEN planning, development and operation with the aim **to replicate and mainstream PED/PENs** in a local, national and European environment. It should take into account the need to develop new public services and public innovation governance, in particular concerning effective public participation and challenge driven

approaches in practice. This should enable sharing of experience, development of standardised packages, adaptation of regulations, human capacity building/trainings etc.

Proposers are requested to include other joint activities including additional joint calls without EU co-funding.

The Commission considers that proposals requesting a contribution of EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The ERA-NET Cofund will significantly support and contribute to:

- the testing, implementation and replication of 100 Positive Energy Districts and Neighbourhoods in Europe by 2025 as set out in the SET-Plan Action 3.2 Implementation Plan;
- transitions towards sustainable urban development, as set out in the UN SDGs and the Urban Agenda of the EU;
- the fulfilment of the role of Europe in Challenge 7 of Mission Innovation, where PED/PENs - a physical aggregator of technologies/solutions collaborating each other with the aim of promoting the transition to a sustainable urbanization - would be a decisive asset for the climate and energy performance of the European built environment; and
- an enhancement of European capacities and knowledge to become a global role model and market leader for the development of PED/PENs.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Smart Airports

The COP21 Paris Agreement recognises the role of cities in rapidly reducing greenhouse gas emissions and adapting to climate change and calls on them to make these goals a reality. Many forward-looking cities have set themselves ambitious climate goals, whose achievement rests on wide scale rollout of highly integrated and highly efficient energy systems. The latter will generate wide implications for the transport system. The EU is committed to support such local initiatives through the implementation of its 2030 Agenda for Sustainable Development, including Sustainable Development Goal 11 ("Make cities inclusive, safe, resilient and sustainable").

Aviation is nowadays an asset of our global society - a driver of economic, social and cultural development - as it changed the way we travel, interact with others and do business globally. Most frequently, airports act as hubs of local development becoming poles of attraction for the development of novel businesses and services, foremost due to their prime-transport-

network locations. The energy and environmental implications of such hubs – including aspects such as buildings, mobility, energy supply, utilities – allied with their importance as travelling terminals and job-centres, qualify them to play a premier role in assisting cities achieving the aforementioned COP21 Paris Agreement’s targets.

Decarbonisation of transport and, in particular, of aviation, figures in the frontend of every political agenda. The use of sustainable fuels by aviation, when compounded with advances in aircraft technologies and air operations, is in the pathway to enable the sector to accommodate the forecast growth of air traffic expected in the forthcoming years. Developing, validating and easing the implementation of novel concepts and solutions aimed at enhancing the capability of airport communities for reducing greenhouse gas emissions and adapt to climate change are of paramount importance. This should evolve from a holistic perspective that integrates the airport physical and operational infrastructure with their users, business and logistics operators, peripheral communities, and ultimately with the whole transportation system that uses and commutes to the airport.

As a sustainable energy-transition for the latter will see an increased usage of electro-mobility and the utilisation of alternative and renewable fuels – such as bio-kerosene in aviation - the impacts on the energy system and on the transport system itself needs to be well understood and accounted for in such a context. The over-arching objective of this action will be to aim at producing a bold vision for the smart airport of 2050¹⁸⁷ in a sustainable perspective. Such a blueprint should notably cover the relevant mobility, technical, operational, economic and social aspects that underline the airports of the future as well as their integration in the urban hinterland.

Proposals are invited against the following topic(s):

LC-SC3-SA-1-2020: Smart Airports

Specific Challenge: The aviation transport sector is growing fast and air traffic is expected, at current rates, to double its volume during the next 25-30 years. This would lead to aviation generating in excess of 10% of the global greenhouse gas emissions by 2050. Sustainable biofuels are the only currently available and tested alternative for reducing the carbon footprint of aviation. Two barriers are at stake: (i) the supply of sustainable biofuels at competitive market pricing to become commercially attractive to airlines, notably enabling to overcome the economic gaps evolving from the fact that fuel represents circa one-third of the operational costs of an airline; (ii) the operation and logistics of handling such biofuels in the operational context of a major airport – including procurement, blending, fuelling, quality control and safety due processes - as a condition sine-qua-non for its penetration within the aviation’s supply-chain. This challenge is designed to tackle this latter deadlock. It is in line with the Renewable Energy Directive (RED II) and the specific targets for commercialization of advanced biofuels identified in the Declarations of Intent in the context of the SET-Plan,

¹⁸⁷ Building on and further concretising their i) Sustainable Energy Action Plans (SEAP) or ii) Sustainable Energy (and Climate) Action Plans (SECAP) or iii) a similar, at least equally ambitious plan. These shall be approved by the corresponding authorities by the end of the project.

Alternative Fuels Infrastructure Directive and Strategic Transport Research and Innovation Agenda (STRIA).

In addition airports are commercial sites with significant greenhouse gas emissions contributing to climate change. Novel concepts and solutions aimed for enhancing the capability of airports communities in reducing greenhouse gas emissions and adapt to climate change are needed in meeting the 2050 policy targets. Specific solutions based on a holistic perspective that integrates the airport physical and operational infrastructure with their users, business and logistics operators, peripheral businesses, and ultimately with the whole transportation system that uses and commutes to the airport, as well as the physical environment it is embedded in.

Scope: Proposals will demonstrate novel concepts and solutions aimed at developing effective solutions for the take-up of biokerosene and other relevant alternative fuels by aviation. The actions should be designed towards ensuring a strong demonstration component involving an exchange of best-practice within the airports participating in the project.

Herein, Lighthouse Airports (the airport that leads the consortium and where the demonstration actions will be implemented) are expected to closely collaborate with Fellow Airports (the airports that participate in the consortium and follow closely the developments and demonstration actions at the Lighthouse airports) in supporting the transfer and tailoring of best-practice solutions tuned to the specific local conditions of the latter.

Each consortium will have one Lighthouse Airport that will demonstrate the novel concepts and solutions and a further two "Fellow Airports" that will follow closely the demonstration actions and are committed to implementing the best practices identified in the project. The Lighthouse Airport must be in a different EU Member State or Country associated to Horizon 2020 than at least one of the Fellow Airports. To increase the impact beyond the airports participating in a consortium, the project will develop a bold vision for the future Smart Airport of 2050. This should cover the relevant sustainable mobility, technical, operational, economic, environmental and social aspects that are expected to shape the airports of the future as well as their integration in the urban hinterland. In addition, the projects should also include a handbook on how to move from planning through implementation to replication and scaling-up of the successful demonstrated solutions in such an over-arching context.

- All biofuels and other relevant alternative fuels must meet the EU sustainability criteria as these are defined under the Renewable Energy Directive¹⁸⁸ (RED) and its recast¹⁸⁹ (REDII). In this context, advanced sustainable biofuels of EU or local or regional origin are highly preferable.

In such a wide context, it is necessary that projects guarantee a holistic perspective in tackling the questions at stake, by systematically addressing all aspects mentioned in the following activity areas:

¹⁸⁸ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009

¹⁸⁹ Directive 2018/2001 of the European Parliament and of the Council of 11 December 2018

A) Smart use of biofuels in airports and other relevant alternative fuels in aircraft:

Proposals will address all of the following:

- **Integration** of sustainable bio-kerosene and other relevant alternative fuels in the fuelling infrastructure and associated fuel handling logistics of the airport, including blending operations resulting in blends compliant with the ASTM standards.
- **Promote decarbonisation of aviation, and airports** while improving local air quality by stimulating the uptake of sustainable biokerosene and other relevant alternative fuels blends;
- **Ensure the development of scalable solutions** –replicated/gradually scaled-up to larger or scaled-down to smaller airports, together with the demonstration of their environmental sustainability and technical, operational, and economic, reliability;
- **Incorporate field performance monitoring** of the deployed solutions starting at least 6 months before the innovative solutions are applied to be followed for a period of at least 1 year within the project duration. This will allow comparing the effectiveness of the deployed solutions.

Projects should deliver all of the following:

- Projects should include specification of the following key quantities for each of the participating airports: blending percentage; total volume of fuel to be blended with bio-kerosene and total fuel consumption.
- Guidelines and metrics to support the transfer of best-practice results into other airports, in particular for purposes of:
 - o Quality control of the sustainable bio-kerosene and of the blended fuel supplied to the airlines, including consideration of aspects such as source and seasonal variations.
 - o Aircraft fuelling logistics, including relevant procedures and associated due processes – e.g. fuel handling, safety considerations.
 - o Collecting feedback from airlines on the impact of using sustainable bio-kerosene and other relevant alternative fuels blends on commercial operations – notably, in engine performance and maintenance.
 - o Notification by the airport to the national authorities regarding the use of bio-kerosene in compliance with the prevailing environmental and transport regulations in force –volumes and qualities of biofuels, certification schemes used, GHG reduction, number of flights fuelled with bio-kerosene.
 - o Key economic indicators associated with a fully-fledged commercial scenario of bio-kerosene and other relevant alternative fuels –price of the bio-kerosene and

other relevant alternative fuels and final blends, price variations and trends, market availability of bio-kerosene and other relevant alternative fuels, security of supply. If possible, collect feedback from airlines regarding bio-kerosene and other relevant alternative fuels differential cost coverage.

- o Gathering passenger perception on using flights operated with a blend of sustainable biokerosene and other relevant alternative fuels.

To enable a widest dissemination of the lessons learned the solutions demonstrated should be monitored, analysed and eventually elaborated in accessible **best-practice handbooks and tools**, covering:

1. The state-of-the-art and reliable sustainable solutions for aircraft fuelling with bio-kerosene, addressing notably:
 - the procurement of bio-kerosene;
 - the assessment of its impact on the airport energy system;
 - the airport planning requirements and operational processes to support large scale roll-out – e.g. handling, quality control, safety;
 - the availability of fit-for-purpose storage and blending facilities.
2. Practical recommendations arising from the project experience on issues relating to
 - regulatory, legal and data security/protection aspects, including those that might hamper the adoption of the solutions demonstrated for sustainable biokerosene;
 - Description of effective business models for the different sustainable solutions, that reflect the relevant technical, operational, economic, social and legal/regulatory implications of their adoption;

B) Smart Energy in airports:

Projects will demonstrate novel concepts and solutions aimed at improving the reduction of greenhouse gas emissions and facilitating adaption to climate change.

Projects will address all of the following aspects:

- ***Promote decarbonisation of aviation, airports and terminals*** while improving air quality, such as by using smart solutions for aircraft taxiing (electrification);
- ***Integrate planning and management of the energy and transport infrastructures at airports***, developing planning and infrastructure management tools supported by intelligent networks improve the energy and resource efficiency at airports, and the use of renewable electricity that integrates airport-specific infrastructures and energy uses (e.g. taxiing, ground handling, including through e-mobility) with other infrastructure and uses (e.g. heating, electricity);

- ***Ensure the development of scalable solutions*** –replicated/gradually scaled-up to larger or scaled-down to smaller airports, together with the demonstration of their environmental sustainability and technical, operational, and economic reliability;
- ***Promote governance*** that addresses the interactions between airport authorities, local communities and local authorities and particularly city planning departments;
- ***Incorporate field performance monitoring*** of the deployed solutions starting at least 6 months before the innovative solutions are applied to be followed for a period of at least 1 year within the project duration. This will allow comparing the effectiveness of the deployed solutions;
- Practically tested and proven solutions to maximise use of sustainable e-mobility solutions of the airport operations (e.g. taxiing, passenger logistics, fuelling logistics, etc);
- Effective innovative ways of increasing energy efficiency (waste heat recovery, battery storage etc.) and renewable energy in all relevant areas of the airport activities based on a thorough analysis of energy and resource flows (e.g. with the involvement of energy service companies, ESCOs). Increased sourcing of electricity and heat from renewable energy sources (e.g. through own generation or power purchasing agreements) can be combined with energy efficiency through smart grid approaches.

These solutions should be monitored, analysed and elaborated in accessible best-practice handbooks and tools including existing state-of-the-art and reliable sustainable solutions related to:

- electro-mobility; the assessment of its impact on the energy system within the boundaries of the airport, notably as support to air operations – e.g. aircraft taxiing, ground handling, emergency control.
- Infrastructure management and planning tools that are able to gather and combine data from different sources and allow optimisation of energy and resources;
- Best practice examples of transport solutions within and around the airport.

Proposals must foresee a work package for cooperation with other similar actions and earmark appropriate resources (at least 3% of the requested EU contribution) for coordination and communication efforts and relevant research work with other projects and initiatives.

The Commission considers that proposals requesting a contribution from the EU of EUR 12 million would allow this specific challenge to be addressed appropriately (of which around 2/3 must be dedicated to aspects relating to "SMART use of biofuels in airports" and around 1/3 must be dedicated to aspects relating to "Smart Energy in airports"). Typically, projects should have a duration of 48 to 60 months. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts or durations. At least 15% of the requested EU contribution should be for the Fellow airports.

The technology related to the utilisation of biokerosene in airports will move the TRL from 6 to 8 (see part G of the General Annexes). The TRL refers to infrastructure and biokerosene logistics, blending, fuelling et al. and not to technology for fuel production.

Eligible costs are primarily those that concern the innovative elements of the project needed to:

- foster innovative overall energy systems integration;
- demonstrate effective integration of transport modes within and around the airport;
- foster wider use of electrification at airports.

Costs of commercial technologies are not eligible, for example:

- Buildings: purchase, construction, retrofitting and maintenance;
- Electric vehicles and charging stations: purchase, installation and maintenance;
- Airport ICT platforms: purchase, development and maintenance;
- Standard, commercially-available RES: purchase, development and maintenance;
- Biokerosene or biokerosene blends, or other relevant alternative fuels: direct purchase.

Expected Impact: The supported projects are expected to facilitate the deployment of advanced biofuels, e-mobility, energy storage and waste heat recovery in airports and reduce greenhouse gas and other air pollutants (e.g. sulphur oxides and particulates) emissions by airports. Projects should measure the reduction in GHG emissions due to actions demonstrated. Projects should measure the improvements in ambient air quality by the reduction of emissions due to the actions demonstrated.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Enabling near-zero CO₂ emissions from fossil fuel power plants and carbon intensive industries

CCS is one of the key promising technologies that can reduce CO₂ emissions in the power generation sector and the only pathway for very stringent GHG emission reductions from energy and/or carbon intensive industries that generate CO₂ as part of their production processes.

In order to realise its potential, CCS needs to become a cost-competitive technology and prove its safety (mainly regarding pipeline transportation and storage), so that it could start to be commercially deployed and thus contribute to the low-carbon transition of the European economy. Key challenges are the demonstration of the full CCS chain, the reduction of the

energy penalty and cost of capture, the detailed appraisal of cost-effective storage capacity in selected regions, and establishing the necessary infrastructure for CO₂ transport.

New solutions for the conversion of captured CO₂ (CCU) to useful products such as fuels or chemicals will create new markets for innovative industrial sectors and can play a role in supporting the deployment of CCS by offsetting the high costs of capture and storage.

The integration of flexible fossil fuel power generation and storage (including through power-to-X-to-power) will contribute to a smart, secure and more resilient power system.

The Energy Union priorities, also in the area of enabling near-zero CO₂ emissions from fossil fuel power plants and carbon intensive industries, are jointly implemented by the stakeholder community, national authorities and the Commission through the key actions of the EU Strategic Energy Technology Plan (SET Plan), notably action 9 (CCUS) and action 4 (resilience, security and smartness of the energy system). To attain these goals, ambitious R&I targets have been set in agreement with the sectorial stakeholders. In action 9, the focus is on cost-reductions, new technologies and proliferation of pilots and demonstrators. In action 4, goals were set to increase the flexibility of fossil fuel power plants. While it is expected that the Member States will take coordinated actions towards the priorities and targets set by the SET-Plan, a strong and concerted effort also from the EU is needed to sustain the technological and economic leading position in some technologies and to catch up in areas where the EU is lagging behind. Activities supported in this area contribute to the specific objectives, targets and relevant Implementation Plans of the SET Plan action 9 and 4¹⁹⁰.

Proposals are invited against the following topic(s):

LC-SC3-NZE-1-2018: Advanced CO₂ capture technologies

Specific Challenge: Commercial deployment of CCS requires a significant reduction of the energy intensity of the CO₂ capture process for power plants or other energy-intensive industries, and a substantial decrease of the cost of capture. A continuous effort is needed to develop and demonstrate new and advanced capture technologies, including new materials.

Scope: The objective is the validation and pilot demonstration of advanced CO₂ capture technologies that have shown a high potential for reduction of the energy penalty and a significant overall improvement of cost-efficiency of the whole capture process, but that are not yet commercial. Projects will test operating conditions and operational flexibility, and provide proof of the reliability and cost-effectiveness of these concepts, whilst at the same time evaluating the cost, technical requirements and operational and safety impacts on the associated transportation infrastructure, storage or utilisation of CO₂, as part of their integration in a CCS cluster based on a whole system approach. The proposal should state credible and clearly defined targets and key performance indicators (KPIs) for the energy penalty reduction, the capture rate and the relative incremental operating costs of the capture

¹⁹⁰ For further information please consult the SETIS website: <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan>

process. Environmentally benign technologies have to be pursued and their environmental impact addressed in the project also in view of future scaling up.

Proposals are expected to bring technologies to TRL 5-7 (please see part G of the General Annexes). Technology development should be balanced by an assessment of the societal readiness towards the proposed innovations, including by identifying and involving relevant end users and societal stakeholders and analysing their concerns and needs using appropriate techniques and methods from the social sciences and humanities.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 5 to 10 million (depending on the degree of demonstration) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Significant, step-change advances in reductions in energy penalty and thus in the fuel-dependent cost of CO₂ capture, facilitating safe and economic integration into industrial clusters - which will lower the barriers to the wider uptake of CCS, in particular for those sectors vulnerable to carbon leakage.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-SC3-NZE-2-2018: Conversion of captured CO₂¹⁹¹

Specific Challenge: Conversion of captured CO₂, for example using hydrogen made from renewable energy, to produce fuels is not only a means to replace fossil fuels, but also a promising solution for seasonal energy storage. There are still relevant and significant scientific and technological challenges to be able to exploit the CO₂ as a chemical and fuel feedstock in a systematic manner, the main challenge being that the chemical utilisation of CO₂ is limited by its low energy content, and the conversion process is highly energy intensive.

Scope: Development of energy-efficient and economically and environmentally viable CO₂ conversion technologies for chemical energy storage or displacement of fossil fuels that allow for upscaling in the short to medium term. Projects have to substantiate the potential for the proposed CCU solution(s) as CO₂ mitigation option through conducting an LCA in conformity with guidelines developed by the Commission or the relevant ISO standard. Proposals have to define ambitious but achievable targets for energy requirements of the conversion process (including catalytic conversion), production costs and product yields, that will be used to monitor project implementation.

Proposals are expected to bring technologies that have reached at least TRL 3-4 to TRL 5-6 (please see part G of the General Annexes). Technology development has to be accompanied

¹⁹¹ This topic contributes to the roadmap of the SPIRE cPPP and to the focus area "Connecting economic and environmental gains – the Circular Economy".

by an assessment of the societal readiness towards the proposed innovations. Relevant end users and societal stakeholders will be identified in the proposal, and their concerns and needs will be analysed during the project using appropriate techniques and methods from the social sciences and humanities, in order to create awareness, gain feedback on societal impact and advancing society's readiness for the proposed solutions.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 3 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with relevant Mission Innovation¹⁹² countries such as China¹⁹³.

Expected Impact: New solutions for the conversion of captured CO₂, either from power plants or from carbon-intensive industry, to useful products such as fuels or chemicals for energy storage (CCU) that will create new markets for innovative industrial sectors, diversify the economic base in carbon-intensive regions, as well as contribute to achieving a Circular Economy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-3-2018: Strategic planning for CCUS development

Specific Challenge: Establishing the necessary infrastructure for safe and cost-effective CO₂ transport and storage is of high importance in Europe. Early CCS projects will most likely explore CO₂ storage sinks in the vicinity of capture points, and the required infrastructure will therefore most likely be initiated at national level in CO₂ hubs and industrial clusters in order to achieve economies of scale by sharing CO₂ transport and storage infrastructure. A cross border transport infrastructure is ultimately necessary to efficiently connect the CO₂ hubs and industrial clusters to sinks.

Scope: Elaboration of detailed plans for comprehensive European CO₂ gathering networks and industrial clusters linked to CO₂ storage sites via hubs, pipeline networks and shipping routes, with due attention to national and border-crossing permitting and regulatory issues. Mapping and understanding the nature and longevity of emission sources, identification of transport corridors and performing initial impact assessments, and developing local business models for delivery of CO₂ capture, transport, utilisation and/or storage (including the separation of capture, transport, utilisation and storage responsibilities) within promising

¹⁹² <http://mission-innovation.net/our-work/innovation-challenges/>

¹⁹³ A Co-funding mechanism is in place in China; see <https://ec.europa.eu/programmes/horizon2020/en/news/eu-china-research-and-innovation-co-funding-mechanism-first-call-launched-china>

start-up regions. Industrial clusters may include for example power producers, cement and steel factories, chemical plants, refineries and hydrogen production facilities. A hubs-and-clusters approach could also include the coupling of hydrogen production and CCS, possibly using common infrastructure. The assessment of cost-effective ('bankable') storage capacity in selected regions is a key component of strategic planning, as it will provide additional certainty that the required CO₂ storage capacity will be available when needed. Due attention has to be given to regions with potential for early onshore storage development (including enhanced oil recovery). Close cooperation with industrial players, as well as engagement with local stakeholders, is paramount. This includes identifying and involving relevant end users and societal stakeholders and analysing their concerns and needs using appropriate techniques and methods from the social sciences and humanities.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Timely strategic planning will enable and accelerate the roll-out of a CCS infrastructure consisting of capture points and clusters, intermediate hubs, CO₂ conversion facilities, safe and cost-effective CO₂ transport and storage. Projects should pave the way for the development of operational storage sites as from the early 2020's, in particular linked to carbon-intensive industry. Proposals should clearly demonstrate how their outputs will contribute to achieving these expected impacts in the short term (up to 3 years), medium term (3-10 years) and long term (more than 10 years).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-4-2019: Integrated solutions for flexible operation of fossil fuel power plants through power-to-X-to-power and/or energy storage

Specific Challenge: With a growing share of energy produced from renewable resources (RES), fossil fuel power plants will have to increasingly shift their role from providing base-load power to providing fluctuating back-up power (i.e. ramping up and down) in order to control and stabilise the grid. These strong fluctuations result not only in increased wear-and-tear, but (more importantly) also in a lower efficiency and hence higher greenhouse gas emissions per unit of produced electricity. Severe ramping up and down can be limited through load-levelling i.e. storing power during periods of light loading on the system and delivering it during periods of high demand.

Scope: Validation and pilot demonstration of the integration of energy storage and/or use of excess energy (including via power-to-X-to-power in fossil fuel power plants and showing that EU emission limits for such installations can not only still be met, but that emissions of air pollutants can even be reduced. This could include the enabling of the combustion system

to deal with synthetic fuels and/or hydrogen enriched fuels, as well as a better integration of combined production of heat and power into the overall system.

Proposals are expected to bring technologies to TRL 6-7 (please see part G of the General Annexes). Technology development has to be complemented by activities to create awareness, gain feedback on societal impact and advancing society's readiness for the proposed solutions.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Solutions will contribute to a smart, secure and more resilient power system through the integration of energy storage for the purpose of load levelling in fossil fuel power generation. Results of the project(s) should allow a smoother operation of these plants at optimal efficiency and environmental performance in order to better adapt to an energy systems that will increasingly be dominated by intermittent renewable energy.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-5-2019-2020: Low carbon industrial production using CCUS¹⁹⁴

Specific Challenge: CCUS in industrial applications faces significant challenges due to its high cost and the fierce international competition in the sectors concerned. However, these sectors currently account for 20% of global CO₂ emissions, and in the 2 degree scenario, should represent half of the stored CO₂ by 2050. Relevant sectors with high CO₂ emissions are for example steel, iron and cement making, oil refining, gas processing, hydrogen production, biofuel production and waste incineration plants.

Scope: Projects will focus on integrating CO₂ capture in industrial installations, whilst addressing the full CCUS chain. Projects will elaborate a detailed plan on how to use the results, i.e. the subsequent transport, utilisation and/or underground storage of the captured CO₂. Important aspects to address are of technical (e.g. the optimised integration of capture plant with industrial processes; scalability; CO₂ purity), safety (e.g. during transportation and storage), financial (e.g. cost of capture; cost of integration) and strategic nature (e.g. business models; operation and logistics of industrial clusters and networks).

Projects are expected to bring technologies to TRL 6-7 (please see part G of the General Annexes). Technology development has to be balanced by an assessment of the societal readiness towards the proposed innovations. Relevant end users and societal stakeholders will be identified in the proposal, and their concerns and needs will be analysed during the project

¹⁹⁴ In 2020, this topic will be implemented through the call "Competitive, Low Carbon And Circular Industries", included in the work programme Annex "Cross-cutting activities".

using appropriate techniques and methods from the social sciences and humanities, in order to create awareness, gain feedback on societal impact and advancing society's readiness for the proposed solutions. Projects should also explore the socio-economic and political barriers to acceptance and awareness with a view to regulatory or policy initiatives.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with relevant Mission Innovation¹⁹⁵ countries such as China¹⁹⁶.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 10 to 12 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Successful, safe and economic demonstration of integrated-chain CCUS from relevant industrial sources such as mentioned in the specific challenge will accelerate the learning, drive down the cost and thus help break the link between economic growth and the demand for industrial output on one hand, and increasing CO₂ emissions on the other hand. The impact of projects under this call will to a large extent be determined by the extent to which the results will be exploited, i.e. the plan on how the captured CO₂ will be actually utilised and/or stored, either in the project or planned as a future phase. This will be evaluated based on the maturity and quality of the proposed post-capture solutions. Projects under this call that are carried out in areas where there is both a high concentration of CO₂ emitting industries and a nearby capacity for geological storage are considered prime sites for hub and cluster developments, and will generate the highest impact on full-scale deployment in the medium to longer term.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-NZE-6-2020: Geological Storage Pilots

Specific Challenge: The total geological storage capacity in Europe is estimated to be over 300 billion tonnes (Gt) of CO₂¹⁹⁷. This is sufficient to permanently hold all the CO₂ that could be captured in the EU for decades to come. The significant lead time for the development and permitting of geological storage, which is in the order of 7-10 years, demands speeding-up storage site identification and characterisation in Europe. The appraisal and development of storage capacity in promising regions has to provide the necessary confidence that the required CO₂ storage capacity will be available when needed. In addition, storage pilots will play a crucial role in unlocking European CO₂ storage capacity, assessing

¹⁹⁵ <http://mission-innovation.net/our-work/innovation-challenges/>

¹⁹⁶ A Co-funding mechanism is in place in China; see <https://ec.europa.eu/programmes/horizon2020/en/news/eu-china-research-and-innovation-co-funding-mechanism-first-call-launched-china>

¹⁹⁷ <http://www.geology.cz/geocapacity/publications/D42%20GeoCapacity%20Final%20Report-red.pdf>

the potential risks and visualising CCS technology to the wider public. A portfolio of pilot storage sites in different geological settings, onshore or offshore, either in depleted hydrocarbon fields or in deep saline aquifers, is therefore needed to catalyse full-scale deployment of CCS in the medium to longer term.

This topic responds to the targets in the SET-Plan CCUS Implementation Plan¹⁹⁸ to have at least 3 new CO₂ storage pilots operating in different settings, and SET Plan countries having completed feasibility studies on applying CCS to a set of clusters of major industrial and other sources by 2025-2030.

Scope: The objective is to carry out the identification and geological characterisation of new prospective storage sites for CO₂ (including the 3D architecture of the storage complex) in promising regions of future demonstration and deployment (onshore or offshore) through the implementation of new CO₂ storage pilots. This will result in new data, knowledge and detailed models of potential storage complexes and their response to dynamic pressurisation. Important aspects include (but are not limited to): detailed geological characterisation, including faults and fracture systems; analysis of initial stress field and geomechanical behaviour of the storage formations and seals under varying stress and pore-pressure conditions; estimation of storage capacity; accurate modelling of injectivity; overall storage risk assessment, including induced seismicity and blow-out or blockage during injection, and including proposed mitigation action. Detailed plans should propose site-specific solutions for CO₂ injection strategies, pressure management, mitigation of induced seismicity, and MMV (measurement, monitoring and verification).

For geological storage, in particular onshore, public acceptance is paramount. Therefore projects are expected to identify and engage relevant end users and societal stakeholders and analyse their concerns and needs using appropriate techniques and methods from the social sciences and humanities, noting the significant differences in potential regional consequences where the CO₂ stored comes from power versus industry.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 7 to 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Detailed geological characterisation and development planning of promising and safe storage sites and successful realisation of storage pilots will facilitate the subsequent application for storage permits and the kick-start of CCS in the concerned Member States and Associated Countries. Such a ‘pipeline of sweet spots’ can provide a baseline for estimation of storage cost, increase public awareness and help prepare the ground for full and active development into operational storage sites in the mid 2020's.

Type of Action: Research and Innovation action

¹⁹⁸ <https://setis.ec.europa.eu/implementing-integrated-set-plan/carbon-capture-utilisation-and-storage-ongoing-work>

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Joint Actions

The Commission Communication "Towards an Integrated Strategic Energy Technology (SET) Plan"¹⁹⁹ reiterates that achieving the objectives and ambitions of the Energy Union requires more effective coordination of research and innovation (R&I) activities to avoid unnecessary duplication of funding and efforts. Partnerships between organisations in the public sector, or between public and private sector entities involved in funding energy R&I activities, are a crucial means of achieving this goal. The Communication also calls for more joint actions, and specifically mentions Horizon 2020 instruments as a concrete way to support this objective.

Public funding is essential in supporting new technologies in their early stages, and has been fundamental in the past in providing the EU with a competitive edge in various energy technologies. But public funding accounts for only around 19% of all energy R&I funding in the EU (excluding the nuclear sector), with the rest provided by the private sector. And of this, only 4% is funding from EU R&I programmes, with the rest coming from national R&I programmes²⁰⁰. It is therefore crucial that public funding is used as effectively as possible.

The SET Plan provides the strategic framework for the best possible use of this funding. Topics in this section complement the activities of other public funders in Europe by focusing on activities with clear European Union added value, and in particular on those with a high potential to leverage funding from other sources and therefore maximise the reach of Horizon 2020. This is a crucial objective of the SET Plan as well as the overall goal of the European Research Area.

