Call: HORIZON-CL5-2021-D3-02

(Sustainable, secure and competitive energy supply)

Topic: HORIZON-CL5-2021-D3-02-06

Type of Action: HORIZON-IA

Proposal number: 101075687

Proposal acronym: CINESIS

Type of Model Grant Agreement: HORIZON Action Grant Budget-Based

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Proposal ID **101075687**

Acronym **CINESIS**

1 - General information

Fields marked * are mandatory to fill.

Topic	HORIZON-CL5-2021-D3-02-06	Type of Action	HORIZON-IA
Call	HORIZON-CL5-2021-D3-02	Type of Model Grant Agreement	HORIZON-AG

Acronym: CINESIS

Proposal title: Consumer mobIlizatioN for Energy Services that Increase System flexibility

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months: 48

Fixed keyword 1: Electrical engineering, Electronic engineering, Information engineering

Free keywords: *ICT Platform, Flexibility services, consumer engagement, prosumers, power-to-X, sector coupling, TSO-DSO cooperation*

Abstract *

CINESIS project will propose an interoperable platform of tools that unleash the cross-vector flexibility potential of consumers to provide energy/flexibility services to DSOs and TSOs. Such services and CINESIS Platform will be tested in 7 demosites (CY, ITA, PT, EE, BG, IE, HR) involving both TSOs/DSOs. Tools that will be integrated in CINESIS Platform and that will enable CINESIS flexibility services are already being developed in national and international innovation projects and mainly (i) promote data-driven scenarios for engaging consumers for energy services provision, by valorizing the flexibility capabilities of their multi vector assets, in coordination with various actors in the value chain; (ii) foster the end-use sector coupling approach in local energy grids as new 'resource' for flexibility provision; (iii) are built on the basis of a customer-oriented approach for business models and market designs that are explicitly linked to the wholesale markets, so that to incentivize citizens as active energy market participants, and (iv) aim at affecting strongly the system management up to DSO and TSO level for deferring conventional infrastructure investments. Replicability of CINESIS services at EU level will be properly studied in the project from a business (RINA-C),regulatory (UBE), SSH (UNITN) and energy planning (ENC) point of view. CINESIS will actively cooperate and share project results with relevant EU initiatives such as BRIDGE, OPEN DEI, ETIP SNET.

Remaining characters 504

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under any EU programme, including the current call? ○ Yes ◉ No

Please give the proposal reference or contract number.

Administrative forms

Proposal ID **101075687**

Acronym **CINESIS**

Declarations

Field(s) marked * are mandatory to fill.

1) We declare to have the explicit consent of all applicants on their participation and on the content of this proposal. *	☒
2) We confirm that the information contained in this proposal is correct and complete and that none of the project activities have started before the proposal was submitted (unless explicitly authorised in the call conditions).	☒
3) We declare: - to be fully compliant with the eligibility criteria set out in the call - not to be subject to any exclusion grounds under the EU Financial Regulation 2018/1046 - to have the financial and operational capacity to carry out the proposed project.	☒
4) We acknowledge that all communication will be made through the Funding & Tenders Portal electronic exchange system and that access and use of this system is subject to the Funding & Tenders Portal Terms and Conditions.	☒
5) We have read, understood and accepted the Funding & Tenders Portal Terms & Conditions and Privacy Statement that set out the conditions of use of the Portal and the scope, purposes, retention periods, etc. for the processing of personal data of all data subjects whose data we communicate for the purpose of the application, evaluation, award and subsequent management of our grant, prizes and contracts (including financial transactions and audits).	☒
6) We declare that the proposal complies with ethical principles (including the highest standards of research integrity as set out in the ALLEA European Code of Conduct for Research Integrity, as well as applicable international and national law, including the Charter of Fundamental Rights of the European Union and the European Convention on Human Rights and its Supplementary Protocols. Appropriate procedures, policies and structures are in place to foster responsible research practices, to prevent questionable research practices and research misconduct, and to handle allegations of breaches of the principles and standards in the Code of Conduct.	☒
7) We declare that the proposal has an exclusive focus on civil applications (activities intended to be used in military application or aiming to serve military purposes cannot be funded). If the project involves dual-use items in the sense of Regulation 428/2009, or other items for which authorisation is required, we confirm that we will comply with the applicable regulatory framework (e.g. obtain export/import licences before these items are used).	☒
8) We confirm that the activities proposed do not - aim at human cloning for reproductive purposes; - intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads, which may be financed), or - intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer. - lead to the destruction of human embryos (for example, for obtaining stem cells) These activities are excluded from funding.	☒
9) We confirm that for activities carried out outside the Union, the same activities would have been allowed in at least one EU Member State.	☒

The coordinator is only responsible for the information relating to their own organisation. Each applicant remains responsible for the information declared for their organisation. If the proposal is retained for EU funding, they will all be required to sign a declaration of honour.

False statements or incorrect information may lead to administrative sanctions under the EU Financial Regulation.

2 - Participants

List of participating organisations

#	Participating Organisation Legal Name	Country	Action
1	RINA CONSULTING SPA	IT	
2	UBITECH ENERGY	BE	
3	CEDIS - Consorzio Elettrico di Storo	IT	
4	FONDAZIONE BRUNO KESSLER	IT	
5	Evolvere S.p.A. Benifit Corporation	IT	
6	UNIVERSITY OF CYPRUS	CY	
7	TP Aeolian Dynamics Ltd	CY	
8	H. WISE WIRE ENERGY SOLUTIONS LIMITED	CY	
9	DIACHEIRISTIS SYSTIMATOS METAFORAS	CY	
10	CINTECH SOLUTIONS LTD	CY	
11	CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA	PT	
12	EEM EMPRESA DE ELECTRICIDADE DA MADEIRA SA	PT	
13	ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E DESENVOLVIMENTO	PT	
14	ENERGOINFO GROUP-SCINET DOO BEOGRAD-RAKOVICA	RS	
15	YUGOIZTOCHNOEVROPEYSKA TEHNOLOGICHNA KOMPANIA OOD	BG	
16	ELEKTROENERGIEN SISTEMEN OPERATOR EAD	BG	
17	CEZ DISTRIBUTION BULGARIA AD	BG	
18	EESTI ENERGIA AS	EE	
19	ENEFIT CONNECT OU	EE	
20	ELEKTRILEVI OU	EE	
21	SMART WIRE GRID EUROPE LIMITED	IE	

22	Iarnród Éireann - Irish Rail	IE
23	SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA	HR
24	HZ INFRASTRUKTURA D.O.O.	HR
25	HRVATSKI OPERATOR PRIJENOSNOG SUSTAVA DOO	HR
26	UNIVERSITA DEGLI STUDI DI TRENTO	IT
27	ENCOORD GMBH	DE
28	FACHHOCHSCHULE ZENTRALSCHWEIZ - HOCHSCHULE LUZERN	Switzerland

Organisation data

PIC	Legal name
999951467	*RINA CONSULTING SPA*

Short name: RINA-C

Address

Street	VIA CECCHI 6
Town	GENOVA
Postcode	16129
Country	Italy
Webpage	http://www.rinaconsulting.org

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	26/06/2008	- yes
SME self-assessment	unknown	
SME validation	26/06/2008	- no

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Stefano**

Last name* **Barberis**

E-Mail* **stefano.barberis@rina.org**

Position in org. Business Development Manager

Department RINA CONSULTING SPA

☒ Same as organisation name

☒ Same as proposing organisation's address

Street VIA CECCHI 6

Town GENOVA

Post code 16129

Country Italy

Website https://www.rina.org/

Phone +39 010 31961

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Chiara	Longo	chiara.longo@rina.org	+39 010 31961
Alessandra	Cuneo	alessandra.cuneo@rina.org	+39 010 31961

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Stefano	Barberis	Man	Italy	STEFANO.BARBERIS@RINA.ORG	Category B Senior resea	Leading	0000-0001-6643-9989	Orcid ID
Dr	Alessandra	Cuneo	Woman	Italy	ALESSANDRA.CUNEO@RINA.ORG	Category B Senior resea	Team member	0000-0001-6595-0371	Orcid ID
Mrs	Fabiola	Roccatagliata	Woman	Italy	FABIOLA.ROCCATAGLIATA@RINA.ORG	Category D First stage r	Team member	0000-0001-9350-9225	Orcid ID
Mr	Alessandro	Venturin	Man	Italy	ALESSANDRO.VENTURIN@RINA.ORG	Category D First stage r	Team member	0000-0002-8721-3898	Orcid ID
Mr	Federico	Vignera	Man	Italy	FEDERICO.VIGNERA@RINA.ORG	Category D First stage r	Team member	0000-0003-1423-2884	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*S.Barberis, R.Abrams, Q. Tabart, M. Mimica, G.Krajacic, D. Jardas* *5th International Hybrid Power Systems - Virtual conference, 2021* *Decarbonizing Unije Islands thanks to a proper exploitation of Renewables via PV-battery and PV- desalination hybrid energy systems*
Publication	*S.Barberis, P.Robello, D.Rattazzi, M.Rivarolo, D.Bellotti, L.Magistri* *E3S Web of Conferences 2019 | conference-paper – SUPHER 2019 Conference* *DOI: 10.1051/e3sconf/201911303011* *Techno-economic analysis for the assessment of heat pump integration in a real poly-generative energy district*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
MUSE GRIDS *H2020 GA 824441*	*It aims to demonstrate, in 2 weakly connected areas a set of both technological and non-technological solutions targeting the interaction of local energy grids (electricity grids, district heating and cooling networks, water networks, gas grids, electrical mobility) to enable maximization of local energy independency through optimized management of the production via end user driven control strategies, smart grid functionality, storage, CHP and RES integration. RINA- C is Project Coordinator.*
TIGON *H2020 GA No. 957769*	*It deals with the development of DC microgrids integrating solar energy, energy storage systems, electric vehicle charging points, through highly efficient grid technologies. RINA is mainly responsible for the development of business cases and exploitation strategies, guaranteeing the replicability of the results and the identification of the most convenient ways to develop TIGON innovation on the market. RINA also contributes to the standardization and analysis of the regulatory framework.*
TALENT *H2020 Ga 864459*	*It deals with the development of 4 innovative technologies (scalable and modular power electronics topologies/power electronics devices/high-voltage batteries/interoperable software as service for energy resources management) to increase the flexibility in the energy system. RINA is involved in the cost assessment of the project innovations, in the environmental assessment of the new technological systems and it is responsible for the definition of the exploitation strategy.*
E-LOBSTER *H2020 GA 774392*	*It deals with an innovative Railway to Grid Management system that will be able to reduce electricity losses in both the power distribution and the light railway network. RINA, as project coordinator, is leading the development of an innovative tool to real-time monitoring losses and energy consumption of power distribution networks and railway electrification networks, together with the development of a new real-time optimized Railway to Grid/Grid to Railway (R+G) energy management.*
FLEXnCONFU *H2020 - GA 884157*	*FLEXnCONFU aims to develop and demonstrate innovative, economically, viable and replicable Power-to-X-to-Power solutions to level the power plants load, and to un-tap their flexibility, converting electricity into hydrogen or ammonia to be in turn locally re-used in the same power plant to respond to varying demand. RINA- C is Project Coordinator.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
903457031	*UBITECH ENERGY*

Short name: UBE

Address

Street	BOULEVARD EDMONDMACHTENS 79/22
Town	BRUSSELS
Postcode	1080
Country	Belgium
Webpage	energy.ubitech.eu

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	10/12/2018 - yes
SME self-assessment	10/12/2018 - yes
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: Electrical Power and Energy Systems ☐ not applicable

☐ Same as proposing organisation's address

Street: Koningin Astridlaan 59b

Town: Wemmel

Postcode: 1780

Country: Belgium

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Lambros**

Last name* **Ekonomou**

E-Mail* **lekonomou@ubitech.eu**

Position in org. Research and Innovation Director

Department Electrical Power and Energy Systems

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Koningin Astridlaan

Town 59b Wemmel

Post code 1780

Country Belgium

Website https://energy.ubitech.eu

Phone +32 241 17525

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Anastasis	Tzoumpas	atzoumpas@ubitech.eu	+32 241 17525
Athanassios	Bouras	bouras@ubitech.eu	+32 241 17525
Ilias	Zafeiropoulos	izafeiropoulos@ubitech.eu	+32 241 17525

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	ANASTASIS	TZOUMPAS	Man	Greece	atzoumpas@ubitech.eu	Category A Top grade re	Leading	0000-0001-6231-0176	Orcid ID
Dr	ILIAS	ZAFEIROPOULOS	Man	Greece	izafeiropoulos@ubitech.eu	Category A Top grade re	Team member	0000-0001-6173-2158	Orcid ID
Mr	ATHANASIOS	BACHOUMIS	Man	Greece	abachoumis@ubitech.eu	Category C Recognised	Team member	0000-0003-3887-9789	Orcid ID
Mrs	KATERINA	DRIVAKOU	Woman	Greece	kdrivakou@ubitech.eu	Category D First stage r	Team member	0000-0002-1026-6115	Orcid ID
Mrs	MAGDALINI	ZAFEIROPOULOU	Woman	Greece	mzafeiropoulou@ubitech.eu	Category D First stage r	Team member	0000-0001-7512-1796	Orcid ID

Role of participating organisation in the project

Project management	☒
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☒
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Stratigakos A., Bachoumis A., Vita V., Zafiropoulos E., Short-term net load forecasting with singular spectrum analysis and LSTM neural networks, Energies, Vol. 14, No. 14, (DOI) 10.3390/ en14144107, 2021.*
Publication	*Polydoros C., Vita V., Design of an offshore wind farm: Connection to the main electrical grid, Proceedings of the 11th Electrical Engineering Faculty Conference (BulEF), Varna, Bulgaria, (DOI) 10.1109/BulEF48056.2019.9030737, 2019.*
Publication	*Torkzadeh R., Eliassi M., Mazidi P., Rodriguez P., Brnobi D., Krommydas K.F., Stratigakos A.C., Dikeakos C., Michael M., Tapakis R., Vita V., Zafiropoulos E., Pastor R., Boultadakis G., "Synchrophasor based monitoring system for grid interactive energy storage system control", 21st International Symposium on High Voltage Engineering (ISH 2019), Budapest, Hungary, (DOI) 10.1007/978-3-030-37818-9_9, 2019.*
Publication	*Vita V., Zafiropoulos E., Gonos I.F., Mladenov V., Chobanov V., "Power system studies in the clean energy era: From capacity to flexibility adequacy through research and innovation", 21st International Symposium on High Voltage Engineering (ISH 2019), Budapest, Hungary, (DOI) 10.1007/978-3-030-37818-9_7, 2019.*
Publication	*Mladenov V., Chobanov V., Zafeiropoulos E., Vita V., "Flexibility assessment studies worldwide-bridging with the adequacy needs", Proceedings of the 11th Electrical Engineering Faculty Conference (BulEF), Varna, Bulgaria, (DOI) 10.1109/BulEF48056.2019.9030794, 2019.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Smart5Grid (H2020)	*Smart5Grid aims to revolutionize the energy industry through the establishment of four fundamental functions of modern smart grids, i.e., automatic power distribution grid fault detection, remote inspection of automatically delimited working areas, millisecond level precise distribution generation control, and real-time wide area monitoring. Moreover introduces an open 5G experimental facility, supporting integration, testing and validation of existing and new 5G services and NetApps.*
OneNet (H2020)	*OneNet proposes an integrated view on the grid operations beyond the traditional barriers creating the conditions for a new generation of grid services able to fully exploit demand response, storage and distributed generation while creating fair, transparent and open conditions for the consumer. This is achieved by proposing new markets, products and services and by creating a unique IT architecture.*
FARCROSS (H2020)	*FARCROSS addresses the challenge of electricity to flow between Member States as easily as it currently flows within Member States, so as to increase sustainability potential and real competition as well as to drive economic efficiency of the energy system, by connecting major stakeholders of the energy value chain and demonstrating integrated hardware & software solutions that will facilitate the "unlocking" of the resources for the cross-border electricity flows and regional cooperation.*
TIGON (H2020)	*TIGON achieves a smooth deployment and integration of intelligent DC-based grid architectures within the current energy system while providing ancillary services to the main network. It proposes a fourlevel approach aiming at improving Reliability, Resilience, Performance, and Cost Efficiency of hybrid grids through the development of an innovative portfolio of power electronic solutions and software systems and tools focused on the efficient monitoring, control and management of DC grids.*
frESCO (H2020)	*frESCO engages with ESCOs and aggregators and enable the deployment of innovative business models on the basis of novel integrated energy service bundles that properly combine and remunerate local flexibility for optimizing local energy performance both in the form of energy efficiency and demand side management.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Software	*Modern power systems software (NEPLAN & DigSILENT), Multi Agent System (MAS) - Intelligent Load controllers, Power-Hardware-In-the-Loop (PHIL) simulation environment, PV Simulator, Laboratory SCADA.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
914011213	*CEDIS - Consorzio Elettrico di Storo*

Short name: CEDIS

Address

Street	via Garibaldi 180
Town	Storo
Postcode	38078
Country	Italy
Webpage	www.cedis.info

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	unknown
Secondary or Higher education establishment	unknown
Research organisation	unknown

SME Data

Based on the below details from the Participant Registry the organisation is yes (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: TECHNICAL-ELECTRICAL AREA ☐ not applicable

☐ Same as proposing organisation's address

Street: VIA GARIBALDI 180

Town: STORO

Postcode: 38089

Country: Italy

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Lorenzo**

Last name* **Melzani**

E-Mail* **lorenzo.melzani@cedis.info**

Position in org. TECHNICAL MANAGER

Department TECHNICAL-ELECTRICAL AREA

☐ Same as organisation name

☐ Same as proposing organisation's address

Street VIA GARIBALDI, 180

Town STORO

Post code 38089

Country Italy

Website WWW.CEDIS.INFO

Phone +39 3455805769

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Franco	Berti	franco.berti@cedis.info	+39 0465 686 049