This section of the Work Programme provides support for joint actions and public partnerships between European, national and regional funding agencies and procurers through the use of several Horizon 2020 instruments.

Topic LC-SC3-JA-1-2018 supports ERA-NET Cofund actions. Topic LC-SC3-JA-2-2018 provides support for the execution of the Implementation Plans produced by of the SET Plan Temporary Working Groups, which are expected to be endorsed by the SET Plan Steering Group during 2017 and the beginning of 2018. Topic LC-SC3-JA-3-2018 makes use of procurement to push forward the research and development of wave energy solutions.

Topics LC-SC3-JA-4-2018 and LC-SC3-JA-5-2020 are linked to Africa and the opportunities it presents for European research and industry. R&I cooperation in this area will reinforce the EU commitments under the Paris Agreement, the Agenda 2030 on Sustainable Development and the Cotonou Agreement. This initiative contributes to achieving the Sustainable Development Goal on energy by ensuring access to affordable, reliable, sustainable and

¹⁹⁹ C(2015) 6317

²⁰⁰ SWD(2017) 32, 2014 figures.

modern energy for all. It will also contribute to the priorities set up by the EU-Africa High Level Policy Dialogue on Science, Technology and Innovation.

The objective of topics included in this area is to facilitate the creation or continuation of energy R&I public partnerships between the European Commission and/or countries and regions in Europe and beyond. These public partnerships will have as a goal to contribute to the objectives and ambitions of the Energy Union and the Strategic Energy Technology (SET) Plan, and to continue developing a European Research Area in energy.

Proposals are invited against the following topic(s):

LC-SC3-JA-1-2018: Joint programming actions to foster innovative energy solutions²⁰¹

Specific Challenge: The EU needs to accelerate the transformation of its energy system by bridging the gap between research and commercial deployment with innovative solutions. Bridging this gap often requires substantial volumes of investment which cannot be allocated by individual countries or by the European Commission on their own. Mobilising the necessary investment can only be achieved by pooling together financial resources from multiple countries, the Commission, and the private sector. This is a challenge because the funding landscape is complex.

One of the objectives of the SET Plan is to create funding synergies on such a big scale by organising joint programming actions between the entities responsible for public funding programmes and the Commission. ERA-NETs are a key instrument for joint programming actions within the SET Plan, and they also contribute to achieving the objectives of the European Research Area (ERA). In addition, they can play a key role in achieving the goal of the Energy Union of moving away from a fragmented system characterised by uncoordinated national policies and towards an integrated European R&I approach which accelerates the transformation of the energy system.

Areas suitable for ERA-NETs will be identified by Member States' / Associated Countries' representatives in the SET Plan governance bodies (in particular the Joint Actions Working Group). They will then be developed from the early stages in close collaboration with the European Commission and with input from the Programme Committee as needed. This collaboration will ensure that proposed ERA-NETs are in line with energy R&I and SET Plan policy objectives.

Scope: Actions should aim at coordinating the efforts of participating Member States, Associated Countries and Regions towards achieving SET Plan objectives and, where they exist, executing the Implementation Plans jointly developed by SET Plan countries' representatives, industry and research organisations within the SET Plan priority areas

²⁰¹ This activity directly aimed at supporting public-public partnerships with Member States and Associated Countries, and technology platforms with industrial partners is excluded from the delegation to the Innovation & Networks Executive Agency (INEA) and will be implemented by the Commission services. In the case of energy efficiency, the activity is not excluded from the delegation to the Executive Agency for SMEs (EASME).

numbers 1 to 9²⁰². In establishing their thematic scope, proposals will also take into due consideration support already provided through other topics in this work programme part. As for their technology development scope, proposals can support projects addressing any stage of the innovation chain through joint calls.

Proposals should pool the necessary financial resources from participating national or regional research programmes with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding. Proposers are requested to also implement other joint activities, including additional joint calls without EU co-funding.

Proposals shall include provision for at least one joint call without EU funding on top of the compulsory co-funded joint call.

Proposals shall specify which additional activities will be carried out as part of the action in accordance with the definition given in General Annex D.

It is expected that actions funded through this topic will bring together national and regional programme owners and programme managers who represent diverse conditions and approaches from the EU.

Participation of legal entities from third countries is also encouraged in the joint calls and in additional joint activities, on the basis of common interest and mutual benefit. Participants from these countries may request a Union contribution (on the basis of the ERA-NET unit cost) for the coordination costs of additional activities.

Expected Impact: It is expected that actions will help to:

- Establish long-lasting joint programming research efforts between Member States/Associated Countries/Regions in areas of common interest;
- Accelerate the time to commercial deployment of affordable, cost-effective and resource-efficient technology solutions which decarbonise the energy system in a sustainable way;
- Reduce the environmental impact of the energy system;
- Make a measurable contribution to the objectives of the Energy Union, the SET Plan, and the European Research Area;
- Achieve a funding leverage effect of at least 5:1 between national, regional and private sector contributions, on the one hand, and EU contributions on the other.

Type of Action: ERA-NET Cofund

²⁰² C(2015)6317, pp.10-13: SET Plan Priorities n°.1 to n°.9
https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v8_0.pdf C(2015)6317,
pp.10-13: SET Plan Priorities n°.1 to n°.9
https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v8_0.pdf

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-2-2018-2019: Support to the realisation of the Implementation Plans of the SET Plan²⁰³

Specific Challenge: The Strategic Energy Technology Plan of the European Union focusses on ten actions structured around the Energy Union R&I priorities. Its goal is to accelerate the transformation of the European energy system making it more sustainable, secure and competitive as a fundamental enabler of a low carbon economy. This strategy relies on a strengthened partnership among SET Plan countries and the stakeholders from both the industrial (including the European Technology and Innovation Platforms, ETIPs) and research communities (including the European Energy Research Alliance, EERA). In 2016, the SET Plan adopted a set of ambitious targets for its ten actions through a wide participatory process and the corresponding Implementation Plans will be finalised in 2017 and beginning of 2018.

Scope: Proposals will support, when appropriate, the execution/realisation of a SET Plan Implementation Plan prepared by one of the following SET Plan Temporary Working Groups (TWGs):

2018:

- Solar thermal energy (CSP / STE);
- Offshore wind;
- Photovoltaics (PV);
- Ocean energy;
- Deep geothermal systems; and
- Driving ambition in carbon capture and storage deployment.

2019:

- Renewable fuels & bioenergy.

Proposals should take into consideration the coordination needs of each specific sector and the emerging policy priorities for their implementation. Proposals should count with the participation of research organisations and/or companies (industry) committed in principle to execute all or some of the SET Plan related R&I activities specified in the corresponding Implementation Plan as endorsed by the SET Plan Steering Group²⁰⁴. In this sense, proposals shall detail, to the extent possible, the financial contributions from public and private funding

²⁰³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁰⁴ <https://setis.ec.europa.eu/actions-towards-implementing-integrated-set-plan/implementation-plans>

sources at national level needed for the execution of those R&I activities, and explain which processes or mechanisms will be put in place to actually execute and monitor the R&I activities.

Furthermore, proposals shall also establish and implement a dissemination plan to communicate their output (in connection to the achievement of specific SET Plan targets). Regardless of other communication means, all outputs shall be fed into the SET Plan information system (SETIS).

In addition, proposals will ensure the coordination of the outcome of the relevant outputs of ongoing R&I actions listed in the Implementation Plan contributing to the achievement of the SET Plan targets.

The actions financed under this topic will be coordinated with the SET Plan Steering Group through the SET Plan secretariat.

The Commission considers that proposals requesting a contribution from the EU in the range of 1 EUR million per SET Plan Implementation Plan would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts that should be justified on the basis of the number and volume of the R&I to be coordinated. The specific characteristics and the different needs for support among the different SET Plan Implementation Plans needs to be considered. The duration of the projects should allow for a stable and continuous implementation of the R&I actions addressed (indicative duration: 3 years).

Expected Impact: The expected impact will be the achievement of the research and innovation goals of the Energy Union through the implementation of the integrated Strategic Energy Technology (SET) Plan, in particular the execution of the SET Plan Implementation Plans endorsed by EU Member States and SET Plan Associated Countries.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-3-2019: European Pre-Commercial Procurement Programme for Wave Energy Research & Development²⁰⁵

Specific Challenge: The challenge is the design, development and validation of cost-effective Wave energy convertors that can survive in a harsh and unpredictable ocean environment as the ocean through demand-driven Pre-Commercial Procurement. The challenge is open to proposals seeking to steer wave energy research and development in an effective way at a European level establishing convergence of wave energy technologies and to bring these technologies to the market.

²⁰⁵ This activity directly aimed at supporting public-public partnerships with Member States and associated countries, and technology platforms with industrial partners and earth observation networks and will be implemented by the Commission services.

Scope: In the past years, Member States and the European Commission have been working closely together to use their public resources via previous Ocean ERA-NET Cofund actions but like to reinforce their cooperation to address the challenge through a different funding instrument. In this European PCP action it is the aim to elevate experience with national public procurement approaches at a European level to bring European Wave Energy Research and Development more efficiently into the direction of commercialization.

The proposed action is to be structured along the following phases:

Preparation phase: The participating users/buyers of R&D service should agree on common performance levels and associated specifications for the wave energy systems. The action should introduce the ocean energy phase gate procedure on a European level.

They will plan the research and the design of actions covering a broad variety of issues. The PCP will consist of several building blocks addressing different sub-challenges. The funding of the participating programme owners (national and/or regional) and the European Union will be used for different stages in the wave energy technology development. The results of phase 1 should lead to calls for tenders (for the procurement of R&D services) which focus on clearly identified technologies which contribute to the development of commercial wave energy devices. The procurement should be also open for developers, researcher organisations which are not located in the participating countries/regions.

The expected outcomes at this stage: 1) completed tender documents, 2) signed joint procurement agreement confirming the collaboration modus including the financial commitment of the buyers group and 3) final confirmation of the lead procurer.

Execution stage: The action will take care for the implementation of the Pre-Commercial Procurement and of the PCP contracts. The results will be shared within the European industry to accelerate technology development and the establishment of guidelines and standards to facilitate the transferability of the knowledge creation. The research and specification work should lead to at least 3 prototypes tested in an environment close to expected performance. At the end of the action at least one of the prototypes should be ready for testing in an operational environment at commercial scale.

Proposals have to describe the jointly identified challenge, indicating how it fits into their mid-to-long term innovation plans, why solutions currently available on the market or under development are not meeting their needs. Activities have to include: (1) networking related to preparation, management and coordination and (2) joint research activities related to the validation of PCP strategy.

The consortium should have at least three legal entities established in different member states or H2020 associated countries. In the consortium the participation of minimum two 'public procurers' is required. Other entities might be considered which can have a clear added value in the preparation and/or execution of the PCP or in coordination and networking activities.

Please see part E of the General Annexes for the specific proposal requirements for PCP actions.

The Commission considers that PCP proposals requesting a contribution from the EU of between 15 and 20 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission a selection of proposals requesting other amounts.

Expected Impact:

- Convergence of wave energy technologies, acceleration of technology development, proof-of-concept and validation of wave energy technology for the benefit of the wave energy sector and as such improved knowledge transfer.
- Pool resources at national and EU levels dedicated to Research and Development and provide effectively a significant developmental boost of wave energy technology.
- More effective use of public resources for Research and Demonstration.

Type of Action: Pre-Commercial Procurement

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-4-2018: Support action in preparation of a Joint Programming activity²⁰⁶

Specific Challenge: Providing sustainable and affordable energy to sub-Saharan Africa is critical to the development of a region that accounts for 13% of the world's population, but only 4% of its energy demand. Sub-Saharan Africa's energy resources are more than sufficient to meet its demands, but they are unevenly distributed and under-developed (IEA, 2014).

Building local capacities and promoting research, including applied research, are recognized to be essential pillars in the development of sustainable energy in Africa. Africa-EU research cooperation in this area can contribute substantially to further technology take-up in the region. It can also strengthen the market position of involved European institutions through increased knowledge and competitive capacity.

Several initiatives in the past decade have launched support projects aiming to promote research addressing African energy challenges. The participation of African researchers in related calls has however remained limited. African scientists and researchers in general are underrepresented in the international arena: there are only few scientific publications or patent applications related to renewable energy, and limited participation in international conferences. In addition to the limited exposure the international scientific community, limited research capacities both in the sense of human capital and financial resources hinder better representation of African researchers in abovementioned funding schemes.

²⁰⁶ This activity directly aimed at supporting public-public partnerships with Member States and Associated Countries, technology platforms with industrial partners is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Following the EU commitments under the Paris Agreement, Agenda 2030 on Sustainable Development and Cotonou Agreement, research and innovation cooperation in the field of renewable energy generation technologies between EU and Africa needs to be strengthened and further developed. Coordination of the existing bilateral activities between European and African countries is advisable. The challenge is bringing together the national funding agencies of EU member states and African states interested in developing joint research activities between the two continents to create synergies and to push forward common research and innovation cooperation in the field of renewable energy generations.

Scope: The proposal will be the preparatory step towards the action to be supported under topic LC-SC3-JA-5-2020. The consortium has to bring together the core relevant European funding agencies and African partners already involved research and innovation cooperation actions.

The fields of activities to be programmed will cover the research and development of new or the adaptation of renewable energy generation technologies to the African environmental, social and economic conditions, of providing affordable access to renewable energy and of improving the innovation cycles.

The objectives will be the development a common strategic joint research and innovation programme on renewable energy technology and to establish its organisational principles that could lead to a Joint Programme. The common strategic joint programme needs to create synergies with existing African-European programmes such as the Africa-EU Energy Partnership, the EU Energy Initiative, the Africa Renewable Energy Initiative and the EU-Africa Research and Innovation Partnership.

The estimated duration to achieve these objectives is approximately 12 months.

Expected Impact: The expected impact will be firstly the achievement of the joint commitments necessary to propose and to implement a Joint Programme, secondly the identifications through its strategic joint programme of the essential research and innovation activities needed to reinforce and to boost European and African research cooperation.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-JA-5-2020: Long Term EU-Africa Partnership for Research and Innovation actions in the area of renewable energy

Specific Challenge: Following the EU commitments under the Paris Agreement, Agenda 2030 on Sustainable Development and the Cotonou Agreement, the renewed objective to evolve current forms of cooperation into equal footing partnership between Africa and Europe, the current research and innovation cooperation between Europe and Africa in the field of renewable energy needs to be strengthened and further developed. The challenge is to establish and jointly implement activities that contribute to a mutual beneficial Research and

Innovation agenda and its related Research Capacity Building agenda. Through this action EU member states/ Associated Countries and African states interested parties (public and private) will carry out joint research activities between the two continents, will develop synergies and will push forward research capacity building activities in the field of renewable energy production and use, to promote mutual empowerment and to enhance co-designed innovation.

Coordination of the already existing bilateral activities between MSs/ACs and African countries is advisable.

Scope: The proposal will establish a long term partnership through the implementations of a series of strategic and joint research and innovation actions, and their related research capacity building actions, whose development has been conceptualised and whose essential elements have been so far developed by the project PRE_LEAP_RE <http://www.leap-re.eu/> granted under topic LC-SC3-JA-2-2018. The scope of the research activities supported under the long term partnership would include adaptation of renewable energy technologies to the African environmental, social and economic conditions through joint research efforts on renewable energy technologies.

The range of activities supported shall address the broad range elements identified in the preparatory phase and shall include a well-balanced set of research projects, demonstration projects, technology transfer projects, and also include provisions for exchange of researchers between MSs/ACs and African actors. A rolling annual programme of activities will be an annual deliverable detailing the breakdown of activities for each year based on the overall programme of activities. The action might also include financial support to third parties.

It is also expected that the activities proposed under this long term partnership create synergies with existing research, innovation and development programmes.

Inclusiveness of a broad range of MSs/ACs and African partners will be considered an asset. In addition, due to the synergic effect that the coordination of public and private investments and activities can have on accelerating the fast market introduction of innovative solutions, the inclusion in the consortium of private sector stakeholders will be considered a positive asset.

The estimated duration of the project in order to achieve the establishment of the long term and sustainable collaboration is 5 years.

The EU estimates that a EU contribution of 15 million EUR would sufficiently allow the establishment of the intended long term partnership. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

Expected Impact: The expected impacts are firstly the creation of long lasting research and development cooperation through common understanding and trust between MSs/ACs and African stakeholders and its related mechanisms, that will be able to continue after the project. Secondly, the contribution to the development of local vibrant research and industrial frameworks, boosting in particular African innovation capacity and significantly improve African stakeholders ability to be included in research and collaboration future networks,

improving local innovation capacity. Finally, a strong contribution to the fast development and market introduction of sustainable renewable energy solutions in the African continent.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Cross-cutting issues

Proposals are invited against the following topic(s):

LC-SC3-CC-1-2018-2019-2020: Social Sciences and Humanities (SSH) aspects of the Clean-Energy Transition

Specific Challenge: The clean-energy transition doesn't just pose technological and scientific challenges; it also requires a better understanding of cross-cutting issues related to socioeconomic, gender, sociocultural, and socio-political issues. Addressing these issues will help to devise more effective ways of involving citizens and to better understand energy-related views and attitudes, ultimately leading to greater social acceptability as well as more durable governance arrangements and socioeconomic benefits.

Scope: In 2018, proposals must be submitted under the theme "Social innovation in the energy sector", in 2019 under the theme "Challenges facing carbon-intensive regions" and in 2020 under the theme "Energy citizenship". They have to address one or several of the questions listed under the respective sub-topics below. All proposals have to adopt a comparative perspective, with case studies or data from at least three European Union Member States or Associated Countries.

2018:

*Social innovation*²⁰⁷ *in the energy sector:* The energy transition has given rise to various forms of social innovation, such as the emergence of energy cooperatives or that of energy "prosumers" consuming but also producing energy. Urban areas have emerged as major hubs for these trends, given the close proximity between citizens, businesses and institutions, facilitating linkages between sectors and the emergence of new business and service models, as well as associated governance arrangements. These issues need to be studied in more detail, with a particular focus on the following questions:

- What characterizes successful examples of social innovation in the energy sector?
- What enabling conditions facilitate social innovation in the energy sector and how can it be encouraged? What factors work against it?

²⁰⁷ Social innovations are defined as new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. In other words they are innovations that are not only good for society but also enhance society's capacity to act. See, *Empowering people, driving change*, Bureau of European Advisers (BEPA), Brussels (2011), p. 33.

- In what way does social innovation contribute to the preservation of livelihoods and the development of new business and service models in the energy sector?
- In what way does social innovation contribute to making energy more secure, sustainable and affordable? Does social innovation lead to greater competitiveness and if so, how?
- Under what conditions does social innovation lead to greater acceptance of the transition towards a low-carbon energy system?

2019:

Challenges facing carbon-intensive regions: The transition to a low-carbon energy system and economy poses particular challenges for regions that are still heavily dependent on fossil-fuel-based industries or the extraction of fossil fuels themselves ("coal and carbon-intensive regions"). At the same time, this transition offers major opportunities for developing new lines of business and for increasing the competitiveness of structurally weak regions. Focusing on the past 5-10 years up to the present, particular attention should be focused on one or several of the following issues:

- What are the principal socio-economic challenges facing coal and carbon-intensive regions today and what effect have these had on livelihoods and the sustainability of local and regional economies?
- What coping strategies have emerged in recent years? What are the principal differences between regions that are coping well and those that are not?
- To what extent have coal and carbon-intensive regions experienced outward migration in recent years and in what way has this affected their social and demographic composition?
- What effect, if any, have these changes had on the rise of populism and of anti-democratic attitudes in the regions concerned?

2020:

Energy citizenship: SSH research offers many insights into the conditions favouring civic engagement, active participation and interaction with institutional or corporate actors. Such "energy citizenship" is not limited to early technology adopters or environmental activists, and it goes beyond (but also encompasses) mere "consumer involvement". Rather than using SSH research as an instrument to achieve particular outcomes (e.g., social acceptance) it can help to understand in what kind of environments collaborative goal setting and commitment can take place, how relevant decisions are made and any trade-offs between competing goals are addressed. This has important implications for EU energy policymaking. Proposals are expected to examine the factors affecting the emergence and effectiveness of energy citizenship and its potential for achieving the decarbonisation of the energy system. This should include factors such as digitalisation, social media, social group dynamics (e.g.

creating trust, finding shared goals), societal factors (e.g. institutional, corporate or legal environment), demographics and social justice. It should result in practical recommendations for policy-makers. Specifically, proposals are expected to focus on one or several of the following questions:

- Is energy citizenship more likely to emerge locally, or at regional, national or supranational levels? For what reasons?
- What is the relative importance of processes internal to relevant social groups (e.g., creating trust and connection, finding shared goals and solutions, building coalitions), as opposed to external environmental variables (e.g., relative openness of institutional or corporate environments, availability of sympathetic interlocutors, access to financial or other sources of support, legal or other obstacles)?
- What impact does the digitisation of the energy system and the proliferation of social media have on the emergence and consolidation of energy citizenship?
- Under what conditions is energy citizenship conducive to reaching broader policy goals, particularly the decarbonisation of the energy system, and under what conditions does it have the opposite effect?

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The proposed research will:

- provide a better understanding of socioeconomic, gender, sociocultural, and socio-political factors and their interrelations with technological, regulatory, and investment-related aspects, in support of the goals of the Energy Union and particularly its research and innovation pillar;²⁰⁸
- *Social innovation*²⁰⁹ in the energy sector (2018): yield practical recommendations for using the potential of social innovation to further the goals of the Energy Union, namely, to make Europe's energy system more secure, sustainable, competitive, and affordable for Europe's citizens;
- *Challenges facing carbon-intensive regions* (2019): yield practical recommendations for addressing the challenges of the clean-energy transition for Europe's coal and carbon-intensive regions, including socioeconomic and political ones.

²⁰⁸ As expressed in the "Accelerating Clean Energy Innovation" Communication (COM [2016] 763)

²⁰⁹ Social innovations are defined as new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. In other words they are innovations that are not only good for society but also enhance society's capacity to act. See, *Empowering people, driving change*, Bureau of European Advisers (BEPA), Brussels (2011), p. 33.

- *Energy citizenship* (2020): based on a better understanding of socio-economic, gender, socio-cultural, and socio-political factors, their interrelations with technological, regulatory, and investment aspects, yield practical recommendations for harnessing energy citizenship to achieve the energy and decarbonisation goals in the European Union and Associated Countries.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-2-2018: Modelling in support to the transition to a Low-Carbon Energy System in Europe

Specific Challenge: The energy system in Europe will follow a transition to a low-carbon future in accordance with the COP21 agreements and the European Union targets and objectives set for 2020, 2030 and 2050. Energy models that are currently used to plan, support and verify the energy policies at national and European level do not fully encompass and integrate all the new challenges posed by this transition, such as decentralisation and variability in electricity supply, the need for flexibility, short-and long-term market dynamics, integration of the energy systems, the deployment of innovative technologies and the interaction between increasing numbers of independently acting agents in liberalised markets. In addition, energy models do not always capture the determinants, barriers (including financing-related issues) and (macroeconomic) impacts of the necessary investments to secure the low-carbon transition.

Civil society is looking for improved access to the assumptions, tools and results underlying the assessment of policy options. Researchers are also looking for enhanced possibilities for open collaborative research and the use of open data sources. An enhanced transparency of modelling tools and a wider availability of data used and generated by the modelling exercises would improve access and understanding of the challenges ahead. In addition, Europe needs to continuously promote networks and platforms for dialogues on energy modelling across relevant actors and institutions in order to progress the scientific knowledge in the field and to reinforce the interaction between researchers and policy makers.

The challenge is therefore to develop new knowledge on energy system modelling to set up an open space for researchers at national and European levels to collaboratively innovate and progress in using modelling tools to understand and predict the requirements of the transition towards a low-carbon energy system. The aim is to support the development of effective and efficient policy measures, to increase consistency and comparability of modelling practices and their use in defining low-carbon transition pathways at regional, national and European level.

Scope: Proposals must target the development of a suite of modelling tools and scenario building exercises that will contribute to a better understanding of the issues below. Proposals will address all of the following issues:

1. A better representation of recent and future aspects of the European energy system in transition. For power generation, it includes aspects such as decentralisation, variability, the need for flexibility, and real market functioning. For demand, it includes the behaviour of individuals and communities of actors. It should also help address issues such as the integration of energy sectors (electricity, heating/cooling and gas).
2. Greater transparency and access to assumptions, data, model outputs and to tools used in modelling exercises. A collaborative environment for research on modelling, scenario and pathways development including ex-post validation and inter-comparison exercises should be proposed. Interaction with energy transition modelling activities in member states and with energy and climate policy makers.
3. A better representation of the investment determinants, barriers (energy market and regulatory failures) and impacts of actors: individuals, communities, private and public actors and cover the deployment of innovative technologies. This should help represent policy measures that address barriers and market failures. The exploration of energy and macroeconomic relationships, including via the investment channels, would also create a clearer understanding of macro-economic impacts of the low-carbon transition.

The organisation of an annual conference on energy modelling, bringing together the relevant experts and policy-makers, would be an important asset.

The Commission considers the proposals requesting a contribution from the EU of between 4 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The supported projects are expected to contribute to:

- a. A better adequacy of energy system modelling approaches to model the transition to a low-carbon energy system and to encompass the new challenges posed by the energy transition driven by the Energy Union with its targets and objectives for 2020, 2030 and 2050;
- b. Improve the understanding of energy systems by enhancing the transparency of modelling engines and practices and making data and knowledge more widely available. Increase the sharing of modelling infrastructures and databases;
- c. Increase openness to collaborative research on energy system modelling as well as the provision of more complete information on policy options and their assessment to civil society and decision-makers.
- d. Better representation of the determinants, barriers and impacts of investments by actors: individuals, communities, and private and public actors. Allow better design and representation of policy measures that address barriers and market failures;

- e. Promote a coherence of modelling practices at regional, national and European levels, allowing an assessment of cross-border effects and the comparison and integration of individual approaches;
- f. Provide a clearer understanding of the macro-economic impacts of the low-carbon transition.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-3-2019: Support for the opening of low-carbon energy research databases in Europe²¹⁰

Specific Challenge: Recent advances in the collection and exploitation of large data sets open the possibility for major industrial and social innovations. The European Open Science Cloud initiative aims to maximise the incentives for sharing data and to increase the capacity to exploit them, to ensure that data can be used as widely as possible.

Increasing aspects of research in the transition to a low-carbon energy system in Europe rely on the collection, analysis and processing of large data sets. Insights, information and knowledge are increasingly extracted from data sets in individual sectors and in the combination of data from different sectors.

The challenge is to promote the opening of research databases for low-carbon energy in Europe, and to support a European-level approach to defining the development of future research data bases; this action focuses on the area of low-carbon energy. As the energy transition combines different scientific disciplines, particular attention has to be paid to agreed metadata in order to allow for the joint exploitation of data from these disciplines.

Scope: Proposals will develop together with energy research communities several of the items below:

- Development and use of data management practices that follow findable, accessible, interoperable, re-usable (FAIR) principles, and to the validation of data quality measures;
- Coordination of existing data repositories and databases, including those from SETIS and from the IEA;
- Access to tools to manage energy data with FAIR principles; promotion of open source access of such tools;

²¹⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Access to analytics to exploit energy data; promotion of open source access of such tools;
- Capacity building of data experts for the domain of low-carbon energy research;
- New research topics based on the analysis of large data sets in the energy domain;
- Trans-disciplinary research combining data from different domains and at different scales;
- Development of partnerships with industry to promote the opening of large datasets of interest to foster research into future technologies and services.

A broad coverage of the issues mentioned above is encouraged.

Recommendations that will be produced by the ongoing study on "*Opportunities and barriers for opening of research databases in low-carbon energy research*" should be taken into account²¹¹.

Proposals should also follow developments of the European Open Science Cloud initiative, and plan to cooperate with and complement this activity.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.5 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Increasing/extending/widening the use of low-carbon energy research databases, particularly those from publicly financed R&I projects.
- Development of a critical mass of open research databases in Europe, and of researchers equipped with the know-how for the deployment, maintenance and exploitation of these.
- Easy and open access to these databases and to tools for their elaboration and exploitation, leading to increased efficiency of research investments.
- Strengthening of data-intensive research on low-carbon energy in Europe;
- Strengthening the development of industrial applications of data-intensive processes.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

²¹¹ To be published in the first half of 2018 on <https://bookshop.europa.eu/en/home/>

LC-SC3-CC-4-2018: Support to sectorial fora²¹²

Specific Challenge: The transition to a low-carbon energy system poses a unique set of policy, technological and scientific challenges, changes the fundamental nature of the interrelations between all actors in our societies (from energy incumbents to regulators and citizens), and requires the engagement of all stakeholders. Not only is there a need to find novel approaches to the development and application of technological or social processes as they relate to the energy transition, but also to a better understanding of how these changes impact people's behaviour, pervasive values, cultures of practice and modes of communication. It also entails the need to engage all stakeholders, foster cooperation between them, align their actions to the achievement of commonly agreed goals.

Scope: Proposals will have to support sector-specific stakeholder fora along the following lines:

1. Support the coordination of stakeholders' activities in the context of the *SET-Plan European Technology Innovation Platforms* (especially towards the progress of the strategic R&I Implementation Plans identified in the different technological areas in the context of the SET-Plan Key Actions), in particular in the area of
 - a. PV;
 - b. Ocean energy;
 - c. Wind energy;
 - d. Renewable Fuels and Bioenergy;
 - e. Renewable Heating and Cooling (RHC); and
 - f. Zero emission fossil fuel power plants and energy intensive industry.
2. All relevant stakeholders of the *hydropower sector* will be brought together in a forum including workshops and online discussion groups in order to identify research and innovation needs and priorities, to share knowledge at the European level between basic science, the research and industrial value chain, civil society and European and national authorities, to support the discussion with up-to-date information. The forum will produce a synthesis of expected research developments and research needs for the coming decades in a technology roadmap and research and innovation agenda in the hydropower sector, targeting an energy system with high flexibility and renewable share.
3. Building on the platform for *energy-related SSH research* that was set up during the pilot phase, the dialogue among different SSH stakeholders - as well as with other energy-research communities, fostering interdisciplinarity as well as knowledge and information sharing – should be continued and enhanced. This includes promoting the

²¹² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

generation of novel, evidence-based research designed to inform and influence relevant policy processes, particularly in the context of the Energy Union and the transition to a low-carbon energy system. The platform will be sought after by European policymakers as a source of specific expertise and advice on how best to integrate SSH aspects in energy-related policymaking.