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
CIVIS	*Project similar to CINESIS that have as outcome the participation of citizens as active prosumer/consumer in order to optimize the use of electricity in their house. We participated as a demo site*
RENEWABLE ENERGY COMMUNITY (REC) OF RICCOMASSIMO	*In partnership with RSE – Ricerca sul Sistema Elettrico S.p.A. we have built a new REC, Renewable Energy Community, in the north of Italy, one of the first REC in Italy. It was created in a mountain village of 51 inhabitants which do not have any association. The project had a great impact in the community, mainly with respect to social improvements*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
300 KM OF MV AN LV ELECTRICAL GRIDS	*The company owns the public electrical grid of Storo, Bondone and part of Ledro Municipalities*
ABOUT 30 HOME STORAGE SYSTEM	*Some members of the company have installed at their home some storage systems*
5 MW HYDROELECTRIC PLANTS and 3 MW PHOTOVOLTAIC PL	*We own 4 hydroelectric power plants and 6 PV power plants, some installed in our grid, other ones are installed out of our grid*
SMART ELECTRICAL GRIDS	*We have installed a smart system to control the entire electrical grid, we can control all of 300 km of lines and up to 40 MV/LV stations directly from the PC or smartphone, reducing drastically the time of "out of service" events and so improving the quality of the electrical service for our users*
OPTICAL FIBER GRID	*CEDIS own the entire optical fiber grid that reach more than 2000 user (most of them are member of the cooperative). The first user connection in optical fiber was realized in 2003, now we have a grid that reach all of the electrical user and also all of our plants and MV/LV stations.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999625450	*FONDAZIONE BRUNO KESSLER*

Short name: FBK

Address

Street	VIA SANTA CROCE 77
Town	TRENTO
Postcode	38122
Country	Italy
Webpage	www.fbk.eu

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	31/12/2014	- no
SME self-assessment	31/12/2014	- no
SME validation	18/09/2008	- no

Departments carrying out the proposed work

Department 1

Department name: Centre on Sustainable Energy ☐ not applicable

☐ Same as proposing organisation's address

Street: Via Sommarive 18

Town: Trento

Postcode: 38123

Country: Italy

Department 2

Department name: Cybersecurity Centre ☐ not applicable

☐ Same as proposing organisation's address

Street: Via Sommarive 18

Town: Trento

Postcode: 38123

Country: Italy

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Luigi**

Last name* **Crema**

E-Mail* **crema@fbk.eu**

Position in org. Director

Department Centre on Sustainable Energy

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Via Sommarive 18

Town Trento

Post code 38123

Country Italy

Website https://www.fbk.eu/en/sustainable-energy/

Phone +39-335-6104991

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Diego	Viesi	viesi@fbk.eu	+39 3407172989
Michele	Bolognese	mbolognese@fbk.eu	+39 3495458972

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Luigi	Crema	Man	Italy	crema@fbk.eu	Category A Top grade re	Leading	0000-0003-3263-1766	Orcid ID
Dr	Diego	Viesi	Man	Italy	viesi@fbk.eu	Category B Senior resea	Team member	0000-0003-0254-9112	Orcid ID
Mr	Michele	Bolognese	Man	Italy	mbolognese@fbk.eu	Category D First stage r	Team member	0000-0003-2293-9249	Orcid ID
Dr	Edoardo Gino	Macchi	Man	Italy	emacchi@fbk.eu	Category B Senior resea	Team member	0000-0002-3649-6859	Orcid ID
Dr	Domenico	Siracusa	Man	Italy	dsiracusa@fbk.eu	Category B Senior resea	Team member	0000-0002-5640-6507	Orcid ID
Dr	Francescomaria	Faticanti	Man	Italy	ffaticanti@fbk.eu	Category D First stage r	Team member	0000-0002-3075-313X	Orcid ID
Mr	Matteo	Gerola	Man	Italy	mgerola@fbk.eu	Category D First stage r	Team member	0000-0002-1001-8242	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Viesi, D., Crema, L., Mahbub, M.S., Verones, S., Brunelli, R., Baggio, P., Fauri, M., Prada, A., Bello, A., Nodari, B. and Silvestri, S., 2020. Integrated and dynamic energy modelling of a regional system: A cost-optimized approach in the deep decarbonisation of the Province of Trento (Italy). Energy, 209, p.118378*
Publication	*Mahbub, M.S., Viesi, D. and Crema, L., 2016. Designing optimized energy scenarios for an Italian Alpine valley: the case of Giudicarie Esteriori. Energy, 116, pp.236-249*
Publication	*Di Florio G, Macchi EG, Mongibello L, Baratto MC, Basosi R, Busi E, et al. Comparative life cycle assessment of two different SOFC-based cogeneration systems with thermal energy storage integrated into a single-family house nanogrid. Appl Energy 2021;285:116378. https:// doi.org/10.1016/j. apenergy.2020.116378.*
Publication	*Tovazzi, D., Faticanti, F., Siracusa, D., Peroni, C., Cretti, S., Gazzini, T., 2020. GEM-Analytics: Cloud-to-Edge AI-Powered Energy Management. Economics of Grids, Clouds, Systems, and Services. GECON 2020, pp.57-66.*
Publication	*Segala G, Doriguzzi-Corin R, Peroni C, Gazzini T, Siracusa D. A Practical and Adaptive Approach to Predicting Indoor CO2. Applied Sciences. 2021; 11(22):10771. https:// doi.org/10.3390/app112210771*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
OSMOSE	*The European power system is facing new challenges, and in particular the increasing penetration of Renewable Energy Sources. But in parallel, new solutions are also emerging such as smarter controls or large-scale storage. OSMOSE develops an approach to capture the synergies across different needs and sources of flexibilities. Flexibility is understood as a power system's ability to cope with variability and uncertainty in demand, generation and grid, over different timescales.*
IPCEI EuBatIn	*FBK is involved in the IPCEI European Battery Innovation. The R&D&I activities aim at the development of innovative redox flow batteries employing non-toxic and low-cost electrolytes. Activities will cover from redox couples and electrolyte development to stack design and battery construction and testing. Furthermore R&D activities will also focus on developing and testing breakthrough solutions for next-gen batteries, focusing in particular on metal-air technologies.*
EnergIA!	*The project has developed, in collaboration with the company Energenius Srl, an innovative product in which a distributed computing infrastructure based on fog computing is supporting artificial intelligence algorithms (AI, deep-learning, neural networks) in order to collect energy and environmental data and perform an automated energy analysis, customized on the specific energy characteristics of industrial machinery.*
ComESto	*FBK is participating to ComESto (Community Energy Storage: Aggregated Management of Energy Storage Systems in Power Cloud), a PON MIUR project launched in November 2018 and coordinated by e-distribuzione. In ComESto, 15 partners between companies, universities, institutions and research bodies work together with the aim of integrating energy storage systems and renewable sources, promoting the active participation of end users.*
DEVISE	*DEVISE (Different Energy Vector Integration for Storage of Energy) is a recently started ERA-Net project coordinated by IIT Roorkee. In DEVISE 8 European and Indian universities and research organisations will develop a multi-vector energy system suitable for local energy communities with strong presence of renewable sources based on storage technologies.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Facility for hydrogen system development	• *Power to power system with a bidirectional Solid Oxide Cell (1,5 kW) acting as HT electrolyzer or SOFC in combination with a solid state hydrogen storage (10 kWh), fully instrumented and under validation in the EDEN project;* • *Two hydrogen laboratories: the first specialized in solid state storage*
Facility for battery development and testing	• *Chemical labs for materials preparation and cell assembly;* • *Labs and test rigs for cell, pack and battery testing (with potentiostats and cyclers.*
Facility for solar thermal system development	• *A modular 1-3 kWe, 3-9 kWth micro Combined Heat and Power (m-CHP) system based on innovative Concentrated Solar Power (CSP) and Stirling engine technology (Digespo project);* • *CSP dish solar technology: testing facility for Stirling or other thermodynamic cycles combined with parabolic dish*
Fac. for geological & energetic monitoring system	• *Geological & energetic monitoring of 5 active geothermal plants (GSHP systems) in the Province of Trento.*
Fac for material development and characterization	• *Main equipments for new materials are PVD, CVD, Plasma and ALD processes. Main equipments for characterization include TOF SIMS, XPS, XRD, Auger, FTIR, TGA, DSC and others.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
889289017	*Evolvere S.p.A. Benifit Corporation*

Short name: EVO

Address

Street	via Gustavo Fara 35
Town	Milano
Postcode	20124
Country	Italy
Webpage	www.evolvere.io

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	16/09/2021 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: R&D Department ☐ not applicable

☐ Same as proposing organisation's address

Street: Via Giovanni Porzio 4, CdN Isola c2

Town: Naples

Postcode: 80143

Country: Italy

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Domenico**

Last name* **Cimmino**

E-Mail* **domenico.cimmino@evolvere.io**

Position in org. R&D and innovation manager

Department Evolvere

☐ Same as organisation name

☒ Same as proposing organisation's address

Street via Gustavo Fara 35

Town Milano

Post code 20124

Country Italy

Website www.evolvere.com

Phone +39 340 477 3622

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Alessandro	Burgio	alessandro.burgio@evolvere.io	+3357310586

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier	
Dr	Alessandro	Burgio	Man	Italy	alessandro.burgio@evolvere.io	Category B Senior resea	Team member	0000-0002-1450-8935	Orcid ID	
Dr	Giuseppe	De Marco	Man	Italy	giuseppe.demarco@evolvere.io	Category B Senior resea	Team member	https://scholar.google.it/citations?user=iho0L-wAAAAJ&hl=it	Other ID	Scholar

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Software	*EugenioCloud: a cloud platform which, to date, manages the power flows of hundreds of hybrid PV&lithium-storage systems installed in as many residential households. EugenioCloud applies machine-learning and Artificial intelligence algorithms to provide the more recent and innovative solutions in the energy community framework.*
Software	*OF-IS and OF-UVAM: two software integrated into Eugenio Cloud platform; OF-IS optimizes the operation of the hundreds of hybrid PV&lithium-storage systems installed in as many residential households, reducing the overall costs for electricity bills, managing energy tradings between the households and from/to the external market. OF-UVAM allows the above households to participate in the Italian balancing market.*
Good	*Eugenio: a local controller, installed in all residential households mounted with hybrid PV&lithium-storage systems, which acts as a gateway between EugenioCloud platform and the residential edge devices. Eugenio integrates a blockchain wallet to store and certifies all energy transactions.*
Good	*EvoBess: a residential edge device that allows the EugenioCloud platform to remotely control the charge/discharge of residential lithium-energy storage systems.*
Good	*Dino and EvoMeter: two residential edge devices which forward to EugenioCloud platform the measurements of household energy consumption, provided by both the 1st and 2nd generation Italian DSO meters (time resolutions 15 min and 1min). When measurments of DSO meter is not available, conventional smart meters are utilized.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Comesto	*Community Energy Storage (COMESTO) is a research project focused on the optimal management of distributed energy storage systems in the renewable energy communities framework. Evolvere effort was on social acceptability, EU markets and regulatory framework, Life Cycle Assessment ing technologies, cloud-platform design and deply, generation forecasting, pilots; Evolvere leaded WPs and tasks.*
UVAM	*UVAM is pilot project, supervised by the italian TSO, which aggregated almost 350 residential users, placed in northern Italy and mounted with as many hybrid PV&Lithium-storage systems; all hybrid systems are centrally controlled via Evolvere's cloud platform so as to participate in the balancing service markets. Evolvere daily monitors and controls the hybrid systems.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999835843	*UNIVERSITY OF CYPRUS*

Short name: UCY

Address

Street	AVENUE PANEPISTIMIOU 2109 AGLANTZI
Town	NICOSIA
Postcode	1678
Country	Cyprus
Webpage	www.ucy.ac.cy

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	14/08/2008 - no
SME self-assessment	unknown
SME validation	14/08/2008 - no

Departments carrying out the proposed work

Department 1

Department name	KIOS Research and Innovation Center of Excellence (KIOS CoE)	☐ not applicable
	☒ Same as proposing organisation's address	
Street	AVENUE PANEPISTIMIOU 2109 AGLANTZI	
Town	NICOSIA	
Postcode	1678	
Country	Cyprus	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Stelios**

Last name* **Timotheou**

E-Mail* **timotheou.stelios@ucy.ac.cy**

Position in org. Assistant Professor at the Department of Electrical and Computer Engineering

Department KIOS Research and Innovation Center of Excellence

☐ Same as organisation name

☒ Same as proposing organisation's address

Street AVENUE PANEPISTIMIOU 2109 AGLANTZI

Town NICOSIA

Post code 1678

Country Cyprus

Website www.kios.ucy.ac.cy

Phone +357 22893450

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Kalina	Georgiades	georgiades.kalina@ucy.ac.cy	+357 22893492
Lenos	Hadjidemetriou	hadjidemetriou.lenos@ucy.ac.cy	+357 22893451
Markos	Asprou	asprou.markos@ucy.ac.cy	+357 22893451

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	STELIOS	TIMOTHEOU	Man	Cyprus	timotheou.stelios@ucy.ac.cy	Category A Top grade re	Leading	0000-0002-3617-7962	Orcid ID
Dr	LENOS	HADJIDEMETRIOU	Man	Cyprus	hadjidemetriou.lenos@ucy.ac.cy	Category B Senior resea	Team member	0000-0002-6675-9357	Orcid ID
Dr	MARKOS	ASPROU	Man	Cyprus	asprou.markos@ucy.ac.cy	Category B Senior resea	Team member	0000-0002-7553-677X	Orcid ID
Dr	IRINA	CIORNEI	Woman	Romania	ciornei.irina@ucy.ac.cy	Category B Senior resea	Team member	0000-0002-8008-1335	Orcid ID
Mr	LYSANDROS	TZIOVANI	Man	Romania	tziovani.lysandros@ucy.ac.cy	Category D First stage r	Team member	0000-0003-3588-5518	Orcid ID
Mrs	CAROLINA	CORTEZ	Woman	Brazil	Cortez.carolina@ucy.ac.cy	Category D First stage r	Team member	0000-0003-1737-4845	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*L. Tziovani, L. Hadjidemetriou, P. Kolios, A. Astolfi, E. Kyriakides, S. Timotheou, "Energy management and control of photovoltaic and storage systems in active distribution grids,"*
Publication	*L. Tziovani, L. Hadjidemetriou, C. Charalampous, M. Tziakouri, S. Timotheou, E. Kyriakides, "Energy management and control of a flywheel storage system for peak shaving applications," IEEE Tran. Smart Grid, vol. 12, no. 5, pp. 4195-4207, Sep. 2021.*
Publication	*I. Papayiannis, M. Asprou, L. Tziovani, and E. Kyriakides, "Enhancement of Power System Flexibility and Operating Cost Reduction Using a BESS," 2020 IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe), Oct. 2020 (accepted).*
Publication	*L. Tziovani, M. Savva, M. Asprou, P. Kolios, E. Kyriakides, R. Tapakis, M. Michael, C. Hadjilaou, "Assessing the Operational Flexibility in Power Systems with Energy Storage Integration" Springer, Flexitranstore. ISH 2019, Lecture Notes in Electrical Engineering, vol 610.*
Publication	*L. Tziovani, P. Kolios, L. Hadjidemetriou, E. Kyriakides, "Energy scheduling in non-residential buildings integrating battery storage and renewable solutions," in Proc. IEEE ENERGYCON2018, Limassol, Cyprus, 2018, pp. 1-6.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
FLEXITRANSTORE (EU H2020)	*FLEXITRANSTORE contribute to the evolution towards a pan-European transmission network with high flexibility and high interconnection levels. This facilitates the transformation of the current energy production mix by hosting an increasing share of renewable energy sources. Novel smart grid technologies, control and storage methods and new market approaches are developed, installed, demonstrated and tested introducing flexibility to the European power system.*
ONENET: One Network for Europe (EU H2020)	*OneNet aims to provide a seamless near real time integration of all the actors in the electricity network across countries with a view to create the conditions for a synergistic operation that optimizes the overall energy management while creating an open and fair market structure. To this end, it will define a common market design for Europe, as well as a common IT architecture and common IT interfaces.*
EMPOWER -Cyprus Research and Innovation Foundation	*EMPOWER evolve the Cyprus power system by installing several Phasor Measurement Units (PMUs) in the transmission grid of Cyprus to enable real-time monitoring and self-healing control actions for the power system. Further, two pilot storage systems are developed within EMPOWER in order to enhance system's flexibility and to ensure ultra-high penetration of renewables without causing stability problems to the grid.*
PVGNOSIS (EU Solar-era.net)	*PVGNOSIS develops an intelligent software platform to advance the operation, diagnosis, maintenance and management of large photovoltaic plants. Moreover, the project develops a smart multi-functional photovoltaic inverter with advanced operational and fault diagnosis capabilities. The resulted solutions improve the reliability and accelerate the maintenance procedure for PV plants while coordinating the operation of large PV plants to provide valuable services to smart grids.*
WiseStorage-Cyprus Research and Innovation Foundat	*The WiseStorage project aims to develop an innovative web-based solution to optimize the operation of Battery Energy Storage Systems (BESS) installed in buildings and maximize the prosumers' profit. Capturing the momentum, this project exploits the tremendous growth of BESS market by focusing on the development of a cost-effective solution based on Information and Communication Technology for optimizing the energy use in buildings and increasing the penetration of RES.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
888311160	*TP Aeolian Dynamics Ltd*

Short name: TPAD

Address

Street	Karaiskaki 13
Town	Limassol
Postcode	3032
Country	Cyprus
Webpage	www.aeolian-dynamics.com

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	08/12/2021 - yes
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Sotiris**

Last name* **Shiakallis**

E-Mail* **info@aeolian-dynamics.com**

Position in org. Projects Manager

Department TP Aeolian Dynamics Ltd

☒ Same as organisation name

☐ Same as proposing organisation's address

Street 33 Neas Egkomis Street

Town Nicosia

Post code 2409

Country Cyprus

Website www.aeolian-dynamics.com

Phone +357 22269662

Phone 2 +357 96555209

Other contact persons

First Name	Last Name	E-mail	Phone
Anastasis	Polykarpou	t.polycarpou@aeolian-dynamics.com	+357 96555200

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	SOTIRIS	SHIAKALLIS	Man	Cyprus	s.shiacallis@aeolian-dynamics.com	Category D First stage r	Team member	836352	Researcher ID
Mr	ANASTASIS	POLYKARPOU	Man	Cyprus	t.polycarpou@aeolian-dynamics.com	Category D First stage r	Team member	785741	Researcher ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Dataset	*These datasets can be extracted by the TPAD wind farm SCADA are include the generation of wind power and photovoltaic system for several years using different time resolutions.*
Dataset	*This dataset includes the day ahead and the 3-hours ahead forecasting generation profile for the TPAD wind farm using a time resolution of 30 minutes. The actual generation and forecasted data are very useful for the creation of robust and stochastic optimization algorithms to control flexible resources to accurately track the day ahead profile that has been placed as a bit in the energy market.*
Dataset	*This dataset includes weather data (e.g., temperature, wind speed, wind direction, etc.) from weather station installed in each turbine that can be used for improving the forecasting of the wind farm generation.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
EMPOWER	*EMPOWER evolve the Cyprus power system by installing several Phasor Measurement Units (PMUs) in the transmission grid of Cyprus to enable real-time monitoring and self-healing control actions for the power system. Further, two pilot storage systems are developed within EMPOWER in order to enhance the system's flexibility and to ensure ultra-high penetration of renewables without causing stability problems to the grid. The first battery system has been installed in the TPAD wind farm.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
10.8 MW wind power park	*The TPAD wind farm was developed in 2015 and is located in the Larnaca region in Cyprus. The installed capacity of the wind farm is equal to 10.8 MW, and it consists of 6 wind turbines (Vestas V100-1.8MW) with 1.8MW nominal power each.*
10 kW photovoltaic system	*The TPAD renewable energy park is also equipped with a 10 kW photovoltaic system grid connected through 2 SolarEdge inverters. The operation of the photovoltaic system is monitored in real-time by the EMPOWER platform in order to manage the energy storage system.*
Prototype battery storage system	*A pilot battery storage system has been recently installed in TPAD Wind Farm through the EMPOWER project. The EMPOWER platform is developed to optimally control the pilot battery system by receiving forecasting and real-time measurements for the wind and photovoltaic generation.*
SCADA system	*The SCADA system of the wind farm allows the real-time management of the wind power system. In addition, a third-party application programming interface is implemented in the SCADA to allow the integration of new platforms (i.e., EMPOWER, AggreMan, etc.)*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
888345401	*H. WISE WIRE ENERGY SOLUTIONS LIMITED*

Short name: WW

Address

Street	4 Menandrou street, GALA Tower, 2nd floor, Offi
Town	Nicosia
Postcode	1066
Country	Cyprus
Webpage	http://wisewiresolutions.com/

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	03/12/2021 - yes
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Andreas**

Last name* **Hadjidemetriou**

E-Mail* **info@wisewiresolutions.com**

Position in org. Director of the Company

Department H. WISE WIRE ENERGY SOLUTIONS LIMITED

☒ Same as organisation name

☒ Same as proposing organisation's address

Street 4 Menandrou street, GALA Tower, 2nd floor, Office 201, Nicosia

Town Nicosia

Post code 1066

Country Cyprus

Website http://wisewiresolutions.com

Phone +357 99808268

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Alexis	Kyriacou	alexiskyriacou89@gmail.com	+357 99303887

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	ALEXIS	KYRIACOU	Man	Cyprus	alexiskyriacou89@gmail.com	Category C Recognised	Leading	0000-0003-4815-2989	Orcid ID
Mr	PETROS	NIKOLAOU	Man	Cyprus	petrosninou@gmail.com	Category D First stage r	Team member	0000-0001-9428-6318	Orcid ID
Mr	KONSTANTINOS	ZAOU	Man	Cyprus	Konstantinos_Zaou@hotmail.com	Category D First stage r	Team member	0000-0002-7873-6355	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*WiseWire Cloud – A web-based platform for energy management of buildings*
Software	*WiseWire Energy Box: a hardware/software solution offered by WiseWire that is installed in a building and act as a hub. This hub communicates through the local network with the key devices in a building (i.e., smart meter, photovoltaic inverter, battery inverter, air-quality sensors, etc.) to concentrate measurements and send coordination signals.*
Publication	*A. Kyriacou, M. Michaelides, D. Eliades, C. Panayiotou, and M. Polycarpou, "COMOB: A MATLAB toolbox for sensor placement and contaminant event monitoring in multi-zone buildings," Building and Environment, vol. 154, pp. 348-361, 2019.*
Publication	*A. Kyriacou, P. Demetriou, C. Panayiotou, and E. Kyriakides, "Controlled islanding solution for large-scale power systems," IEEE Transactions on Power Systems, vol. 33, no. 2, pp. 1591-1602, 2017.*
Publication	*L. Zacharia, A. Kyriakou, L. Hadjidemetriou, E. Kyriakides, C. Panayiotou, B. Azzopardi, N. Martensen, N. Borg, "Islanding and resynchronization procedure of a university campus microgrid," in Proc. IEEE SEST, Seville, Spain, 2018, pp. 1-6.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
WiseStorage (Cyprus R&I Foundation)	*The WiseStorage project aims to develop an innovative web-based solution to optimize the operation of Battery Energy Storage Systems (BESS) installed in buildings and maximize the prosumers' profit. Capturing the momentum, this project exploits the tremendous growth of BESS market by focusing on the development of a cost-effective solution based on information and communication technology for optimizing the energy use in buildings and increasing the penetration of renewable energy sources.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
WiseWire pilot residential prosumer	*The WiseWire pilot prosumer is a residential building in Nicosia, with 210m2 cross-building area, that will participate in the Cyprus demonstration of CINESIS to provide flexibility services through the aggregator context.*
5 kW photovoltaic system	*The WiseWire pilot residential building is equipped with 5 kW rooftop photovoltaics interconnected through a SolarEdge SE5K inverter. It is noted that the inverter is compatible and is able to communicate with the WiseWire Energy Box to exchange measurement and set-points.*
Smart meter and indoor-air quality sensors	*A Janitza UMG 604 fast reporting smart meter is installed in WiseWire pilot residential building to measure the electricity consumption and the exchange power with the grid with up to 200 ms reporting rate enabling high resolution monitoring capabilities.*
Battery systems	*A 6 kW – 5 kWh battery storage system (Fronious+BYD) is installed in WiseWire pilot residential building to provide flexible management capabilities for the prosumer.*
A 6 kW – 5 kWh battery storage system (Fronious+BY	*In the WiseWire residential building, the thermal loads are fully electrified. The heating relies on an underfloor system based on two heat-pump devices while the cooling is achieved through 6 air-conditioning devices.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
992345988	*DIACHEIRISTIS SYSTIMATOS METAFORAS*

Short name: TSOC

Address

Street	EVAGGELISTRIAS 68
Town	LEFKOSIA
Postcode	2057
Country	Cyprus
Webpage	www.dsm.org.cy

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	25/07/2003 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name	OPERATION AND SYSTEM INFRASTRUCTURE DEPARTMENT	☐ not applicable
	☒ Same as proposing organisation's address	
Street	EVAGGELISTRIAS 68	
Town	LEFKOSIA	
Postcode	2057	
Country	Cyprus	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Michalis**

Last name* **Michael**

E-Mail* **mmichael@dsm.org.cy**

Position in org. Engineer

Department Operation and System Infrastructure Department

☐ Same as organisation name

☒ Same as proposing organisation's address

Street EVAGGELISTRIAS 68

Town LEFKOSIA

Post code 2057

Country Cyprus

Website www.tsoc.org.cy

Phone ++357 22277042

Phone 2 ++357 22277000

Other contact persons

First Name	Last Name	E-mail	Phone
ROGIROS	TAPAKIS	rtapakis@dsm.org.cy	++357 22277021

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	MICHALIS	MICHAEL	Man	Cyprus	MMICHAEL@DSM.ORG.CY	Category C Recognised	Leading		
Dr	ROGIROS	TAPAKIS	Man	Cyprus	RTAPAKIS@DSM.ORG.CY	Category C Recognised	Team member	0000-0002-4957-4772	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Eliassi M. et al. (2020) Conflict of Interests Between SPC-Based BESS and UFLS Scheme Frequency Responses. In: Németh B., Ekonomou L. (eds) Flexitranstore. ISH 2019. Lecture Notes in Electrical Engineering, vol 610. Springer, Cham. https://doi.org/10.1007/978-3-030-37818-9_6*
Publication	*Torkzadeh R. et al. (2020) Synchrophasor Based Monitoring System for Grid Interactive Energy Storage System Control. In: Németh B., Ekonomou L. (eds) Flexitranstore. ISH 2019. Lecture Notes in Electrical Engineering, vol 610. Springer, Cham. https://doi.org/10.1007/978-3-030-37818-9_9*
Publication	*Mazidi P. et al. (2020) Zero Renewable Incentive Analysis for Flexibility Study of a Grid. In: Németh B., Ekonomou L. (eds) Flexitranstore. ISH 2019. Lecture Notes in Electrical Engineering, vol 610. Springer, Cham. https://doi.org/10.1007/978-3-030-37818-9_5*
Publication	*Tziovani L. et al. (2020) Assessing the Operational Flexibility in Power Systems with Energy Storage Integration. In: Németh B., Ekonomou L. (eds) Flexitranstore. ISH 2019. Lecture Notes in Electrical Engineering, vol 610. Springer, Cham. https://doi.org/10.1007/978-3-030-37818-9_1*
Dataset	*Cyprus transmission system topology*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
FLEXITRANSTORE (EU H2020)	*FLEXITRANSTORE contribute to the evolution towards a pan-European transmission network with high flexibility and high interconnection levels. This facilitates the transformation of the current energy production mix by hosting an increasing share of renewable energy sources. Novel smart grid technologies, control and storage methods and new market approaches are developed, installed, demonstrated and tested introducing flexibility to the European power system.*
ONENET (EU H2020)	*OneNet aims to provide a seamless near real time integration of all the actors in the electricity network across countries with a view to create the conditions for a synergistic operation that optimizes the overall energy management while creating an open and fair market structure. To this end, it will define a common market design for Europe, as well as a common IT architecture and common IT interfaces.*
EMPOWER(Cyprus Research and Innovation Foundation)	*EMPOWER evolve the Cyprus power system by installing several Phasor Measurement Units (PMUs) in the transmission grid of Cyprus to enable real-time monitoring and self-healing control actions for the power system. Further, two pilot storage systems are developed within EMPOWER in order to enhance system's flexibility and to ensure ultra-high penetration of renewables without causing stability problems to the grid.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
SCADA system	*Supervisory Control and Data Acquisition system for the Cyprus transmission system. Among others, the system is able to monitor in real time the 58 transmission substations in terms of real/reactive power injection while all the transmission lines are monitored by measuring real/ reactive power flow*
Phasor Data Concentrator (PDC)	*A software tool that allows the connection of more than 200 PMUs. The PDC gathers the PMU measurements of 18 PMUs that are installed in the transmission substations, time aligns them and archives them for 60 days.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
906316979	*CINTECH SOLUTIONS LTD*

Short name: CINT

Address

Street	KYPRANOROS 13
Town	LEFKOSIA
Postcode	1061
Country	Cyprus
Webpage	www.cintechsolutions.eu

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	25/02/2018 - yes
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: R&D ☐ not applicable

☒ Same as proposing organisation's address

Street: KYPRANOROS 13

Town: LEFKOSIA

Postcode: 1061

Country: Cyprus

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title: Ms

Gender: (•) Woman ( ) Man ( ) Non Binary

First name*: **Panayiota**

Last name*: **Karantzias**

E-Mail*: **p.karantzias@cintechsolutions.eu**

Position in org.: Product Manager

Department: R&D

☐ Same as organisation name

☒ Same as proposing organisation's address

Street: KYPRANOROS 13

Town: LEFKOSIA

Post code: 1061

Country: Cyprus

Website: www.cintechsolutions.eu

Phone: +35722000127

Phone 2: *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Maria	Papadimitriou	m.papadimitriou@cintechsolutions.eu	+xxx xxxxxxxxx

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☒
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☒
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*A.C. Dimopoulos, C. Pavlatos, G. Papakonstantinou, Hardware inexact grammar parser, International Journal of Pattern Recognition and Artificial Intelligence, Vol. 31, No.11, 2017*
Publication	*A. Kyritsis, D. Voglitsis, N. Papanikolaou, S. Tselepis, C. Christodoulou, I. G, S.A. Kalogirou, Evolution of PV systems in Greece and review of applicable solutions for higher penetration levels, Renewable Energy, Vol. 109, pp. 487-499.*
Publication	*D. Voglitsis, N.P. Papanikolaou, C.A. Christodoulou, D.K. Baros, I.F. Gonos, Sensitivity analysis for the power quality indices of standalone PV systems, IEEE Access, Vol. 5, pp. 25913-25922, 2017.*
Publication	*C Pavlatos, Linguistic representation of power system signals, Electricity Distribution, Energy Systems Series, Springer-Verlag Berlin Heidelberg, pp. 285-295, DOI 10.1007/978-3-662-49434-9_12, 2016.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Horizon 2020 – INTERRFACE	*INTERRFACE designs, develops and exploits an Interoperable pan-European Grid Services Architecture to act as the interface between TSOs, DSOs and customers and allow the seamless and coordinated operation of all stakeholders to use and procure common services. State-of-the-art digital tools based on blockchains and big data management provide new opportunities for electricity market participation engaging consumers into the market structures designed to exploit DERs.*
Horizon 2020 – FARCROSS	*FARCROSS addresses the challenge of electricity to flow between Member States as easily as it currently flows within Member States, so as to increase sustainability potential and real competition as well as to drive economic efficiency of the energy system, by connecting major stakeholders of the energy value chain and demonstrating integrated hardware & software solutions that will facilitate the "unlocking" of the resources for the cross-border electricity flows and regional cooperation.*
Horizon 2020 – OneNet: One Network for Europe	*OneNet proposes an integrated view on the grid operations beyond the traditional barriers creating the conditions for a new generation of grid services able to fully exploit demand response, storage and distributed generation while creating fair, transparent and open conditions for the consumer. This is achieved by proposing new markets, products and services and by creating a unique IT architecture.*
Horizon 2020 – BD4NRG	*BD4NRG i) delivers a reference architecture for Smart Energy, providing full interoperability of leading-edge big data technologies with smart grid standards and operational frameworks ii) evolve and upscale a number of technology enablers, iii) deliver a open modular big data analytic toolbox as front-end for one-stop-shop analytics services development, iv) validate such framework on 13 large scale pilots, v) setup a vibrant data-driven ecosystem.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Software	*Modern IT (hardware and software) infrastructure related to the fields of company's operation.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
940068323	*CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA*

Short name: R&D-N

Address

Street	RUA CIDADE DE GOA, 4-B
Town	SACAVEM
Postcode	2685 038
Country	Portugal
Webpage	www.rdnester.com

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	10/11/2017 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Nuno**

Last name* **Amaro**

E-Mail* **nuno.amaro@rdnester.com**

Position in org. Project Manager / Senior Researcher

Department CENTRO DE INVESTIGACAO EM ENERGIA REN - STATE GRID SA

☒ Same as organisation name

☒ Same as proposing organisation's address

Street RUA CIDADE DE GOA, 4-B

Town SACAVEM

Post code 2685 038

Country Portugal

Website www.rdnester.com

Phone +351 962755678

Phone 2 +351 210011300

Other contact persons

First Name	Last Name	E-mail	Phone
Ricardo	Pastor	ricardo.pastor@rdnester.com	+351 210011300
Isabel	Alvite	isabel.alvite@rdnester.com	+351 210011300
Nuno	Souza e Silva	nuno.souzaesilva@rdnester.com	+351 210011300

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	NUNO	AMARO	Man	Portugal	NUNO.AMARO@RDNESTER.COM	Category B Senior resea	Leading		Orcid ID
Mr	RICARDO	PASTOR	Man	Portugal	RICARDO.PASTOR@RDNESTER.COM	Category C Recognised	Team member		Orcid ID
Mrs	ISABEL	ALVITE	Woman	Portugal	ISABEL.ALVITE@RDNESTER.COM	Category D First stage r	Team member		Orcid ID
Mr	NUNO	SOUZA E SILVA	Man	Portugal	NUNO.SOUZAESILVA@RDNESTER.COM	Category A Top grade re	Leading		Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*N. P. da Silva, R. Pastor, J. Esteves and R. Pestana, "Market integration of renewables and multi-service storage applications," 2017 IEEE PES Innovative Smart Grid Technologies Conference Europe (ISGT-Europe), 2017, pp. 1-6, doi: 10.1109/ISGTEurope.2017.8260310.*
Publication	*E. Lambert et al., "Practices and Architectures for TSO-DSO Data Exchange: European Landscape," 2018 IEEE PES Innovative Smart Grid Technologies Conference Europe (ISGT-Europe), 2018, pp. 1-6, doi: 10.1109/ISGTEurope.2018.8571547.*
Publication	*R. Alves et al., "TSOs and DSOs Collaboration: The Need for Data Exchange", Trivent Engineering and Industry Series, DOI: 10.22618/TP.EI.20151.192009*
Publication	*Y. Maioui et al., "Comparative Assessment of Demand Response Participation in Selected European Balancing Market," 2020 17th International Conference on the European Energy Market (EEM), 2020, pp. 1-6, doi: 10.1109/EEM49802.2020.9221975.*
Publication	*M. Al-Saadi et al., "Survey Analysis on Existing Tools and Services for Grid and Market Stakeholders and Requirements to Improve TSO/DSO Coordination," 2019 International Symposium on Systems Engineering (ISSE), 2019, pp. 1-7, doi: 10.1109/ISSE46696.2019.8984489.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
OneNet - H2020	*The Horizon2020 project OneNet will provide a seamless integration of all the actors in the electricity network across Europe and create the conditions for a synergistic operation that optimizes the overall energy system while creating an open and fair market structure.*
INTERRFACE - H2020	*To support the energy transition, the INTERRFACE project will design, develop and exploit an Interoperable pan-European Grid Services Architecture (IEGSA) to act as the interface between the power system (TSO and DSO) and the customers and allow the seamless and coordinated operation of all stakeholders to use and procure common services.*
OSMOSE - H2020	*The project aims for the development of flexibilities which can be used for a better integration of RES. The approach chosen is global as it considers at the same time, the increased need of flexibilities in the system (mainly improved balance of supply and demand in electricity markets, provision of existing and future system services and allowance of a dynamic control of electricity flows) and the sources of flexibilities (RES, demand-response, grid and new storages).*
TDX-ASSIST - H2020	*This project aims to design and develop novel Information and Communication Technology (ICT) tools and techniques that facilitate scalable and secure information systems and data exchange between Transmission System Operator (TSO) and Distribution System Operator (DSO).*
FlexUnity - H2020	*The objective of FleXunity project is to deploy novel services for retailers and aggregators, enhanced by Virtual Power Plant (VPP) technology empowered with AI algorithms focused on minimizing the cost of energy (bought in the wholesale market) and optimizing the use of distributed renewables from the utility or community portfolio.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Laboratory for real time simulation of power syste	*R&D NESTER – Centro de Investigação em Energia REN – State Grid S.A. owns a laboratory for real time simulation of power systems, enabling the simulation of power systems and communication networks (either in a stand-alone mode or performing co-simulation).*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
952728957	*EEM EMPRESA DE ELECTRICIDADE DA MADEIRA SA*