4. Taking into account that private investment is the most important contributor to the Energy Union's Research and Innovation priorities, this action will support the coordination of the industrial participation in the SET Plan. It will in particular focus on the execution of the implementation plans of the SET Plan nine non-nuclear priority actions to reach the strategic targets agreed by the SET Plan Steering Group to enhance European competitiveness in clean energy innovation. In order to reach this goal, the action will promote collaboration and the development of cross thematic synergies among actors who are interested in bringing new clean energy innovations to the market, in particular from the European industry-driven associations and initiatives such as the European Technology and Innovation platforms (ETIPs), European Joint Technology Initiatives or other relevant public-private partnerships, and importantly the industrial actors identified in the 13 non-nuclear SET plan implementation plans. A key task of this action will be to help further define adequate financial strategies to mobilise investments from different sources to fulfil the implementation plans. In line with the SET Plan principles, financial resources will come mainly from industry and national public funds. The use of complementary European funds will be promoted whenever relevant (e.g. from ESIF and the risk sharing facility InnovFin EDP recently significantly enlarged in terms of funding and scope to channel undisbursed funds from NER300 and to prepare the future Innovation Fund). The focus of the action will be European, establishing links with the corresponding sectorial fora in Europe and with other international initiatives in the clean energy domain, such as Mission Innovation.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Coordinated stakeholders' activities in the different sectors, providing specific and extensive advice to EU policymakers on energy-related research policy-making, continuing to foster social innovation and social dialogue in the energy field at European level, contributing towards the progress of the strategic research and innovation Implementation Plans identified in the context of the SET-Plan.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-5-2018: Research, innovation and educational capacities for energy transition

Specific Challenge: The energy sector is evolving rapidly creating new job opportunities while requiring new skills and expertise to be developed. The challenges are significant. Over the coming years, the growing low-carbon energy sector requires many employees to be educated, trained or re-skilled. At the same time, energy innovation creates a massive need for new talents, able to cope and conduct the energy transition with a systemic approach. Therefore curricula and programmes, including the modules organised in operating environment, need to be upgraded or new ones developed.

Due to their interdisciplinary work in research, innovation, education and training, universities are core stakeholders in Europe's energy transition towards a low carbon society. They also are important change agents that will be instrumental in responding to the above mentioned challenges.

In order that European universities contribute fully to the objectives of the Energy Union and to the SET Plan²¹³ they need to cooperate further with innovative businesses and offer appropriate curricula/programmes²¹⁴. To do so silos need to be broken between energy technologies and interdisciplinarity that is conducive to addressing the challenges of the whole energy system needs to be fostered. The appropriate skills for tackling the energy transition, going beyond separate technologies and incorporating social, entrepreneurial/managerial and market aspects of the energy system, need to be developed.

In addition, solutions need to be clearly targeted, oriented to meet skills needs quickly, easily replicable in other domains and scalable to other European universities/institutions. For this purpose it is crucial to have active networks in place among universities and between universities and business.

Scope: Proposals will cover one or more of the following fields:

- Renewable energy,
- Energy storage,
- Smart and flexible energy systems,
- Carbon capture, utilisation and storage (CCUS).

Proposals will combine the relevant scientific and technological elements of these fields with relevant social sciences and humanities in a way that is balanced and provides an interdisciplinary approach (e.g. involving SSH scientists as partners; including SSH scientific subjects as parts of interdisciplinarity, developing special SSH curricula or similar).

²¹³ <https://ec.europa.eu/energy/en/topics/technology-and-innovation/strategic-energy-technology-plan>

²¹⁴ The SET Plan Education and Training Roadmap can serve as a general reference document
<https://setis.ec.europa.eu/setis-output/education-training-roadmap>

Proposals will deliver all the following, addressing the specific needs of the SET Plan objectives and its Implementation Plans:

- Efficient and effective cooperation networks both among European universities and between European universities and business;
- Challenge and case-based modules that are linked to European university programmes (at least three per programme) to teach students about operational problems combining the social, technological and industrial dimensions;
- At least three innovative (such as using digitisation) and short (3-4 months) university tools/programmes in the chosen field or fields, which are replicable and scalable in Europe, and respond rapidly to urgent European industry needs and the rapidly evolving European energy landscape;
- Opportunities for student mobility between the academia and industry.

The networks will also address needs for training the trainers. However, except for piloting, the actual teaching or training the trainer activities remain outside the scope of this topic. Modules and programmes will only be developed in English.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 to 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The funded proposals are expected to lead to a generation of researchers and engineers who are equipped to develop, improve and deploy new energy technologies, thereby contributing to meeting the challenges of the energy transition.

At the same time, the capacities of the European universities in energy research, innovation and education will be enhanced, as will their ability to engage with industry, cities, regions and other key societal actors. This will increase European universities' abilities to facilitate the swift deployment of technological and non-technological innovations in the energy sector.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-6-2018: Transition in coal intensive regions

Specific Challenge: The implementation of the EU Energy Union transition towards a low-carbon economy poses significant technological, economic and social challenges, in particular for coal-intensive regions that have to prepare for the reduction or phasing-out of coal production, both due to market-driven trends and environmental policies. These regions need an effective roadmap to make the necessary transition to a more diversified economic base

and a more sustainable energy system, while safeguarding the social cohesion for communities and regions dependent on coal production.

Smart Specialisation strategies, which are also a precondition for benefiting from European Structural and Investment Funds, are expected to help organise the structural changes. The involvement of the private sector, researchers and local governments in the process of 'entrepreneurial discovery' is a key challenge in itself. Developing joint strategies, built on complementarities and respective strengths, can be valuable for better realising the individual and combined potential of coal-intensive regions.

Scope: The objective is to support European coal-intensive regions to design research and innovation strategies to facilitate their transition towards a sustainable energy system. The proposed action will assist policy makers to develop, implement and review their strategies by providing information, developing methodologies, expertise and advice. Main deliverables are a set of blueprints and tools for Member States, Associated Countries and regions. Special consideration will be given to the Implementation Plans jointly developed by European countries, as part of the EU's Strategic Energy Technology Plan (SET Plan).

Specific issues to be addressed include:

- Assist regional actors in developing Research and Innovation strategies for smart specialisation, including the development of public R&I capacities, consistent with the SET Plan;
- Investigate relevant social challenges including the re-skilling needs of the workforce;
- Identification and exchange of best practices, including industrial roadmaps from coal towards new technologies and transformation strategies for coal based combined heat and power production to low carbon electricity and district heating generation;
- Guidance to regional actors for the access to available European funds and programmes, such as; (a combination of) the European Fund for Strategic Investments (EFSI), Cohesion Policy funds and Horizon 2020, and leveraging additional national public and private co-financing.

The project should develop synergies and complementarities to the European Commission's Smart Specialisation Platform on Energy (S3PEnergy)²¹⁵.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The proposed action should lead to new and deepened cooperation in R&I between coal intensive regions that will facilitate their transition to a more sustainable energy system. This cooperation should in the short to medium term contribute to reach the targets

²¹⁵ <http://s3platform.jrc.ec.europa.eu/s3p-energy>

set in the SET Plan and stimulate investment in the low-carbon energy sector, with the long term aim to boost innovation-driven growth and industrial competitiveness, create opportunities for employment, meet the COP21 targets and safeguard environmental protection.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SC3-CC-7-2020: European Energy and Climate Modelling Forum (2020-2024)

Specific Challenge: The European Union aims to decarbonise its economy according to policies for 2020 and 2030 and long-term visions for mid-century. The Commission has extensively used energy and climate economic models to assess the impacts of its policies and has supported the development of new knowledge in this field. As the energy transition will require radical changes in energy production, distribution and use, there is a need for a diversified set of modelling approaches to add robustness to the technical feasibility of the identified pathways and the evaluation of their respective costs and benefits.

Currently, the European energy and climate modelling landscape is quite fragmented. Structured, multilateral communication between modelling groups and other stakeholders was only recently initiated via the Energy Modelling Platform Europe²¹⁶, whereas similar initiatives have a long history in the USA²¹⁷ and at UN level^{218 219} and also exist in China²²⁰.

The European capacity to explore the pathways to achieve its long-term climate and energy objectives needs to be enhanced and these efforts need to be made within a structured and transparent framework that results in tools that are open for use by all stakeholders.

Scope: A new "European Energy & Climate Modelling Forum" will structure and manage joint model benchmarking and comparison exercises on the EU energy system, climate mitigation and its regional and sectoral components along relevant policy questions. This does not include new model development, but will:

- a. Benchmark and compare different assumptions, data sources, scenario building and modelling suites to explore the pathways to long-term climate – energy policies;
- b. Interpret the results across different societal, economic, and policy perspectives;
- c. Provide robust evidence supporting the development of near-term and long-term policies for the implementation of the 2030 and 2050 objectives;

²¹⁶ Energy Modelling Platform Europe <http://www.energymodellingplatform.eu>

²¹⁷ Energy Modelling Forum (US) <https://emf.stanford.edu/>

²¹⁸ IIASA multi-model database <https://tntcat.iiasa.ac.at/AR5DB/dsd?Action=htmlpage&page=about>

²¹⁹ Climate Watch data portal <https://www.climatewatchdata.org/pathways/models>

²²⁰ China Energy Modelling Forum <http://www.cemf.net.cn/en/index.php>

- d. Support the development of modelling capacity in Member States/Associated Countries and create a technical (IT-based) communication channel between the EC and Member States. This will complement existing channels like the Energy Economics Group²²¹ (which gathers experts from the Member States/Associated Countries) and new groups arising from the regulation on the governance of Energy Union or groups from Framework Programme research projects. No group currently exists for climate policy, but the project could actively support engagement between member states stakeholders and modellers.
- e. Link with existing global modelling projects, such as COMMIT, and projects under Horizon 2020 Work Programmes to support the transition to a low-carbon energy system (LC-SC3-CC-2-2018)²²² or to improve integrated assessment models and use them to inform policy-making (LC-CLA-01-2018)²²³
- f. Contribute to joint scientific publications from modelling teams.

Besides managing the core comparison activity, the forum will:

- a. Organise regular meetings to share findings and to brainstorm on research questions with policy relevance and directions for the European energy and climate modelling community;
- b. Contribute to the development of a truly integrated approach by considering the possible feedbacks between the energy system and the environment;
- c. Organise, store or link the quantitative information produced by modelling exercises in a transparent and accessible manner;
- d. Interact with a wide range of stakeholders including modelling experts working for Member States/Associated Countries and other entities as well as promoting links with policy makers at all levels.

The Commission considers that proposals requesting a contribution from the EU of around EUR 5 Million would allow this specific challenge to be addressed appropriately. However, this does not preclude submission and selection of proposals requesting other amounts.

At least 60% of the estimated budget should be allocated directly to climate and energy modelling activities.

Expected Impact: Results from the Forum's activities (modelling comparisons, scenarios etc.) will inform the development of future energy and climate policies at national and European level.

²²¹ Energy Economics Group (EEG) <https://www.psi.ch/eem/>

²²² <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/lc-sc3-cc-2-2018>

²²³ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/lc-cla-01-2018>

The Forum will create a closer, stronger, European modelling community. It will present a more coherent, unified evidence base that will, in turn, form a concrete basis for action by policy makers.

It will also improve collaboration beyond Europe, which will lead to a greater influence on global energy and climate policy.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - BUILDING A LOW-CARBON, CLIMATE RESILIENT FUTURE: SECURE, CLEAN AND EFFICIENT ENERGY

Opening date(s), deadline(s), indicative budget(s).²²⁴

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
LC-SC3-JA-4-2018 (CSA)	1.00			31 Jan 2018
LC-SC3-RES-11-2018 (RIA)	30.00			31 Jan 2018 (First Stage) 28 Aug 2018 (Second Stage)
LC-SC3-RES-4-2018 (RIA)	27.50			
LC-SC3-RES-12-2018 (IA)	30.00			13 Feb 2018
LC-SC3-RES-13-2018 (IA)	45.00			
LC-SC3-RES-21-2018 (RIA)	25.00			
LC-SC3-RES-28-2018-2019-2020 (CSA)	15.00			
LC-SC3-RES-5-2018 (IA)	10.00			
LC-SC3-RES-6-2018 (IA)	30.00			
Opening: 05 Dec 2017				

²²⁴

The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.

The Director-General responsible may delay the deadline(s) by up to two months.

All deadlines are at 17.00.00 Brussels local time.

The budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

Horizon 2020 - Work Programme 2018-2020
Secure, clean and efficient energy

LC-SC3-ES-3-2018-2020 (IA)	26.30			05 Apr 2018
LC-SC3-ES-4-2018-2020 (IA)	19.00			
LC-SC3-ES-5-2018-2020 (IA)	30.00			
LC-SC3-ES-7-2018 (CSA)	3.00			
LC-SC3-RES-22-2018 (IA)	20.00			
LC-SC3-SCC-1-2018-2019-2020 (IA)	43.00 225			
LC-SC3-CC-4-2018 (CSA)	8.50			19 Apr 2018
LC-SC3-RES-2-2018 (RIA)	12.00			
Opening: 25 Jan 2018				
LC-SC3-EC-1-2018-2019-2020 (CSA)	5.00			13 Sep 2018
LC-SC3-EC-2-2018-2019-2020 (CSA)	5.00			
LC-SC3-EE-1-2018-2019-2020 (IA)	9.00			
LC-SC3-EE-10-2018-2019-2020 (CSA)	6.00			
LC-SC3-EE-11-2018-2019-2020 (CSA)	7.00			
LC-SC3-EE-13-2018-2019-2020 (CSA)	4.00			
LC-SC3-EE-14-2018-2019-2020 (RIA)	4.00			
LC-SC3-EE-15-2018 (CSA)	5.00			
LC-SC3-EE-16-2018-2019-2020 (CSA)	8.00			
LC-SC3-EE-2-2018-2019 (CSA)	7.00			
LC-SC3-EE-5-2018-2019-2020 (CSA)	5.00			

²²⁵

of which EUR 3.00 million from the 'Smart, green and integrated transport' WP part.

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Secure, clean and efficient energy

LC-SC3-EE-6-2018-2019-2020 (IA)	9.00			
LC-SC3-EE-8-2018-2019 (CSA)	10.00			
LC-SC3-EE-9-2018-2019 (CSA)	6.00			
Opening: 15 May 2018				
CE-SC3-NZE-2-2018 (RIA)	12.00			06 Sep 2018
LC-SC3-CC-1-2018-2019-2020 (RIA)	10.00			
LC-SC3-CC-2-2018 (RIA)	5.00			
LC-SC3-CC-5-2018 (CSA)	4.00			
LC-SC3-CC-6-2018 (CSA)	2.00			
LC-SC3-NZE-1-2018 (RIA)	20.00			
LC-SC3-NZE-3-2018 (CSA)	3.00			
LC-SC3-JA-1-2018 (ERA-NET-Cofund)	10.00			11 Sep 2018
LC-SC3-JA-2-2018-2019 (CSA)	6.00			
Opening: 01 Aug 2018				
LC-SC3-RES-1-2019-2020 (RIA)		20.00		16 Oct 2018 (First Stage)
LC-SC3-RES-14-2019 (RIA)		20.00		25 Apr 2019 (Second Stage)
LC-SC3-EE-17-2019 (CSA)		16.00		05 Feb 2019
Opening: 05 Sep 2018				
LC-SC3-RES-15-2019 (IA)		25.00		11 Dec 2018
LC-SC3-RES-17-2019 (IA)		40.00		
LC-SC3-RES-24-2019 (IA)		20.00		
LC-SC3-RES-28-2018-2019-2020 (CSA)		15.00		
LC-SC3-RES-30-2019 (IA)		10.00		
LC-SC3-RES-8-2019 (IA)		15.00		
LC-SC3-ES-1-2019 (IA)		37.30		05 Feb 2019

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LC-SC3-ES-2-2019 (IA)		25.00		
LC-SC3-ES-6-2019 (RIA)		28.35		
LC-SC3-ES-8-2019 (CSA)		10.00		
LC-SC3-SCC-1-2018-2019-2020 (IA)		83.00 226		
Opening: 14 Nov 2018				
LC-SC3-CC-3-2019 (CSA)		2.00		27 Aug 2019
LC-SC3-ES-9-2019 (ERA-NET-Cofund)		10.00		
LC-SC3-JA-2-2018-2019 (CSA)		1.00		
LC-SC3-JA-3-2019 (PCP)		20.00		
Opening: 12 Mar 2019				
LC-SC3-EC-1-2018-2019-2020 (CSA)		7.50		10 Sep 2019
LC-SC3-EC-2-2018-2019-2020 (CSA)		7.50		
LC-SC3-EE-1-2018-2019-2020 (IA)		12.00		
LC-SC3-EE-10-2018-2019-2020 (CSA)		6.00		
LC-SC3-EE-11-2018-2019-2020 (CSA)		6.00		
LC-SC3-EE-13-2018-2019-2020 (IA)		8.00		
LC-SC3-EE-14-2018-2019-2020 (RIA)		4.00		
LC-SC3-EE-16-2018-2019-2020 (CSA)		10.00		
LC-SC3-EE-18-2019 (CSA)		1.00		
LC-SC3-EE-2-2018-2019 (CSA)		10.00		
LC-SC3-EE-3-2019-2020 (CSA)		6.00		

²²⁶

of which EUR 3.00 million from the 'Smart, green and integrated transport' WP part.

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Secure, clean and efficient energy

LC-SC3-EE-4-2019-2020 (IA)		10.00		
LC-SC3-EE-5-2018-2019-2020 (IA)		10.00		
LC-SC3-EE-6-2018-2019-2020 (CSA)		5.00		
LC-SC3-EE-8-2018-2019 (CSA)		5.00		
LC-SC3-EE-9-2018-2019 (CSA)		4.00		
Opening: 07 May 2019				
LC-SC3-CC-1-2018-2019-2020 (RIA)		10.00		27 Aug 2019
LC-SC3-NZE-4-2019 (IA)		20.00		
LC-SC3-NZE-5-2019-2020 (IA)		33.00		
LC-SC3-RES-16-2019 (RIA)		15.00		
LC-SC3-RES-23-2019 (RIA)		20.00		
LC-SC3-RES-29-2019 (RIA)		6.00		
LC-SC3-RES-7-2019 (RIA)		10.00		
Opening: 16 Jul 2019				
LC-SC3-B4E-1-2020 (CSA)			7.00	15 Jan 2020
LC-SC3-B4E-10-2020 (IA)			6.00	
LC-SC3-B4E-12-2020 (CSA)			3.00	
LC-SC3-B4E-5-2020 (IA)			3.00	
LC-SC3-B4E-6-2020 (IA)			12.00	
LC-SC3-B4E-7-2020 (CSA)			4.00	
LC-SC3-B4E-8-2020 (IA)			7.00	
LC-SC3-B4E-9-2020 (CSA)			1.50	
LC-SC3-EC-4-2020 (RIA)			10.00	
Opening: 03 Sep 2019				
LC-SC3-RES-19-2020 (IA)			25.00	11 Dec 2019
LC-SC3-RES-27-2020 (IA)			10.00	

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Secure, clean and efficient energy

LC-SC3-RES-28-2018-2019-2020 (CSA)			25.00	
LC-SC3-RES-33-2020 (IA)			20.00	
LC-SC3-RES-35-2020 (IA)			10.00	
LC-SC3-RES-9-2020 (IA)			20.00 227	
LC-SC3-EC-3-2020 (IA)			16.00	29 Jan 2020
LC-SC3-ES-10-2020 (IA)			14.00	
LC-SC3-ES-11-2020 (IA)			4.00	
LC-SC3-ES-12-2020 (IA)				
LC-SC3-ES-3-2018-2020 (IA)			15.00	
LC-SC3-ES-4-2018-2020 (IA)			40.00	
LC-SC3-ES-5-2018-2020 (IA)			22.00	
LC-SC3-SA-1-2020 (IA)			12.00 228	
LC-SC3-SCC-1-2018-2019-2020 (IA)			55.00	
Opening: 26 Sep 2019				
LC-SC3-JA-5-2020 (RIA)			15.00	21 Apr 2020
LC-SC3-RES-10-2020 (PCP)			15.00	
Opening: 03 Dec 2019				
LC-SC3-RES-1-2019-2020 (RIA)			45.00	21 Apr 2020
LC-SC3-RES-18-2020 (RIA-LS)			8.00	
LC-SC3-RES-26-2020 (RIA)			8.00	
LC-SC3-RES-31-2020 (RIA)			8.00	
LC-SC3-RES-32-2020 (RIA)			8.00	

²²⁷ of which EUR 10.00 million from the 'Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing' WP part.

²²⁸ of which EUR 8.00 million from the 'Smart, green and integrated transport' WP part.

Horizon 2020 - Work Programme 2018-2020
Secure, clean and efficient energy

LC-SC3-RES-37-2020 (RIA)			6.00	
Opening: 05 Mar 2020				
LC-SC3-B4E-11-2020 (CSA)			10.00	10 Sep 2020
LC-SC3-B4E-12-2020 (CSA)			3.00	
LC-SC3-B4E-13-2020 (CSA)			6.00	
LC-SC3-B4E-14-2020 (CSA)			6.00	
LC-SC3-B4E-2-2020 (CSA)			4.00	
LC-SC3-B4E-3-2020 (IA)			8.00	
LC-SC3-B4E-4-2020 (CSA)			6.00	
LC-SC3-EC-1-2018-2019-2020 (CSA)			6.00	
LC-SC3-EC-2-2018-2019-2020 (CSA)			6.00	
LC-SC3-EC-5-2020 (CSA)			9.00	
Opening: 05 May 2020				
LC-SC3-CC-1-2018-2019-2020 (RIA)			10.00	01 Sep 2020
LC-SC3-CC-7-2020 (RIA)			5.00	
LC-SC3-ES-13-2020 (IA)			9.00	
LC-SC3-NZE-6-2020 (RIA)			14.00	
LC-SC3-RES-20-2020 (IA)			10.00	
LC-SC3-RES-25-2020 (RIA)			5.00	
LC-SC3-RES-3-2020 (RIA)			10.00	
LC-SC3-RES-34-2020 (IA)			10.00	
LC-SC3-RES-36-2020 (RIA)			5.00	
LC-SC3-SCC-2-2020 (ERA-NET-Cofund)			5.00	
Overall indicative budget	537.30	623.65	601.50	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Exceptional funding rates:

LC-SC3-RES-10-2020	The funding rate for grants awarded under this topic and type of action is 90% of the eligible costs.
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Eligibility and admissibility conditions: The conditions are described in General Annexes B and C of the work programme. The following exceptions apply:

LC-SC3-B4E-1-2020, LC-SC3-B4E-11-2020, LC-SC3-B4E-14-2020, LC-SC3-B4E-2-2020, LC-SC3-B4E-4-2020, LC-SC3-B4E-7-2020, LC-SC3-B4E-9-2020, LC-SC3-EC-1-2018- 2019-2020, LC-SC3- EC-2-2018-2019-2020, LC-SC3-EC-5-2020, LC-SC3-EE-10-2018- 2019-2020, LC-SC3- EE-13-2018-2019- 2020, LC-SC3-EE-15- 2018, LC-SC3-EE-16- 2018-2019-2020, LC-	Taking into account the nature of the activity and with the objective to maximize the European Added Value and European market uptake through transnational collaboration ²²⁹ , the following additional eligibility criteria apply for Coordination and Support Actions (CSA): <ol style="list-style-type: none">1. at least three legal entities shall participate in an action;2. each of the three legal entities shall be established in a different Member State or Associated Country all three legal entities shall be independent of each other within the meaning of Article 8 of the Rules for Participation.
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²²⁹ Transition towards Secure, Clean and Efficient Energy and the Energy Union project are cross-national policy initiatives and priorities aiming at trans-national solutions.

SC3-EE-3-2019-2020, LC-SC3-EE-5-2018- 2019-2020, LC-SC3- EE-6-2018-2019-2020, LC-SC3-EE-8-2018- 2019, LC-SC3-EE-9- 2018-2019	
LC-SC3-SCC-1-2018- 2019-2020	<p>Consortia shall be composed of 2 lighthouse cities and at least 5 follower cities.</p> <p>By the call deadline, all lighthouse cities must have a validated²³⁰: i) Sustainable Energy Action Plans (SEAP)²³¹ or ii) Sustainable Energy (and Climate) Action Plans (SECAP)²³² or iii) a similar, at least equally ambitious, plan.</p> <p>A city can be funded as a lighthouse city only once under Horizon 2020.</p> <p>All relevant performance data must be incorporated into the Smart Cities Information System database (SCIS).</p>
LC-SC3-ES-5-2018- 2020	<p>Consortia shall involve:</p> <ul style="list-style-type: none"> • at least 2 energy suppliers and at least 2 ESCOs or independent aggregators, • Transmission System Operators (TSO) from at least 5 different Member States and/or Associated Countries (this doesn't exclude participation of additional TSOs from non-Member States), • 8 Distribution System Operators (DSO) from several Member States and/or Associated Countries, with at least 3 of those DSOs operating in the area covered by the transmission system of any of the participating TSOs.
LC-SC3-ES-4-2018- 2020	<p>Proposals must include:</p> <ul style="list-style-type: none"> • at least one demonstration on one island; • at least two Follower islands (geographical islands). The follower islands are to be members of the consortium although their participation in the project can be limited to

²³⁰ Validated by DG JRC. See also FAQ for more detail.

²³¹ http://www.covenantofmayors.eu/actions/sustainable-energy-action-plans_en.html

²³² <http://www.covenantofmayors.eu/0-4.html>

	actions allowing them to develop plans to adapt similar solutions to their islands in a cost-efficient way.
LC-SC3-ES-1-2019	In case of sub-topic 2) International cooperation with Canada, participants in the Horizon 2020 proposal will have to conclude, if successful, a Coordination Agreement with the project supported by Canadian funding authorities. A final draft of this agreement must be provided with the proposal. A guidance document on how to draw up such coordination agreement is provided with the topic documentation.
LC-SC3-ES-6-2019, LC-SC3-RES-29-2019, LC-SC3-RES-30-2019	Due to the specific challenges associated with this topic (in case of topic LC-SC3-ES-6-2019 this refers only to sub-topic 4) and the international focus of the Mission Innovation initiative, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least one participant from a non-EU/Associated country member of Mission Innovation (i.e. Australia, Brazil, Canada, Chile, People's Republic of China, India, Indonesia, Japan, Mexico, Republic of Korea, Saudi Arabia, United Arab Emirates, United States). Standard rules on eligibility for EU funding apply.
LC-SC3-EE-18-2019	Due to the specific challenges associated with this topic, proposals must involve at least one legal entity established in a Member State or Associated Country and one legal entity established in one of the following African countries: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic People's Republic), Congo (Republic), Côte d'Ivoire, Djibouti, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.
LC-SC3-RES-3-2020	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals must include as beneficiary at least one legal entity established in the following countries: USA or China.
LC-SC3-RES-34-2020	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes,

	<p>proposals must include as beneficiaries at least two legal entities established in one of the following Central Asian countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.</p> <p>The demonstration activities shall take place in one or more of the following countries, with participation of local partners: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan or Uzbekistan.</p>
LC-SC3-RES-25-2020	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals must include as beneficiary at least one legal entity established in Japan.
LC-SC3-RES-36-2020	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals must include as beneficiary at least one legal entity established in Canada.
LC-SC3-JA-5-2020	Due to the specific challenges associated with this topic, and with the objective to maximize collaboration and joint activities between European and African continents, proposals must involve at least five legal entities established in different Member State or Associated Country and five legal entities established in different African countries from the following: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic People's Republic), Congo (Republic), Côte d'Ivoire, Djibouti, Egypt, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.
LC-SC3-SA-1-2020	Consortia must encompass a Lighthouse Airport and at least two Fellow Airports based in the EU or in a country associated to Horizon 2020. At a minimum, one Fellow Airport has to be located in another Member State or a country associated to Horizon 2020, other than that of the Lighthouse Airport.
LC-SC3-ES-10-2020	Each solution proposed has to be demonstrated in at least two Members States or Associated Countries. Each demonstration

	has to include at least two micro/nano-grids (AC or DC), of which at least one with low-voltage DC infrastructure. Each demonstration has to be interconnected with at least one point of common coupling (PCC) to the existing grid through medium-voltage DC.
LC-SC3-ES-13-2020	<p>In addition to the minimum number of participants set out in the General Annexes, proposals shall include as international partners under the grant agreement²³³ at least three legal entities from India that apply for and are eligible for DST funding.</p> <p>Proposals will only be selected on the condition that the contribution to the project of Indian international partners will be funded by the DST.</p> <p>The eligibility conditions for the Indian applicants will be published in due time by the DST. The eligibility of the applicants will be checked shortly after the closure of the call. For this purpose, the Commission will share a list with all project names, proposal numbers and acronyms as well as the names of beneficiaries and international partners per proposal with the DST.</p>

Exceptional page limits to proposals/applications:

LC-SC3-SCC-1-2018-2019-2020	The page limit for a full proposal is 150 pages
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the work programme. The following exceptions apply:

LC-SC3-B4E-10-2020, LC-SC3-B4E-3-2020, LC-SC3-B4E-5-2020, LC-SC3-B4E-6-2020, LC-SC3-B4E-8-2020, LC-SC3-EE-1-2018-2019-2020, LC-SC3-EE-4-2019-2020, LC-SC3-EE-5-2018-2019-2020	In line with the other topics for Innovation Actions contributing to the PPP on Energy-efficient Buildings and SPIRE, the threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.
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²³³

Article 14a of the Horizon 2020 Model Grant Agreement.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the work programme. The following exceptions apply:

LC-SC3-RES-12-2018, LC-SC3-RES-13-2018, LC-SC3-RES-16-2019, LC-SC3-RES-17-2019	In order to ensure that a balanced portfolio of activities covering different renewable energy technology areas will be supported, the available budget will be firstly allocated to the proposal with the highest score, passing all thresholds, in each of the sub-topics. In a second round, proposals will be selected for funding regardless of the sub-topic and only according to the single ranking list of this topic.
LC-SC3-ES-6-2019	In order to ensure the coverage of all sub-topics, proposals above all thresholds will be ranked in each of the 4 areas and the first ranked proposals in each sub-topic will be selected until the available budget is exhausted (first, all proposals ranked nb 1, then nb 2, etc.), with the exception of sub-topic 4 for which only the highest-ranked eligible proposal will be selected; in case of insufficient budget to select all projects of the same rank to cover the 3 sub-topics, the best scores will prevail; in case of equal scores, standard rules do apply.
LC-SC3-ES-1-2019	At least one proposal per sub-topic will be funded, provided it passed all thresholds.
LC-SC3-RES-3-2020	In order to ensure that a balanced portfolio of activities covering both cooperation with China and the USA, the available budget will first be allocated to the proposal with the highest score, followed by the next highest-ranked proposal with either participants from both countries or with participants from either USA or China in case this country is not yet covered by the proposal selected first. Further ranking will be according to the ranking list.