Short name: EEM

Address

Street	AV DO MAR E DAS COM MADEIRENSES 32
Town	FUNCHAL
Postcode	9054 523
Country	Portugal
Webpage	www.eem.pt

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	20/09/2012 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: Studies and Planning Directorate ☐ not applicable

☒ Same as proposing organisation's address

Street: AV DO MAR E DAS COM MADEIRENSES 32

Town: FUNCHAL

Postcode: 9054 523

Country: Portugal

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Agostinho**

Last name* **Figueira**

E-Mail* **afigueira@eem.pt**

Position in org. Director of Studies and Planning Directorate

Department Studies and Planning Directorate

☐ Same as organisation name

☒ Same as proposing organisation's address

Street AV DO MAR E DAS COM MADEIRENSES 32

Town FUNCHAL

Post code 9054 523

Country Portugal

Website www.eem.pt

Phone +351 291 211 331

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Diogo	Vasconcelos	dvasconcelos@eem.pt	+351 291 211 350
Henrique	Pinto Correia	hcorreia@eem.pt	+351 291 211 450
Rui	Martins	rmartins@eem.pt	+351 291 211 346

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Calheta III Project in Madeira Island	*Construction of a reversible system with a capacity installed of 30 MW (2x15 MW) and 16,5 MW pumping capacity (3x5,5 MW)*
Sustainable Porto Santo - Smart Fossil Free Island	*Involves international partners, regional public entities and population, providing technologies like: ESS (Energy Storage System), electric vehicles (Vehicle to Grid-V2G), LED lighting with tele management and smart grids (w/ smart-metering)*
H2020 SMILE project (2017 - 2021)	*The SMILE project will demonstrate a set of both technological and non-technological solutions adapted to local conditions targeting the distribution grid to enable demand response, smart grid functionalities, storage, and energy system integration*
H2020 INSULAE project (2019 - 2023)	*The aim of INSULAE is to foster the deployment of innovative solutions for the EU islands decarbonization by developing and demonstrating at three Lighthouse Islands a set of interventions linked to seven replicable use cases, whose results will validate an Investment Planning Tool*
Energy storage system with batteries	*Energy storage system with batteries, with a power of 15MW and nominal capacity of 10 MWh*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Madeira electrical grid (in 2020)	*HV: 60 kV;* *MV: 30 kV and 6.6 kV;* *LV: 0.4 kV.* *Number of substations:* *- 19 x 30/6.6 kV;* *- 5 x 60/6.6 kV;* *- 3 x 60/30 kV;* *- 2 x 60/30/6.6 kV.*
Madeira installed power (in 2020)	*Thermal: 205.74 MW;* *Hydroelectric: 77.17 MW;* *Wind: 63.11 MW;* *Solar PV: 20.22 MW;* *Waste incineration: 8.00 MW.*
Madeira reverse hydro system (in 2020)	*Pumping installed power: 11.25 MW;* *Installed capacity: 40 MWh.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
954983722	*ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E DESENVOLVIMENTO*

Short name: IST

Address

Street	AVENIDA ROVISCO PAIS 1
Town	LISBOA
Postcode	1049 001
Country	Portugal
Webpage	www.ist-id.pt

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	no
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	04/04/2011 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Lucas**

Last name* **Pereira**

E-Mail* **lucas.pereira@tecnico.ulisboa.pt**

Position in org. Researcher

Department ITI, LARSyS

☐ Same as organisation name

☒ Same as proposing organisation's address

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Town LISBOA

Post code 1049 001

Country Portugal

Website https://tecnico.ulisboa.pt

Phone +351967734005

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Miguel	Correia	miguel.correia@tecnico.ulisboa.pt	+xxx xxxxxxxxx

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Lucas	Pereira	Man	Portugal	lucas.pereira@tecnico.ulisboa.pt	Category C Recognised	Leading	0000-0002-9110-8775	Orcid ID
Prof	Hugo	Morais	Man	Portugal	hugo.morais@tecnico.ulisboa.pt	Category B Senior resea	Leading	0000-0001-5906-4744	Orcid ID
Prof	Filipe	Quintal	Man	Portugal	filipe.quintal@iti.larsys.pt	Category C Recognised	Team member	0000-0002-3525-142X	Orcid ID
Dr	Sabrina	Scuri	Woman	Italy	sabrina.scuri@iti.larsys.pt	Category C Recognised	Team member	0000-0001-8805-3083	Orcid ID
Dr	Mary	Barreto	Woman	Portugal	mary.barreto@iti.larsys.pt	Category C Recognised	Team member	0000-0002-9619-4254	Orcid ID
Dr	Carla	Pestana	Woman	Portugal	carla.pestana@iti.larsys.pt	Category D First stage r	Team member	0000-0001-5631-9246	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Lucas Pereira, Nuno Nunes, "Understanding the practical issues of deploying energy monitoring and eco-feedback technology in the wild: Lesson learned from three long-term deployments", Energy Reports, 2020.*
Publication	*Filipe Quintal, et. al., "Energy Monitoring in the Wild: Platform Development and Lessons Learned from a Real-World Demonstrator", Energies, 2021*
Publication	*Carla Pestana, et. al, "Can HCI Help Increase People's Engagement in Sustainable Development? A Case Study on Energy Literacy", Sustainability, 2021*
Publication	*Lucas Pereira, et. Al., "SustData: A Public Dataset for ICT4S Electric Energy Research", ICT4S, 2014*
Publication	*Hugo Morais, et. al. "Balancing Services Business Use Case Development for TSO-DSO Interoperability Demonstration", MEDPOWER, 2018*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
SMILE (Smart-Islands Energy Systems)	*H2020 project where smart-grid technologies have been deployed and demonstrated in the real world, including five pilots in Madeira Island. A critical component of the project was the recruitment and engagement of local domestic and commercial PV micro-producers and EV drivers. To this end, several recruitment and engagement strategies were developed and put into practice during the project. The end-user acceptance of the demonstrated technologies was also assessed during the project.*
FIK (Future Industrial Kitchen)	*The FIK project involved the deployment of IoT for electricity and water monitoring in three industrial kitchens in Madeira Island. The data was then used to understand the role of industrial kitchens in the future of sustainable energy systems, in particular concerning their role in increasing the number of RES in the grid, either by introducing PV-BESS or providing flexibility services.*
EnergiasMadeira.pt	*Energias Madeira is an online information platform that provides relevant content, in an independent manner, on energy consumption and PV generation for self-consumption, focusing its activities in the context of the Madeira Archipelago.* *It is intended to allow consumers, to better understand their energy consumption and help them make more conscious and informed decisions about their consumption habits, promoting a reduction in consumption and the possibility of producing their own energy.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
897106829	*ENERGOINFO GROUP-SCINET DOO BEOGRAD-RAKOVICA*

Short name: EIG

Address

Street	NICIFORA NINKOVICA 3
Town	BEOGRAD
Postcode	11000
Country	Serbia
Webpage	www.energoinfogroup.com

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is yes (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title: Mr.

Gender: ○ Woman ◉ Man ○ Non Binary

First name*: **Sijakovic**

Last name*: **Nenad**

E-Mail*: **nenad.sijakovic@energoinfogroup.com**

Position in org.: Director

Department: ENERGOINFO GROUP-SCINET DOO BEOGRAD-RAKOVICA

☒ Same as organisation name

☒ Same as proposing organisation's address

Street: NICIFORA NINKOVICA 3

Town: BEOGRAD

Post code: 11000

Country: Serbia

Website: http://www.energoinfogroup.com/

Phone: +381 63 363 487

Phone 2: *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Aleksandar	Terzic	aleksandar.terzic@energoinfogroup.com	+381648029623

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	ZELJKO	DJURISIC	Man	Serbia	ZELJKO.DJURISIC@ENERGOINFOGROUP.COM	Category A Top grade re	Leading		
Dr	JOVAN	CVETIC	Man	Serbia	JOVAN.CVETIC@ENERGOINFOGROUP.COM	Category A Top grade re	Team member		
Mr	NENAD	SIJAKOVIC	Man	Serbia	NENAD.SIJAKOVIC@ENERGOINFOGROUP.COM	Category D First stage r	Team member		
Mrs	VLADAN	RISTIC	Man	Serbia	VLADAN.RISTIC@ENERGOINFOGROUP.COM	Category D First stage r	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*M. Stojanović, N. Šijaković, J. Mikulović, Ž. Đurišić, Impact of large scale wind farm integration to active power losses in transmission network of Serbia, Proc. of European Wind Energy Conference (EWEC 2010), Warsaw, Poland, April, 2010.*
Publication	*Ž. Đurišić, K. Džodić, Đ. Lazović, N. Arsenijević, Free wind operation of wind turbine for permanent power system frequency support, WindEurope Summit 2019, Bilbao, Spain, April 2019.*
Publication	*P. Dakić, Ž. Đurišić, Correcting forecast deviations uncertainty for wind turbine generating power by properly sized energy storage, WindEurope Summit 2019, Bilbao, Spain, April 2019.*
Publication	*P. Dakić, D. Kotur, Ž. Đurišić, Feasibility study of offshore wind turbines coupled to offshore compressed air energy storage, Wine Europe Summit 2016, PO-327, Hamburg, Germany, September 2016.*
Publication	*P. Krstevski, J. Angelov, A. Krkoleva, K. Naumoski, A. Paunoski, N. Sijakovic, R. Taleski and V. Borozan, Regional transmission network modeling for power flow analysis, 1st Conference on Power Options for the Eastern Mediterranean Region 19-21 November 2012, Limassol, Cyprus (Paper No. POEM12/144)*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
OneNet project	*OneNet proposes an integrated view on the grid operations beyond the traditional barriers creating the conditions for a new generation of grid services able to fully exploit demand response, storage and distributed generation while creating fair, transparent and open conditions for the consumer. This is achieved by proposing new markets, products and services and by creating a unique IT architecture.*
FARCROSS project	*FARCROSS aims to address this challenge by connecting major stakeholders of the energy value chain and demonstrating integrated hardware and software solutions that will facilitate the "unlocking" of the resources for the cross-border electricity flows and regional cooperation. Energoinfo is involved as a subcontractor to European Dynamics, working on the specifications and development of the EUROPAN platform.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
GIS server	*Virtual Machines on a physical Linux servers (GIS server, MySql, SQLite)*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

Administrative forms

PIC	Legal name
895375282	*YUGOIZTOCHNOEVROPEYSKA TEHNOLOGICHNA KOMPANIA OOD*

Short name: STHC

Address

Street	MAGNAURSKA SHKOLA 11 HAY TEH PARK IZOT
Town	SOFIA
Postcode	1784
Country	Bulgaria
Webpage	www.setechco.eu

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	25/02/2020	- yes
SME self-assessment	25/02/2020	- yes
SME validation	unknown	

Departments carrying out the proposed work

Department 1

Department name: R&D ☐ not applicable

☒ Same as proposing organisation's address

Street: MAGNAURSKA SHKOLA 11 HAY TEH PARK IZOT

Town: SOFIA

Postcode: 1784

Country: Bulgaria

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title: Mr.

Gender: ○ Woman ◉ Man ○ Non Binary

First name*: **Angel**

Last name*: **Markov**

E-Mail*: **a.markov@setechco.eu**

Position in org.: Manager

Department: R&D

☐ Same as organisation name

☒ Same as proposing organisation's address

Street: MAGNAURSKA SHKOLA 11 HAY TEH PARK IZOT OFIS 316

Town: SOFIA

Post code: 1784

Country: Bulgaria

Website: https://setechco.eu/

Phone: +3598825470127

Phone 2: *+xxx xxxxxxxxx*

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	ANGEL	MARKOV	Man	Bulgaria	A.MARKOV@SETECHCO.EU	Category A Top grade re	Leading	0000-0001-9169-6872	Orcid ID
Dr	PENCHO	ZLATEV	Man	Bulgaria	P.ZLATEV@SETECHCO.EU	Category A Top grade re	Team member	0000-0001-8335-600X	Orcid ID
Dr	STOYAN	BOZHKOV	Man	Bulgaria	S.BOZHKOV@SETECHCO.EU	Category A Top grade re	Team member	0000-0001-8540-5223	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Bozhkov St., Mladenov V., Operational failures of photovoltaic plants, XII-th Summer School Advanced Aspects of Theoretical Electrical Engineering, Technical University of Sofia, Bulgaria, 2019.*
Publication	*Bozhkov St., Mladenov V., Methods of control, technical support and monitoring of high voltage air networks, Proceedings of the Energy Forum 2018, pp.165-174, 2018.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Horizon 2020 – SMART5GRID	*Smart5Grid aims to revolutionize the energy industry through the establishment of four fundamental functions of modern smart grids, i.e., automatic power distribution grid fault detection, remote inspection of automatically delimited working areas, millisecond level precise distribution generation control, and real-time wide area monitoring. Moreover introduces an open 5G experimental facility, supporting integration, testing and validation of existing and new 5G services and NetApps.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Software	*Power systems software (NEPLAN, DigSilent), scientific software (Matlab, Mathematica, LabView).*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
996604385	*ELEKTROENERGIEN SISTEMEN OPERATOR EAD*

Short name: ESO

Address

Street	BUL TSAR BORIS III 201
Town	SOFIA
Postcode	1618
Country	Bulgaria
Webpage	www.eso.bg

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	04/01/2007 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: National Dispatching Centre ☐ not applicable

☐ Same as proposing organisation's address

Street: Veslets str. 8

Town: Sofia

Postcode: 1000

Country: Bulgaria

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Dimitar**

Last name* **Zarchev**

E-Mail* **dzarchev@ndc.bg**

Position in org. Director

Department NationNational Dispatching Centeral Dispatching Center

☐ Same as organisation name

☐ Same as proposing organisation's address

Street 8, Veslets str.