The full evaluation procedure is described in the relevant [guide](#) published on the Funding & Tenders Portal.

Grant Conditions:

LC-SC3-ES-5-2018-2020	For grants awarded under this topic beneficiaries may provide support to third parties as described in part K of the General Annexes of the Work Programme . The support to third parties can only be provided in the form of grants. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied. Each consortium will define the
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	selection process of the third parties for which financial support will be granted (with a maximum of EUR 60.000 per party ²³⁴). Up to 2,5% of the EU funding requested by the proposal may be allocated to the purpose of financial support to third parties.
LC-SC3-EE-17-2019, LC-SC3-ES-8-2019	For grants awarded under this topic beneficiaries should provide support to third parties as described in part K of the General Annexes of the Work Programme . The support to third parties can only be provided in the form of lump sum grants. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied.
LC-SC3-JA-3-2019	In line with the nature of the instrument and the need to leverage national funding, the funding rate for grants awarded under this topic and type of action is 50% of the eligible costs.
LC-SC3-ES-1-2019	For sub-topic 2), the respective options of Article 2, Article 41.5 and Article 50.3.1 (i) (j) of the Model Grant Agreement will be applied.
LC-SC3-RES-9-2020	Grants awarded under this topic will be subject to the following additional dissemination obligations: For grants awarded under this topic and type of action the Commission or Agency may object to a transfer of ownership or the exclusive licensing of results to a third party established in a third country not associated to Horizon 2020. Applicants must acknowledge these obligations in their proposal. The respective option of Article 29.1 of the Model Grant Agreement will be applied.
LC-SC3-JA-5-2020	In order to maximize the stakeholders engagement in the long term partnership, the funding rate for grants awarded under this topic is capped at 50% of the total eligible costs. For grants awarded under this topic beneficiaries may provide support to third parties as described in part K of the General Annexes of the Work Programme . The support to third parties can only be provided in the form of grants. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied. Each consortium will define the

²³⁴

In line with Article 23 (7) of the Rules for Participation the amounts referred to in Article 137 of the Financial Regulation may be exceeded, and if this is the case proposals should explain why this is necessary to achieve the objectives of the action.

	selection process of the third parties for which financial support will be granted).
LC-SC3-SCC-1-2018-2019-2020	For grants awarded under this topic, beneficiaries may provide support to third parties as described in part K of the General Annexes of the Work Programme. The support to third parties can only be provided in the form of grants. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied. Each consortium will define the selection process of the third parties for which financial support will be granted (with a maximum of EUR 60.000 per party). Up to 5% of the EU funding requested by the proposal may be allocated to the purpose of financial support to third parties.
LC-SC3-RES-9-2020	For grants awarded under this topic the Commission or Agency may object to a transfer of ownership or the exclusive licensing of results to a third party established in a third country not associated to Horizon 2020. The respective option of Article 30.3 of the Model Grant Agreement will be applied.
LC-SC3-SCC-1-2018-2019-2020	<p>Grants awarded under this topic will be subject to the following additional dissemination obligations:</p> <p>Projects will incorporate performance monitoring of at least 2 years of deployed solutions from the earliest feasible moment²³⁵. All relevant performance data must be incorporated into the Smart Cities Information System database (SCIS)²³⁶.</p> <p>Applicants must incorporate these obligations in their proposal. The respective option of Article 29.1 of the Model Grant Agreement will be applied.</p>
LC-SC3-SA-1-2020	<p>Grants awarded under this topic will be subject to the following additional dissemination obligations:</p> <p>All relevant performance data must be incorporated into the Smart Cities Information System database (SCIS)²³⁷.</p> <p>Applicants must incorporate these obligations in their proposal. The respective option of Article 29.1 of the Model Grant Agreement will be applied.</p>

²³⁵ In case of the same solution being implemented in different buildings, monitoring for 2 years must be done at least for one building of each category in the same city. Monitoring must in all cases be at least one year.

²³⁶ <http://www.smartcities-infosystem.eu/>

²³⁷ <http://www.smartcities-infosystem.eu/>

	Agreement will be applied.
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Consortium agreement:

All topics of this call	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.
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NEXT-GENERATION BATTERIES

The Energy Challenge contributes to the call "Building a low-carbon, climate resilient future: Next-generation Batteries" (call identifier H2020-LC-BAT-2019-2020), in particular as regards the topics:

- LC-BAT-2-2019: Strengthening EU materials technologies for non-automotive battery storage
- LC-BAT-3-2019: Modelling and simulation for Redox Flow Battery development
- LC-BAT-4-2019: Advanced Redox Flow Batteries for stationary energy storage

For 2020, the following topics are indicated:

- LC-BAT-8-2020: Next-generation batteries for stationary energy storage
- LC-BAT-9-2020: Hybridisation of battery systems for stationary energy storage

TRANSFORMING THE ENERGY SECTOR THROUGH DIGITISATION

At a time when the energy landscape is undergoing a fundamental change towards decentralisation and decarbonisation, the introduction of new and smarter technologies will make an important contribution. They will help integrate renewable energies from variable and distributed resources in the energy systems and increase efficiency through better monitoring and optimisation of assets.

These technologies can moreover provide an opportunity for the uptake of new energy services and business models enabling consumers in the active participation in the energy system and energy markets.

The Energy Challenge contributes to the Focus Area "Digitising and transforming European industry and services" with the following specific topic which is implemented under the work programme annex of the Information and Communication Technologies part (the contribution of the Energy Challenge is matched by a contribution from the ICT part of the H2020 programme):

- DT-ICT-10-2018: Interoperable and smart homes and grids;
- DT-ICT-11-2019: Big data solutions for energy.

In addition, the Energy Challenge contributes to the Focus Area "Boosting the effectiveness of the Security Union" by contributing to a topic under the work programme Annex 'Secure societies - Protecting freedom and security of Europe and its citizens':

- SU-DS-04-2018-2020: Cybersecurity in the Electrical Power and Energy System (EPES): an armour against cyber and privacy attacks.

CONTRIBUTION TO THE CALL " COMPETITIVE, LOW CARBON AND CIRCULAR INDUSTRIES"

The Energy Challenge contributes to the call "COMPETITIVE, LOW CARBON AND CIRCULAR INDUSTRIES" (call identifier H2020-LOW-CARBON-CIRCULAR-INDUSTRIES-2020), included in the work programme Annex "Cross-cutting activities", the following topics:

- LC-SC3-NZE-5-2020: Low carbon industrial production using CCUS;
- LC-SC3-CC-9-2020: Industrial (Waste) Heat-to-Power conversion.

SME instrument & Fast-Track-to-Innovation

The respective calls for the EIC-SME instrument (H2020-EIC-SMEInst-2018-2020) and EIC-Fast-Track-to-Innovation (H2020-EIC-FTI-2018-2020) are found under the Horizon 2020 Work Programme Part – *Towards the next EU Framework Programme for Research and Innovation: European Innovation Council (EIC) Pilot* (part 17 of this work programme).

Other actions²³⁸

Horizon Prizes

1. Horizon prizes launched under the Work Programme 2016-2017 of the Horizon 2020 Societal Challenge "Clean Secure and efficient energy" (SC3)

On 4 July 2016 the following Horizon prizes were launched under the Work Programme 2016-2017 of the Horizon 2020 Societal Challenge "Clean Secure and efficient energy" (SC3)²³⁹.

Prize	Budget – Prize amount	Timeline of the contest	Expected award ceremony
Horizon prize for CO2 reuse	EUR 1.5 million	5 July 2016 - 03 April 2019	Q4 2019
Horizon Prize for a Combined heat and power installation in a hospital using 100% renewable energy sources	EUR 1 million	5 July 2016 - 03 April 2019	Q4 2019
Horizon prize for Integrated Photovoltaic System in European Protected Historic Urban districts	EUR 0.75 Million	5 July 2016 - 26 September 2018	Q2 2019

The prizes are expected to be awarded in 2019 and provision for the prize amounts must be made accordingly.

Type of Action: Prize

Indicative budget: EUR 3.25 million from the 2019 budget

2. RESponsible Island - Prize for a renewable geographic energy island ²⁴⁰

The prize intends to highlight the potential of renewables for decentralized energy grids by addressing energy needs for electricity, heating, cooling and transport. The title is inspired by RES (short for Renewables) and "responsible" to highlight the citizen in the centre of the energy system. Within this context, the prize recognizes realised achievements in renewables on geographic energy islands.

²³⁸ The budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

²³⁹ As amended, C(2016)4614, announcing the prizes.

²⁴⁰ This activity directly aimed at supporting pilot activities is excluded from the delegation to INEA and will be implemented by the Commission services.

Geographic energy islands are ideal test labs for the deployment of innovative energy technologies. The prize will reward integrated local RES production in a decentralized electricity grid and the achievements in decarbonizing heating, cooling and transport. In this context, renewable energy consumed on the island is also linked to the renewable energy produced on the island, supporting its local value chains and self-engaging the local society as a RESponsible prosumer.

The prize is in line with the objectives of the Political Declaration on Clean Energy on EU Islands and the Smart Islands Initiative and will contribute to Mission Innovation Challenge 2 (“Off Grid Access to Electricity Innovation Challenge”)²⁴¹.

The specific rules of the contest will be published by the European Commission at the beginning of each yearly competition. The European Commission will directly launch and manage the annual contest and annual award the prize based on the judgement of independent experts²⁴².

The indicative budget for the prize is EUR 1.7 million from the 2020 budget, intended as award for two yearly competitions: EUR 0.5 million for the 1st place, EUR 0.25 million for the 2nd place, EUR 0.1 million for the 3rd place.

Essential award criteria: After closure of the contest, the prize will be awarded to the three best-ranked contestants, who in the opinion of the jury, best address the following cumulative criteria for the respective whole geographic energy island²⁴³:

- The share of renewable energy produced by innovative energy technologies on the island respective to the energy consumed on the island for electricity, heating and/or cooling and transport;
- Environmental and socioeconomic sustainability and impact of the renewable energy solution;
- Citizen and community involvement;
- Replicability of the solution.

Eligibility criteria: The island shall be located within the territory of an EU Member State (including Overseas Countries and Territories linked to them) or an H2020 associated country and the prize is open to any legal entity or group of legal entities representing the respective island. Representation has to be proven through written representation agreement signed by the respective authorities responsible for the whole island. Participating islands must have permanent residents and an energy demand in electricity, heating and/or cooling as well as transport of at least 100 MWh/year overall.

²⁴¹ <http://mission-innovation.net/our-work/innovation-challenges/off-grid-access-challenge/>

²⁴² A pre-selection phase may be done by Commission services in case of numerous applications received.

²⁴³ Further clarification of these criteria might be published in the Rules of Contest

Contestants that have already received an EU or Euratom prize cannot receive a second prize for the same activities.

For the common Rules of Contest for Prizes please see General Annex F of the work programme.

Expected results: The prize will highlight realised achievements/best practices in reaching the potential of renewable energy for covering electricity, heating, cooling and transport needs in off-grid societies, and in the introduction of innovative technologies to the market. It will be a recognition of a responsible local society committed to expanding the share of renewables. It will also provide excellent visibility for citizens participating in the promotion of innovative renewable energy technologies.

The recognised solutions are expected to have high replicability also to other isolated energy systems with islands characteristics worldwide in the context of Mission Innovation Challenge 2²⁴⁴ by show-casing working business models.

Indicative timetable of contest(s):

Stages	Date and time or indicative period
Opening of the contest	1st round: 1st quarter of 2019; 2nd round: 1st quarter of 2020
Deadline for submission of application	first round: 3rd quarter of 2019; 2nd round: 3rd quarter of 2020
Award of the prize	1st round: 1st quarter of 2020; 2nd round: 1st quarter of 2021

Type of Action: Recognition prize

Indicative budget: EUR 1.70 million from the 2020 budget

Grants to identified beneficiaries

1. Fostering transnational cooperation between National Contact Points (NCP) in the area of Energy: follow-up project²⁴⁵

The action will facilitate transnational cooperation between Horizon 2020 NCPs in the area of Energy with a view to identifying and sharing good practices and raising the general standard

²⁴⁴ <http://mission-innovation.net/our-work/innovation-challenges/off-grid-access-challenge/>

²⁴⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

of support to programme applicants, taking into account the diversity of actors that make up the constituency of the energy sector. It will involve one consortium of NCPs focussing on transnational cooperation on issues specific to the energy sector, within the context of Horizon 2020 calls for proposals.

All activities must be tailored according to the nature of this sector.

The proposal should show that the activities put forward will deliver tangible benefits to potential applicants. Activities should capitalise on relevant work of the previous NCP network project in this sector (C-ENERGY 2020), and of the 'NCP Academy' (www.ncpacademy.eu). Various mechanisms may be included, such as benchmarking, joint workshops, enhanced cross-border brokerage events, and specific training linked to the energy sector.

Where relevant, activities should make use of commonly available tools (e.g. for brokerage and partner search, benchmarking tools, guidebooks, promotional tools etc).

To help close the innovation divide, a substantial component of the proposed activities must be devoted to activities aimed at helping NCPs in those countries that have been participating at low levels in the programme up to now. These activities should help these NCPs to rapidly acquire the know-how on NCP operations accumulated in other countries including, for example, training, mentoring, and twinning. They may also include awareness raising actions aimed at increasing visibility of well-qualified potential applicant organisations in the above mentioned countries.

The legal entities listed below are the host organisations of NCPs from EU Member States and Associated Countries who have been officially appointed by the relevant national authorities, and who have expressed a willingness to participate in this proposal. NCPs opting not to be a beneficiary are nevertheless invited and encouraged to participate in the project activities (e.g. workshops), and costs for such participation (e.g. travel costs paid by the consortium) may be included in the estimated budget and be eligible for funding by the Commission.

In line with Articles 2, 31.6 and 41.4 of the Model Grant agreement, the project arising from this grant will complement other NCP network projects. This means that the beneficiaries and those of the complementary grants must cooperate and provide access to their results. They must conclude a written collaboration agreement regarding the coordination of the complementary grants and the work of the action.

The project must end by August 2020.

Expected impact:

- An improved, more consistent and professionalised NCP service across Europe, thereby helping to simplify access to Horizon 2020 calls, and lowering the entry barriers for newcomers;

- An increase in the quality of proposals submitted, including those from countries where success rates are currently lower than average.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Austrian Research Promotion Agency, Sensengasse 1, A-1090 Vienna, Austria

The Brussels Enterprise Agency - impulse.brussels, Chaussée de Charleroi 110, 1060 Brussels, Belgium

GIS - Transfer Center Foundation; Technology Transfer Center on Renewable Energy Sources and Energy Efficiency, Acad. G. Bonchev Str., block 4, 1113 Sofia, Bulgaria

Agency for Mobility and EU Programmes, Frankopanska 26, 10000 Zagreb, Croatia

Research Promotion Foundation, PO BOX 23422, 1683 Nicosia, Cyprus

Estonian Research Council, Soola 8, 51013 Tartu, Estonia

Project Management Juelich (PtJ), Wilhelm-Johnen-Straße, 52425 Jülich, Germany

National Documentation Centre, 48 Vas. Constantinou Ave, 116 35 Athens, Greece

Icelandic Centre for Research - RANNIS, Borgartun 30, 105 Reykjavik, Iceland

ISERD, 4 Hayarden St., 7019900 Airport City (Lod), Isreal

APRE, Via Cavour 71, 00184 Rome, Italy

State Education Development Agency, Ministry of Education and Science of the Republic of Latvia, Valnu iela 1, LV 1050 Riga, Latvia

IPPT PAN, Pawinskiego 5B, 02-106 Warsaw, Poland

FCT, Av. D Carlos I 126, 1249-074 Lisboa, Portugal

Centro para el Desarrollo Tecnológico Industrial - CDTI, C/ Cid, 4, 28001 Madrid, Spain

TUBITAK, TÜBİTAK Başkanlık Tunus Caddesi No:80 Kavaklıdere, 6100 Ankara, Turkey

Ivano-Frankivsk National Technical University of Oil and Gas, 15 Karpatska St., 76019 Ivano-Frankivsk, Ukraine

EU Energy Focus, c/o Microwire Ltd, 27 Porson Road, Cambridge, CB2 8ET, United Kingdom

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 0.50 million from the 2018 budget

2. 5th Concerted Action on the Energy Performance of Buildings Directive support to Member States and participating countries for the implementation of the EPBD²⁴⁶

Concerted action with regard to implementation of EU legislation and policy: It covers topics where coordination and/or harmonisation of approaches would be beneficial, but is not required by EU legislation. A concerted action is therefore designed to provide added value compared with measures taken by each MS acting on its own and to achieve an optimum combination of the various instruments at the disposal of both the EU and the MS.

A concerted action meets the conditions laid down in Article 190(1)(f) of the rules implementing the Financial Regulation and the relevant procedures will be applied. Concerted actions will be undertaken by organisations designated by the MS and countries participating in the CA. The Commission Member States (MS) and participating countries (CA) concerns a limited number of specific activities in relation to implementation of EU legislation and policy. It aims at fostering exchanges of information and experience between MS and participating countries with has the role of coordinating this kind of action with the countries concerned.

Each concerted action will be allocated to a consortium of organisations designated and entrusted by the participating countries, under the coordination of one member of the consortium.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

ENERGISTYRELSEN, Danish Energy Authority (DEA), Amaliegade 44, KOBENHAVN K 1256, Denmark

OSTERREICHISCHES INSTITUT FÜR BAUTECHNIK, Austrian Institute of Construction Engineering (OIB), Schenkenstrasse 4, WIEN 1010, Austria

CENTRE SCIENTIFIQUE ET TECHNIQUE DE LA CONSTRUCTION, The Belgian Building Research Institute (CSTC), Rue du Lombard 42, BRUXELLES 1000, Belgium

SUSTAINABLE ENERGY DEVELOPMENT AGENCY (SEDA), 37 Ekzarh Jossif Str., SOFIA 1000, Bulgaria

²⁴⁶ This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

MINISTRY OF ENERGY, COMMERCE, INDUSTRY AND TOURISM (MCIT), 6, Andreas Araouzos str., Nicosia 1076, Cyprus

MINISTRY OF INDUSTRY AND TRADE (MPO), Na Frantisku, 32, PRAHA 1, 11015, Czech Republic

BUNDESAMT FÜR WIRTSCHAFT UND AUSFUHRKONTROLLE, Federal Office for Economic Affairs and Export Control (BAFA) Frankfurter Straße 29–35, 65760 Eschborn, Germany

MAJANDUS- JA KOMMUNIKATSIOONIMINISTEERIUM, Ministry of Economic Affairs and communications (MKM), Harju 11, Tallinn, 15072, Estonia

CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING (CRES), Marathonos 19TH KM, PIKERMI 19009, Greece

INSTITUTO PARA LA DIVERSIFICACION Y AHORRO DE LA ENERGIA, Institute for Diversification and Energy Saving (IDAE), Calle Madera 8, MADRID 28004, Spain

MOTIVA OY (MOTIVA), Urho Kekkosen katu 4-6 A, Helsinki 00101, Finland

MINISTERE DE L'ENVIRONNEMENT, DE L'ENERGIE ET DE LA MER, French Ministry of the Environment, Energy and the Sea (MEDDE), Grande Arche - Tour Pascal A et B, Paris-La Défense 92055, France

MINISTARSTVO GRADITELJSTVA I PROSTORNOGA UREDENJA, Ministry of construction and physical planning (MGIPU), Republike Austrije 20, ZAGREB 10000, Croatia

EGYETEM TER 1, UNIVERSITY OF DEBRECEN, DEBRECEN 4032, Hungary

THE SUSTAINABLE ENERGY AUTHORITY OF IRELAND (SEAI), Wilton Park House, Wilton Place, Dublin 2, D02T228, Ireland

AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE, Italian national Agency for new technologies, Energy and Sustainable Economic Development (ENEA), Lungotevere Grande Ammiraglio Thaon di Revel 76, ROMA 00196, Italy

STATYBOS PRODUKCIJOS SERTIFIKAVIMO CENTRAS, Certification Center of Building Products (SPSC), Linkmenu Gatve 28, VILNIUS 08217, Lithuania

MINISTERE DE L'ECONOMIE (MinEco), 19-21 Boulevard Royal, LUXEMBOURG 2914, Luxembourg

EKONOMIKAS MINISTRIJA, Ministry of Economics (ME), Brivibas Iela 55, RIGA LV 1519, Latvia

BUILDING REGULATION OFFICE (BRO), Horn Works Ditch, Emvin Cremona Street, Floriana, FRN1280, Malta

MINISTERIE VAN ECONOMISCHE ZAKEN, Ministry of Economic Affairs (RVO), Bezuidenhoutseweg 73, The Hague 2595 AC, Netherlands

NORGES VASSDRAGS- OG ENERGIDIREKTORAT, The Norwegian Water Resources and Energy Directorate (NVE), Middelthunsgate gate 29, Oslo 0368, Norway

INSTYTUT TECHNIKI BUDOWLANEJ, Building Research Institute (ITB), Ul Filtrowa 1, WARSAW 00 611, Poland

AGENCIA PARA A ENERGIA, Energy Agency (ADENE), Av. 5 de Outubro, n° 208, 2° piso, 1050-065 Lisboa, Portugal

MINISTERUL DEZVOLTARII REGIONALE, ADMINISTRATIEI PUBLICE SI FONDURILOR EUROPENE, Ministry of Regional Development and Public Administration (MDRAPFE), Libertatii 16, Latura Nord, sector 5, BUCHAREST, 050706, Romania

BOVERKET, National Board of Housing, Building and Planning (BOVERKET), Drottninggatan 18, KARLSKRONA 37123, Sweden

TECHNICKY A SKUSOBNY USTAV STAVEBNY N.O., Building Testing and Research Institute (TSUS), Studena 3, BRATISLAVA 821 04, Slovakia

GRADBENI INSTITUT ZRMK DOO, Building and Civil Engineering Institute (GI ZRMK) Dimiceva Ulica 12, LJUBLJANA 1000, Slovenia

BUILDING RESEARCH ESTABLISHMENT LTD (BRE), Bucknalls Lane, WATFORD WD25 9XX, United Kingdom

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 5.00 million from the 2018 budget

3. Support for a Member States' concerted market surveillance action on EU product energy efficiency legislation²⁴⁷

Compliance by industry and dealers with EU product efficiency legislation is key to ensure that the EU's energy efficiency targets are met. Non-compliance with these rules is estimated to reduce the resulting savings by at least 10%. Enforcement of this legislation is the sole competence of Member States.

²⁴⁷ This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

This action aims to strengthen the enforcement of the Ecodesign Directive, the Energy Labelling Directive and the Regulation on Labelling of Tyres, by supporting the coordination, monitoring, verification and enforcement activities of national Market Surveillance Authorities, in particular for those products that represent the highest energy saving potential or those that represent new challenges (e.g. newly regulated products), thereby improving compliance and increasing energy savings. The project should not replace activities that are under the responsibility of Member States, but should add European value to them. The project is expected to cover both horizontal activities (i.e. actions that are not product specific) and vertical activities (i.e. actions targeting specific product groups). It may include exchange of information and best practices, development of common methods, protocols, checklists or IT tools (e.g. web crawlers), execution of joint surveillance activities, strengthening the collaboration with customs authorities, communication, establishment of centres of excellence for product testing, support the development of the Energy Labelling products registration database, input into standardisation, addressing challenging issues like defeat devices, software updates, plausibility testing, support for international alignment of standards and requirements, etc.

The project shall have a Management Team consisting of representatives of MSAs, which is responsible for supporting the Coordinator in decisions relating to the technical content of the programme, planning of plenary meetings (including agenda), communication and dissemination and reporting in agreement with nominated representatives from the Commission. Each operational work package shall be led by a MSA representative, or other relevant entity formally appointed by its national MSA to perform market surveillance activities.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Federal Ministry of Science, Research and Economy - Division I/9, Stubenring 1, 1011 Vienna, Austria

Federal Ministry for Europe, Integration and Foreign Affairs, Minoritenplatz 8, 1010 Vienna

Österreichische Energiagentur, Austrian Energy Agency, Mariahilfer Straße 136, 1150 Vienna, Austria

Federal Public Service Economy, S.M.E.s, Self-employed and Energy, Directorate-General Energy - Division Infrastructure et Contrôles (Energy labelling), Boulevard du Roi Albert II 16, 1000 Brussels

Federal Public Service Health, Food Chain Safety and Environment, Directorate-General Environment (Eco design and tyre labelling), Place Victor Horta 40 boîte 10, 1060 Brussels

Commission for Consumer Protection (energy labelling + tyre labelling), 4A, Slaveykov Sq., 1000 Sofia, Bulgaria

Stage Agency for Metrological and Technical Surveillance -Directorate-General Market Surveillance (eco-design), 52A, "G.M.Dimitrov" Boulevard, Sofia 1797, Bulgaria

Ministry of Economy, Entrepreneurship and Crafts - Directorate for Economic Inspection - Sector of Market Inspection, Ulica grada Vukovara 78, 10000 Zagreb, Croatia

Ministry of Energy, Commerce, Industry and Tourism - Energy Service, 6 Andreas Araouzos Street, 1421 Nicosia, Cyprus

State Energy Inspection, Gorazdova 24 120 00 Praha 2

Ministry of Transport, Nábřeží Ludvíka Svobody 12/1222 P.O. Box 9 110 15 Prague 1

Danish Energy Agency, Amaliegade 44, DK-1256 Copenhagen C

Danish Transport Authority, Edvard Thomsens Vej 14, DK-2300 Copenhagen S

Technical Regulatory Authority, Sõle 23 A, Tallinn 10614, Estonia

Environmental Inspectorate, Kopli 76 10416 Tallinn, Estonia

Finnish Safety and Chemicals Agency (Tukes), Kalevantie 2, FI-33100 Tampere, Finland

Finnish Transport Safety Agency (Trafí), P.O. Box 320, FI-00101 Helsinki

Ministère de l'Écologie, du Développement durable et de l'Énergie (MEDDE) - Direction générale de l'énergie et du climat - Bureau des économies d'énergie et de la chaleur renouvelable (ecodesign), Tour Séquoia 92055 Paris La Défense Cédex

Ministry of the Economy, Industry and the Digital Sector - Direction générale de la concurrence, de la consommation et de la répression des fraudes - Unit 5A – Teledoc 241 (energy labelling and tyre labelling), 59 boulevard Vincent Auriol F-75703 Paris Cédex 13

Direction Générale des douanes et droits indirects , 11 rue des deux Communes 93, F-558 Montreuil Cédex, France

Thüringer Ministerium für Umwelt, Energie und Naturschutz, Max-Reger-Str. 4 – 8, 99096 Erfurt

Ministerium für Energie, Infrastruktur und Digitalisierung, Schloßstraße 6-8, 19053 Schwerin

Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Landesentwicklung, Kaiser-Friedrich Ring 75, 65185 Wiesbaden

Ministerium für Wirtschaft, Wissenschaft und Digitalisierung des Landes Sachsen-Anhalt, Hasselbachstr. 4, 39104 Magdeburg

Sächsisches Staatsministerium für Wirtschaft, Arbeit und Verkehr, Wilhelm-Buck-Str. 2, 01097 Dresden

Ministerium für Wirtschaft, Arbeit, Energie und Verkehr, Franz-Josef-Röder-Str. 17, 66119 Saarbrücken

Ministerium für Umwelt, Energie, Ernährung und Forsten – Rheinland-Pfalz, Kaiser-Friedrich-Str. 1, 55116 Mainz

Bayerisches Staatsministerium für Umwelt und Verbraucherschutz, Rosenkavalierplatz 2, 81925 München

Senatsverwaltung für Wirtschaft, Technologie und Forschung, Martin-Luther-Straße 105, 10825 Berlin

Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes NRW, Schwannstr. 3, 40476 Düsseldorf

Niedersächsisches Ministerium für Umwelt, Energie und Klimaschutz, Archivstr. 2, 30169 Hannover

Behörde für Umwelt und Energie, Neuenfelder Str. 19, 21109 Hamburg

Der Senator für Umwelt, Bau und Verkehr, Ansgaritorstraße 2, 28195 Bremen

Ministerium für Arbeit, Soziales, Gesundheit, Frauen und Familie, Henning-von-Tresckow-Str. 2-13, Haus S, 14467 Potsdam

Ministerium für Umwelt, Klima und Energiewirtschaft Baden Württemberg, Kernerplatz 9, 70182 Stuttgart

Ministerium für Energiewende, Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein, Mercatorstrasse 3, 24106 Kiel

Federal Ministry for Economic Affairs and Energy, Scharnhorststrasse 34-37 DE-10115 Berlin

BAM - Federal Institute for Materials Research and Testing Division S.4, Ecodesign and Energy Labelling, 12200 Berlin

BAM - Federal Institute for Materials Research and Testing Department S, Working Group Product Requirements, 12200 Berlin

Ministry of Economy, Development and Tourism - General Secretariat of Industry - Directorate of Technical Industrial Legislation, Kaniggos sq. 10181 Athens - Greece

Ministry of Development & competitiveness, General Secretariat of Consumer Affairs, Directorate for technical control , Pl. Kaniggos, 101 81 Athens

Hungarian Trade Licensing Office (MKEH) (Industrial and commercial products),
Németvölgyi út 37-39. 1124 Budapest

Hungarian Authority for Consumer Protection (HACP), 1088 Budapest, József krt. 6

Iceland Construction Authority, Skúlagata 21 - 101 Reykjavík

Department of Communications, Energy and Natural Resources, 29 - 31 Adelaide Road,
Dublin 2

Sustainable Energy Authority of Ireland, Wilton Park House, Wilton Place, Dublin 2, D02
T228

Ministry of Economic Development - Directorate General for the Market, Competition,
Consumers, Surveillance and Technical Standards - Division XIII - Technical Standards and
Safety and product conformity, Via Sallustiana, n.53 IT-00187 Roma

Ministry of Infrastructure and Transport -Directorate-General motorization, Via Caraci 36
00157 IT Roma

Ministero delle Infrastrutture e Trasporti - Consiglio Superiore dei Lavori Pubblici – Servizio
Tecnico Centrale, Via Nomentana, 2, Roma, Città Metropolitana di Roma, 00161 Lazio, Italy

Agenzia Nazionale Per Le Nuove Tecnologie, L'energia E Lo Sviluppo Economico
Sostenibile - Italian national Agency for new technologies, Energy and Sustainable Economic
Development (ENEA), Lungotevere Grande Ammiraglio Thaon di Revel 76, 00196 Roma,
Italy

Camera Di Commercio Metropolitana Di Milano-Monza-Brianza-Lodi, Metropolitan
Chamber of Commerce of Milano-Monza-Brianza-Lodi, Via Meravigli 9/B 000, 20123
Milano, Italy

Consumer Rights Protection Centre, Brivibas street 55, Riga, Latvia, LV-1010

State Non-Food Products Inspectorate, Gedimino Ave. 38 LT-01104 Vilnius

ILNAS – Surveillance du Marché, 1, avenue du Swing L-4367 Belvaux

Malta Competition and Consumer Affairs Authority - Market Surveillance Directorate,
Technical Regulations Division, Mizzi House, National Road, Blata l-Bajda, Hamrun, Malta
HMR 9010

Netherlands Food and Product Safety Authority (NVWA) (energy labelling), Catharijnesingel
59 3511 GG Utrecht

Human Environment and Transport Inspectorate (eco-design and tyre labelling), Koningskade
4, 2596 AA Den Haag

RDW, Europaweg 205 – NL 2711ER Zoetermeer

The Norwegian Water Resources and Energy Directorate (NVE), PO Box 5091 Majorstua, 0301 Oslo, Norway

Public Roads Administration , PO Box 8142 Dep, NO-0033 Oslo, Norway

Office of Competition and Consumer Protection - Market Surveillance Department, Plac Powstańców Warszawy 1 00-950 Warszawa

Office of Competition and Consumer Protection - Trade Inspection Department , Plac Powstańców Warszawy 1 00-950 Warszawa

Office of Electronic Communications - Department of Monitoring and Enforcement, 18/20 Kasprzaka Street 01-211 Warsaw Poland

Food and Economic Safety Authority (ASAE), Rua Rodrigo da Fonseca, n° 73; 1269-274 Lisboa

Regional Inspectorate for Economic Activities in the Madeira (IRAE Madeira), Rua Direita n° 27, 3° andar; 9050-450 Funchal

Regional Inspection of Economic Activities in the Azores (IRAE Açores), Rua Margarida de Chaves, n.º 103, 9500 – 088 Ponta Delgada, São Miguel Açores

National Authority for Consumers Protection, 72 Aviatorilor blvd, sect. 1 – RO-O1865, Bucharest

Romanian Energy Regulatory Authority (ANRE) - Department for Energy Efficiency, Str. Cotroceni nr. 4, sector 6, 060114, Bucharest

Slovak Trade Inspection, PO Box 29 Prievozská 32 827 99 Bratislava 27 Slovak Republic

Market Inspectorate, Dunajska cesta 160 SI-1000 Ljubljana Slovenia

Inspectorate for Infrastructure , Vožarski pot 12, 1000 Ljubljana

Ministerio de Economía, Industria y Competitividad. Subdirección General de Calidad y Seguridad Industrial (EcoDesign), P. de la Castellana 160. 28071 Madrid

Agencia Española de Consumo, Seguridad Alimentaria y Nutrición - AECOSAN. Consumer Affairs, Food Safety and Nutrition Agency (Energy labelling and Tyre labelling), C/ Príncipe de Vergara, 54. 28071 Madrid.