Town Sofia

Post code 1000

Country Bulgaria

Website www.eso.bg

Phone +35929613701

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Milena	Tsoleva	m.tsoleva@eso.bg	+ 35929696731

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	KRASIMIR	IVANOV	Man	Bulgaria	kivanov@ndc.bg	Category B Senior resea	Leading	0000-0002-3318-354X	Orcid ID
Mr	ANDREY	ANDREEV	Man	Bulgaria	aandreev@ndc.bg	Category B Senior resea	Leading	0000-0002-8177-0941	Orcid ID
Mr	SVETLOZAR	STOICHKOV	Man	Bulgaria	sstoichkov@ndc.bg	Category D First stage r	Team member	0000-0001-9875-1491	Orcid ID
Mr	KONSTANTIN	KANEV	Man	Bulgaria	kkanev@eso.bg	Category D First stage r	Team member	0000-0001-6111-1546	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Conference Paper "BIOGAS POWER PLANT PARTICIPATION IN PROVISION OF MANUAL FREQUENCY RESTORATION RESERVE" (2021, Authors: M. Eng. Denitsa Kuzeva – Albena AD, M. Eng. Nikolay Chavdarov - ESO EAD, PhD. M. Eng. Stefan Sulakov - ESO EAD; PoD ISSN 2367-6728)*
Publication	*Conference Paper "Estimation of the capacity credits of different supply technologies in Bulgaria" (2020, Authors: Angel Georgiev - ESO EAD, Nikolay Chavdarov - ESO EAD, Stefan Sulakov - ESO EAD; Electronic ISBN:978-1-7281-9439-4)*
Publication	*Conference Paper "Short-term power output forecasting of the photovoltaics in Bulgaria" (2018, Co-author: Stefan Sulakov - ESO EAD; Electronic 978-1-5386-7565-6)*
Publication	*Conference Paper "The role of innovative grid-impacting technologies towards the development of the future pan-European system: the GridTech project" (2014, Co-author: Stefan Sulakov - ESO EAD,CIGRE 2014, Paris*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
X-FLEX	*Project "X-FLEX - Integrated energy solutions and new market mechanisms for an eXtended FLEXibility of the European grid" is funded by the multiannual program of the European Union for Research and Innovation - Horizon 2020 and is implemented by a consortium of 12 organizations from 6 countries. X-FLEX uses a new concept that integrates and creates synergies between all sources and technologies for energy flexibility, promoting cooperation between smart grid participants and the energy market.*
FARCROSS	*Project "FARCROSS – FAcilitating Regional CROSS-border Electricity Transmission through Innovations funded by the multiannual program of the European Union for Research and Innovation - Horizon 2020 and is implemented by a consortium of 31 organizations. FARCROSS aims to connect major stakeholders of the energy value chain and demonstrate integrated hardware and software solutions that will facilitate the "unlocking" of the resources for the cross-border electricity flows.*
INTERRFACE	*Project "INTERRFACE - TSO-DSO-Consumer INTERFACE aRchitecture to Provide innovative Grid Services for an efficient power system" is funded by the multiannual program of the European Union for Research and Innovation - Horizon 2020 and is implemented by a consortium of 42 organizations. INTERRACE demonstrates for the first time in the energy sector the added value of data sharing by all actors in the value chain of the power system (customers, networks, markets).*
CROSSBOW	*Project „CROSSBOW - CROSS BOrder management of variable renewable energies and storage units enabling a transnational Wholesale market" is funded by the multiannual program of the European Union for Research and Innovation - Horizon 2020 and is implemented by a consortium of 24 organizations from 13 countries. CROSSBOW is a TSO driven project that enables increasing the shared use of resources to foster transmission networks cross-border management of variable renewable energies and storage unit*
FLEXITRANSTORE	*Project „ FLEXITRANSTORE - An Integrated Platform for Increased FLEXIbility in smart TRANSmission grids with STORage Entities and large penetration of Renewable Energy Sources" is funded by the multiannual program of the European Union for Research and Innovation - Horizon 2020 and is implemented by a consortium of 28 organizations. FLEXITRANSTORE promotes increased cross-border electricity flows using the valorization of flexibility services.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
996588283	*CEZ DISTRIBUTION BULGARIA AD*

Short name: CEZ

Address

Street	TSARIGRADSKO SHOUSE BLV 159
Town	SOFIA
Postcode	1784
Country	Bulgaria
Webpage	www.cez-rp.bg

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	28/04/2009	- no
SME self-assessment	unknown	
SME validation	28/04/2009	- no

Departments carrying out the proposed work

Department 1

Department name	Network Management	☐ not applicable
	☒ Same as proposing organisation's address	
Street	TSARIGRADSKO SHOUSE BLV 159	
Town	SOFIA	
Postcode	1784	
Country	Bulgaria	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Yasen**

Last name* **Todorov**

E-Mail* **yasen.todorov@cez.bg**

Position in org. Network Management Director

Department Network Management

☐ Same as organisation name

☒ Same as proposing organisation's address

Street TSARIGRADSKO SHOUSE BLV 159

Town SOFIA

Post code 1784

Country Bulgaria

Website www.cez-rp.bg

Phone +359888280483

Phone 2 *+xxx xxxxxxxxx*

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	YASEN	TODOROV	Man	Bulgaria	yasen.todorov@cez.bg	Category A Top grade re	Team member	0000-0002-5300-2603	Orcid ID
Mr	VALENTIN	MILEV	Man	Bulgaria	valentin.milev@cez.bg	Category A Top grade re	Team member	0000-0001-9801-685X	Orcid ID
Mrs	MILENA	KOVACHEVA	Woman	Bulgaria	milena.kovachevа@cez.bg	Category A Top grade re	Team member	0000-0003-0192-4523	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Todorov Y., "Survey of the methods for calculations of established regimes of work of the electric grids", Energy Forum, Papers, vol. 2, Varna, 2005*
Publication	*Ivanov M., Stanev R., Todorov Y., Stoilov D., Karaivanov D., "Steady state stability of a middle voltage power distribution line with connected wind generators", Proceedings of the Technical University of Sofia, vol. 60, book 1, 2010*
Publication	*Todorov Y., Ivanov M., Andonov D., Stoilov D., Stanev R., "Study of steady state operation modes of a power distribution network incorporating with generators", Proceedings of the Technical University of Sofia, vol. 61, book 2, 2011*
Publication	*Todorov Y., Botsov M. "Connecting producers of electricity from renewable energy sources to the distribution network MV", Energy Forum, Papers, Varna, 2012*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Horizon 2020 – SDN-microSENSE	*SDN-microSENSE intends to provide a set of secure, privacy-enabled and resilient to cyberattacks tools, thus ensuring the normal operation of EPES as well as the integrity and the confidentiality of communications. It develops a three-layer security architecture, by deploying and implementing risk assessment processes, self-healing capabilities, large-scale distributed detection and prevention mechanisms, as well as an overlay privacy protection framework.*
Horizon 2020 – ENERGY SHIELD	*EnergyShield develops an integrated toolkit covering the complete EPES value chain. The toolkit combines novel security tools from leading European technology vendors and is validated in large-scale demonstrations by end-users. The developed toolkit combines the latest technologies for vulnerability assessment, monitoring & protection and learning & sharing. It allows end-users to predict future attacks and learn from past attacks.*
Horizon 2020 – INTERRFACE	*Digitalisation is a key driver for coordination and active system management in the electricity grid, enabling TSOs and DSOs to optimise the use of distributed resources and ensure a cost-effective and secure supply of electricity but also empowers end-users to become active market participants, supporting self-generation and providing demand flexibility. To support the transformation, INTERRFACE designs, develops and exploits an Interoperable pan-European Grid Services.*
Horizon 2020 – FLEXITRANSTORE	*FLEXITRANSTORE develops a next generation of Flexible Energy Grid (FEG), which provides the technical basis to support the valorisation of flexibility services, enhancing the existing European Internal Energy Market (IEM). FEG addresses the capability of a power system to maintain continuous service in the face of rapid and large swings in supply or demand, whatever the cause.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
High-voltage networks (HV)	*CEZ Distribution Bulgaria operates and maintains the electricity distribution network on the territory of the city of Sofia, the district of Sofia and Pernik, Kyustendil, Blagoevgrad, Vidin, Montana, Vratsa, Pleven and Lovech districts.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
899428912	*EESTI ENERGIA AS*

Short name: EE

Address

Street	LELLE 22
Town	TALLINN
Postcode	11318
Country	Estonia
Webpage	https://www.energia.ee/et/avaleht

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	07/12/2021 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: R&D department ☐ not applicable

☒ Same as proposing organisation's address

Street: LELLE 22

Town: TALLINN

Postcode: 11318

Country: Estonia

Links with other participants

Type of link	Participant
Same Group	ENEFIT CONNECT OU
Same Group	ELEKTRILEVI OU

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Taavi**

Last name* **Liivandi**

E-Mail* **taavi.liivandi@energia.ee**

Position in org. Business Development Manager

Department R&D department

☐ Same as organisation name

☒ Same as proposing organisation's address

Street LELLE 22

Town TALLINN

Post code 11318

Country Estonia

Website https://www.energia.ee/en/avaleht

Phone +3725292313

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Rahel	Lindparg	rahel.lindparg@energia.ee	+37251980067

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☒
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
891605086	*ENEFIT CONNECT OU*

Short name: EC

Address

Street	VESKIPOSTI TN 2
Town	TALLINN
Postcode	10138
Country	Estonia
Webpage	https://www.energia.ee/et/enefit-connect

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is yes (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name	Planning and Project Management Dept.	☐ not applicable
	☒ Same as proposing organisation's address	
Street	VESKIPOSTI TN 2	
Town	TALLINN	
Postcode	10138	
Country	Estonia	

Links with other participants

Type of link	Participant
Same Group	ELEKTRILEVI OU
Same Group	EESTI ENERGIA AS

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
950614357	*ELEKTRILEVI OU*

Short name: ELV

Address

Street	VESKIPOSTI TN 2, KESKLINNA LINNAOSA
Town	TALLINN
Postcode	10138
Country	Estonia
Webpage	www.elektrilevi.ee

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	08/11/2017 - yes
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant
Same Group	EESTI ENERGIA AS
Same Group	ENEFIT CONNECT OU

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☒
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
EU-SysFlex; *Horizon 2020; GA 773505*	*In cooperation with Estonian TSO Elering and other partners development of an application facilitating TSO-DSO cooperation with the aim to enable efficient provision and use of flexibility services. Participation in identification, description and analysis of data exchange platform and flexibility services use cases.*
Interrface *Horizon 2020; GA No 824330*	*Elektrilevi will give an input to the project from the DSO point of view and know-how. More specifically, Elektrilevi will contribute 3 for the design, deployment and evaluation of the Single Flexibility Platform Demo.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
914634535	*SMART WIRE GRID EUROPE LIMITED*

Short name: SWE

Address

Street	GLENCULLEN HOUSE KYLEMORE ROAD BALLYFE
Town	DUBLIN 10
Postcode	D10CA33
Country	Ireland
Webpage	www.smartwires.com

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	10/05/2017 - yes
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: Commercial Team ☐ not applicable

☒ Same as proposing organisation's address

Street: GLENCULLEN HOUSE KYLEMORE ROAD BALLYFERM

Town: DUBLIN 10

Postcode: D10CA33

Country: Ireland

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Mark**

Last name* **Norton**

E-Mail* **mark.norton@smartwires.com**

Position in org. Vice President of Business Development, Europe

Department Commercial Department

☐ Same as organisation name

☒ Same as proposing organisation's address

Street GLENCULLEN HOUSE KYLEMORE ROAD BALLYFERMOT

Town DUBLIN 10

Post code D10CA33

Country Ireland

Website https://www.smartwires.com/

Phone 00353 86 887 8551

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Lenka	McNamara	lenka.mcnamara@smartwires.com	00353 87 191 6925
Robert	Fenlon	robert.fenlon@smartwires.com	00 353 87 258 7957

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*CIRED 2020 Berlin Workshop. Planning of an efficient power system with the use of power of modular static synchronous series compensation to enable flexible operational services.*
Publication	*CASE STUDY OF THE SOUTHWEST POWER POOL – Report. Unlocking the Queue with Grid-Enhancing Technologies. This report was prepared for the WATT (Working for Advanced Transmission Technologies)*
Publication	*Wind Europe – Making the most of Europe's grids Grid optimisations technologies to build a greener Europe (September 2020)*
Publication	*Modular Power Flow Control Enhancing German Transmission Grid Capacity: An Investigation-Institute of Power System and Power Economics, Scientific Study (RWTH Aachen Study–Germany, 2020)*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
FLEXITRANSTORE	*Horizon 2020 project aimed at increasing the flexibility in smart transmission grids with storage entities and large penetration of renewable energy sources. SWE is leading WP8 (Demonstration 4) which will demonstrate how Power Flow Control solutions can improve transfer capacities and clean electricity flows in South-East Europe. The Power Flow Control solution is a mobile unit containing 3 Power Guardian devices and was deployed between 2019 and 2021.*
CENTRAL HUDSON PILOT EPRI	*EPRI observed Central Hudson's installation of SmartValve and SmartBypass devices, evaluated the functioning of the technology based on the agreed project success criteria, identified, and recommended areas for improvement or simplification, and summarized the findings and EPRI's experience into a technical report.*
FARCROSS	*FARCROSS – is a project under the European Union's Horizon 2020 programme with the objectives of improving cross-border electricity capacity, thereby facilitating regional electricity markets providing better benefits to all market participants including security of supply, reliability, and lower cost.*
National Grid Electricity Transmission SmartValve	*National Grid Electricity Transmission SmartValve is a series of projects consisting of 5 installations installed on the transmission system at 275 kV and 400 kV for enabling increased grid utilization. The deployment uses power flow control technology to increase transfer limits on the electricity transmission system*
EirGrid 'SmartValve Pilot'	*A pilot project on the Irish transmission grid consisting of 3 SmartValves deployed on towers at 2 separate locations. The project aimed to validate that these Power Flow Control devices would perform as expected on a live system. In 2017 the project was deemed successful, enabling EirGrid to leverage the SmartValve in future projects aimed at creating a more flexible and dynamic grid*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Modular power Flow Control - SmartValveTM	*Modular power flow control technology is a single-phase, modular-SSSC that injects a leading or lagging voltage in quadrature with the line current. SmartValve is transformerless and uses an integrated, fast-acting bypass for protection form system faults.*

SmartBypass	*A modular device that is connected in parallel with one or more SmartValve v1.02 devices to protect the SmartValves from fault currents and maintain normal power flow on the line when the SmartValves are not required to control power flows.*
Bypass Filter	*The Bypass Filter is a modular device that is connected to the SmartBypass. It ensure the correct operation of the SmartValves by filtering transient signals that may be present on a transmission line.*
PowerLine Coordinator	*A Smart Wires End-to-End Device that serves as an intermediary between the Smart Wires Field Devices and the PowerLine Gateway.*
PowerLine Gateway	*Smart Wires End-to-End Device located in a control house that serves as an intermediary between the Smart Wires Field Devices, SmartInterface and the Energy Management System. Provides configuration, observation, control and asset management services for the Smart Wires Devices.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
888953494	*Iarnród Éireann - Irish Rail*

Short name: IRAIL

Address

Street	Connolly Station, Amiens Street
Town	Dublin
Postcode	D01V6V6
Country	Ireland
Webpage	

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	08/10/2021 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: SET (Signalling, Electrification & Telecoms) ☐ not applicable

☐ Same as proposing organisation's address

Street: CIE Inchicore Works, Inchicore

Town: Dublin

Postcode: D08K6Y3

Country: Ireland

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Barry**

Last name* **McCarthy**

E-Mail* **barry.mccarthy@irishrail.ie**

Position in org. Electrification Manager SET

Department SET (Signalling, Electrification & Telecoms)

☐ Same as organisation name

☐ Same as proposing organisation's address

Street CIE Inchicore Works, Inchicore

Town Dublin

Post code D08K6Y3

Country Ireland

Website www.irishrail.ie

Phone +353 879482630

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Aneesh	Prabhakaran	aneesh.prabhakaran@irishrail.ie	+353 87 101 8671

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Other achievement	*Ireland's rail network is an invaluable national asset, providing the backbone for an integrated public transport system for the nation. Iarnród Éireann, as the national railway provider, is ready and strengthened to play a key role supporting economic recovery post the COVID-19 pandemic and in delivering high capacity sustainable public transport solutions*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999876486	*SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA*

Short name: UNIZAG

Address

Street	UNSKA 3
Town	ZAGREB
Postcode	10000
Country	Croatia
Webpage	www.fer.unizg.hr

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	07/03/1995 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: High Voltage Laboratory ☐ not applicable

☒ Same as proposing organisation's address

Street: UNSKA 3

Town: ZAGREB

Postcode: 10000

Country: Croatia

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Bozidar**

Last name* **Filipovic-Grcic**

E-Mail* **bozidar.filipovic-grcic@fer.hr**

Position in org. Professor

Department High Voltage Laboratory

☐ Same as organisation name

☒ Same as proposing organisation's address

Street UNSKA 3

Town ZAGREB

Post code 10000

Country Croatia

Website www.fer.unizg.hr/lvn

Phone +385 1 6129 714

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Jasna	Matijevic	jasna.matijevic@fer.hr	+385 1 6129 728
Davor	Latkovic	davor.latkovic@fer.hr	+xxx xxxxxxxxx

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	BOŽIDAR	FILIPOVIĆ-GRČIĆ	Man	Croatia	bozidar.filipovic-grcic@fer.hr	Category A Top grade re	Leading	0000-0002-2230-1336	Orcid ID
Ms	NINA	STIPETIĆ	Woman	Croatia	Nina.stipetic@fer.hr	Category D First stage r	Team member	0000-0003-2525-8916	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Milešević, Boško; Filipović-Grčić, Božidar; Uglešić, Ivo; Jurišić, Bruno. Estimation of Current Distribution in the Electric Railway System in the EMTP-RV // Electric power systems research, 162 (2018), C; 83-88 doi:10.1016/j.epsr.2018.05.004*
Publication	*Božidar Filipović-Grčić, Ivana Damjanović, Ljupko Teklić, Mate Lasić. Model of Static Var Compensator Connected to the Power Transmission Network for Electromagnetic Transient Studies, CIGRE South East European Regional Council Conference SEERC, 2021, Vienna, Austria.*
Publication	*Ivana Damjanović, Frano Tomašević, Ivica Pavić, Božidar Filipović-Grčić, Alan Župan. Harmonic Performance Analysis of Static Var Compensator Connected to the Power Transmission Network, 2nd South East European Regional CIGRE Conference, Kyiv 2018*
Publication	*Filipović-Grčić, Božidar; Uglešić, Ivo. Modelling of 25 kV electric railway system in EMTP-RV // EMTP-RV User Group Conference, Aix-en-Provence, France, 9th - 10th June 2016.*
Publication	*Župan, Alan; Tomasović Teklić, Ana; Filipović-Grčić, Božidar. Modelling of 25 kV Electric Railway System for Power Quality Studies // IEEE Eurocon Conference / pp. 844-849, 2013.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Power quality measurements	*The voltage quality was measured simultaneously in electric traction substations and nearby hydro power plant, and the effect of electric traction on the voltage quality in the transmission network was quantified. Measurements were carried out on 110 kV busbars in 5 electric traction substations and in nearby hydro power plant.*
Application of regenerative breaking	*The study deals with the application of regenerative braking on AC traction system of 25 kV, 50 Hz of Croatian railways. Detailed investigations of the impact of regenerative braking on the 110 kV transmission network were conducted. Power quality and relay protection issues were analyzed and for this purpose electromagnetic transient model of train movement was developed.*
DAHVAT	*Croatian Science Foundation funded project on development of lightning location system and correlating the LLS data with circuit breakers' operations in the Croatian transmission network. Project also addresses power quality issues in transmission network caused by 25 kV 50 Hz electric traction system.* *Web: https://www.fer.unizg.hr/lvn/dahvat/about_project*
Analysis of electromagnetic transients	*In this study, the electromagnetic transients in electric traction substation Jankovci were analyzed after connection of the dynamic reactive power compensation. The calculations were performed in a program for the calculation of electromagnetic transients (EMTP). Overvoltages, short-circuits and inrush currents were calculated. Voltages and powers were calculated in time domain during train movement.*
AACES	*The AACES project aims to improve and modernize the NETVISION platform with SCADA system functions in the cloud, implement cyber security for facility management in power networks, introduce predictive network management, RES and active consumers to optimize energy system operation, and include a growing number of RES and new conversion technologies, and based on new tools for meteorological forecasts and forecasts of RES production and consumption.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
High Voltage Laboratory (HVLab)	*The High Voltage Laboratory (HVLab) has been established back in 1965. Today the laboratory performs testing and calculations for research and industrial purposes. Since 2004, it has been accredited by the Croatian Accreditation Agency according to the requirements of the ISO/IEC 17025.*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
988894049	*HZ INFRASTRUKTURA D.O.O.*

Short name: HZIN

Address

Street	ULICA ANTUNA MIHANOVICA 12
Town	ZAGREB
Postcode	10000
Country	Croatia
Webpage	www.hzinfra.hr

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	05/10/2009 - no
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name	Maintenance Sector	☐ not applicable
	☒ Same as proposing organisation's address	
Street	ULICA ANTUNA MIHANOVICA 12	
Town	ZAGREB	
Postcode	10000	
Country	Croatia	

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Ivan**

Last name* **Karlovic**

E-Mail* **van.karlovic@hzinfra.hr**

Position in org. Head of the Maintentance Sector

Department Maintenance Sector

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Branimirova 27

Town Zagreb

Post code 10000

Country Croatia

Website https://www.hzinfra.hr/

Phone +385 99 263 5141

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Ivan	Zrno	ivan.zrno@hzinfra.hr	+ 385 98 241 701
Andria	Pavicic	andria.pavicic@hzinfra.hr	+385 99 3739 660

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☒
Policy maker or regulator, incl. standardisation body	☐
Research performer	☐
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Other achievement	*Reconstruction of the plant includes the following designs:* *- reconstruction of the building,* *- 25 kV medium voltage plant,* *- secondary installation: control, protection, signaling and measurement,* *- control and signaling of the position of the catenary disconnector,* *- remote control of the plant,* *- auxiliary voltage supply systems: 230 V (AC) and 110 V (DC),* *- electrical installations and lightning rod.*
Other achievement	*Reconstruction of the plant includes the following:* *- construction of new foundations for appliances and power transformers in a 110 kV high-voltage plant,* *- construction revitalization of the plant plateau,* *- replacement of appliances and power transformers in a high voltage plant,* *- construction of an auxiliary facility in a 110 kV high voltage plant,*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (●) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
998132135	*HRVATSKI OPERATOR PRIJENOSNOG SUSTAVA DOO*

Short name: HOPS

Address

Street	KUPSKA 4
Town	ZAGREB
Postcode	10000
Country	Croatia
Webpage	www.hops.hr

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is yes (small- and medium-sized enterprise) for the call.