Dirección General de Industria, Energía y Minas de la Comunidad de Madrid, C/Cardenal Marcelo Spínola, 14 – 28016 Madrid

Fundación para el Fomento de la Innovación Industrial (FFII), C/ José Gutierrez Abascal 2, 28006 Madrid

The Swedish Energy Agency, P.O. Box 310, SE-631 04 Eskilstuna

Ministry of Science, Industry and Technology - Directorate General for Safety and Inspection of Industrial Products, Mustafa Kemal Mahallesi Dumlupınar Bulvarı (Eskişehir Yolu 7.Km) 2151. Cadde No:154 06510 Çankaya, Ankara

National Measurement and Regulation Office, Stanton Avenue Teddington Middlesex TW11 0JZ

International Vehicle Standards - Department for Transport, Great Minister House 33 Horseferry Road London SW1P 4DR

Stichting Prosafe - The Product Safety Enforcement Forum Of Europe (Prosafe), Avenue des Arts, 41, B-1040 Brussels, Belgium

Vores Bureau ApS, Bredbjergvej 44, 5230 Odense M, Denmark

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 6.00 million from the 2018 budget

4. Support to the coordination of national research and innovation programmes in the areas of activities of the European Energy Research Alliance (EERA) ²⁴⁸

The European Energy Research Alliance (EERA) plays a key role in the coordination of European energy research actors along the SET Plan objectives. This includes the participation of the joint programmes of EERA in the definition and accomplishment of the specific sectorial implementation plans with the goal to reach the specific targets previously defined in collaboration with industry and the official representatives of the SET Plan countries.

The action will facilitate the coordination of EERA with the organisations responsible for national research and innovation programmes in the SET Plan Member countries in support of the SET Plan priorities and the execution of the corresponding implementation plans. This will include when appropriate the coordination of the public resources and capabilities of the energy research organisations in the EU member states and associated countries.

Activities will include the organisation of regular meetings and workshops between European energy research organisations, national research and innovation programme owners/ programme managers and other stakeholders to increase coordination between European national research and innovation programmes.

²⁴⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

European Energy Research Alliance (EERA AISBL), Rue de Namur 72, 1000 Brussels, Belgium

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

5. Support to the initiative on sustainable energy in the defence and security sector²⁴⁹

A specific consultation mechanism with Member States experts from the defence sector based on the model of the Consultation Forum for Sustainable Energy in the Defence and Security Sector (CF SEDSS) phase I (2015-2017) and phase II (2017-2019).

The main purpose of CF SEDSS for Member States' experts is to:

- Facilitate sharing of good practice including from R&I projects, expertise and policies on improving the capabilities of the defence sector in sector in implementing and enforcing the EU energy efficiency, renewable energy and critical energy infrastructure legislation and
- Facilitate sharing of good practice including from R&I projects, expertise and policies focused on helping the armed forces to develop their full potential to contribute to the EU and national energy (in energy efficiency and renewable energy) strategic objectives.

The Phase III will build on the achievements of the first two phases.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

European Defence Agency (EDA), Rue des Drapiers, 17-23, B-1050 Ixelles (Belgium)

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2019

²⁴⁹ This grant will be awarded without call for proposals in line with Article 195(e) of Regulation (EU, Euratom) 2018/1046 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

Indicative budget: EUR 3.20 million from the 2019 budget

6. Support to the Austrian Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2018²⁵⁰

Austria will organise the 11th Strategic Energy Technology Plan conference. The conference will take place in Austria during the Austrian Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

AIT Austrian Institute of Technology GmbH, Giefinggasse 2, 1210 Vienna, Austria

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter of 2018

Indicative budget: EUR 0.25 million from the 2018 budget

7. Support to disruptive innovation in clean energy technologies²⁵¹

This action shall support the implementation of the pilot on 'disruptive innovation in clean energy technologies'. This pilot aims to crack specific technological challenges, while emphasising societal impact and market relevance. Projects selected under this pilot will follow a stage-gate approach based on milestones and periodic reviews.

This action shall support selected projects under topic LC-SC3-RES-2-2018 during their lifetime with continuous innovation and business development, including completing the market uptake supply chain, with the aim to strengthen the consortium's innovation performance. During the first 6 months of the projects' lifetime, the action shall perform a deep-dive assessment of the feasibility and innovation potential of the proposed solution or application, analysing a.o. the business and innovation strategy, the technology readiness level

²⁵⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

²⁵¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

of the proposed application, the consortium's freedom to operate (e.g. background, foreground, IP), and the market. Since the action is part of a pilot, the assessment of 'lessons learned' will be a key deliverable. The beneficiary shall establish appropriate confidentiality and conflict of interest procedures for carrying out the related activities.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

InnoEnergy SE, Kennispoort, John F. Kennedylaan 2, 5612 AB Eindhoven, The Netherlands

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

8. Contribution to the IEA & Energy Transition Support²⁵²

Given the momentum to implement commitments undertaken by the EU and others in the framework of the Paris Agreement, the EU will support and help shape sustainable energy policies in emerging economies. With its specific all-of-energy expertise, the International Energy Agency is well placed to support EU's work in helping guide major emerging economies' (such as China, Indonesia, Brazil, India, South Africa and Mexico) energy transition through policy advice and guidance efforts.

The proposed activities primarily aim to accelerate energy transition efforts in emerging economies by:

- Strengthening training and capacity building, targeting improved ability to develop a sound, analytically rigorous evidence base for policy action (via statistics, indicators, energy modelling, and improved data analysis capabilities);
- Building more effective knowledge and information systems, as well as enabling environments, creating capacity for stronger policy action (via country-specific scenario development, modelling capacity, advice and support on policy development, and facilitating knowledge exchange as relevant to country needs);
- Building a more robust international energy and climate architecture, by complementing and facilitating implementation of other initiatives, supporting multilateral efforts to

²⁵² This grant will be awarded without call for proposals in line with Article 195(e) of Regulation (EU, Euratom) 2018/1046 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

facilitate and enable NDC implementation, and by strengthening connections and collaboration between experts across countries and relevant global expertise; and

- Encouraging technology RDD&D and innovation, through specific technology policy support activities, which should encourage the promotion of sustainable energy technologies and related investments.

Given the close link between a sustainable energy transition and meeting GHG mitigation objectives, the above outcomes also would bolster these key countries as they develop, implement, and further strengthen their NDCs under the Paris Agreement.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

International Energy Agency (IEA), 31-35 rue de la Fédération, 75739 Paris Cedex 15 France

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: as of 3rd quarter 2019

Indicative budget: EUR 3.50 million from the 2019 budget

9. Support to the Romanian Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2019 with a focus on regional dimension²⁵³

Romania will organise a High-Level Strategic Energy Technology Plan conference with a special emphasis on the European regional dimension. The conference will take place in Romania during the Romanian Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Romanian Municipalities Association, Matei Basarab Street no. 63, District 3, 030672, Romania

Type of Action: Grant to identified beneficiary - Coordination and support actions

²⁵³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 0.25 million from the 2019 budget

10. Support to the Finnish Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2019²⁵⁴

Finland will organise the Annual Strategic Energy Technology Plan conference in 2019. The conference will take place in Finland during the Finnish Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Any entity designated by the Presidency under its responsibility

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4th quarter 2019

Indicative budget: EUR 0.25 million from the 2019 budget

11. Support to the German Presidency Conference on the European Strategic Technology Plan (SET-Plan) 2020²⁵⁵

Germany will organise the Strategic Energy Technology Plan conference. The conference will take place in Germany during the German Presidency of the Council of the European Union.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

Federal Ministry for Economic Affairs and Energy – Germany, Scharnhorststrasse 34-37, 10115 Berlin

²⁵⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 195(e) of Regulation (EU, Euratom) 2018/1046 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

²⁵⁵ This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 0.25 million from the 2020 budget

12. Concerted Action supporting the transposition and implementation of the recast Renewables Directive²⁵⁶

The concerted action covers topics where coordination and/or harmonisation of approaches would be beneficial, but are not required by EU legislation. The action is designed to provide added value compared with measures taken by each MS acting on its own and to achieve an optimum combination of the various instruments at the disposal of both the EU and the MS

Concerted actions will be undertaken by organisations designated by the MS and other countries participating in the CA. It aims at fostering exchanges of information and experience between MS and participating countries. Each concerted action will be allocated to a consortium of organisations designated and entrusted by the participating countries, under the coordination of one member of the consortium.

The activities shall be built on the experiences and structures of the CA-RES III, with due consideration of the new elements in the Recast Renewable Energy directive (EU) 2018/2001. It may include activities related to RES-relevant provisions in the Clean Energy Package (e.g. The Energy Union Governance Regulation (EU) 2018/1999, Regulation (EU) 2019/943 and Directive (EU) 2019/944 on the internal market for electricity).

The main objectives of the CA-RES IV action are:

- To enhance and structure the sharing of information and experiences from national implementation whilst promoting good practice concepts in activities to improve and strengthen MS implementation of the Recast Renewable Energy directive.
- To encourage dialogue between the Member States and the provision of logistics in order to develop common approaches for the effective implementation of particular parts of the Recast Renewable Energy directive (e.g. opening of support schemes, bio-energy sustainability, administrative procedures, consumer information etc).
- To complement the work of the Committee assisting the European Commission.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

²⁵⁶ This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013

Austrian Energy Agency, Mariahilfer Strasse 136, A-1150, Vienna, Austria

Service Public de Wallonie, Place Josephine Charlotte 2, 5100, Jambes, BE

Ministry of Energy, Commerce, Industry and Tourism, 6, Andreas Araouzos str., 1076, Nicosia, CY

Ministry of Industry and Trade , Na Frantisku, 32, 11015, PRAHA, CZ

Danish Energy Agency, Amaliegade 44, 1256, Kobenhavn K, DK

Ministry of Economic Affairs and Communications , Suur-Ameerika 1, 10122, Tallinn, EE

Ministry of Employment and the Economy, Ratakatu 3, 00023, Helsinki, FI

Ministère de la Transition écologique et solidaire, Grande Arche - Tour Pascal A et B, 92055, paris-la défense, FR

Center for Renewable Energy Sources and Saving, Marathonos 19th Km, 19009, Pikermi, EL

Hungarian Energy and Public Utility Regulatory Authority, Bajcsy-Zsilinszky Ut 52, 1054, Budapest, HU

Department of Communications, Climate Action & Environment, Adelaide Road 29-31, D02 X285, Dublin, IE

Gestore dei Servizi Energetici – G.S.E. S.p.a, Viale Maresciallo Pilsudski 92, 00197, Roma, IT

Ministry of Economics, Brivibas Iela 55, Lv 1519, Riga, LV

Ministère de l'Economie, 19-21 Boulevard Royal, 2914, Luxembourg, LU

Ministry of Energy, Gedemino Avenue 38, 01104, Vilnius, LT

The Energy and Water Agency, WSC, TRIQ HAL-QORMI, LQA 9043, LUQA, MT

Rijksdienst voor Ondernemend Nederland, Ministry of Economic Affairs and Climate, Bezuidenhoutseweg 73, 2595 Ac, The Hague, NL

Ministry of Petroleum and Energy, Akersgata 59, 0180, Oslo, NO

Polish National Energy Conservation Agency, Al. Jerozolimskie 65/79, 00 697, Warszawa, PL

Laboratório Nacional de Energia e Geologia, Rua da Amieira , 4466-901 , S.Mamede de infesta , PT

Slovak Innovation and Energy Agency, Bajkalska 27, 82799, Bratislava, SK

Ministry of Infrastructure, Langusova Ulica 4, 1000, Ljubljana, SI

Instituto para la Diversificación y el Ahorro de la Energía, Calle Madera 8, 28004, Madrid, ES

Swedish Energy Agency, Gredbyvagen 10, 632 21, Eskilstuna, SE

Energy Saving Trust, 30 North Colonnade Canary Wharf, E14 5gp, London, UK

Ministry of Industries and innovation, Skulagotu 4, 150, Reykjavik, IS

Ministry of Energy, 8, Triaditsa Street, 1000, Sofia, BG

Federal Ministry for Economic Affairs and Energy, Scharnhorststr. 34-37, 10115, Berlin, DE

Ministry of Environment and Energy, Radnicka Cesta 80, 10000, Zagreb, HR

Autoritatea Națională de Reglementare în domeniul Energiei, Str. Constantin Nacu nr. 3, Bucuresti, Sector 2, Cod postal 020995, RO 3

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 5.00 million from the 2020 budget

13. Concerted Action on the Energy Efficiency Directive support to Member States and participating countries for the implementation of the EED²⁵⁷

The concerted action covers topics where coordination and/or harmonisation of approaches would be beneficial, but are not required by EU legislation. Concerted actions will be undertaken by organisations designated by the MS and other countries participating in the CA. It aims at fostering exchanges of information and experience between MS and participating countries. Each concerted action will be allocated to a consortium of organisations designated and entrusted by the participating countries, under the coordination of one member of the consortium.

The main objectives of the CA EED III are as follows:

- To enhance and structure the sharing of information and experiences from national implementation whilst promoting good practice concepts in activities to improve and strengthen MS implementation of the Energy Efficiency Directive, in particular the areas of recast.
- To encourage dialogue between the Member States on common approaches for the effective implementation of particular parts of the Energy Efficiency Directive.

²⁵⁷ This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013

- To complement the work of the Committee assisting the European Commission.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in parts D and H of the General Annexes.

Legal entities:

AGENCE DE L'ENVIRONNEMENT ET DE LA MAITRISE DE L'ENERGIE, ADEME,
Avenue du Gresille 20, 49004 ANGERS, FR

OSTERREICHISCHE ENERGIEAGENTUR AUSTRIAN ENERGY AGENCY, AEA,
MARIAHILFER STRASSE 136, 1150 WIEN, AT

AUTORITATEA NATIONALA DE REGLEMENTARE IN DOMENIUL ENERGIEI,
ANRE, CONSTANTIN NACU 3 DISTRICT 2, 020995 BUCURESTI, RO

BUNDESAMT FUR WIRTSCHAFT UND AUSFUHRKONTROLLE, BAFA, Frankfurter
Str. 29 – 35, 65760 ESCHBORN, DE

CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING FONDATION, CRES,
MARATHONOS 19TH KM, 19009 PIKERM, EL

COMMUNICATIONS, CLIMATE ACTION AND ENVIRONMENTS, DCCAE, Adelaide
Road 29-31, D02 X285, Dublin, IE

ENERGISTYRELSN, DEA, , AMALIEGADE 44, 1256 KOBENHAVN K, DK

DIRECAO-GERAL DE ENERGIA E GEOLOGIA, DGEG, Av 5 de Outubro 208, 1069-203
LISBOA, PT

AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO
ECONOMICO SOSTENIBILE, ENEA, LUNGOTEVERE GRANDE AMMIRAGLIO,
THAON DI REVEL 76, 000196 ROMA, IT

LIETUVOS RESPUBLIKOS ENERGETIKOS MINISTERIJOS, ENMIN, GEDEMINO
AVENUE 38, 01104 VILNIUS, LT

THE ENERGY SAVING TRUST LIMITED, EST, 30 NORTH COLONNADE CANARY
WHARF, E14 5GP LONDON, UK

INSTITUTO PARA LA DIVERSIFICACION Y AHORRO DE LA ENERGIA, IDAE,
CALLE MADERA 8, 28004 MADRID, ES

KRAJOWA AGENCJA POSZANOWANIA ENERGII SPOLKA AKCYJNA, KAPE, AL.
JEROZOLIMSKIE 65/79, 00 697 WARSZAWA, PL

EKONOMIKAS MINISTRIJA, MEA, BRIVIBAS IELA 55, LV 1519 RIGA, LV

MAGYAR ENERGETIKAI ES KOZMU-SZABALYOZASI HIVATAL, MEKH, BAJCSY-ZSILINSZKY UT 52, 1054 BUDAPEST, HU

MINISTERSTVO HOSPODRSTVA SLOVENSKEJ REPUBLIKY, MH SR, Mlynské nivy 44/a, 827 15 BRATISLAVA, SK

MINISTERE DE L'ECONOMIE ET DU COMMERCE EXTERIEUR, MINECO, 19-21 BOULEVARD ROYAL, 2914 Luxembourg, LU

MINISTRY OF INDUSTRY AND TRADE, MIT, Na Frantisku, 32, 11015 PRAHA, CZ

MAJANDUS JA KOMMUNIKATSIOONIMINISTEERIUM, MKM, SUUR-AMEERIKA 110122 TALLINN, EE

MINISTARSTVO ZASTITE OKOLISA I ENERGETIKE, MOEE, RADNICKA CESTA 80, 10000 Zagreb, HR

MOTIVA OY, MOTIVA, POHJOINEN RAUTATIEKATU 25, 00100 HELSINKI, FI

MINISTRSTVO ZA INFRASTRUKTURO, MZI, LANGUSOVA ULICA 4, 1000 LJUBLJANA, SI

NORWEGIAN MINISTRY OF PETROLEUM AND ENERGY, OED, AKERSGATA 59, 0180 OSLO, NO

MINISTERIE VAN ECONOMISCHE ZAKEN EN KLIMAAT, RVO, BEZUIDENHOUTSEWEG 73, 2595 AC The Hague, NL

SUSTAINABLE ENERGY DEVELOPMENT AGENCY, SEDA, 37 EKZARH JOSSIF STR., 1000 SOFIA, BG

ENERGY AND WATER AGENCY, SEWCU, WSC, TRIQ HAL-QORMI, LQA 9043 LUQA, MT

STATENS ENERGIMYNDIGHET SWEA - STEM, GREDBYVAGEN 10, 632 21 ESKILSTUNA, SE

VLAAMSE GEWEST VEA, KONING ALBERT II LAAN 20, 1000 BRUSSEL, BE

MINISTRY OF ENERGY, COMMERCE, INDUSTRY AND TOURISM, YEEBT, 6, Andreas Araouzos str., 1076, Nicosia, CY

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 3rd quarter 2020

Indicative budget: EUR 5.00 million from the 2020 budget

14. Contribution to the IRENA's Clean Energy Innovation Analysis²⁵⁸

Clean-energy technology innovation is expected to play an increasingly strategic role to accelerate the global sustainable energy transition. The development of new analytical approaches to tracking innovation and the expansion of relevant, publicly available datasets, will be necessary to support more effective and efficient clean energy innovation policy making that will deliver the solutions needed for the energy transition.

While a significant amount of activity and data has been produced and made freely available on the front-end of innovation “inputs” (e.g. on public and private RD&D investments), there are still significant data gaps concerning innovation “outputs” (e.g. technology cost reductions, performance improvements, early stage deployments etc.).

The International Renewable Energy Agency (IRENA) has developed significant capacity to support enhanced assessments of the effectiveness and efficiency of clean energy innovation policies of the EC, EC member states, as well as the main global players in clean energy innovation. The analytical experience developed by IRENA, with insights and data from its near global membership of 160 countries, coupled with its ability to convene experts and decision makers from around the world, has enabled the agency to produce detailed data resources and indicators relevant to clean energy innovation policy making, including on jobs, costs, patents, etc.

The proposed activities build on that capability and aim to enhance IRENA's analytical and data-related capacity to inform clean-energy innovation policy making by:

- Expanding the granularity of IRENA's renewable cost database (including levelised electricity costs), both in terms of technology value chain and geographical coverage (e.g. expanding data availability on EU Member States)
- Strengthening datasets related to clean energy innovation, for example on output indicators like patents, trade flows and scientific publications.
- Analysing clean energy innovation progress and trends based on innovation output indicators to improve understanding of efficiency and effectiveness of innovation policies.

The activity above would enable IRENA to actively partner with the Mission Innovation initiative to support the implementation of the workstream on Tracking Overall Progress to Accelerate Clean Energy Innovation.

²⁵⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.
This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013

The above should be undertaken taking into account existing efforts by the EC, especially the JRC and its work on innovation indicators. In addition, this work will be carried out in synergy with EC's work on the development of a new "Clean Energy Innovation Index".

Legal entities:

International Renewable Energy Agency, IRENA Headquarters, Masdar City, PO Box 236, Abu Dhabi, United Arab Emirate

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 3rd quarter 2019

Indicative budget: EUR 0.50 million from the 2019 budget

15. Pilot action to support investments in the frame of the 'Green Deal'²⁵⁹

The willingness to create greater impact in tackling climate change in line with the goals set in the Paris Agreement and EU Green deal needs to be operationalised in synergy across different actors and funders.

For the world to be sustainable, the future of R&I investment, especially in clean technologies and solutions, needs to capture the attention of and enlist mainstream investors. The Eurogroup concluded in November 2019 that *"expenditure in R&D from the private sector remains low [...] and all agreed it needs to change"*; and that *"experimental approaches can improve the efficiency of public policies supporting innovation and maximise their return"*.

Current R&I funding is policy-driven and would benefit considerably from inside investor knowledge on the key priorities that are driving the market, thus avoiding funding overlaps and ensuring strategic support.

Because of the central role of the energy pillar in the Green Deal, the following set of first pilot actions seek to prepare Horizon Europe, by involving the InnovFin Advisory Services for the following actions:

- Identify and reach out to key European public and private investors in the energy, on the basis of InnovFin's network of investors, supplemented with additional investor outreach as appropriate, and understanding of their investment appetites;
- Based on the above mapping, create a dialogue with appropriate groups of investors on how to raise interest for co-investment in EC projects supported by grants as well as how

²⁵⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.
This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013

to increase their likelihood of market up-take, in particular by framing, and using comprehensive vocabulary for each party;

- Issue recommendations (incorporating InnovFin's existing set of market assessment studies) on adequate support and instruments, including blending instruments, to boost investment in energy and better serve specific and mission-oriented needs of Horizon Europe
- Propose set of considerations for further advisory support in the next MFF based on this targeted pilot action.

All the work will be implemented in partnership with the European Commission and to the extent necessary with other public actors such as national banks, innovations investment agencies, industries, Knowledge Innovation Communities (e.g. InnoEnergy), etc.

Expected impacts:

- Input into the R&I investment strategies and agendas with a mission oriented approach where EU innovation is lagging behind or crucial to achieve our policy goals;
- Mobilise suitable resources for sustainable financing with the core objective to identify incentives for long-term sustainable investment for secure, clean and efficient technologies and solutions;
- Create a European coalition of impact investors in those keys areas;

Legal entities:

European Investment Bank, established at 98-100, Boulevard K. Adenauer, L-2950 Luxembourg, Grand Duchy of Luxembourg

Type of Action: Amendment to the Framework Partnership Agreement between the EC and the EIB and first specific grant agreement launching Innovfin Advisory services for the specific action described above

Indicative timetable: as from 1st quarter 2020

Indicative budget: EUR 0.30 million from the 2020 budget

16. Support to the expansion of global network activities of the Renewable Energy Policy Network for the 21st Century²⁶⁰

With 162 countries with renewable energy targets in place, renewable energy deployment is rapidly expanding across the world. In the electricity sector, renewables account for two-thirds of global investments in power generation and more than 45 countries have exceeded 1 GW of renewable power generation capacity. In other markets, renewable energy technologies are now provide the lowest-cost power generation option. The uptake of renewable energy in heating, cooling and transport is much slower, yet is necessary to achieve the Paris agreement targets.

Renewable Energy Policy Network for the 21st Century (REN21) has been collecting, consolidating and synthesising peer-reviewed data on renewable energy deployment since 2004, which is published annually in its Global Status Report. The findings of this report provide a useful data source to position EU's development in a global context. With the arrival of the International Renewable Energy Agency, REN21 has shifted away from collecting official statistics to the collection of 'real-time' market and project developments within specific industries and at local level.

With the growth of the renewables market across the globe, REN21 activities to collect the latest developments across the world have been expanding. Furthermore, REN21 is considering new tools and method to distribute data and information on renewables deployment at local level, e.g. through the establishment of local networks of online collaborators

The proposed activities build on that capability and aim to enhance REN21's analytical and data-related capacity to inform EU's global engagement and enhance the global energy debate by:

- Expansion of its global network activities, especially in emerging renewable energy markets and sectors;
- Strengthening the outreach and engagement activities, with a particular focus on engaging citizens;
- Organise workshops, debates and online tools to support informed decision-making, by providing high quality, up-to-date information to help shape the energy debate;
- Support training and capacity building, targeting young leaders and entrepreneurs operating in renewable energy markets.

²⁶⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013

Legal entities:

Renewable Energy Policy Network for the 21st Century e.V. (REN21), Robert-Schuman Platz 3, 53175 Bonn, Germany

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: 4rd quarter 2020

Indicative budget: EUR 0.60 million from the 2020 budget

Public procurements

1. Provision of technical assistance, IT tools, modelling and/or studies to collect and analyse relevant data and to properly assess complex technical, environmental, economic, legal and social aspects of energy efficiency²⁶¹

The services contracted under this point will provide the Commission with the expertise needed to inform policymakers with an objective and unbiased judgement of the likely impacts of different policy options and, allow an efficient implementation and monitoring of existing legislation in the area of energy efficiency (EED, EPBD, Ecodesign, Energy Labelling and Labelling of Tyres Directives).

The services will address technical, economical, legal aspects linked to, for example, the analysis of calculation method of Member States, the verification of compliance of national legislative measures implementing the directives, assessments of certain costs and/or benefits of the energy efficiency policies, the support to the standardisation of instruments (calculation methodologies and common certification).

Provision of technical assistance, studies and IT tools to collect and analyse relevant data and to properly assess complex technical, environmental, economic, legal and social aspects of different product groups in order to inform policymakers with an objective and unbiased judgement of the likely impacts of different policy options, including in view of international collaboration on such policies, and allow an efficient monitoring of existing legislation and technical support to the Commission on standardisation work for energy related products.

The services will provide preparatory and review studies, technical assistance (including where appropriate IT tools), impact assessment studies and testing campaigns for identified product groups.

Type of Action: Public Procurement - 1 single framework contract, 28 specific contracts under framework contracts or direct service contracts

Indicative timetable: As from 1st quarter 2018 and as from 1st quarter 2019 and as from 1st quarter 2020

²⁶¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Indicative budget: EUR 4.20 million from the 2018 budget and EUR 4.80 million from the 2019 budget and EUR 4.60 million from the 2020 budget

2. Study on the role of smart technologies in residential buildings²⁶²

Forward looking study to create a better understanding of the role of smart technologies in achieving higher comfort levels and wellbeing for building occupants; the link between buildings quipped for electro-mobility and smart appliances, products and local grid networks; and adaptation of buildings to the needs of an aging population.