SME self-declared status	unknown
SME self-assessment	unknown
SME validation	unknown

Departments carrying out the proposed work

Department 1

Department name: System Operation Department ☐ not applicable

☒ Same as proposing organisation's address

Street: KUPSKA 4

Town: ZAGREB

Postcode: 10000

Country: Croatia

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Mr.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Vladimir**

Last name* **Valentic**

E-Mail* **vladimir.valentic@hops.hr**

Position in org. Head of Grid Centre Rijeka

Department System Operation Department

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Mihovilići 15b

Town Rijeka

Post code 51000

Country Croatia

Website https://www.hops.hr

Phone +385 51 408 210

Phone 2 +385 98 1729 798

Other contact persons

First Name	Last Name	E-mail	Phone
Marko	Jusic	marko.jusic@hops.hr	+385 51 408 210
Iva	Zupan	iva.zupan@hops.hr	+385 1 45 45 089

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Mr	VLADIMIR	VALENTIĆ	Man	Croatia	vladimir.valentic@hops.hr	Category B Senior resea	Team member		
Mr	MARKO	JUŠIĆ	Man	Croatia	marko.jusic@hops.hr	Category B Senior resea	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☒
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☒
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☒
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Vladimir Valentić, Davor Kotorac, Marko Jušić, Ranko Jančić, Stipe Ćurlin. Improving safety and flexibility of the energy power system using phase shifting transformer. CG KO CIGRE 2019.*
Publication	*Vladimir Valentić, Davor Kotorac, Zoran Bunčec, Dubravko Franković, Zoran Grba, Ranko Jančić. Voltage management analysis in 110 kV network with significant amount of cables and combined transmission lines. HRO CIGRE 2019*
Publication	*Vladimir Valentić, Marko Jušić, Ranko Jančić, Dubravko Franković. Croatian islands supply issues. SEERC 2021*
Publication	*Vladimir Valentić, Marko Jušić at all Power supply subsystem of croatian islands in conditions of increased integration of renewable energy sources. HRO CIGRE 2021*
Publication	*Noskov, Robert; Petrović, Ivica; Valentić, Vladimir; - Analisys of some aspects of powes system management in the presence of distributed generation and active distributed networks HRO CIGRE 2021*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
SINCRO.GRID PCI – Phase 1	*The increasing integration of decentralised renewable energy sources (RES) both in the regions of Slovenia and Croatia has led to a lack of flexibility resources needed to regulate the electricity system. In 2014, the transmission system operators (HOPS and ELES) and distribution system operators (HEP ODS and SODO) of Croatia and Slovenia began to search for joint solutions.*
Grant Agreement number: 864298 — ATTEST	*The objective of the ATTEST project is to develop and operationalize a modular open source toolbox comprising a suite of innovative tools to support TSOs / DSOs operating, maintaining and planning the energy systems of 2030 and beyond in an optimised and coordinated manner, considering technical, economic and environmental aspects.*
Grant Agreement number: 773430 — CROSSBOW	*CROSSBOW will propose the shared use of resources to foster cross-border management of variable renewable energies and storage units, enabling a higher penetration of clean energies whilst reducing network operational costs and improving economic benefits of RES and storage units. The objective is to demonstrate a number of different, though complementary, technologies, offering Transmission System Operators higher flexibility and robustness.*
Grant Agreement number: 864274 — FARCROSS	*To achieve its energy goals EU needs to establish a geographically large market by initially improving its cross-border electricity interconnections. A geographically large market, based on imports and exports of electricity, could increase the level of competition, boost the EU's security of electricity supply and integrate more renewables into energy markets.*
Grant Agreement number: 863876 — FLEXGRID	*Future smart grids require the effective interaction between energy markets and electricity grid management systems in order to introduce new services and mitigate risks introduced by high RES penetration. FLEXGRID envisages the orchestration and integration of: i) advanced electricity grid models and tools, ii) flexibility assets' management tools, and iii) data analytics and accurate forecasts of the various markets and RES production.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
High Voltage Laboratory (HVLab)	*Professional data base(s) with power assets' data, diverse data sources, rofessional tools for power system operation, such as real time measuring systems, SCADA, SUMO DTLR, Professional tools for data analytics and access to real data sets for management of company's assets*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
999841954	*UNIVERSITA DEGLI STUDI DI TRENTO*

Short name: UNITN

Address

Street	VIA CALEPINA 14
Town	TRENTO
Postcode	38122
Country	Italy
Webpage	www.unitn.it

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	14/08/1982	- no
SME self-assessment	14/08/1982	- no
SME validation	unknown	

Departments carrying out the proposed work

Department 1

Department name: Information Engineering and Computer Science ☐ not applicable

☐ Same as proposing organisation's address

Street: Via Sommarive 9

Town: Trento

Postcode: 38123

Country: Italy

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Prof.

Gender ○ Woman ◉ Man ○ Non Binary

First name* **Vincenzo**

Last name* **D'Andrea**

E-Mail* **vincenzo.dandrea@unitn.it**

Position in org. Associate Professor

Department Information Engineering and Computer Science Social Informatics

☐ Same as organisation name

☐ Same as proposing organisation's address

Street Via Sommarive 9

Town Trento

Post code 38123

Country Italy

Website www.disi.unitn.it

Phone +39 0461 282084

Phone 2 +39 320 4368858

Other contact persons

First Name	Last Name	E-mail	Phone
Laura	Segalla	laura.segalla@unitn.it	+39 0461 283233
Laura	Paternoster	laura.paternoster@unitn.it	+39 0461 283032

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	Vincenzo	Dandrea	Man	Italy	vincenzo.dandrea@unitn.it	Category B Senior resea	Leading	0000-0002-0598-5107	Orcid ID
Prof	Maurizio	Marchese	Man	Italy	maurizio.marchese@unitn.it	Category B Senior resea	Team member	0000-0001-6485-1443	Orcid ID
Prof	Attila	Bruni	Man	Italy	attila.bruni@unitn.it	Category B Senior resea	Team member	0000-0002-4561-0780	Orcid ID

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☐
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☒
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*Poderi, Giacomo; Bettega, Mela; Capaccioli, Andrea; D'Andrea, Vincenzo, "Disentangling participation through time and interaction spaces-the case of IT design for energy demand management" in CODESIGN, v. 14, n. 1 (2018), p. 45-59. - URL: http://www.tandfonline.com/toc/ncdn20/current . - DOI: 10.1080/15710882.2017.1416145*
Publication	*Capaccioli, Andrea; Poderi, Giacomo; Bettega, Mela; D'Andrea, Vincenzo, "Exploring participatory energy budgeting as a policy instrument to foster energy justice" in ENERGY POLICY, v. 2017, (2017). - URL: http://www.sciencedirect.com/science/article/pii/S0301421517302094 . - DOI: 10.1016/j.enpol.2017.03.055*
Publication	*Bruni, Attila; Miele, Francesco; Pittino, Daniel; Tirabeni, Lia, "The intricacies of power relations and digital technologies in organizational processes" in STUDI ORGANIZZATIVI, v. 2021, n. 1 (2021), p. 7-24. - DOI: 10.3280/SO2021-001001*
Publication	*Bruni, Attila; Miele, Francesco; Pittino, Daniel; Tirabeni, Lia, "On the dualistic nature of power and (digital) technology in organizing processes" in STUDI ORGANIZZATIVI, v. 2020, (2020)*
Publication	*Bonifacio, Matteo Salvatore; Capaccioli, Andrea; Poderi, Giacomo; Marchese, Maurizio; D'Andrea, Vincenzo, "Communities of Practice and Renewable Distributed Energy: The CIVIS Experience" in Proceedings of the 15th European Conference on Knowledge Management, Reading UK: Academic Conferences and Publishing International Limited, 2014, p. 148-155. - ISBN: 9781910309353. https://www.dropbox.com/sh/6mezeu0rcdzzeax/AACRhguxsJvPX1McfddS89G7a/ECKM2014_abstract_booklet.pdf?dl=0*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
896584678	*ENCOORD GMBH*

Short name: ENC

Address

Street	AM WALDTHAUSENPARK 9
Town	ESSEN
Postcode	45127
Country	Germany
Webpage	www.encoord.com

Specific Legal Statuses

Legal person	yes
Public body	no
Non-profit	no
International organisation	no
Secondary or Higher education establishment	no
Research organisation	no

SME Data

Based on the below details from the Participant Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	31/12/2019	- yes
SME self-assessment	31/12/2019	- yes
SME validation	unknown	

Departments carrying out the proposed work

No department involved

Department name *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.*

Postcode *Area code.*

Country *Please select a country*

Links with other participants

Type of link	Participant

Main contact person

This will be the person the EU services will contact concerning this proposal (e.g. for additional information, invitation to hearings, sending of evaluation results, convocation to start grant preparation). The data in blue is read-only. Details (name, first name and e-mail) of Main Contact persons should be edited in the step "Participants" of the submission wizard.

Title Dr.

Gender ◯ Woman ◉ Man ◯ Non Binary

First name* **Kwabena**

Last name* **Pambour**

E-Mail* **kp@encoord.com**

Position in org. Managing Director

Department ENCOORD GMBH

☒ Same as organisation name

☒ Same as proposing organisation's address

Street AM WALDTHAUSENPARK 9

Town ESSEN

Post code 45127

Country Germany

Website www.encoord.com

Phone (+49) 201 206 026 27

Phone 2 *+xxx xxxxxxxxx*

Other contact persons

First Name	Last Name	E-mail	Phone
Aurelio	Lazaro	aurelio@encoord.com	(+34) 627893655

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Dr	Kwabena	Pambour	Man	Germany	kp@encoord.com	Category B Senior resea	Leading	0000-0003-0199-7888	Orcid ID
Dr	Marco	Flammini	Man	Italy	marco@encoord.com	Category C Recognised	Team member		
Mr	Andrés	Peluso	Man	Canada	andres@encoord.com	Category D First stage r	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☐
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☐
Prototyping and demonstration	☒
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Software	*SAInt Software* *encoord's core technology is the Scenario Analysis Interface for Energy Systems (SAInt), a software platform to model energy markets and coupled energy networks, including electricity grids and gas pipeline networks.*
Publication	*Valuing intra-day coordination of electric power and natural gas system operations* *Energy Policy, vol. 141, 2020* *Michael Craig, Omar J. Guerra, Carlo Brancucci, Kwabena Addo Pambour and Bri-Mathias Hodge*
Publication	*The value of day-ahead coordination of power and natural gas network operations* *Energies, vol. 11, no. 7, pp. 1628, 2018.* *Kwabena Addo Pambour, Rostand Sopgwi, Bri-Mathias Hodge and Carlo Brancucci*
Publication	*Modelling, simulation and analysis of security of supply scenarios in integrated gas and electricity transmission networks* *PhD dissertation, University of Groningen, 2018.* *Kwabena Addo Pambour*
Publication	*SAInt - A novel quasi-dynamic Model for assessing Security of Supply in coupled Gas and Electricity Transmission Networks* *Applied Energy, vol. 203, pp. 829 - 857, 2017* *Kwabena Addo Pambour, Burcin Erdener, Ricardo Bolado-Lavin, and Gerard Dijkema*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
HYPERGRID	*IT aims at developing a set of replicable and scalable cost effective technical solutions to allow the integration of RES with different dispatchability and intrinsic variability inside thermal grids as well as their link with the electrical grids, including the development of innovative key components, in parallel with innovative and integrated ICT services formed by a scalable suite of tools for the proper handling of the complexity of the systems from building to Local Energy Community*
HELICS+	*Developed through support from the Grid Modernization Laboratory Consortium (GMLC), the HELICS™ tool is intended to facilitate the interconnection of existing simulator tools across domains. In this partnership, encoord is working with NREL and other GMLC partners to develop HELICS™ linkages to its SAInt tool. These linkages will extend to both gas and power flow modeling in SAInt, enabling future users to integrate SAInt's capabilities with a range of power or gas simulating tools.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? ○ Yes ◉ No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

PIC	Legal name
998686781	*FACHHOCHSCHULE ZENTRALSCHWEIZ - HOCHSCHULE LUZERN*

Short name: HSLU

Address

Street	WERFTESTRASSE 4
Town	LUZERN
Postcode	6002
Country	Switzerland
Webpage	www.hslu.ch

Specific Legal Statuses

Legal person	yes
Public body	yes
Non-profit	yes
International organisation	no
Secondary or Higher education establishment	yes
Research organisation	yes

SME Data

Based on the below details from the Participant Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

SME self-declared status	12/03/2009	- no
SME self-assessment	unknown	
SME validation	12/03/2009	- no

Departments carrying out the proposed work

Department 1

Department name: Engineering and Architecture ☐ not applicable

☐ Same as proposing organisation's address

Street: Technikumstrasse 21

Town: Horw

Postcode: 6048

Country: Switzerland

Links with other participants

Type of link	Participant

Researchers involved in the proposal

Title	First Name	Last Name	Gender	Nationality	E-mail	Career Stage	Role of researcher (in the project)	Reference Identifier	Type of identifier
Prof	ANDREW	PAICE	Man	Australia	ANDREW.PAICE@HSLU.CH	Category A Top grade re	Team member	0000-0001-6336-5478	Orcid ID
Mrs	EDITH	BIRRER	Woman	Switzerland	EDITH.BIRRER@HSLU.CH	Category B Senior resea	Team member		
Prof	CHRISTOPH	IMBODEN	Man	Switzerland	CHRISTOPH.IMBODEN@HSLU.CH	Category A Top grade re	Team member		
Mr	ANDREAS	RUMSCH	Man	Switzerland	ANDREAS.RUMSCH@HSLU.CH	Category B Senior resea	Leading	0000-0002-4342-1783	Orcid ID
Dr	ALBERTO	CALATRONI	Man	Italy	ALBERTO.CALATRONI@HSLU.CH	Category B Senior resea	Team member	0000-0002-8789-3213	Orcid ID
Dr	BASTIAN	WIDENMAYER	Man	Germany	BASTIAN.WIDENMAYER@HSLU.CH	Category B Senior resea	Team member		
Mr	BENJAMIN	BOWLER	Man	United Kingdom	BENJAMIN.BOWLER@HSLU.CH	Category B Senior resea	Team member	0000-0001-6110-0687	Orcid ID
Dr	MOJGAN	HOJABRI	Man	Iran (Islamic Rep	MOJGAN.HOJABRI@HSLU.CH	Category B Senior resea	Team member		
Mr	ANDRÉ	EGGLI	Man	Switzerland	ANDRE.EGGLI@HSLU.CH	Category C Recognised	Team member		
Mr	NIKOLAOS	KATSOULAKOS	Man	Greece	NIKOLAOS.KATSOULAKOS@HSLU.CH	Category C Recognised	Team member		
Mrs	TANAKA MANDY	MBAVARIRA	Woman	Zambia	TANAKAMANDY.MBAVARIRA@HSLU.CH	Category C Recognised	Team member		

Role of participating organisation in the project

Project management	☐
Communication, dissemination and engagement	☐
Provision of research and technology infrastructure	☒
Co-definition of research and market needs	☐
Civil society representative	☐
Policy maker or regulator, incl. standardisation body	☐
Research performer	☒
Technology developer	☒
Testing/validation of approaches and ideas	☒
Prototyping and demonstration	☐
IPR management incl. technology transfer	☐
Public procurer of results	☐
Private buyer of results	☐
Finance provider (public or private)	☐
Education and training	☐
Contributions from the social sciences or/and the humanities	☐
Other If yes, please specify: (Maximum number of characters allowed: 50)	☐

List of up to 5 publications, widely-used datasets, software, goods, services, or any other achievements relevant to the call content.