Type of Action: Public Procurement - 1 service contract

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 0.10 million from the 2018 budget

3. Multiple Framework contract with reopening of competition for qualified legal, technical and economic expertise in the field of Energy Efficiency to support the Commission in the area of Energy Efficiency²⁶³

The purpose of the framework contract with reopening of competition is to provide at short notice the contracting authority with highly qualified external expertise to support with objectivity the contracting authority in the design, preparation and proper implementation of EU initiatives and legislation in the area of Energy Efficiency. The maximum amount of the Multiple Framework contract will be EUR 4.000.000 for a period of 4 years.

Type of Action: Public Procurement - 1 multiple Framework service contract with reopening of competition

Indicative timetable: 4th quarter 2020

Indicative budget: EUR million from the 0 budget (Commitments will be made through specific contracts)

4. Technical support for renewable heating and cooling²⁶⁴

Technical support for policy development and implementation in the field of renewable (RES) heating and cooling addressing the following key areas

²⁶² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁶³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁶⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Technical requirements and regulatory options of TPA for RES and waste heat in District heating & cooling;
- Costs and feasibility of deploying renewables in the space heating sector (buildings) in EU and by MS;
- Electrification of heating in the building sector;
- Heat decarbonisation trajectory scenarios through renewables in the building related heating sector by 2050, including an assessment of the renewable district heating and cooling potentials by 2050;
- Renewable cooling;
- Best practice overview of national strategies and national policies of switching the building sector to renewable heating and cooling and comparison with other non-RES decarbonisation options with identification of commonly applicable tools, policies, regulations and approaches, including financing;
- Industrial and other process heat decarbonisation pathways, the role and share of renewable energy in comparison with other decarbonisation options (energy efficiency, CCS, hydrogen technologies, etc.);
- Support for policy and market issues for decarbonisation of heating initiatives.
- Policy development support for district heating sectors' transition;
- Support for energy communities, consumer initiatives and micro-district systems in renewable heating and cooling.

Type of Action: Public Procurement - 4 tenders as from 1st quarter 2018, 3 direct service contracts or specific contracts from 1st quarter 2019 and 3 direct service contracts or specific contracts as from 1st quarter 2020

Indicative timetable: 4 tenders as from 1st quarter 2018, as 3 tenders from 1st quarter 2019 and 3 tenders as from 1st quarter 2020

Indicative budget: EUR 1.50 million from the 2018 budget and EUR 1.20 million from the 2019 budget and EUR 1.00 million from the 2020 budget

5. Provision of technical assistance and/or studies to support the implementation of the heating and cooling strategy ²⁶⁵

Provision of technical assistance and/or studies to support the implementation of the heating and cooling strategy, in particular for setting up sectoral round tables with industry and developing guidance/best practices.

Type of Action: Public Procurement - 3 direct service contracts or specific contracts under Framework contracts

Indicative timetable: 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 0.35 million from the 2019 budget and EUR 0.50 million from the 2020 budget

6. Product registration database at EU level ²⁶⁶

The study for the review of Directive 2010/30/EU on Energy labelling of energy-related products highlighted non-compliance issues as the main cause of a loss of about 10% of envisaged energy savings from product-specific measures. To correct this policy failure the Commission proposed to establish a product registration database at EU level to support enforcement by Member States. The database is developed under the central management of the Commission and manufacturers will have to register their models before placing them on the market. The database has to be operational (i.e. populated with data and accessible to all users) at the latest by 1/1/2019.

Type of Action: Public Procurement - 4 specific contracts under framework contracts

Indicative timetable: as from 1st quarter 2018, as from 1st quarter 2019 and as from 1st quarter 2020

Indicative budget: EUR 0.70 million from the 2018 budget and EUR 0.50 million from the 2019 budget and EUR 0.90 million from the 2020 budget

7. Support for the Smart Cities and Communities Lighthouse project group

Smart Cities and Communities lighthouse projects are supported since 2014 and will continue over the full duration of Horizon 2020. Individual project duration is of 60 to 66 month. By 2020, the programme will have been co-funded with approximately EUR 500 million and will have helped close to 150 cities to implement/replicate integrated smart city solutions.

²⁶⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁶⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

The current projects are now pro-actively working together as the Smart Cities and Communities Lighthouse Group. They have formalized their collaboration through a Manifest signed by the coordinators. Presently, the Lighthouse group is self-organised and the coordinators are sharing the work amongst them.

The creation of a large scale, long-term support for the Lighthouse group will give the group a stable governance and logistical/organisational structure and will guarantee that best use is made of results of seven generations of Lighthouse projects covering the period of 2014 to 2025. It will maximise positive impact at European scale beyond the duration of Horizon 2020.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 5.00 million from the 2020 budget

8. Technical assistance for communication and evaluation purposes related to energy efficiency²⁶⁷

Provision of technical assistance to the Commission for collecting and processing information of all kinds needed for the analysis and promotion of Energy Efficiency projects financed under Horizon 2020, such as the evaluation of the 2nd Concerted Action on the Energy Efficiency Directive; the 4th Concerted Action on the Energy Performance of Buildings Directive. Services will also address technical assistance related to information and communication, conferences and events promoting activities on energy efficiency, including electronic and paper publications, audio-visual products as well as the development of different web based and social media activities directly linked to the achievement of the objective of the energy efficiency policy. This action will also support the organisation of stakeholders meetings and other communication activities aiming at the exchange and replication of successful practices.

Type of Action: Public Procurement - specific contracts under existing framework contract

Indicative timetable: As of 1st quarter 2018 and as of 1st quarter 2019 and as of 1st quarter 2020

Indicative budget: EUR 0.50 million from the 2018 budget and EUR 0.50 million from the 2019 budget and EUR 0.60 million from the 2020 budget

²⁶⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

9. Support to Smart finance for smart buildings initiative²⁶⁸

Provision of technical assistance and high level financial/economic expertise to support the development of an investible market framework for energy efficiency. Specific contracts under one single framework contract to address the following type of activities:

- EEFIG 3.0 activities, studies on the valuation of externalities related to energy efficiency investments;
- Mapping of energy efficiency financing schemes across Europe;
- Mapping of energy efficiency services available and progress in setting up one-stop shops in Europe.

Type of Action: Public Procurement - 1 single framework contract and 3 specific contracts in 2018, 4 specific contracts in 2019 and 4 specific contracts in 2020

Indicative timetable: 2nd quarter 2018, and 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 1.00 million from the 2018 budget and EUR 0.70 million from the 2019 budget and EUR 0.80 million from the 2020 budget

10. Tender on "Energy Efficiency Finance Market Place"

In complement to the activities carried out at European level to support the implementation of the Smart Finance for Smart Buildings initiative, in co-operation with the EEFIG, there is a need to further engage with stakeholders at national level on the specificities of energy efficiency finance, in order to identify obstacles, facilitate a common understanding and create co-operation between the financial sector, governments, industry and consumers.

This service contract will build on the Sustainable Energy Investment Forums and focus on the national and regional levels, through the organisation of public events and stakeholder dialogue roundtables at national level on energy efficiency finance, as well as targeted EU events disseminating the lessons learned from ongoing initiatives (EU, national and regional levels, in particular from Horizon 2020 projects).

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: As of 1st quarter 2018

Indicative budget: EUR 2.20 million from the 2018 budget

²⁶⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

11. Assessment of Finance projects covering PDA, De-risking and Innovative Finance

The aim of the tender is to assess the impacts and the achievements of the energy efficiency financing related projects supported under the Energy Efficiency Calls in Horizon 2020, including call topics on:

- project development assistance, i.e. projects focussed on developing a concrete investment pipeline at local and regional level;
- innovative financing schemes, i.e. projects looking at how to match demand and supply of finance for energy efficiency with a focus on attracting private finance;
- energy performance contracting, in which investments are designed by an Energy Service Company which guarantees the energy savings and usually makes the upfront investments;
- making the energy efficiency market investible, e.g. projects looking at how to reduce the perceived risk of energy efficiency projects, reduce transaction costs and change the financial institutions evaluate and process investments in energy efficiency.

This service contract will analyse the projects and their outcomes, evaluate the impact, collect lessons learned and analyse what market gaps still need to be addressed in order to enhance access to finance for energy efficiency investments.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: As of 1st quarter 2019

Indicative budget: EUR 0.25 million from the 2019 budget

12. Evaluation of projects in Industry area

The aim of the tender is to assess the impacts and the achievements of the industry related projects supported under the programme IEE II (2007-2013) and the Energy Efficiency Calls in Horizon 2020. The results of this assessment are expected to contribute to the definition of industry related actions to be supported in the future under FP9.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: As of 1st quarter 2019

Indicative budget: EUR 0.20 million from the 2019 budget

13. EASME external communication activities (publications, audiovisual, events)

Organisation and logistic support for EU Sustainable Energy Week.

This action will also support the organisation of stakeholders meetings and other communication activities aiming at the exchange and replication of successful practices.

Type of Action: Public Procurement - direct service contracts and specific contracts under existing framework contract

Indicative timetable: As of 1st quarter 2018, as of 1st quarter 2019 and as of 1st quarter 2020

Indicative budget: EUR 1.50 million from the 2018 budget and EUR 1.50 million from the 2019 budget and EUR 1.75 million from the 2020 budget

14. Support to Research and Innovation Policy in the areas of Renewable Energy, Carbon Capture and Storage and More Efficient Coal Combustion²⁶⁹

Specific contracts under the Multiple Service Framework Contract 'Studies in Support to Research and Innovation Policy in the areas of Renewable Energy, Carbon Capture and Storage and Clean Coal' – (PP-02161-2014) addressing technical, economic and policy analysis to support various aspects of the Research and Innovation policy in one or more areas of the energy field.

The areas concerned are i) renewable electricity (e.g. wind power, photovoltaics, concentrated solar power, bioenergy, enhanced geothermal systems, ocean energy, hydro power), ii) heating and cooling through renewable energy and fossil fuels, iii) biofuels, iv) Carbon Capture and Storage, including utilisation of Carbon Dioxide and v) More Efficient Coal Combustion.

These analyses required in the terms of reference of the specific contracts may include:

- Technology foresight and potential;
- Analysis of the above specified EU energy areas vis-à-vis global competitors as well as vis-à-vis other technologies at the various levels of the supply lines: an overview and analysis of trends in the different renewable energy sectors and possible synergies with Carbon Capture and Storage. Key factors to maintain global technological leadership.
- Research and innovation strategies of major international players, including inventory, impacts and best practices of the support put in place in leading countries;
- Impact of various European and national, regional, local policies (energy, industrial and SME policy, fiscal, environmental, employment, R&D etc.)
- Economic analysis e.g. business cases, supply line economics, value-added analysis;
- Market take-up issues;
- Environmental and health related impacts of projects in the above specified areas and possible areas for risk mitigation to be undertaken by research and innovation;

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- Public perception and awareness;
- Analysis of capacities and skills.

Type of Action: Public Procurement - 6 specific contracts in 2018 and 6 specific contracts in 2019

Indicative timetable: as of 1st quarter 2018 and as of 1st quarter 2019

Indicative budget: EUR 3.00 million from the 2018 budget and EUR 2.60 million from the 2019 budget

15. Dissemination and information activities²⁷⁰

Communication activities such as meetings, conferences, out-reach communication events/papers/materials and publications should support dissemination of knowledge and information to relevant stakeholders.

Type of Action: Public Procurement - either direct service contract or through existing Framework Contract

Indicative timetable: as of 1 quarter 2018, as of 1 quarter 2019 and as of 1 quarter 2020

Indicative budget: EUR 0.25 million from the 2018 budget and EUR 0.20 million from the 2019 budget and EUR 0.20 million from the 2020 budget

16. Information services for energy research and innovation policy development²⁷¹

An information platform is planned to be used to gain a better understanding of the energy research sector. Intelligence gained through the platform will help to establish priority areas, base policy decisions on hard evidence, and allocate resources optimally.

Type of Action: Public Procurement - 1 service specific contract in each of 2018, 2019 and 2020 using an existing framework contract

Indicative timetable: as of 2nd quarter 2018, as of 2nd quarter 2019, and as of 2nd quarter 2020

Indicative budget: EUR 0.08 million from the 2018 budget and EUR 0.09 million from the 2019 budget and EUR 0.09 million from the 2020 budget

²⁷⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁷¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

17. Information, communication and logistic support for EU #1 in RES²⁷²

EU as global leader in renewables is one of the three main goals of the Clean Energy for all Europeans Package. To support the policy dialogue, analysis, communication and logistics assistance will be necessary. This will include, studies on KPIs for EU's global leadership role, EU global positioning, support to political dialogue in international forums, and communication activities in major global capitals based on the concept of the EU energy days.

Type of Action: Public Procurement - 2 direct service contracts in 2018 and 2020; 1 Framework contract in 2020

Indicative timetable: 1st quarter in 2018, 2019 and 2020

Indicative budget: EUR 1.00 million from the 2018 budget and EUR 0.45 million from the 2019 budget and EUR 0.80 million from the 2020 budget

18. Support services for exploitation of research results (SSERR)²⁷³

A framework contract for Support Services for Exploitation of Research Results SSERR has been concluded in 2015 for four years. This framework contract provides to the Commission external assistance for an on-demand service for the benefit of former and current grant beneficiaries of the Energy Theme of the FP7 Cooperation Specific Programme and of the Energy Challenge of Horizon 2020 in view of supporting them with the exploitation of their EU-funded research results.

The framework contract consists of four predefined support services and two services to be agreed with the beneficiaries on a case-by-case basis. The services involve, inter alia, identification of market potential and opportunities, evaluation of competing technologies, development of business and action plans, pitching results, assessment of the costs for upscaling, and protection of IPR.

Specific contracts will be concluded in 2018 and in 2019 based on the individual needs of the grants to be assisted.

Type of Action: Public Procurement - up to 40 specific contracts in both 2018 and 2019 using an existing framework contract

Indicative timetable: 1st quarter 2018 until 4th quarter 2019

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.60 million from the 2019 budget

²⁷² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

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19. Assessment of the impacts of EU-funded RD&D projects in the area of fuel cells and hydrogen²⁷⁴

The aim of this action is to qualify and quantify the socio-economic, environmental and other impacts of EU-funded research and demonstration projects in the area of fuel cells and hydrogen.

Type of Action: Public Procurement - 1 specific contract under existing framework contract

Indicative timetable: 1st half 2018

Indicative budget: EUR 0.10 million from the 2018 budget

20. Contest implementation, management and communication services related to the second Phase of the international Mission Innovation Prize Program²⁷⁵

The Mission Innovation (MI) Prize Program, called MI Champions Program, is a new recognition program to celebrate and support innovative individuals around the world who are accelerating the clean energy revolution. This program was launched at the MI third ministerial meeting in May 2018 in Malmö, Sweden. The first cohort of MI Champions will be presented at MI fourth ministerial in Vancouver in 2019.

Bolt-on support is required for the further implementation of the second Phase of the MI Prize Program. This will allow the second cohort of MI Champions to be presented to MI fifth ministerial meetings taking place in 2020. The support will entail, in particular, contest launch, implementation and management, communication, marketing and outreach activities. This second Phase of the program will have to ensure continuity with the first phase and use the same selection process based on openness, transparency and fairness.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.30 million from the 2019 budget

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21. Assessment of advanced biofuels, including deployment potential of new/ appearing feedstocks, feedstock availability, resource competition, and sustainability issues in the context of the Renewable Energy Directive Article 3(4)²⁷⁶

Article 3(4) of the Renewable Energy Directive allows extend the list of feedstock's that are eligible for double counting based on an analysis. A similar provision is included in the proposal for the RED post 2020. Technical support is necessary to assist the Commission's work on fulfilling its obligations.

Type of Action: Public Procurement - 1 specific contract under existing framework contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 1.50 million from the 2019 budget

22. Assess the potential of carbon fuels produced from fossil waste streams, of renewable liquid and gaseous transport fuels of non-biological origin and establish a common European methodology for determining the share of renewable energy in such fuels²⁷⁷

Article 25 of the proposal for the RED post 2020 sets out an incorporation obligation covering in addition to renewable fuels also fuels produced from fossil waste streams. Further, the Commission is empowered to set out a methodology for determining the share of renewable energy for renewable fuels of non-biological origin. The study is aiming to provide the Commission with useful information for this exercise.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.75 million from the 2019 budget

23. Technical requirements for track and trace databases²⁷⁸

Article 25 of the proposal for the RED post 2020 requires Member States to set up data bases that allow tracing of biofuels and other low carbon fuels. The Commission is empowered to set out technical parameters of such data bases enabling among other things the exchange of data between individual national data bases. Technical support is necessary to assist the Commission's work on fulfilling its obligations.

Type of Action: Public Procurement - 1 direct service contract

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Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.50 million from the 2019 budget

24. Support for the implementation of the ILUC- Directive²⁷⁹

The support will address the following areas:

- Technical assistance on the implementation of the ILUC- Directive

Directive (EU) 2015/1513 revised the Renewable Energy with the objective to reduce the risk of indirect land use change (ILUC) and to prepare the transition towards advanced biofuels. This directive introduced additional requirements for the Commission (in force as of 5 October 2015) and the Member States (transposition deadline: 10 September 2017) and effectively implemented in view of reaching the mandatory 2020 target of 10% share of renewable energy in transport sector.

Technical and legal support is necessary to assist the Commission's work on fulfilling its obligations under the ILUC – Directive, as well as for assessment of the Member States' progress on transposition and implementation of the ILUC – Directive.

This work should be carried out by taking into account that on 30 November 2016, the Commission adopted a legislative proposal for a recast of the Renewable Energy Directive for the time period 2020–2030, including sustainability criteria, GHG emission requirements, and measures for promotion of renewable energy in transport sector.

- Potential for mitigating ILUC impacts (desk assessment + 3 pilot studies)

Article 2 (w) on the Renewable Energy Directive includes at definition of low indirect land use change biofuels. This includes biofuels produced from crops for which impacts on indirect land use change are mitigated by increasing crop yields and use of abandoned land. The tender aims to explore how this approach could be implemented in practise applying a certification approach.

Type of Action: Public Procurement - 3 direct service contracts in 2018 and in 2020

Indicative timetable: 1st quarter 2018

Indicative budget: EUR 4.00 million from the 2018 budget

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25. Technical assistance for the implementation of the EU bioenergy sustainability criteria²⁸⁰

Recast of the RES Directive, article 26 (5) to (8) includes revised EU bioenergy sustainability criteria covering also biomass and biogas for heat and power. The service contracts will provide the technical support that is necessary to assist the Commission's work in fulfilling its obligations.

Type of Action: Public Procurement - 3 direct service contracts in 2018, 2019 and 2020

Indicative timetable: 1 contract in the 1st quarter 2018, 2 contracts in the 1st quarter of 2019, and in 2020

Indicative budget: EUR 0.20 million from the 2018 budget and EUR 0.60 million from the 2019 budget and EUR 0.60 million from the 2020 budget

26. Technical assistance on bioenergy²⁸¹

Bioenergy supplies over 10% of EU final energy consumption. Therefore it is projected to play a key contribution to the EU 2020 and 2030 targets, supporting energy security, rural development and jobs and growth.

However the production and use of bioenergy needs to be sustainable to deliver the expected GHG and environmental benefits. The recast of the EU Renewable Energy Directive 2018/2001 reinforces the EU sustainability framework for bioenergy by extending the EU criteria also to biomass for heat and power. In addition, this directive introduces new sustainability criteria for the production of forest and agriculture biomass.

This study shall develop guidance and support tools, including on GHG emission savings, to assist the Member States and economic operators to implement the new EU sustainability criteria in a swift and consistent way across the EU.

It shall furthermore further analyse the future development of bioenergy supply and end uses to ensure optimal GHG savings and energy security benefits.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 0.50 million from the 2019 budget

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27. Technical support for RES policy development and implementation²⁸²

Provision of technical support for the implementation of the recast of the renewables directive 2018/2001 and to further develop policy frameworks for renewable technologies and their deployment with a particular focus on electricity generation. This would include studies of industry competitiveness, facilitation of standardisation (e.g. for offshore wind and guarantees of origin), analysis of administrative procedures and permits to support the "one stop shops", and analysis of financial support schemes

Type of Action: Public Procurement - 4 direct service contracts in 2018, 2019 and 2020. One specific contract under an existing framework contract in 2020.

Indicative timetable: 2nd quarter of 2018, 2nd quarter of 2019, 2nd quarter of 2020

Indicative budget: EUR 0.70 million from the 2018 budget and EUR 1.25 million from the 2019 budget and EUR 0.50 million from the 2020 budget

28. Support for policy and market development for alternative and renewable transport fuels and products²⁸³

The aim of this action is to support the European industry, producers and market operators engaging in policy dialogue with the European Institutions and national governments in order to facilitate addressing common issues on markets, policy and regulation that hinder the deployment of alternative and renewable fuels and products.

The action is addressing the following key areas:

- Support for alternative and renewable liquid and gaseous fuels forum

The objective is to facilitate addressing common issues on markets, policy and regulation that hinder the deployment of the alternative and renewable fuels, in particular in relation to the Renewable Energy Directive and the Mobility Package. The activities will be complimentary to those of ETIP Bioenergy.

- Support for market development of algae and their products

The objective is to support the European algae industry on addressing and facilitating the deployment of algal-refineries supplying multiple products (chemicals, feed, cosmetics etc.) in addition to biofuels. Coproduction of algal fuels and other products can significantly reduce the costs of algal fuels and improve their overall market attractiveness.

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- Support for policy and market analysis for the deployment and valorisation of industrial CO_x utilisation (CCU)

The objective is to support the European CCU industry in creating a forum from all sectors of the industry for the deployment of alternative and renewable fuels, chemicals, and products (e.g. cement) representing both CO_x producers and CCU market operators. The forum will address common issues on markets, policy and regulation that hinder the deployment of the such CCU applications in the market,

Type of Action: Public Procurement - 2 direct service contracts in 2018 and 1 direct service contract in 2019 and 1 direct service contract in 2020

Indicative timetable: 3rd quarter 2018 and 1st quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 2.75 million from the 2018 budget and EUR 2.00 million from the 2019 budget and EUR 1.00 million from the 2020 budget

29. Analysis of actual land availability in the EU; trends in changes (abandoned land, low fertility land, saline land etc.) and options for energy crop utilisation²⁸⁴

EUROSTAT and FAO data indicate that there is significant agricultural land that is abandoned continuously in the EU at accelerating rates with adverse effects on the EU farming community and economy. The abandonment is due to several social and economic reasons. The study should analyse the reasons, establish a reliable estimate on the extent of the abandoned land in the EU and then analyse options for using it for energy crop deployment.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2018

Indicative budget: EUR 0.50 million from the 2018 budget

30. Support for the planning and deployment of efficient, low carbon District Heating and Cooling in cities²⁸⁵

The advanced implementation of the first smart cities projects with a special focus on DHC and the good replication policy created a great interest for the DHC sector in numerous cities.

The aim of this action is to support our cities in their endeavour to plan and deploy new, efficient DHC systems or extend, refurbish existing ones to higher standards allowing greater

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uptake of renewables, recovering of excess heat, improving the overall efficiency of the systems.

The objective is to facilitate the deployment of smart DHC with planning tools, trainings, best practices and tailor made technical and financial expertise.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 0.60 million from the 2018 budget

31. Research & Innovation communication activities ²⁸⁶

The purpose of this action is to support the development and implementation of Communication strategies and activities, boost greater stakeholder engagement and inform an even wider audience in the area of EU Energy Research and Innovation policies in general and SET Plan Strategy in particular. The aim is to carry out an effective information campaign on ongoing initiatives (i.e. for SET-Plan, Mission Innovation, of actions stemming out of the Accelerating Clean Energy Innovation Communication) in this field, in a proactive and informative way.

Tasks involve, inter alia, the conception, definition, planning and contribution to communication campaigns, identification of key messages, tailor-made dissemination and information plans, follow-up on key findings for a more sustained and impactful communication strategy for SET Plan over the medium and long term, advertisement and advice, production of content, etc. Organisation of events such as meetings and conferences, publications, mapping and provision of information to relevant stakeholders etc., are some of the envisaged outcomes.

Type of Action: Public Procurement - 3 specific contracts under existing framework contract and direct service contracts

Indicative timetable: 4th quarter 2018, 1st quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 0.20 million from the 2018 budget and EUR 0.20 million from the 2019 budget and EUR 0.27 million from the 2020 budget

²⁸⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

32. Support Services for the Covenant of Mayors for Climate and Energy ²⁸⁷

The new "*Covenant of Mayors for Climate and Energy*" was endorsed in October 2015, merging the Covenant of Mayors with its sister initiative - Mayors Adapt and extending cities commitments to energy and climate changes actions to 2030.

Following the success of the Covenant of Mayors in Europe and the European neighbourhood (CoM – East) regional Covenants were launched in 2017 by the Commission: in i) North America and Mexico; ii) Latin America and Caribbean; iii) Japan; iv) China; v) India; vi) South-East Asia, as part of the International Urban Cooperation (IUC) Programme, with the exception of sub-Saharan Africa, where Covenant of Mayors is a separate initiative launched in 2016.

Since 2017, the Covenant of Mayors office providing support services to the EU Covenant of Mayors for Climate and Energy acts also as central support unit for the IUC programme.

In parallel, the Covenant of Mayors initiative merged with the Compact of Mayors into a Global Covenant of Mayors (GCoM). This merger creates a single coalition of cities taking action on climate change and brings together the signatories of the EU-funded Covenants (CoM Europe, CoM-East and Regional Covenants) and the Compact of Mayors.

Two actions are envisaged:

1) Support services, in particular for the operations of its Brussels-based office

The services to be covered by a new tender will include amongst others:

- Promotion of the Covenant of Mayors for Climate and Energy to encourage new signatories
- Communication activities, including web-based and in media
- Technical assistance to signatories of the Covenant of Mayors for Climate and Energy,
- Organisation of workshops, seminars and tailor-made training and information events
- Capacity building and networking with relevant stakeholders and supporting structures
- Supporting synergies and interactions with relevant EU urban energy actions and policies and with initiatives covering islands, coastal and remote regions
- Cooperating with the Secretariat of the Global Covenant of Mayors
- Facilitate signatories' access to finance for implementation of actions from their SEAPs/SCEAPs.

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- Ensuring of operation of technical and administrative capacity of the Covenant of Mayors Office;
- Providing central support in relation to the IUC programme to Offices on different regions

Given that the scope of activities includes both services that were previously covered by the Mayors Adapt initiative and support to the IUC programme, contributions from corresponding Programmes can be expected to complement the indicated budget.

2) Support for events under the Covenant of Mayors Investment Forum

The Covenant of Mayors Investment Forum consists of a series of events to be organised in different cities across Europe in 2018 and 2019. The Investment Forum aims to bring together mayors and city representatives, Commission, industry and financial institutions. The events will showcase best practices and innovative financing solutions from concrete projects and aim at catalysing major investments in energy efficiency, renewable and smart energy projects in municipalities and regions participating in Covenant of Mayors.

Type of Action: Public Procurement - 1 direct service contract and 3 contracts using framework contract

Indicative timetable: 1st and 3rd quarter 2018, 1st, 3rd and 4th quarter 2019

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 4.30 million from the 2019 budget

33. Innovation, fair transition and sustainable growth in coal and carbon intensive regions in the context of the clean energy transition (technical assistance)²⁸⁸

EU decarbonisation objectives and international competition result in accelerated structural change in regions which depend on coal mining and carbon intensive industries. The clean energy transition is likely to have profound social and economic impacts on selected regions. As part of the Clean Energy Package, the Commission committed to assist coal and carbon intensive regions in order to ensure that any negative effects from the economic and energy transition on these regions can be mitigated. Such action would allow the EU to reinforce the support for climate policies and the decarbonisation objectives.

The proposed technical assistance will:

- Assist identified coal regions in finalising their strategies and a list of priority projects to drive the process of structural and technological transformation;
- Assist identified coal regions in preparing strategies for the implementation of priority projects including strategies for financing and funding.

²⁸⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 1.00 million from the 2018 budget

34. Support to the European Innovation Partnership on Smart Cities and Communities and its Market Place²⁸⁹

This action shall ensure constant and high quality support to the Market Place of the European Innovation Partnership on Smart Cities and Communities:

- Maintenance and further development of the interactive web site of the above mentioned Market Place;
- Further development and improvement of the match making dimension of the above mentioned Market Place (allowing for project and investment focussed matches between cities, companies and financing entities);
- Providing Programme Management Office services to handle daily logistics, communications, social network contributions, etc.;
- Individual streamlined support to each Action Cluster in terms of content as well as logistics;
- Policy analysis and modelling of the Smart Cities context system to allow for sound decision making with regard to novel solutions, new market designs, business models, players and policy instruments (this shall provide assessments of the costs and other impacts of Smart City related policies, policy instruments, including the social, environmental and economic impacts of policy decisions);
- Regular reports containing meaningful up-to-date figures and information to be used for marketing the European Innovation Partnership on Smart Cities and Communities further.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 4th quarter 2019

Indicative budget: EUR 3.00 million from the 2019 budget

²⁸⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

35. Innovative assessment of macro-economic impacts of EU energy transition²⁹⁰

The purpose of this action is to support the development and implementation of innovative approaches in the assessment of the macroeconomic implications of the EU's clean energy transition. Drawing on most recent improvements in the treatment of finance and innovation in macroeconomic models used to assess the clean energy transition, this action would aim at further improving the modelling tools as well as the interpretation of the results that can be derived from such tools.

Tasks relate, inter alia, to better capture interactions between energy systems, finance, innovation, and macroeconomic trends, including in a global context, or to put more focus on the social drivers and implications of the clean energy transition, including at the sub-national level and in specific sectors of the economy. Attention would notably need to be paid on the drivers or necessary conditions to secure a successful clean energy transition. All model improvements would need to be developed in an open and transparent manner, for them to be replicable in various macroeconomic models or contexts.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: as of 3rd quarter 2018

Indicative budget: EUR 3.00 million from the 2018 budget

36. Removing barriers to Green Growth by assessment scale and impact of subsidies in all energy sectors of the EU²⁹¹

The purpose of this action is to prepare a comprehensive study, looking at both financial and non financial interventions in energy markets and in other sectors, taking into account energy production costs and externalities, and to analyse the impact of current interventions on green investment. Under the State of the Energy Union Report and forthcoming Governance regulation, the Commission and Member States are meant to review progress in achieving energy union objectives including stimulating innovation in the energy sector, the achievement of targets and internal market developments such as the removal of market distorting government interventions, including fossil fuel subsidies in particular.

Tasks involve, inter alia, a multi-annual study to develop and explore the methodological issues associated with assessment of energy production, technology and external costs and all the government interventions, including fossil fuel subsidies that inhibit energy innovation, including technology innovation and deployment, in the energy markets of the EU. Existing data are outdated and do not reflect the significant changes in market conditions of certain generation technologies, such as falling wholesale energy prices, ongoing subsidies for low

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carbon energy and the rise of capacity payments. Thus a new study with a comparable up-to-date database across all EU countries and generation technologies, with an international comparative dimension, is necessary. Furthermore, as the scope of the analysis should be extended to other sectors, such as transport, in order to capture the full impact of fossil fuel subsidies. Environmentally harmful subsidies, being an obstacle to green investments, are in the focus of international discussions over the last few years. Therefore, besides collection data on subsidies, production costs and externalities, we need to analyse the impact of energy subsidies to green investments.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 3rd quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

37. Extension of METIS gas/electricity markets and systems model²⁹²

The purpose of this action is to further support the European Commission's energy policy proposals by enhancing the EU's modelling capacity. To study recent trends in energy markets, the Commission has been developing a new mathematical model, METIS, to perform analyses of the European energy system for electricity, gas and heat. It simulates the operation of energy systems and markets on an hourly basis over a year, while also factoring in uncertainties like weather variations. For example, it can analyse the hour-by-hour impact of using more renewable electricity.

In order to further extend and enhance METIS' capabilities, additional activities in the area of, inter alia, data gathering, modelling of interactions between gas, electricity and heat markets, and considerations on optimal capacity expansion are envisaged. In addition, dissemination activities of METIS model and results towards interested stakeholders should also be envisaged.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: as of 2nd quarter 2019

Indicative budget: EUR 4.00 million from the 2019 budget

38. 2020 Renewable energy progress report²⁹³

The Renewable Energy Directive requires the Commission, on biennial basis and drawing on the Member State national renewable energy reports, to present a comprehensive assessment of EU and Member State progress towards 2020 renewable energy targets. These reports shall

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include analysis of data and description of renewable energy policy measures in Member States, based on national renewable energy reports, and the data and impacts of the EU renewable energy policy and biofuel consumption in the EU and in main third countries of supply.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.80 million from the 2019 budget

39. Support to the realisation of Implementation Plans of the SET Plan²⁹⁴

The tenders will support the execution/realisation of the Implementation Plans prepared by one of the following three SET Plan Temporary Working Groups (TWGs): energy efficiency solutions for buildings/Renewable heating and cooling; Industry less energy intensive and more competitive, and Batteries for e-mobility and stationary storage, including the monitoring of their progress and the disseminating of results. The scope shall include: supporting further development of the activities identified in the Implementation Plan into projects with defined partnership and funding plan (at private, National and EU levels); monitoring the projects progress, results and contribution to the targets defined in the Declaration of Intent; enhancing the sharing of information on relevant ongoing projects at National and EU levels, as well as the sharing of experiences of bilateral/multilateral cooperation between countries in order to foster more cooperation; dissemination to communicate the achievements of the SET Plan action.

The support for the Implementation Plan on energy efficiency solutions for buildings/Renewable heating and cooling will also expand to the activities carried out within the Innovation Challenge N°7 of Mission Innovation.

The support for the Implementation Plan on Batteries for e-mobility and stationary storage will also:

- Include a link to the Batteries initiatives;
- Streamline conclusions from stationary energy storage projects (including battery-based projects), especially as regards system integration, with a view to foster relevant policy action and identify research gaps;
- Help with identification/streamlining of accompanying non-R&D&I actions, necessary for uptake of battery-based storage and relevant R&D&I;
- Organise networking activities to foster knowledge sharing.

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The Implementation Plans in the areas of solar thermal energy, offshore wind, photovoltaics, ocean energy, deep geothermal systems, carbon capture and storage, and bioenergy are supported under the topic LC-SC3-JA-2-2018-2019. Support for the Implementation Plan on Smart Cities (Action 3.2) is foreseen through the procurement "Support to the European Innovation Partnership on Smart Cities and Communities and its Market Place" (included in the work programme 2016-2017 of the Horizon 2020 Energy Challenge). Support for the Implementation Plan on Energy Systems (Action 4) will be provided through the ongoing project *Intensys4EU*²⁹⁵.

Type of Action: Public Procurement - 3 direct service contracts.

Indicative timetable: 2nd quarter 2018

Indicative budget: EUR 2.00 million from the 2018 budget

40. Information, dissemination and logistic support for EU in Mission Innovation²⁹⁶

The European Commission, on behalf of the European Union, joined the Mission Innovation (MI) in June 2016. MI is a global initiative that aims to reinvigorate and accelerate public and private global clean energy innovation to make clean energy widely affordable and it is one of the key strategic forum for the EU's international cooperation in clean energy RD&D. MI members committed to share information on their clean energy RD&D activities, double their governmental clean energy investments within 5 years, and encourage greater levels of private sector investments.

To guarantee continuation of MI initiative, and maintain the ownership of the activities the EC, on behalf of the EU, is actively engaged in and another set of activities it leads, a series of supporting services need to be covered, mainly the websites, information and dissemination activities and logistic support, etc.

Type of Action: Public Procurement - up to 6 direct service contracts and specific contracts under existing framework contract

Indicative timetable: 1st quarter of 2018, 2019 and 2020

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.20 million from the 2019 budget and EUR 0.20 million from the 2020 budget

²⁹⁵ <https://www.etip-snet.eu/intensys4eu/>

²⁹⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

41. Website for directing potential innovators to the most appropriate public funding instruments available to support clean energy projects²⁹⁷

This action will provide the European Commission with an internet-based navigator guiding promoters of clean energy innovation projects, in a few steps, to the most relevant EU funding and financing instruments that could support the clean energy technology or service they seek to be assisted financially. The navigator should cover all public and joint public-private funding instruments, including those providing grants, equity, equity-type or loans, provided by the European Union. The tool should be designed with the possibility of covering relevant funding instruments provided at EU Member States level.

Type of Action: Public Procurement - 1 service contract (through an existing Framework Contract)

Indicative timetable: 3rd quarter 2019

Indicative budget: EUR 0.50 million from the 2019 budget

42. Provision of technical assistance and study to support the development of a composite indicator to track clean-energy innovation performance of EU members²⁹⁸

Provision of technical assistance and/or studies to develop the methodology for a composite indicator to track clean-energy innovation performance of EU members and related analysis. These activities, aimed at supporting the governance of the 5th pillar of the Energy Union, will build on work carried out on and know how gained by DG RTD with the European Innovation Scoreboard and by JRC with the monitoring of progress in Research and Innovation in the frame of the annual State of the Energy union reports and the Strategic Energy Technology Plan (SET-Plan).

Type of Action: Public Procurement - 1 service contract (preferably through an existing Framework Contract)

Indicative timetable: 4th quarter 2018

Indicative budget: EUR 0.70 million from the 2018 budget

²⁹⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

²⁹⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

43. Technical and legal assistance to facilitate regional cooperation on deploying renewable energies among EU Member States and transparency on support schemes for renewable energy²⁹⁹

Regional cooperation on deploying renewable energy can bring substantial benefits in terms the cost-effectiveness of RES deployment across Europe and can help to increase market and system integration of renewable energy.

Technical, economic and legal assistance for regional cooperation will be needed to complement and prepare actions based on the recast of the Renewable Energy Directive 2018/2001/EU and the developments within the subsequent co-decision procedure. In particular, Art. 3 (5) and Art. 5, 8-12, emphasize the importance to enhance regional cooperation in the field of RES.

The following actions are needed:

- Developing a coordination tool for auctions of renewable energies, including gathering and disseminating data on (planned) auctions;
- Maintenance and development of internet database with renewable energies support schemes and related information;
- Technical assistance for the development of a platform for statistical transfers of renewable energy between Member States under *Art. 8 of the* recast of the Renewable Energy Directive;
- Technical assistance for developing a platform for national plans to support renewable energy (including indicative timing, capacity and budget) under (Art. 15 (3)) of the recast of the Renewable Energy Directive;
- Technical assistance to support regional cooperation on renewable energy High Level Groups (North Seas, BEMIP, CESEC).

Type of Action: Public Procurement - 2 direct service contracts in 2018, 1 direct services contract in 2019, and 1 direct service contracts

Indicative timetable: 3rd quarter 2018, and 4th quarter 2019

Indicative budget: EUR 0.45 million from the 2018 budget and EUR 0.35 million from the 2019 budget

²⁹⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

44. Support for the creation of a multi-disciplinary innovations analysis for the energy transition³⁰⁰

The creation of a multi-disciplinary centre of expertise on innovations that are relevant for the energy transition, and that identifies and analyses technology and innovation in the energy sector and in other relevant domains (e.g. digital, mobility, industry, circular economy) to make recommendations to the European Commission on policy responses, in the form of priorities for Research and Innovation, but also in terms of regulatory action as well as engagement with key (existing and new) stakeholders. Work would be organised based on proposals for topics or issues by the contractor, to be agreed to and elaborated in cooperation with the European Commission.

Type of Action: Public Procurement - 1 service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 3.00 million from the 2019 budget

45. Technical assistance for the report on the performance of support granted by means of tendering procedures in the Union³⁰¹

The recast of the renewables directive Art 8.8 EU 2018/2001 require the European Commission to report on the performance of support for electricity from renewable sources granted by means of tendering procedures in the Union. This study shall provide the necessary analytical base for the Commission report.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 0.15 million from the 2020 budget

46. Technical assistance for assessing options to establish an EU-wide green label with a view to promote the use of renewable energy coming from new installations³⁰²

The recast of the renewables directive Art 19 EU 2018/2001 require the European Commission to adopt a report assessing the options to establish a Union wide green label with a view to promote the use of renewable energy coming from new installations. This study shall provide the necessary technical assistance including e.g. a mapping of green labels and an assessment of the potential impact.

³⁰⁰ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³⁰¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³⁰² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 3rd quarter 2019

Indicative budget: EUR 0.20 million from the 2019 budget

47. Continuation of the Building Stock Observatory and production of relevant bottom-up statistical data on buildings

The contract must ensure the continuation, update, upgrade and improvement of the current Observatory, including maintenance and update of the website, improvement of the existing indicators, data validation, quality control, gap filling and frequently automatic data updates.

The contract should also conclude a methodology for a bottom-up statistical analysis of the Observatory's data and/or through different data sources and the production of specific data on buildings related with the European policy.

The energy data and indicators produced and presented in the web tools (database, datamapper and factsheets) should cover each of the EU Member States and the EU as a whole.

Type of Action: Public Procurement - 1 direct service contract

Indicative budget: EUR 1.00 million from the 2020 budget

48. Support facility for public authorities

The Manag'Energy Portal is the Europe's reference portal and capacity building service for public authorities and their mandated bodies and agencies, unique players within the energy transition. Using the existing initiative as starting point, this service contract will include deep capacity building, knowledge exchange, communication and networking activities.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 1.80 million from the 2020 budget

49. Support to R&I Strategy and feedback to policy in the field of smart energy systems

The action is directly aimed at supporting the development and implementation of sound evidence base for R&I policies in the field of smart energy systems, encompassing all energy vectors and with a focus on systems integration. The action will support the coordination of stakeholder views on R&I strategy using existing structures (including for instance the BRIDGE initiative and the ETIP Smart Networks for the Energy Transition) and possible new initiatives, while also taking into account the current structure of the Set-Plan as well as its possible evolutions.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 2.95 million from the 2020 budget

50. Research-oriented data sets and open access database³⁰³

The action will contribute to enhancing the information infrastructure within the European Commission for the research and analytical use of the difference services of the Commission and eventually the public. It is expected that such infrastructure could contribute to (but not exclusively): (1) setting up a data repository for the European Commission to store the outputs of its various projections exercises, as well as outputs from other institutions and stakeholders for multi-source comparison purposes of interest for the European Commission ; (2) strengthening the existing Energy Market Data service, as well as (3) setting up an e-reporting platform in the context of the energy and climate governance and the upcoming reporting process on 2030 framework. As such it will enhance the Commission's (and eventually public) capacity to undertake robust research and analysis of energy policies.

Type of Action: Public Procurement - null

Indicative budget: EUR 2.80 million from the 2020 budget

51. Operation, maintenance, improvement and promotion of the BUILD UP interactive web portal

The BUILD UP web portal is Europe's reference portal for energy efficiency in buildings, as foreseen in Article 20(4) of Directive 2010/31/EU on the Energy Performance of Buildings. Using the existing BUILD UP services as a starting point, the services will include: IT maintenance and services, regular feed and update of relevant content, continual improvement of the portal, promotion, communication and logistical support.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 2.50 million from the 2020 budget

52. Studies on the EU energy system in support of policy³⁰⁴

The integration of energy systems for or a fully CO₂-neutral and circular economy requires diverse and ad hoc research. This action will enable a diverse group of experts to deliver and promote studies on a variety of energy subjects on short and medium term deadlines, with an aim to support the delivery of policy priorities.

³⁰³ These activities directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³⁰⁴ These activities directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

The numerous studies will delve into topics for the decarbonisation, digitalisation and democratisation of integrated smart networks. Technical, legal and financial insights will be sought on topics such as - but not limited to - renewable energy integration, smart grids, storage (short and long term), interconnections, increasing prosumers and market design.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 2.80 million from the 2020 budget

53. Assessment of projects and actions funded from Horizon 2020

The aim of the action is to assess the impacts and the achievements of projects and actions funded from Horizon 2020 in energy efficiency field: e.g.; energy efficiency consumers projects, assessment of the role of local and regional energy agencies in the energy transition, assessment of BUILD Up Platform , market surveillance projects.

Type of Action: Public Procurement - 4 service contracts

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 0.53 million from the 2020 budget

54. Technical support for policy development and implementation for renewable fuels³⁰⁵

Provision of technical and legal support for the implementation of the recast of the Renewable Energy Directive further developing policy frameworks for renewable technologies and their deployment with a particular focus on renewable fuels. The aim of this action is to have an understanding on the position of the industry on the various delegated acts that have to be completed in support of the recast of the Renewable Energy Directive.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: st quarter 2020

Indicative budget: EUR 2.00 million from the 2020 budget

55. Support to the Global Covenant of Mayors initiative³⁰⁶

The purpose of this action is for the European Commission to contribute to the funding of the Secretariat of the Global Covenant of Mayors for Climate and Energy.

³⁰⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³⁰⁶ The budget for the implementation of this action will be delegated to the Commission service managing the service contract (Service for Foreign Policy Instruments).

The Global Covenant of Mayors (GCoM), announced in June 2016, brought together the most significant existing local authorities initiatives supporting energy transition and climate action; the European Covenant of Mayors for Climate and Energy and the Compact of Mayors. The Secretariat of the Global Covenant of Mayors will ensure coordination and support to the different Regional Covenant of Mayors Offices financed by the European Commission (Europe, its Eastern and Southern Neighbourhood, Africa, Asia, Latin America and North America). In particular, the Secretariat will: (i) facilitate coordination and exchange of information among stakeholders involved in GCoM activities at the global level; (ii) provide capacity building and facilitate access to finance for local authorities (iii) manage data and act as the interface for global processes (e.g. UNFCCC NAZCA Portal, UNFCCC Action Agenda & Stocktake, World Urban Forum) (iv) contribute to EU energy policy mainstreaming worldwide.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 4th quarter 2020

Indicative budget: EUR 3.50 million from the 2020 budget

56. Contest implementation, management and communication services related to the third Phase of the international Mission Innovation Prize Programme³⁰⁷

The Mission Innovation (MI) Prize Program, called MI Champions Program, is a new recognition program to celebrate and support innovative individuals around the world who are accelerating the clean energy revolution. This program was launched at the MI third ministerial meeting in May 2018 in Malmö, Sweden. The first cohort of MI Champions was presented at MI fourth ministerial in Vancouver in 2019; and the second cohort will be presented at MI fifth ministerial in Chile 2020.

Bolt-on support is required for the further implementation of the third Phase of the MI Prize Program. This will allow the third cohort of MI Champions to be presented to MI sixth ministerial meeting taking place in 2021. The support will entail, in particular, contest launch, implementation and management, communication, marketing and outreach activities. This third Phase of the program will have to ensure continuity with the second phase and use the same selection process based on openness, transparency and fairness.

Type of Action: Public Procurement - - 1 direct service contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 0.30 million from the 2020 budget

³⁰⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

57. In-depth analysis of renewable energy technology opportunities to support regional cooperation in national energy and climate plans (EU Remap) ³⁰⁸

In 2018, the International Renewable Energy Agency developed a Renewable Energy Roadmap (Remap) analysis to identify cost-effective renewable energy options in the period to 2030, based on detailed analysis of 10 Member States. This new study will expand this analysis to all Member States, help support the regional cooperation within national energy and climate plans, and extend the analysis to develop cost-effective pathways for the long-term decarbonization of the EU to 2050. This activity will also be the EU part of IRENA's worldwide analysis.

Contractor: IRENA Headquarters, Masdar City, PO Box 236, Abu Dhabi, United Arab Emirates

Type of Action: Public Procurement - Public Procurement - 1 direct service contract awarded to IRENA on the basis of Article 164(5)(f) and Annex 1.11 b) of the Regulation (EU, Euratom) No 1046/2018

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 1.50 million from the 2020 budget

58. Monitoring and assessment of the performance indicators of renewable energy, investment and RES market trends in Europe³⁰⁹

The contractor shall provide monitoring and performance assessment of various RES sectors, through improved data collection and monitoring of performance indicators on the overall growth of European renewable energy sector, investments in the RES industry, market trends within EU renewables markets across the value chains of each renewable energy sector, economic growth and employment, and the market shares on the EU market of domestic and imported RES products and components. The assessment should result in annual data and statistics on all of above mentioned renewable energy indicators in support of Commission's evaluation and assessment of Member State and the EU progress towards 2030 renewable energy targets.

Type of Action: Public Procurement - 1 direct service contract

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 1.60 million from the 2020 budget

³⁰⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³⁰⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

59. European electricity network: DC grid modelling and load-frequency analysis for AC systems³¹⁰

The purpose of this action is to analyse the specific aspects of the European electricity network of the future, in particular the impact of DC technologies and the optimisation of the load-frequency zones in AC systems.

Presently, there is knowledge of DC interconnections modelling and control, but only for point-to-point connections. There is the need to acquire the necessary knowledge of the behaviour of a DC meshed architecture at EU/transmission level and the interaction with the underlying interconnected AC and/or DC local/micro/nano grids. It is expected that the results of the study would allow the next phase of demonstrations of such architectures to de-risk the technologies allowing deployment and would help transmission (and distribution) system operators in grid modelling and operation.

As part of the implementation of the Clean Energy Package, an analysis of the way to optimally design the regions and methods for dimensioning the balancing reserves needs to be carried out. This action aims to support and inform the EU-level policy discussions with technical analyses.

Type of Action: Public Procurement - 2 direct service contracts

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 0.60 million from the 2020 budget

60. Provision of technical assistance, IT tools, stakeholder platforms and high level financial expertise to support the improvement of the financial/investment environment for clean energy investment under the Green Deal and Green financing Strategy³¹¹

The Green Deal and the energy transformation require major investment, in energy generation, transmission/distribution, energy storage, heating & cooling. The future MFF, the new EIB energy lending policy and the Green Financing Strategy propose to set higher goals to reorient capital flows towards sustainable investment, to help reach EU energy and climate ambitions.

The research services contracted under this point will build on the experience and lessons gained from the investor dialogues created under the smart financing for smart buildings initiative and EEFIG in particular, to foster an investor dialogue on supporting the clean energy transition (beyond energy efficiency). Through research analysis, expert stakeholder forums and outreach, the intention is to support financing the Green Deal through:

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³¹¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- map, with industry experts, the financing instruments available to leverage investment in the clean energy sphere, beyond the sphere of energy efficiency;
- to explore, beyond the sphere of energy efficiency, how investment rules and financing instruments and regimes could be modified in energy sub sectors (renewable energy, clean energy technology innovation, smart grids, energy storage, heating and cooling).

Such analysis should provide the Commission with the expertise needed to inform policymakers with an objective and unbiased judgement of the role for different financing policy and instrument options. It should thus be of assistance in the implementation of the Commission's proposed in "Sustainable Europe Investment Plan".

Setting up a sectoral investor's dialogue with the energy industry and developing guidance/best practices will support and help implement research on sustainable financing in energy. In order to enable timely and cost-efficient energy transformation, the investor's dialogue will identify emerging barriers in financing and recommend solutions based on objective and unbiased judgement and expertise. Through IT tools, it will disseminate best practices, coordinate efforts, foster innovations and build a brand.

Type of Action: Public Procurement - one framework contract, subsequent specific contracts

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 4.00 million from the 2020 budget

61. Support to the funding of a European network of energy youth representatives³¹²

The purpose of this action is to contribute to the funding of a European network of youth focussed on climate and energy, a platform bringing together different youth organisations (universities, energy clubs, etc.) engaged in policy discussions on energy and climate issues.

In particular, the platform will: (i) facilitate coordination and exchange of information among youth organisations at the national and European level; (ii) provide support for organisation of events and activities; (iii) provide support for the dissemination of the network activities.

Type of Action: Public Procurement - 1 direct contract

Indicative timetable: 3rd quarter 2020

Indicative budget: EUR 0.50 million from the 2020 budget

³¹² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

62. Provision of technical assistance, IT tools, and/or studies to collect and analyse relevant data for the Energy Union³¹³

Development and maintenance of the e-platform covering Member States' reporting obligations under Regulation 2018/1999 the Governance of the Energy Union Regulation.

According to Article 28 of Regulation 2018/1999, the Commission shall establish an e-platform to facilitate communication between the Commission and Member States, to promote cooperation among Member States and to facilitate public access to information. In addition, the e-platform will be used by Member states to submit to the Commission their reports on the implementation of their national energy and climate plans (i.e. the e-platform will be a one-stop-shop for Member States for the purpose of the extensive reporting under Regulation 2018/1999). In that regard, the e-platform will be an essential instrument to collect relevant, updated and essential data on the dimensions of the Energy Union in a structured manner, allowing this data to be shared, analysed and used for policy making. The e-platform will this contribute to the implementation of the Europe 2020 strategy and to the 2030 policy framework for energy and climate.

Type of Action: Public Procurement - 1 specific contract under framework contract

Indicative timetable: as from 1st quarter 2020

Indicative budget: EUR 0.21 million from the 2020 budget

63. Dissemination and exploitation of results³¹⁴

The challenge is to exploit the knowledge from projects in the field of (non-nuclear) energy, funded under FP7 and Horizon 2020. Projects that are at a short distance from market application may need assistance amongst other in defining their strategy towards exploitation, developing their business plan, identifying the risks and opportunities, and finding investors and other exploitation partners. For this, the Commission will offer a targeted service linked to the TRL level of the project, through procurement contracts.

Type of Action: Public Procurement - One or several specific contract(s) – Use of an existing framework contract (implemented under the work programme part on 'Dissemination, Exploitation and Evaluation')

Indicative timetable: as of 1st quarter 2020

Indicative budget: EUR 0.50 million from the 2020 budget

³¹³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³¹⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Provision of technical/scientific services by the Joint Research Centre

1. Administrative arrangement with the JRC, to provide Technical assistance on GHG emission saving criteria for biofuels and biomass fuels³¹⁵

Renewable Energy Directive, Articles 17 – 10 and Annex V, Recast of the RES Directive, Articles 26 - 28, Annexes V and VI

The JRC technical and scientific support is needed for the implementation of EU Renewable energy policy and the tasks allocated to the Commission under the Renewable Energy Directive 2009/28/EU, particularly as regards the requirements regarding the greenhouse gas emissions of biofuels and bioliquids and other related provisions for biofuels and bioliquids. The JRC support is also required for the development of the legislative framework following the adoption of the Commission's legislative proposal for the Recast of the Renewable Energy Directive which contains proposal for greenhouse gas emission criteria and provisions for their implementation for liquid, gaseous and solid fuels from biomass.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: 1st quarter of 2018, 2019, and 2020

Indicative budget: EUR 0.25 million from the 2018 budget and EUR 0.25 million from the 2019 budget and EUR 0.20 million from the 2020 budget

2. Technical and scientific assistance to the Covenant of Mayors by JRC³¹⁶

The purpose of this action is for JRC to continue providing third-party verification of Covenant of Mayors signatories' Sustainable Energy and Climate Action Plans as well as overall technical and scientific support and as such to contribute to the credibility and robustness of the initiative. The cities and local authorities under the Covenant of Mayors need support for the development, analysis and implementation of Sustainable Energy and Climate Action Plans. In parallel, it is necessary to continuously ensure the overall methodological coherence of the Initiative, to carry out some new methodological developments and to develop and improve the tools to support the operational performance of signatories as needed. By helping local authorities, this assistance should make a significant contribution to achieving the goals of EU Energy Policy, the Energy Union objectives and the commitments under the Paris agreement. The main objective is to strengthen the Covenant of Mayors Initiative through scientific and technical assistance. Having in mind the specific nature of the Covenant, the different experience and conditions of towns and cities and the large number of signatories, technical assistance by the JRC is needed to evaluate consistently efforts and measures undertaken under the CoM initiative as well as to provide figures and

³¹⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³¹⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

assessment regarding the achievements. JRC's evaluation and analysis work critically contributes to informing policy and disseminating within the research and academia and beyond the Covenant of Mayors's achievements and Commission's action towards local authorities.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative budget: EUR 2.00 million from the 2020 budget

3. Administrative arrangement(s) with the JRC, to implement the relevant provisions of Energy Efficiency related Directives or Regulations, including Directive 2012/27/EU and the EPBD³¹⁷

The JRC technical and scientific support is needed for the implementation of EU energy efficiency policy and the tasks allocated to the Commission under the Energy Efficiency Directive, the Energy Performance of Buildings Directive, the Ecodesign Directive, the Energy Labelling Directive and the Regulation on Labelling of Tyres.

According to Council conclusions of 26.04.1994 (J.O. C 126 of 7.05.1994) on the role of the DG Joint Research Centre, the JRC activities include Institutional support activities such as Scientific and technical support activities necessary for the formulation and implementation of Community policies and of the tasks allocated to the Commission pursuant to the Treaties, which necessitate the neutrality of the JRC.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative budget: EUR 2.50 million from the 2020 budget

4. Technical support for the implementation of the heating and cooling related provisions of the recast of the Renewables Directive³¹⁸

Provision of technical support for the implementation of the new articles on heating and cooling incorporated in the recast of the renewables directive (2018/2001/EU). The work would include technical background studies and other evidence inputs for elaborating guidances on the various new heating and cooling provisions and concepts (waste heat, flexibility criteria and thresholds for sub-targets and definitions, topology and quantification of measures, calculation of renewables heating and cooling, disconnection conditions, thermal storage potentials, etc.); contribution to the technical evaluation of Member States' measures, reports, plans and assessments on heating and cooling, assistance for further developing heating and cooling policies; and appraisal of heating and cooling sector performance in the context of the mandatory review of the EU renewable energy target.

³¹⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³¹⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: 2nd quarter of 2019 and 1st quarter of 2020

Indicative budget: EUR 0.25 million from the 2019 budget and EUR 0.30 million from the 2020 budget

5. Administrative arrangement with the JRC to support the implementation of the initiative for coal and carbon-intensive regions in transition³¹⁹

The JRC technical and scientific support is needed to provide the European Commission with an up-to-date, comprehensive study on the situation in regions producing solid fossil fuels (coal, lignite, peat and oil shale) in the EU, the Western Balkans and Ukraine, in particular as regards a series of indicators (i.a. coal, lignite, peat and oil shale production, electricity production from solid fossil fuels, employment in the solid fossil fuel sector, analysis of carbon-intensive and/or energy intensive industrial value chains in coal regions, etc.).

This study will serve as a key research input for policies related to the initiative for coal and carbon-intensive regions in transition, for the upcoming European Green Deal and its ‘just transition’ chapter, especially the future Just Transition Fund.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: 2nd quarter of 2020

Indicative budget: EUR 0.40 million from the 2020 budget

Delegation Agreements

1. ELENA (European Local Energy Assistance)³²⁰

The ELENA (European Local Energy Assistance) facility was established in 2009 under the Intelligent Energy-Europe Programme II and continued under the H2020 Work Programme 2014-2015 and Work Programme 2016-2017.

The ELENA facility aims at supporting public and private project promoters to prepare and develop ambitious and large-scale (normally above EUR 30 million) aggregated investment programmes which will contribute to achieving and going beyond the objectives of the EU energy and climate policy. The ELENA facility aims at mobilising local, regional and national stakeholders towards actions leading to broader utilisation and market uptake of innovative solutions, including technologies, processes, products, policies, organisational models and practices. The objective is also to accelerate investments by increasing experience, facilitating

³¹⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

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financing, in particular through the aggregation of projects and overcoming existing investment barriers.

In the public sector, the ELENA facility should continue helping cities (such as local authorities) to mobilise investments and implement their sustainable energy action plans, where relevant in synergies with other sustainable development plans (Sustainable Urban Mobility Plans and Air Quality Plans). The ELENA facility can provide, directly or indirectly, assistance to different type of project promoters such as e.g. local, regional or national authorities, social housing operators, public/private infrastructure operators, building owners.

The implementation of the ELENA facility is subject to dedicated delegation agreements between the European Investment Bank (EIB) and the European Commission. The EIB ensures that Project Development Services are being awarded in accordance with the principles of transparency, proportionality, sound financial management, equal treatment and non-discrimination, lack of conflict of interests and compliance with internationally accepted standards. Eligible projects are selected by the EIB and submitted to the European Commission for approval. The selection of projects shall take into consideration:

- the eligibility of the applicant;
- the eligibility and potential bankability of the proposed investment programme;
- the financial and technical capacity of the applicant to implement and complete the Investment Programme;
- the technical need for the project development services;
- the contribution to the broader utilisation and market uptake of innovative solutions including technologies, processes, products, policies, organisational models or practices;
- the expected Leverage Factor (the cost of the Investment Programme divided by the amount of the ELENA contribution)
- the contribution to EU policies and the EU added value.

The project development services grants are provided in relation to all the activities necessary to develop and mobilise finance for a clearly identified investment programme, including for instance: feasibility studies, design studies, structuring of programmes, business plans, energy audits, legal/financial advisory, preparation of tendering procedures and contractual arrangements, bundling of smaller projects to form bankable packages, set-up and running of a project implementation unit. However, costs related to the investment programme itself such as hardware costs are not eligible. The Request for Project Development Services shall be addressed to the EIB according to the standard procedure for the submission of projects to the EIB. Applications are open to all participating countries following the CSA eligibility conditions and are not restricted by the availability of local offices of the EIB in a specific country.