Type of achievement	Short description (Max 500 characters)
Publication	*HuKey elements of the achievement, including a short qualitative assessment of its impact and (where available) its digital object identifier (DOI) or other type of persistent identifier (PID). Publications, in particular journal articles, are expected to be open access. Datasets are expected to be FAIR and 'as open as possible, as closed as necessary'.* *Huber, Patrick; Calatroni, Alberto; Rumsch Andreas; Paice, Andrew. 2021. "Review on Deep Neural Networks Applied to Low-Frequency NILM" Energie*
Publication	*Voinov, Philippe; Huber Mittler, Patrick; Calatroni, Alberto; Rumsch, Andreas & Paice, Andrew (2020). Effect of Sampling Rate on Photovoltaic Self-Consumption in Load Shifting Simulations. Energies, 2020(20), 5393. doi: 10.3390/en13205393* *In this work, we showed how to make sure that load shifting simulations give realistic results. This is crucial to model local energy communities and demand response correctly.*
Publication	*Rohrbach, Benjamin; Papaefthymiou, Maria-Eleni; Schneider, Achim & Imboden, Christoph (20.11.2019). Guidelines for business model innovation on the example of PV self-consumption optimization. IOP's Journal of Physics, 2019 (Conference Series Vol. 1343), n/a. doi: 10.1088/1742-6596/1343/1/012114* *In this publication we investigate how to generate innovative business models which apply in the context of prosumers.*
Publication	*Dudjak, Viktorija; Neves, Diana; Alskaif, Tarek; Khadem, Shafi; Pena-Bello, Alejandro; Saggese, Pietro; Bowler, Benjamin; Andoni, Merlinda; Bertolini, Marina; Zhou, Yue; Lormeteau. Blanche; Mustafa, A.Mustafa; Wang, Yingjie; Francis, Christina; Zobiri, Fairouz; Parra, David; Papaemmanouil, Antonios (2021). Impact of local energy markets integration in power systems layer: A comprehensive review. Applied Energy, November 2021, Volume 301, 1. doi: 10.1016/j.apenergy.2021.117434*
Dataset	*Residential Power Traces for Five Houses: the iHomeLab RAPT Dataset. doi: 10.5281/zenodo.3581895* *This dataset contains meter and submeter energy data, along with thermal metadata for five houses in Switzerland. The data corpus is one of the few containing three-phase electrical data and is useful to design and test load disaggregation algorithms.*

List of up to 5 most relevant previous projects or activities, connected to the subject of this proposal.

Name of Project or Activity	Short description (Max 500 characters)
Balancing Power in the Swiss Ancillary Service Mrk	*This two-year project (2014-2016) identified opportunities and provided tools for potential evaluation for industrial providers of control reserves of medium and large size.*
NILM4Bal	*The goal of this two-year project (2018-2020) was to enable energy suppliers to optimise their load management and thus save costs, by automatically identifying large power consumers and quantifying their load shift potential using smart meter data.*
enerFACEpredict	*This project (2019-2020) investigated and deployed several load forecasting algorithms acting on the level of the single household to guide prosumers towards an improvement of their self-consumption.*
KnowlEDGE	*This project explores new machine learning and federated learning approaches to provide energy forecasting without the need for privacy-critical data aggregation and warehousing.*

Description of any significant infrastructure and/or any major items of technical equipment, relevant to the proposed work.

Name of infrastructure of equipment	Short description (Max 300 characters)
Charging stations	*Uni- and bidirectional charging stations that will be used to demonstrate flexibility services for DSOs/aggregators.*
HIL tools	*Hardware-in-the-loop simulation tools*
PV panels / inverters	*PV panels and inverters*
Storage systems	*Battery storage systems*

Gender Equality Plan

Does the organization have a Gender Equality Plan (GEP) covering the elements listed below? (•) Yes ( ) No

Minimum process-related requirements (building blocks) for a GEP

- **Publication:** formal document published on the institution's website and signed by the top management
- **Dedicated resources:** commitment of human resources and gender expertise to implement it.
- **Data collection and monitoring:** sex/gender disaggregated data on personnel (and students for establishments concerned) and annual reporting based on indicators.
- **Training:** Awareness raising/trainings on gender equality and unconscious gender biases for staff and decision-makers.
- **Content-wise, recommended areas** to be **covered** and addressed via concrete measures and targets are:
    - work-life balance and organisational culture;
    - gender balance in leadership and decision-making;
    - gender equality in recruitment and career progression;
    - integration of the gender dimension into research and teaching content;
    - measures against gender-based violence including sexual harassment.

Proposal ID **101075687**

Acronym **CINESIS**

3 - Budget

?

No.	Name of beneficiary	Country	Role	Personnel costs/€	Subcontracting costs/€	Purchase costs - Travel and substistence /€	Purchase costs - Equipment/€	Purchase costs - Other goods, works and services/€	Internally invoiced goods and services/€ (Unit costs-usual accounting practices)	Indirect costs/€	Total eligible costs	Funding rate	Maximum EU contribution to eligible costs	Requested EU contribution to eligible costs/€	Max grant amount	Income generated by the action	Financial contributions	Own resources	Total estimated income
1	Rina Consulting Spa	IT	Coordinator	578,100		15,500		12,000		151400.00	757000.00	70	529900.00	529,900	529900.00			227,100	757000.00
2	Ubitech Energy	BE	Partner	714,000		15,000		18,000		186750.00	933750.00	70	653625.00	653,625	653625.00			280,125	933750.00
3	Cedis - Consorzio Elettrico Di Storo	IT	Partner	167,700		12,328		20,000		50007.00	250035.00	70	175025.00	175,025	175025.00			75,010	250035.00
4	Fondazione Bruno Kessler	IT	Partner	475,000		11,500		4,000		122625.00	613125.00	100	613125.00	613,125	613125.00			0	613125.00
5	Evolvere S.p.a. Benifit Corporation	IT	Partner	250,000		10,607		92,250		88214.25	441071.25	70	308750.00	308,750	308750.00			132,321	441071.00
6	University Of Cyprus	CY	Partner	365,400		15,000	19,600	4,000		101000.00	505000.00	100	505000.00	505,000	505000.00			0	505000.00
7	Tp Aeolian Dynamics Ltd	CY	Partner	86,667		11,000	2,000			24916.75	124583.75	70	87209.00	87,209	87209.00			37,374	124583.00
8	H. Wise Wire Energy Solutions Limited	CY	Partner	222,000		11,000	3,800	1,800		59650.00	298250.00	70	208775.00	208,775	208775.00			89,475	298250.00
9	Diacheiristis Systimatos Metaforas	CY	Partner	71,414		10,000	56,200			34403.50	172017.50	70	120412.00	120,412	120412.00			51,606	172018.00

10	Cintech Solutions Ltd	CY	Partner	180,000		14,000				48500.00	242500.00	70	169750.00	169,750	169750.00			72,750	242500.00
11	Centro De Investigacao Em Energia Ren - State Grid Sa	PT	Partner	294,000		15,000	60,000			92250.00	461250.00	70	322875.00	322,875	322875.00			138,375	461250.00
12	Eem Empresa De Electricidade Da Madeira Sa	PT	Partner	219,450		13,000		3,000		58862.50	294312.50	70	206019.00	206,019	206019.00			88,293	294312.00
13	Associacao Do Instituto Superior Tecnico Para A Investigacao E Desenvolvimento	PT	Partner	105,893		18,000	15,000	5,000		35973.25	179866.25	100	179866.00	179,866	179866.00				179866.00
14	Energoinfo Group-scinet Doo Beograd-rakovica	RS	Partner	340,000		16,000		2,000		89500.00	447500.00	70	313250.00	313,250	313250.00			134,250	447500.00
15	Yugoiztochno evropeyska Tehnologichna Kompania Ood	BG	Partner	260,000		15,000				68750.00	343750.00	70	240625.00	240,625	240625.00			103,125	343750.00
16	Elektroenergien Sistemen Operator Ead	BG	Partner	117,600		15,000				33150.00	165750.00	70	116025.00	116,025	116025.00			49,725	165750.00
17	Cez Distribution Bulgaria Ad	BG	Partner	81,000		15,000				24000.00	120000.00	70	84000.00	84,000	84000.00			36,000	120000.00
18	Eesti Energia As	EE	Partner	550,000	60,900	12,500	126,000	120,000		202125.00	1071525.00	70	750068.00	750,068	750068.00			321,457	1071525.00
19	Enefit Connect Ou	EE	Affiliated	42,500						10625.00	53125.00	70	37188.00	37,188	37188.00			15,937	53125.00
20	Elektrilevi Ou	EE	Affiliated	235,000			10,000			61250.00	306250.00	70	214375.00	214,375	214375.00			91,875	306250.00
21	Smart Wire Grid Europe Limited	IE	Partner	149,452		20,000	287,173	340,371		199249.00	996245.00	70	697372.00	697,372	697372.00			298,873	996245.00
22	Iarnród Éireann - Irish Rail	IE	Partner	76,659		4,000				20164.75	100823.75	70	70577.00	70,577	70577.00			30,247	100824.00

Proposal ID **101075687**

Acronym **CINESIS**

23	Sveuciliste U Zagrebu Fakultet Elektrotehnike I Racunarstva	HR	Partner	244,000		12,000		15,000		67750.00	338750.00	100	338750.00	338,750	338750.00			338750.00
24	Hz Infrastruktura D.o.o.	HR	Partner	111,000		12,000				30750.00	153750.00	70	107625.00	107,625	107625.00			46,125	153750.00
25	Hrvatski Operator Prijenosnog Sustava Doo	HR	Partner	114,800		12,000		55,000		45450.00	227250.00	70	159075.00	159,075	159075.00			68,175	227250.00
26	Universita Degli Studi Di Trento	IT	Partner	173,787		14,000		4,000		47946.75	239733.75	100	239734.00	239,734	239734.00			0	239734.00
27	Encoord Gmbh	DE	Partner	322,000		12,000		10,000		86000.00	430000.00	70	301000.00	301,000	301000.00			129,000	430000.00
28	Fachhochschule Zentralschweiz - Hochschule Luzern	CH	Associated							0.00	0.00	100	0.00	0	0.00			0	0.00
			TOTAL	6,547,422	60,900	331,435	579,773	706,421	0	2041262.75	10267213.75		7749995.00	7,749,995	7749995.00	0	0	2,517,218	10267213.00

4 - Ethics & security

Ethics Issues Table

1. Human Embryonic Stem Cells and Human Embryos			Page
Does this activity involve Human Embryonic Stem Cells (hESCs)?	○ Yes	◉ No	
Does this activity involve the use of human embryos?	○ Yes	◉ No	
2. Humans			**Page**
Does this activity involve human participants?	○ Yes	◉ No	
Does this activity involve interventions (physical also including imaging technology, behavioural treatments, etc.) on the study participants?	○ Yes	◉ No	
Does this activity involve conducting a clinical study as defined by the Clinical Trial Regulation (EU 536/2014)? (using pharmaceuticals, biologicals, radiopharmaceuticals, or advanced therapy medicinal products)	○ Yes	◉ No	
3. Human Cells / Tissues (not covered by section 1)			**Page**
Does this activity involve the use of human cells or tissues?	○ Yes	◉ No	
4. Personal Data			**Page**
Does this activity involve processing of personal data?	◉ Yes	○ No	14
Does it involve the processing of special categories of personal data (e.g.: genetic, biometric and health data, sexual lifestyle, ethnicity, political opinion, religious or philosophical beliefs)?	○ Yes	◉ No	
Does it involve profiling, systematic monitoring of individuals, or processing of large scale of special categories of data or intrusive methods of data processing (such as, surveillance, geolocation tracking etc.)?	○ Yes	◉ No	
Does this activity involve further processing of previously collected personal data (including use of preexisting data sets or sources, merging existing data sets)?	○ Yes	◉ No	
Is it planned to export personal data from the EU to non-EU countries? Specify the type of personal data and countries involved	◉ Yes	○ No	24-33

All personal data gathering/processing will be conducted in full compliance with GDPR and any other relevant normative. Even if such data will be required to R&D Activities to be performed in Serbia and Switzerland, as the activities conducted in non-EU countries are purely of technical nature, data will be handled in a proper way to make HSLU and EIG able to operate required data in a way fully compliant with the legislation/regulation framework of all the participating EU countries.

Is it planned to import personal data from non-EU countries into the EU or from a non-EU country to another non-EU country? Specify the type of personal data and countries involved	○ Yes	◉ No	
Does this activity involve the processing of personal data related to criminal convictions or offences?	○ Yes	◉ No	
5. Animals			**Page**
Does this activity involve animals?	○ Yes	◉ No	
6. Non-EU Countries			**Page**
Will some of the activities be carried out in non-EU countries?	◉ Yes	○ No	24-33

Yes, a very limited number of activities will be carried out outside of the EU as a partner from Serbia (EIG – No.14) and one from Switzerland (HSLU – No.28) are involved Such activities refer to:

- ENERGOINFO: ENERGOINFO will lead the development and demonstration of the Bulgarian pilot. EIG will design and develop the big data and AI tools and integrate them in the Coordination platform.
- Lucerne University of Applied Sciences and Arts (HSLU) will develop the technical implementation of the monitoring and control architecture of the Portuguese demo, as well as the business models which will be tested in the demonstration. HSLU will implement the demonstrator first in a living lab under controlled settings and then at the demo sites provided by EEM.

In case non-EU countries are involved, do the activities undertaken in these countries raise potential ethics issues?	○ Yes	◉ No	
It is planned to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	○ Yes	◉ No	
Is it planned to import any material (other than data) from non-EU countries into the EU or from a non-EU country to another non-EU country? For data imports, see section 4.	◉ Yes	○ No	24-33

Monitoring infrastructure and tools developed by HSLU and EIG will be tested in Portuguese and Bulgarian demosite respectively

Is it planned to export any material (other than data) from the EU to non-EU countries? For data exports, see section 4.	○ Yes	◉ No	
Does this activity involve low and/or lower middle income countries, (if yes, detail the benefit-sharing actions planned in the self-assessment)	○ Yes	◉ No	
Could the situation in the country put the individuals taking part in the activity at risk?	○ Yes	◉ No	

7. Environment, Health and Safety			Page
Does this activity involve the use of substances or processes that may cause harm to the environment, to animals or plants.(during the implementation of the activity or further to the use of the results, as a possible impact) ?	○ Yes	◉ No	
Does this activity deal with endangered fauna and/or flora / protected areas?	○ Yes	◉ No	
Does this activity involve the use of substances or processes that may cause harm to humans, including those performing the activity.(during the implementation of the activity or further to the use of the results, as a possible impact) ?	○ Yes	◉ No	

8. Artificial Intelligence			Page
Does this activity involve the development, deployment and/or use of Artificial Intelligence? (if yes, detail in the self-assessment whether that could raise ethical concerns related to human rights and values and detail how this will be addressed).	◉ Yes	○ No	14

9. Other Ethics Issues			Page
Are there any other ethics issues that should be taken into consideration?	◉ Yes	○ No	14

AI algorithms are not used to profile or handling personal data but to facilitate replicability and implementation/effectiveness of CINESIS proposed services from monitoring data available in CINESIS demosites

I confirm that I have taken into account all ethics issues above and that, if any ethics issues apply, I will complete the ethics self-assessment as described in the guidelines How to Complete your Ethics Self-Assessment ☒

Administrative forms

Proposal ID **101075687**

Acronym **CINESIS**

Ethics Self-Assessment

Ethical dimension of the objectives, methodology and likely impact

Many of the services and monitoring/tools developed in CINESIS are based on Data. At this purpose CINESISR will pose attention in handling data in a fair, ethical and correct way. At this purpose a specific task has been added in WP1 under UBE leadership (task 1.4). Personal data will be gathered in the framework of dissemination, communication and social assessment activities too. All personal data gathering/processing will be conducted in full compliance with GDPR and any other relevant normative (nevertheless, the obtained data will remain within the EU boundaries at all times). Besides, the technical objectives of the project are focused on development of flexibility services for TSO/DSO, and do not contain an ethical dimension or are ethically controversial/questionable in any way.

Remaining characters 4202

Compliance with ethical principles and relevant legislations

Incidental findings of personal data from demosite monitoring/demosite energy datasets will be avoided working on aggregation/ anonymization of data.
AI algorithms to be developed in the project are not used to profile or handling personal data to facilitate replicability and implementation/effectiveness of CINESIS proposed services from monitoring data available in CINESIS demosites
Personal data will be gathered in the framework of dissemination, communication and social assessment activities of CINESIS.
All personal data gathering/processing will be conducted in full compliance with GDPR and any other relevant normative. Even if such data will be required to R&D Activities to be performed in Serbia and Switzerland, as the activities conducted in non-EU countries are purely of technical nature, data will be handled in a proper way to make HSLU and EIG able to operate required data in a way fully compliant with the legislation/regulation framework of all the participating EU countries.

Remaining characters 3998

Administrative forms

Proposal ID **101075687**

Acronym **CINESIS**

Security issues table

1. EU Classified Information (EUCI)[2]			Page
Does this activity involve information and/or materials requiring protection against unauthorised disclosure (EUCI)?	○ Yes	◉ No	
Does this activity involve non-EU countries?	◉ Yes	○ No	1
Do participants from non-EU countries need to have access to EUCI?	○ Yes	◉ No	
Do the non-EU countries concerned have a security of information agreement with the EU?	◉ Yes	○ No	40

2. Misuse			Page
Does this activity have the potential for misuse of results?	○ Yes	◉ No	

3. Other Security Issues			Page
Does this activity involve information and/or materials subject to national security restrictions? If yes, please specify: (Maximum number of characters allowed: 1000)	○ Yes	◉ No	
Are there any other security issues that should be taken into consideration? If yes, please specify: (Maximum number of characters allowed: 1000)	○ Yes	◉ No	

[2]According to the Commission Decision (EU, Euratom) 2015/444 of 13 March 2015 on the security rules for protecting EU classified information, "European Union classified information (EUCI) means any information or material designated by an EU security classification, the unauthorised disclosure of which could cause varying degrees of prejudice to the interests of the European Union or of one or more of the Member States".