In 2018, 2019 and 2020, the ELENA Facility will aim at supporting ambitious and significant investment programmes in one or both of the following two pillars (1) and (2):

(1) energy efficiency and distributed renewable energy. Investment programmes could cover one or more of the following areas:

- investments to significantly increase the energy performance of public or private buildings, including measures to decrease energy consumption in heating/cooling and electricity – e.g. thermal insulation, energy efficient heating, air conditioning and ventilation systems, efficient lighting, and measures for the integration of renewable energy sources into the built environment – e.g. solar photovoltaic (PV), solar thermal collectors and biomass. These investment programmes could correspond to the deployment of dedicated financial instruments and investment platforms aiming at e.g. accelerating energy renovations, as promoted under the "Smart Finance for Smart Building" Initiative³²¹.
- investments into renovating, extending or building new district heating/cooling networks, including networks based on combined heat and power (CHP); decentralised CHP systems (building or neighbourhood level);
- investments in energy efficient local infrastructures, including energy efficient street and traffic lighting, smart grids leading to energy efficiency improvements, measures to improve the energy efficiency of water infrastructures (water pumping, water treatment etc.), information and communication technology infrastructure for energy efficiency, energy-efficient urban equipment and link with transport.

Following areas shall be excluded:

- Stand-alone renewable energy systems, not integrated in buildings or heating/cooling networks, e.g. wind turbines; stand-alone PV, concentrated solar power; hydropower and geothermal electricity production;
- Large industrial facilities (falling under the Emission Trading Scheme Directive), and investments in reducing greenhouse gas emissions due to industry delocalisation.

(2) Urban transport and mobility in urban/suburban agglomerations and other densely populated areas:

A part of the ELENA budget will be ring-fenced for the development of investment programmes (often with public sector involvement) in the field of urban transport that will contribute to the EU urban transport policy goals of halving the use of 'conventionally-fuelled' cars in cities by 2030, achieving essentially CO₂ free logistics in major urban centres by 2030 and attaining the 2020 objectives for urban areas presented in the Directive on the deployment of alternative fuels infrastructure.

Projects could cover one or more of the following areas:

³²¹ https://ec.europa.eu/energy/sites/ener/files/documents/1_en_annexe_autre_acte_part1_v9.pdf

- Investments to support the use and the integration of innovative solutions (beyond the current state of the art) for alternative fuels³²² in urban mobility, e.g. in vehicles and in refuelling infrastructure for alternative fuel vehicles and other actions to support the wide-scale use of 'alternative fuels' in urban areas.
- Investments to introduce - at a wide scale, system level - new, more energy-efficient transport and mobility measures in any modes in urban areas., e.g. in shared mobility, urban logistics, intelligent transport systems, planning, urban infrastructure (including investments in 'soft modes').

The preparation of a Sustainable Mobility Plan (SUMP) could be one of deliverables of an ELENA funded project, and/or the ELENA-planned investments could contribute to the implementation of an existing or updated SUMP.

Projects dealing with long-distance transport infrastructure are not eligible for financing by the ELENA Facility.

Type of Action: Delegation Agreement

Indicative timetable: 4th quarter 2018, 4th quarter 2019 and 4th quarter 2020

Indicative budget: EUR 54.80 million from the 2018 budget³²³ and EUR 35.00 million from the 2019 budget³²⁴ and EUR 35.00 million from the 2020 budget³²⁵

Contribution Agreements

1. Support to the establishment and operation of the Mineral methane emissions Measurement and Reconciliation Centre (MMEMRC)³²⁶

Methane emissions are responsible for a quarter of today's global warming in terms of radiative forcing³²⁷. Globally, a third of manmade methane emissions come from the energy sector about 45% of which can be mitigated at no net cost³²⁸. Current UNFCCC inventory data on global methane emissions follow differing quantification and reporting standards (tier 1-3) per country. The knowledge on real emissions therefore is patchy, uncertain and inadequate for comparison, analysis and for the development of policy measures and company action to reduce emissions.

As part of a wider methane emissions reduction strategy in the energy sector announced in the European Green Deal of the von der Leyen Commission, the Commission is planning to set

³²² See the Communication on 'Clean Power for Transport: A European alternative fuels strategy' (COM/2013/017)

³²³ of which EUR 5.00 million from the 'Smart, green and integrated transport' WP part.

³²⁴ of which EUR 5.00 million from the 'Smart, green and integrated transport' WP part.

³²⁵ of which EUR 5.00 million from the 'Smart, green and integrated transport' WP part.

³²⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³²⁷ EDF calculation based on IPCC AR5 WGI Chapter 8

³²⁸ IEA World Energy Outlook 2018

up a Mineral Methane Emissions Measurement and Reconciliation Centre (MMEMRC). It will be independent (from companies) central authority, and will fill the knowledge gap between reported and real energy-related methane emissions, which is the necessary condition for further measures and action.

Sources of data, tasks and deliverables

MMEMRC will gather and consolidate emissions data from company reporting under the OGMP (please see below) and verify it against observed emissions, including satellite data (i.a. Copernicus Sentinel 5P), ground-based surveys, aerial surveys (aircrafts and drones), scientific studies and cross-checks with the existing UNFCCC greenhouse gas inventories.

An additional operational task of MMEMRC will be the detection of major methane emissions (intermittent super-emitters) and alert the Commission and relevant companies / stakeholders so they can address them. Based on its data gathering and reporting activities, it will monitor methane emissions reductions, contract scientific measurement campaigns and studies in order to encourage continuous improvement of measurement methods and quantification of emissions, perform spot checks, publish regular and ad-hoc reports with recommendations for specific actions and scientific peer-reviewed papers. It will gradually increase the reliability of inventories and provide support for methane reduction policies and the development of ambitious emission goals.

These activities will be performed through the extension of the scope of existing initiatives under UNEP's CCAC umbrella. MMEMRC will also make sure that its relevant work-streams consider already existing projects and look for synergies with those. Examples are CHE³²⁹ and the upcoming follow-on projects led by ECMWF and VERIFY³³⁰ lead by the French Alternative Energies and Atomic Energy Commission (CEA), which are also funded under the Horizon 2020 program. The EU's Copernicus programme contributes to this initiative with satellite data and information products. By its nature, the activities of the Centre will also contribute to the improvement of Member States reporting under the UNFCCC, by cross-checking existing inventories, identifying anomalies and encouraging the implementation of comparable cutting-edge measurement and reporting standards in the industry, that will fulfil UNFCCC reporting requirements at Tier 3.

Existing initiatives and studies

The MMEMRC will bring under one umbrella the already existing initiatives under the UNEP Climate and Clean Air Coalition's (CCAC) Mineral Methane Initiative (2Mi), where DG Energy represents the Commission as a lead partner, and will further extend their scope in order to arrive at a more holistic approach. The UNEP umbrella ensures the global outreach and already existing and functional structures for the Centre. This also allows the establishment of the Centre at a lower cost.

Governance and Finance

³²⁹ Grant agreement ID: 776186

³³⁰ Grant agreement ID: 776810

The Green Deal includes energy and climate diplomacy having to cover cooperation with third countries and multilateral organizations to reduce methane emissions as an important initiative. As methane emissions is a global challenge, the Centre will also have a global coverage. Reporting companies have global operations and reporting is on all their assets. The UNEP umbrella ensures this global outreach and already existing and functional structures for the Centre and its activities. Such approach also allows the establishment of the Centre at a lower cost.

In order to ensure that the Centre is financially and operationally independent from companies and the results of studies and verification are credible, the MMEMRC and its activities need to be government-funded with no industry contribution. In addition, the contribution by the European Commission can ensure further governments joining the MMEMRC as a whole, or any of its individual initiatives and workstreams (e.g. the science studies).

The Centre will have an executive board with voting rights consisting of European Commission, UNEP, Environmental Defense Fund (EDF) – as founders and current non-company members of the existing initiatives – and joining governments. The executive board will be supported by advisory groups with no voting rights and core staff. The Secretariat will be hosted under UNEP, the core staff (around 10 FTE by the second year of operation) will be responsible for day-to-day operations and project management. The individual elements linked to the MMEMRC, such as OGMP and the Global Methane Science Studies, will maintain their existing governance structure. A new initiative, mirroring the OGMP (which covers oil and gas) but focusing on coal mine methane reporting will have to be established during the first year.

The cost of establishment and three-years' operation of the Centre, that includes the financing of further science studies, is estimated at EUR 10 million. The Centre will gather, consolidate and verify the first round of methane emissions data reported to it by companies for the year 2020 based on the robust reporting template agreed under the OGMP.

Legal entities:

United Nations Environment (UNEP), United Nations Avenue, Gigiri, PO Box 30552, 00100, Nairobi, Kenya

Type of Action: Contribution agreement with an implementing entity (indirect management)

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 10.00 million from the 2020 budget

Specific Grant Agreements

1. Technical support to stakeholders on standardisation work for energy related products³³¹

To give support to environmental NGOs for participating in Technical Committees and Working Groups on Standardisation.

Beneficiary: ECOS, rue d'Edimbourg 26, Brussels 1050, Belgium

ToA text: Three Specific Grant Agreements under Framework Partnership Agreement 1338/G/ENV/ENTR/2014³³² with the identified beneficiary ECOS for Coordination and Support Actions.

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in General Annexes D and H or the work programme.

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2018, 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.30 million from the 2019 budget and EUR 0.30 million from the 2020 budget

2. Support to European Standardisation Organisations on standardisation work for energy related products³³³

Identified beneficiaries:

CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

According to Regulation (EU) No 1025/2012, CEN and CENELEC are the competent European standardisation organisations to carry out this work and are therefore the identified beneficiaries.

ToA text: Three Specific Grant Agreements under the Framework Partnership Agreement FPA/CEN/ with the identified beneficiary for Coordination and Support Actions

The standard evaluation criteria, thresholds, weighting for award criteria and the maximum rate of co-financing for this type of action are provided in General Annexes D and H or the work programme.

³³¹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services

³³² A new Framework Partnership Agreement will be signed in 2020.

³³³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2018 and 2nd quarter 2019

Indicative budget: EUR 0.30 million from the 2018 budget and EUR 0.30 million from the 2019 budget

3. Standardisation request to the CEN for algae and algae-based products in support of the implementation of the RED II Proposal³³⁴

CEN/BT/WG 218 worked on the Commission's Standardization Request M/547 for algae and algae-based products or intermediates under contract CEN/2016-04/ENER/C2/498-2016 - SI2.735225 and developed the Work Programme for Mandate M/547. The Work Programme has been approved by CEN/BT and by the Commission. The additional budget request is to cover for additional work not foreseen in the original Standardization Request M/547 but identified by CEN/BT/WG 218. CEN is in the process of establishing a new Technical Committee CEN/TC XX 'Algae' to implement the Work Programme.

Identified beneficiary: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2019

Indicative budget: EUR 1.00 million from the 2019 budget

4. Support to European Standardisation Organisations for biomethane injection in the grid and co-processing pyrolysis oils in oil refineries in support of the implementation of the RED II Proposal³³⁵

CEN/TC 408 worked on the Commission's Standardization Request M/475 on standards for biomethane use in transport and injection in natural gas pipelines under contract SA/CEN/ENTR/EFTA/475/2012-15 and the standardisation work has progressed well. However the work identified important topics for which research has to be continued in order to provide certainty for the specification and in particular:

- a. Impact of siloxanes on heavy duty engines
- b. Impact of Sulphur on catalytic converters and performance of engines
- c. Impact of oxygen on underground storages

³³⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³³⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

d. Impact of components on health

Furthermore the work carried out by CEN on Mandate 525 on Pyrolysis oils identified new work elements in co-processing pyrolysis oils in oil refineries and additional work is needed to complete the work under Mandate 525.

Identified beneficiaries: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2019 and 2nd quarter 2020

Indicative budget: EUR 2.00 million from the 2019 budget and EUR 3.00 million from the 2020 budget

5. Support to European Standardisation Organisations for Ethanol 20/25 blends in petrol in support of the implementation of the RED II ³³⁶

Under the Framework Partnership Agreement FPA/CEN/ENTR/2014/C(2014)1892, CEN/TC/19 has been carrying out studies for the European Commission on ethanol 20/25 blends with petrol under contracts:

- a. ENER/C2/GA/449-2012/SI2.641582
- b. ENER/C2/GA/449-2012/SI2.674184
- c. SA/CEN/RESEARCH/EFTA/000/2014-13

The results from the first two contracts have been positive while the third one is still ongoing. However, preliminary results are encouraging and it is expected that the Commission, in consultation with CEN and the stakeholders, will consider a standardisation request to CEN on standards for E20/25 ethanol blends in petrol.

Identified beneficiaries: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 1.00 million from the 2019 budget and EUR 1.00 million from the 2020 budget

³³⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.
Please note that the Commission has decided to implement this activity in 2020, and not in 2019 (the budget indicated for 2019 will be used for funding proposals).

6. Support to European Standardisation Organisations for petrol/ethanol blends in diesel in support of the implementation of the RED II Proposal³³⁷

Under contract SA/CEN/RESEARCH/EFTA/000/2014-13 CEN of the Framework Partnership Agreement FPA/CEN/ENTR/2014/C(2014)1892; in close collaboration with ACEA and CONCAWE; CEN is carrying out investigative research work on blends of petrol and/or petrol/ethanol in diesel in view of minimising diesel consumption and increased consumption of petrol/ethanol in the EU. It is expected that further research work will be necessary to ascertain the consideration of an eventual standardisation request by the European Commission.

Identified beneficiary: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 1.50 million from the 2019 budget and EUR 1.50 million from the 2020 budget

7. Support to European Standardisation Organisations for petrol and/or diesel blends in support of the implementation of the RED II³³⁸

Under contract SA/CEN/RESEARCH/EFTA/000/2014-13 CEN of the Framework Partnership Agreement FPA/CEN/ENTR/2014/C(2014)1892; in close collaboration with ACEA and CONCAWE; CEN is carrying out investigative research work on various blends of petrol and diesel. Preliminary results have indicated that further research work on lubricity and wear test assessment on (paraffinic) diesel and on developing an alternative test for octane will be necessary.

Identified beneficiaries: CEN – European Committee for Standardisation, Avenue Marnix 17, 1000 Brussels Belgium

Type of Action: Specific Grant Agreement

Indicative timetable: 2nd quarter 2020

Indicative budget: EUR 1.00 million from the 2020 budget

³³⁷ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Please note that the Commission has decided to implement this activity in 2020, and not in 2019 (the budget indicated for 2019 will be used for funding proposals).

³³⁸ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

Financial Instruments

1. InnovFin Energy Demo Projects (InnovFin EDP) - Support to first-of-a-kind energy projects³³⁹

Meeting the EU's energy goals for 2020 and beyond will require continuous development and commercialisation of new generations of low-carbon energy technologies and systems. First-of-a-kind, commercial-scale demonstration projects are essential to show the technical and commercial viability of new generations of energy technologies. However, a major barrier to implementing such projects is the lack of finance on reasonable terms available, given their pre-commercial development stage and the unproven nature of the technologies concerned at industrial scale. Reflecting the crucial importance of these projects, the Commission has committed, in its recent Communication on 'Accelerating Clean Energy Innovation', to double the budget of InnovFin EDP³⁴⁰ from EUR 150 million to EUR 300 million. Moreover, undisbursed NER300 funds can now be channelled to InnovFin EDP operations, further increasing the financial capacity of the latter

The InnovFin Energy Demonstration Projects
[<https://www.eib.org/en/products/blending/innovfin/products/energy-demo-projects.htm>]

(EDP) Facility delivers support to first-of-a-kind, commercial-scale industrial demonstration projects in the field of energy at Technology Readiness Level (TRL) of mainly 7 or 8 (please see part G of the General Annexes) via European Investment Bank (EIB) loans, or extends guarantees to financial intermediaries making such loans. The scope of EDP covers the whole SET-Plan priorities with the exception of energy efficiency and nuclear safety. This includes, but is not limited to, renewable energy technologies; Smart energy systems, including smart grids; Energy storage, including batteries for both e-mobility and stationary storage; and Carbon capture and storage and use (CCS/U). Projects or investments enhancing the competitiveness of manufacturing processes for innovative technologies may be considered in the light of the SET Plan strategic targets.

The InnovFin EDP Facility contributes to bridging the gap between technology demonstration and market entry by supporting the demonstration of the technical feasibility and commercial viability of such innovative FOAK projects, thereby reducing perceived investment risks for private investors. Successful first-of-a-kind demonstration and validation at commercial scale of technology performance, installation time, reliability and lifetime of energy technologies, is expected to facilitate their subsequent market rollout after 2-4 years of operation.

Expected impact: InnovFin Energy Demo Projects will help in:

- de-risking investments by demonstrating and validating, at industrial scale, technology

³³⁹ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to the Executive Agencies and will be implemented by the Commission services.

³⁴⁰ [1] See <http://ec.europa.eu/research/index.cfm?&na=na-301116&pg=newsalert&year=2016>

performance, installation time and costs, operation and maintenance costs, and reliability and lifetimes;

- reducing perceived investment risks for investors;
- preparing for further roll-out to the market of the technologies by industry, with a view to achieve the EU's energy targets for 2020 and beyond;
- fostering industrial development and hence creating jobs and growth in the EU;
- contributing to the Energy Union's objectives by ensuring higher security of supply, enabling an increasing share of indigenous, low-carbon energy sources in the EU's energy mix, and supporting leading-edge technologies.

Selection procedure: EIB checks the financial viability of each potential financing operation, while DG Research & Innovation, assisted by other Commission DGs, approves each operation against eligibility criteria³⁴¹ specific to this financial instrument.

Type of Action: Financial Instrument

Indicative timetable: as of 1st quarter 2019 and 2020

Indicative budget: EUR 25.00 million from the 2019 budget and EUR 50.00 million from the 2020 budget

2. Breakthrough Energy Ventures Europe: Joint Venture Investment Vehicle between the European Commission and Breakthrough Energy Venture (BEV) ³⁴²

Accelerating Clean Energy Innovation is one of the crucial contributions needed to mitigate the impact of climate change. Therefore, investments need to target the critical stage of scaling up new low-carbon technologies, taking them from demonstration to the market. This requires novel approaches to public and private sector engagement aimed to support entrepreneurs with risk-tolerant and patient capital, and to address market and policy challenges faced by new enterprises in the clean energy sector. See: https://ec.europa.eu/energy/sites/ener/files/documents/1_en_act_part1_v6_0.pdf

To this end the European Commission and BEV seek to pilot a risk-sharing financial instrument to provide access to finance, in the form of equity or quasi-equity, to innovative breakthrough companies and their projects in the sectors of clean energy innovation (electricity, transport, agriculture, manufacturing and buildings). The Commission and BEV

³⁴¹ See p.2 of http://www.eib.org/attachments/documents/innovfin_energy_demo_projects_flysheet_en.pdf

³⁴² This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to the Executive Agencies and will be implemented by the Commission services.

are willing to welcome additional public and/or private sources of capital (such as VC/PE funds, banks, and other national and financial institutions) provided that they adhere to the objectives.

Type of Action: Financial Instrument

Indicative timetable: first quarter of 2019

Indicative budget: EUR 25.00 million from the 2019 budget (complemented by EUR 25 million from the Work programme part on Access to Risk Finance, and EUR 50 million committed by Breakthrough Energy Ventures (BEV))

Subscriptions

1. Annual subscription to the International Partnership for Energy Efficiency Cooperation (IPEEC)/ Energy Efficiency Hub Secretariat hosted by the International Energy Agency³⁴³

The purpose of the International Partnership for Energy Efficiency Cooperation (IPEEC) is to strengthen international cooperation on energy efficiency. The action carried out under the auspices of the Partnership should result in more effective energy policy and programme output, in best practices being more widely known, disseminated and applied and in economies of scale. The aim of the Partnership is to offer a topic-driven, structured dialogue and an operational network for enhanced cooperation and exchanges on energy efficiency between countries and international organisations by:

- exchanging information and experience on development of regulatory measures, policies and programmes;
- developing benchmarks and sharing information on goods and services, along with measurement methods regarding energy performance and energy savings;
- strengthening information, education and training for energy consumers;
- building stakeholder capacity by improving contacts between national, regional and local authorities and other relevant partners and stakeholders, exchanging views and sharing knowledge and experience.

On 30 November 2009 the Council adopted a Decision on the signing and conclusion of the Terms of Reference for the IPEEC and the Memorandum concerning the hosting by the International Energy Agency of the Secretariat of the International Partnership for Energy Efficiency Cooperation by the European Community. The Council endorsed the Commission proposal that, from the second year of membership (i.e. 2012), the European Union will voluntarily contribute for each subsequent year.

³⁴³ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

The Terms of Reference of the International Partnership for Energy Efficiency (IPEEC) expired on 31 December 2019. Council Decision (EU) 2019/1133 of 25 June 2019 approved the administrative transfer of the IPEEC to a new energy efficiency hub, in particular in relation to the transfer of Task Groups, funds and the IPEEC Secretariat Staff.

The Administrative Arrangement concerning the Hosting of the Energy Efficiency Hub Secretariat by the International Energy Agency (IEA) was adopted by the IEA Governing Board on 6 December 2019.

A Commission Decision shall establish the participation of the Commission, on behalf of the European Union, in the Energy Efficiency Hub.

Type of Action: Subscription

Indicative timetable: From 3rd quarter of 2018 onwards

Indicative budget: EUR 0.08 million from the 2018 budget and EUR 0.08 million from the 2019 budget and EUR 0.08 million from the 2020 budget

2. Contribution to Technology Collaboration Programmes (TCPs) of the International Energy Agency (IEA)³⁴⁴

The Commission represents the European Union in the Technology Collaboration Programmes (TCPs) concluded under the framework of the International Energy Agency where it participates in activities in certain areas of energy research. The annual financial contributions will be paid to the entities responsible for managing the following TCPs:

- Geothermal;
- Bioenergy;
- Ocean Energy Systems;
- Smart Grids (ISGAN);
- Greenhouse Gas R&D;
- Concentrated Solar Power;
- Photovoltaic Power Systems;
- Solar Heating and Cooling;
- Clean Coal Centre;
- Wind Energy Systems;

³⁴⁴ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

- Renewable Energy Technology Deployment;
- Hydropower;
- Gas and Oil Technologies;
- Energy Efficient End-Use Equipment (4E);
- Clean Energy Education and Empowerment (C3E).

Type of Action: Subscription

Indicative timetable: as of 1st quarter 2018, as of 1st quarter 2019, and as of 1st quarter 2020

Indicative budget: EUR 0.45 million from the 2018 budget and EUR 0.45 million from the 2019 budget and EUR 0.49 million from the 2020 budget

3. Contribution to the International Renewable Energy Agency (IRENA)³⁴⁵

The European Union is a member of IRENA. According to the organisation's Statute and Financial Regulation this implies the obligation to pay an annual contribution to its budget covering the participation of the EU in IRENA's activities. IRENA's main objective is to disseminate best practices in the field of renewables as the principal platform for international cooperation in the field, a centre of excellence on renewable energy and a repository of policy, technology, resource and financial knowledge. This includes:

- The promotion of the widespread and increased adoption and the sustainable use of all forms of renewable energy globally, including in the EU, in particular to bring down costs and also to increase market experience, in order to contribute to economic growth and social cohesion as well as access to and security of energy supply
- Support activities for countries in their transition to a renewable energy future
- Reducing of barriers for renewable energy, stimulating best practice and raising awareness.

Type of Action: Subscription

Indicative timetable: as of 1st quarter 2018, as of 1st quarter 2019, and as of 1st quarter 2020

Indicative budget: EUR 0.56 million from the 2018 budget and EUR 0.56 million from the 2019 budget and EUR 0.56 million from the 2020 budget

³⁴⁵ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

4. Contribution to the Secretariat of the Clean Energy Ministerial (CEM)³⁴⁶

While the Commission has been active in the Clean Energy Ministerial (CEM) since its inception in 2010, the European Union formally became a member on 6 June 2016 when the EU Energy Ministers formally endorsed the CEM Framework Document. This Framework Document is a combination of political commitment and more detailed procedural arrangements of the co-operation, but does not create any legal or financial obligations under domestic or international law.

The CEM Framework Document establishes a multilateral CEM Secretariat to facilitate the long term engagement of all CEM Members in the work of the CEM. This is hosted at the International Energy Agency (IEA) under an "Administrative Arrangement" between the IEA and CEM Members. In order to provide "adequate and predictable financial resources" for the CEM Secretariat, CEM Members are encouraged to provide voluntary contributions on an annual or multi-annual basis.

The CEM consists of a small group of countries³⁴⁷ that, together with the European Commission on behalf of the EU, are aiming to accelerate the global clean energy transition. Together they have the potential for making a major impact as they represent about 90% of global clean energy investment and 75% of global greenhouse gas emissions.

In particular for the energy efficiency of products, CEM developed the Super-efficient Equipment and Appliance Deployment (SEAD) initiative, which is about governments collaborating to accelerate and strengthen the design and implementation of appliance energy efficiency policies and related measures. The IEA currently functions as operating agent for the initiative.

CEM also developed a Hydrogen Initiative (H2I), aiming to raise international ambition and advance policies, programmes and projects that accelerate the commercialization and deployment of hydrogen and fuel cell technologies across all aspects of the economy. The IEA functions as coordinator of the initiative.

The CEM is focused on three global climate and energy policy goals, namely:

- Improve energy efficiency worldwide;
- Enhance clean energy supply;
- Expand clean energy access.

Type of Action: Subscription

³⁴⁶ This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to Executive Agencies and will be implemented by the Commission services.

³⁴⁷ Australia, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Indonesia, Italy, Japan, Mexico, Norway, Russia, Saudi Arabia, South Africa, South Korea, Spain, Sweden, the United Arab Emirates, the United Kingdom, and the United States) and the European Commiss

Indicative timetable: As of 1st quarter 2018 and as of 1st quarter 2019 and as of 1st quarter 2020

Indicative budget: EUR 0.20 million from the 2018 budget and EUR 0.70 million from the 2019 budget and EUR 0.07 million from the 2020 budget

Expert contracts

1. External expertise

This action will support the use of appointed independent experts for the monitoring of actions (grant agreements, grant decisions, procurements, financial instruments).

Type of Action: Expert Contracts

Indicative timetable: As of 1st quarter 2018, 1st quarter 2019 and 1st quarter 2020

Indicative budget: EUR 1.00 million from the 2018 budget and EUR 0.95 million from the 2019 budget and EUR 0.89 million from the 2020 budget

Budget³⁴⁸

	Budget line(s)	0 Budget (EUR million)	2018 Budget (EUR million)	2019 Budget (EUR million)	2020 Budget (EUR million)
Calls					
H2020-LC-SC3-2018-2019-2020			534.30 ³⁴⁹	620.65 ³⁵⁰	583.50 ³⁵¹
	<i>from 08.020303</i>		<i>326.00</i>	<i>302.00</i>	<i>281.00</i>
	<i>from 32.040301</i>		<i>208.30</i>	<i>318.65</i>	<i>302.50</i>
Contribution from this part to call H2020-LC-BAT-2019-2020 under Part 20 of the work programme				44.00	30.00
	<i>from 08.020303</i>			<i>44.00</i>	<i>30.00</i>
Contribution from this part to call H2020-LOW-CARBON-CIRCULAR-INDUSTRIES-2020 under Part 20 of the work programme					29.00
	<i>from 08.020303</i>				<i>15.00</i>
	<i>from 32.040301</i>				<i>14.00</i>

³⁴⁸ The budget figures given in this table are rounded to two decimal places.

The budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

³⁴⁹ To which EUR 3.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 537.30 million for this call.

³⁵⁰ To which EUR 3.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 623.65 million for this call.

³⁵¹ To which EUR 10.00 million from the 'Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing' WP part and EUR 8.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 601.50 million for this call.

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Contribution from this part to call H2020-EIC-FTI-2018-2020 under Part 17 of the work programme			13.65	13.65	13.65
	<i>from 08.02030 3</i>		6.87	6.87	6.87
	<i>from 32.04030 1</i>		6.78	6.78	6.78
Contribution from this part to call H2020-SU-DS-2018-2019-2020 under Part 14 of the work programme			5.00		
	<i>from 32.04030 1</i>		5.00		
Contribution from this part to call H2020-DT-2018-2020 under Part 5.i of the work programme			15.00	15.00	
	<i>from 32.04030 1</i>		15.00	15.00	
Other actions					
Prize				3.25	1.70
	<i>from 08.02030 3</i>			3.25	1.70
Grant to Identified beneficiary			15.75	7.70	11.15
	<i>from 08.02030 3</i>		4.50	0.75	0.30
	<i>from 32.04030 1</i>		11.25	6.95	10.85
Public Procurement			35.13	37.88	48.05
	<i>from 32.04030 1</i>		30.40	33.40	46.76

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	<i>from 08.02030 3</i>		4.73	4.49	1.28
Provision of technical/scientific services by the Joint Research Centre			0.25	0.50	5.40
	<i>from 32.04030 1</i>		0.25	0.50	5.40
Delegation Agreement			49.80 ³⁵²	30.00 ³⁵³	30.00 ³⁵⁴
	<i>from 32.04030 1</i>		49.80	30.00	30.00
Contribution agreement with an implementing entity (indirect management)					10.00
	<i>from 32.04030 1</i>				10.00
Specific Grant Agreement			0.60	6.10	6.80
	<i>from 32.04030 1</i>		0.60	6.10	6.80
Financial Instrument				50.00	50.00
	<i>from 08.02030 3</i>			50.00	50.00
Subscription			1.29	1.79	1.20
	<i>from 32.04030 1</i>		1.06	1.56	0.97
	<i>from 08.02030</i>		0.23	0.23	0.23

³⁵² To which EUR 5.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 54.80 million for these actions.

³⁵³ To which EUR 5.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 35.00 million for these actions.

³⁵⁴ To which EUR 5.00 million from the 'Smart, green and integrated transport' WP part will be added making a total of EUR 35.00 million for these actions.

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Expert Contracts			1.00	0.95	0.89
	<i>from 32.04030 1</i>		<i>0.75</i>	<i>0.65</i>	<i>0.64</i>
	<i>from 08.02030 3</i>		<i>0.25</i>	<i>0.30</i>	<i>0.25</i>
Estimated total budget			671.77	831.48	821.34