[3]Classified background information is information that is already classified by a country and/or international organisation and/or the EU and is going to be used by the project. In this case, the project must have in advance the authorisation from the originator of the classified information, which is the entity (EU institution, EU Member State, third state or international organisation) under whose authority the classified information has been generated.

[4]EU classified foreground information is information (documents/deliverables/materials) planned to be generated by the project and that needs to be protected from unauthorised disclosure. The originator of the EUCI generated by the project is the European Commission.

Call for Proposals: HORIZON-CL5-2021-D3-02-06 - Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)
Title: *Consumer mobIlizatioN for Energy Services that Increase System flexibility*
Proposal Acronym: CINESIS

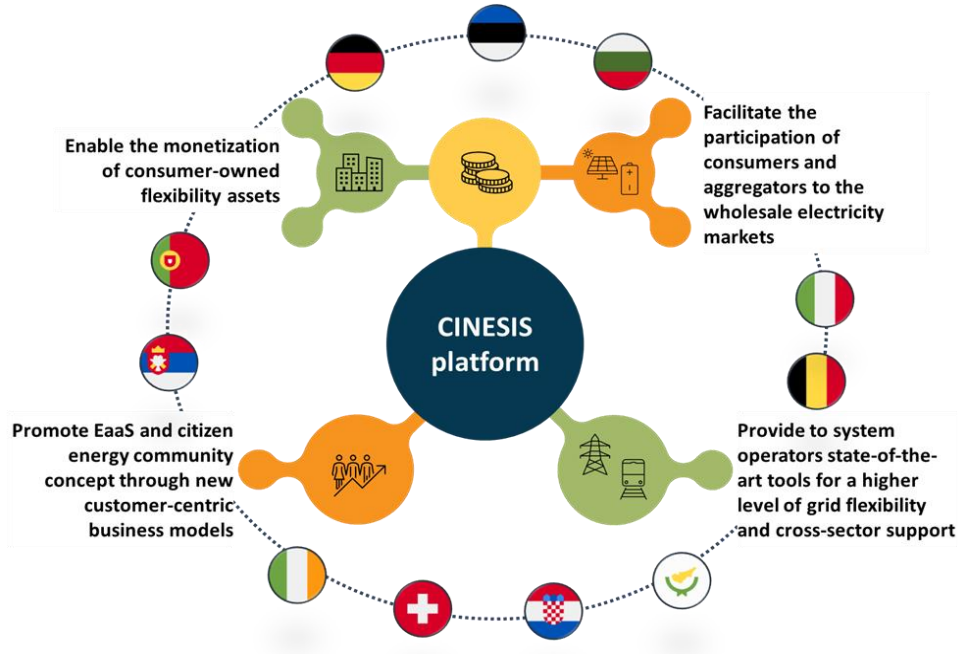
#	Organisation Full Name [SHORT NAME]	Country	Type
1	**RINA CONSULTING SPA - Coordinator [RINA-C]**	**IT**	**LE**
2	UBITECH ENERGY Sprl [UBE]	**BE**	**SME**
3	CONSORZIO ELETTRICO DI STORO [CEDIS]	**IT**	**SME**
4	FONDAZIONE BRUNO KESSLER [FBK]	**IT**	**RTO**
5	Evolvere S.p.A. Benefit Corporation[EVO]	**IT**	**LE**
6	University of Cyprus [UCY]	**CY**	**HEE**
7	TP Aeolian Dynamics Ltd [TPAD]	**CY**	**SME**
8	H. Wise Wire Energy Solutions Limited [WW]	**CY**	**SME**
9	DIACHEIRISTIS SYSTIMATOS METAFORAS [TSOC]	**CY**	**LE**
10	Cintech Solutions Ltd [CINT]	**CY**	**SME**
11	CENTRO DE INVESTIGAÇÃO EM ENERGIA REN-STATE GRID, S.A.[R&D-N]	**PT**	**LE**
12	EEM S.A - EEM Empresa de Electricidade da Madeira S.A.[EEM]	**PT**	**LE**
13	ASSOCIACAO DO INSTITUTO SUPERIOR TECNICO PARA A INVESTIGACAO E DESENVOLVIMENTO [IST]	**PT**	**RTO**
14	ENERGOINFO GROUP-SCINET DOO BEOGRAD-RAKOVICA [EIG]	**RS**	**SME**
15	SOUTHEAST EUROPEAN TECHNOLOGICAL COMPANY LTD [STCH]	**BG**	**SME**
16	ELEKTROENERGIEN SISTEMEN OPERATOR EAD [ESO]	**BG**	**LE**
17	CEZ Distribution Bulgaria AD [CEZ]	**BG**	**LE**
18	Eesti Energia AS [EE]	**EE**	**LE**
19	Enefit Connect AS (affiliated partner to EE) [EC]	**EE**	**LE**
20	Elektrilevi OÜ (affiliated partner to EE) [ELV]	**EE**	**LE**
21	Smart Wire Grid Europe Limited [SWE]	**IE**	**SME**
22	Iarnród Éireann - Irish Rail [IRAIL]	**IE**	**LE**
23	SVEUCILISTE U ZAGREBU FAKULTET ELEKTROTEHNIKE I RACUNARSTVA [UNIZAG]	**HR**	**HEE**
24	HZ INFRASTRUKTURA D.O.O. [HZIN]	**HR**	**LE**
25	Hrvatski operator prijenosnog sustava [HOPS]	**HR**	**LE**
26	UNIVERSITA DEGLI STUDI DI TRENTO [UNITN]	**IT**	**HEE**
27	ENCOORD GmbH [ENC]	**DE**	**SME**
28	FACHHOCHSCHULE ZENTRALSCHWEIZ - HOCHSCHULE LUZERN [HSLU]	**CH**	**HEE**

1 EXCELLENCE

CINESIS project aims to develop and demonstrate in 6 demo sites in 7 EU countries (ITA, CY, PT, BG, EE, IE, HR) an **interoperable platform of tools** that unleashes the **cross-vector flexibility potential of consumers to provide energy/flexibility services to DSOs/TSOs.** These tools have already been **developed in national/international projects** and **promote data-driven scenarios** for TSO-DSO coordination schemes for grid services and to **foster the end-user sector coupling** approach in local energy grids based on a **customer-oriented approach** for business models/market designs also incentivizing citizens to become active energy market actors.

A greener, secure and affordable energy system is one of the seventeen (17) goals for sustainable development, as defined by the United Nations[1]. A greener energy system will significantly increase the future prosperity of European citizens, contributing to the actions needed to be taken on a global scale in all the sectors to limit the

[1] *https://sdgs.un.org/goals/goal7*



planet's warming below 1.5 degrees Celsius by 2100. In order to achieve those goals, several sectors, such as transportation and mobility, turn to electrification, increasing steeply the demand for electricity[2], and thus necessitating carbon-free electricity production. Therefore, European Commission's proposed "Fit-for–55"[3] to accelerate the trend for a greener, secure and carbon neutral European power system by 2050, by revising its legislation to increase the use of Variable Renewable Energy Sources (V-RES) during the decade 2020-2030. Flexibility, i.e. the ability of the power system for maintaining the balance of demand and production on all time horizons, is thus increasingly needed due to the stochasticity introduced in the net-load by V-RES.

Rationale | Background and challenges 1 - Flexibility needs and renovation of TSO's and DSO's business: Some of the crucial open questions and challenges for both Transmission System Operators (TSOs) and Distribution System Operators (DSOs) are which additional flexibilities may be needed at what time in the future and in which European regions, driven by increases in V-RES share and converter-connected generation, and what negative and cascading effects on the system a flexibility gap could have. In addition, new consumption patterns such as electrical heat pumps, additional air conditioning and e-mobility, partly also participating in demand-side management (DSM), are expected to add their specific load profiles to the overall load, increasing the complexity of its forecasting due to the dependence in weather conditions and time of the day, and thus increasing the amount of flexibility required on a system level[4]. It is inevitable from the above, that both TSOs and DSOs have a challenge to change the way they plan and operate their grids. DSOs will have to connect large amounts of V-RES to their networks, even at the edge of the distribution grid. To do this, DSOs cannot rely anymore only on their traditional operations, such as network reinforcement and direct load control, but they will need to bring in new tools in order to operate (local) flexibility markets (potential market-based approaches similar to those in the wholesales), and thus alleviating problems and securing security of supply for end-user. From their side, TSOs will also need to expand their toolkit to make better use of new sources of flexibility that will allow them, for example, to deal with a growing need for balancing and congestion services to maintain the grid frequency resulting from the use of new energy sources where output is more difficult to forecast.

Rationale | Background and challenges 2 - Energy communities' establishment in the European energy transition: The Clean Energy Package recognises certain categories of community energy initiatives as 'energy communities' in European legislation[5]. Energy communities can be understood as a way to 'organise' collective energy actions around open, democratic participation and governance and the provision of benefits for the members or the local community[6]. The main driver at the centre of the EU strategic path considers the promotion and the adequate market uptake for the development of energy communities to promote collective self-consumption, flexibility harvesting, democratization and equity in energy services, while eliminating energy poverty. Those efforts will pave the way for a sustainable future for EU citizens, creating innovative business models that will be made possible through funding and investment schemes for the reorganization and reconstruction of the energy sector.

Rationale | Background and challenges 3 - Consumer acceptance and engagement in energy transition: Consumer's kinesis (mobilization) towards acceptance and engagement in the green transformation of the energy sector is of vital importance. Through investing in renewable energy assets, consumers from passive participants in energy markets turn into active users that both consume and produce electricity. Therefore, they have the opportunity to provide flexibility services to the grid operators, and thus increase their revenues through innovative business

[2] *https://ec.europa.eu/energy/sites/ener/files/documents/metis_s13_final_report_electromobility_201806.pdf*
[3] *https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/package-fit-for-55*
[4] *https://www.agora-energiewende.de/fileadmin/Projekte/2014/Ein-flexibler-Strommarkt-2030/Agora_European_Flexibility_Challenges_Integration_Benefits_WEB_Rev1.pdf*
[5] *https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en*
[6] *https://publications.jrc.ec.europa.eu/repository/handle/JRC119433*

models. However, as consumers are not a homogeneous group (industrial, tertiary, residential consumers), their preferences and willingness to adopt new technologies differ. Strong behavioural change is needed, in order the consumers to change habits, respond to signals for demand response, and participate in novel flexibility markets. Hence, customer segmentation and specific strategies to create consumer engagement plans tailored for the different needs, preferences and capabilities is crucial. To doing so, previous H2020 projects have defined initial plans for awareness, interest increase and action phases in the consumer engagement strategy[7]. Consolidating all this work, the BRIDGE initiative, and specifically the consumer and citizen engagement working group investigates how the previous H2020 projects tackled this issue from a regulatory, technological, data governance and societal perspective.

Specific Needs and Challenges

As Europe's energy system integrates ever-increasing shares of renewable energy, electrification of end-users and sectoral integration will play important roles in reaching this target by placing the electrical grid at the core of an integrated, decarbonised energy system. This calls for TSOs and DSOs to fast-track the integration of clean energy solutions into the electrical grid, to develop bold and agile strategies with policymakers and stakeholders, to fast-track the integration of clean energy solutions. In this context, CINESIS will address the increasing needs of the system operators for additional flexibility in the operation of their systems:

Flexibility needs	Short-term (at CINESIS end)	Long-term (at 2030)	CINESIS Proposed Service	Country of demo
TSO				
Frequency Control	15% increase[8]	50% increase	frequency control through island's DER aggregation	Portugal
Congestion Management &Voltage Control	small/ medium[9]	high/ very high	voltage control service through train mobility DR	Ireland & Croatia
Congestion Management			congestion management through consumer's predictive behaviour	Bulgaria
DSO				
Congestion Management	small/medium	high/very high	congestion management through P2P capacity sharing and DER aggregation	Estonia, Italy
Voltage Control			congestion management through DER aggregation (for Voltage Control)	Italy
Phase Balancing			intelligent phase balancing technique for ESS	Cyprus

Key Message: CINESIS project aims to guarantee the flexibility of the power system not only engaging consumers to provide energy services to TSOs/DSOs but also empowering them to be active participants in the new energy landscape, as well as by unleashing the flexibility potential of sector coupling and of TSO/DSOs cooperation.

1.1. Objectives and ambition

1.1.1. Project Main Objectives

CINESIS' overall objective is to demonstrate the **flexibility potential of consumers** to provide energy/flexibility services (also based on sector coupling) to DSOs and TSOs enabled by a suite of interoperable tools and digital technologies based on already mature technologies and well-established architecture frameworks.

To face all previously mentioned challenges and to reach CINESIS main mission, **the consortium identified six (6) main objectives (MO) each one addressed in a specific WP (see Sections 1.2 - 3) and split into specific objectives (SO) all together concurring to the main project target.** The project main objectives follow the SMART principles i.e. they are: a) **Specific (S)** linked to specific needs identified in §2.3 and Deliverables (§3), b) **Measurable (M)** linked to expected results and KPI related outcomes/impacts (§2.3), c) **Achievable (A)** as they are partners' expertise related and technologies that have already been pre-piloted, d) **Relevant (R)** directly linked to the scope of the topic and the work programme, and e) **Time-Related (T)** as they are linked with specific WP/tasks (see GANTT chart).

[7] *https://coordinet-project.eu/publications/deliverables*

[8] *According to the study conducted by Elia for the flexibility needs assessment in Central Europe in the day-ahead timeframe.. https://www.elia.be/-/media/project/elia/shared/documents/elia-group/publications/studies-and-reports/20210701_adequacy-flexibility-study-2021_en_v2.pdf*

[9] Taxonomy to assess the flexibility needs used by: *Laaksonen, Hannu, et al. "Towards Flexible Distribution Systems: Future Adaptive Management Schemes." Applied Sciences 11.8 (2021): 3709.* There is no study on a European level to quantify the flexibility needs for voltage control and congestion management for the overall European power system.

MO1: Develop and demonstrate CINESIS interoperable platform of tools for flexibility management and holistic planning based on already existing digital platforms for enabling seamless data exchange between TSO-DSO-Aggregator-consumer that holds a high replication potential around the EU – WP3

CINESIS platform for flexibility management and holistic planning, materialized in WP3, enables the provision of energy, mobility, home automation services, as well as cross-sector services through consumer's heating capacity. Moreover, it allows the integration of the end-user directly in the electrical system, being an active part of its management, allowing the creation of new small-scale businesses. To this aim, CINESIS platform valorises the data flows from building sensors, smart meters, heat pumps/boilers, SCADA systems, storage systems, PVs, and wind plants, engaging 4 TSOs and 2 DSOs from 5 European Countries.

SO1.1: Deliver CINESIS interoperable architecture (data governance, analytics and visualization layers)

The architecture of the CINESIS platform offers a scalable, simple-to-expand and secure framework that can provide useful insights for each different stakeholder, prosumer, TSO, DSO and aggregator through descriptive and predictive analytics, historic and aggregated analytics, specialized optimization algorithms, correlations between variables, impact of recommendations on energy usage behaviour and impact of the interaction of the users with the CINESIS platform. Different dashboards for the end users will be delivered, while secure access will be granted only to authenticated and authorized users. In addition, to ensure a high level of interoperability, CINESIS platform will enable the connection of platforms also through the use of the OneNet framework, which allows any platform to connect with the OneNet middleware using the OneNet connector. - **TARGET:** Integration in CINESIS platform of 8 existing tools/monitoring and control architecture to guarantee a wide interoperability

SO1.2: Test the provision of specified energy, mobility, home automation and cross-sector services and the respective business models through the CINESIS platform

A specific set of tools regarding integrated energy, mobility, home automation and cross-sector services, as well as the necessary business models (BMs) for providing these services, will be designed and developed. The provision of these services and the evaluation of the BMs will be carried out via CINESIS platform.- **TARGET:** Demonstration of CINESIS platform in 6 demos handling data from 15 actors from different sectors (mobility, heating, electricity)

S: Linked with SN#1, #2, #3, #4, #5 / Linked Deliverables: D3.1, D3.2
M: Linked outcomes: #O1 / Linked Impacts: #1, #2, #3, #4, #5, #6
A: Linked partners: UBE, RINA-C, HSLU, UCY, CINT
R: Relation to the work programme topic: #1- #8
T: Linked WP/tasks: WP3 / T3.1, T3.2, T3.3

MO2: Facilitate the participation of flexible consumers and aggregators to the wholesale electricity markets via consumer engagement and enhancing competitiveness of consumer centred aggregation services – WP4

CINESIS provides the appropriate ICT-enabled tools and solutions for optimizing aggregators' business strategy and exposing energy consumers into energy market tariffs to address critical situations in energy networks and demand/supply balancing operations. Appropriate optimization tools enable guidance to aggregators and consumers, towards enhancing self-consumption and making the most out of local storage and generation, without compromising their comfort or indoor environment quality. Moreover, CINESIS will demonstrate the provision of flexibility services by residential customers to electric grid operators from a VPP approach which optimally manages multiple resources, i.e., BESS, heat pumps, EV charging stations, in an aggregated way while respecting grid constraints.

SO2.1: Increase the incentives of flexible consumers and producers by providing new flexibility services to the wholesale market through the aggregator framework

The AggreMan platform will be developed that optimizes the aggregator's business strategy, maximizing the profit from the electricity market by providing as many flexibility services to the grid as possible. The AggreMan platform will provide intelligent decision support and coordination signals to the aggregator assets for maximizing the overall revenue utilizing the received information such as generation and consumption measurements, weather/RES/load forecasts as well as electricity price forecasts. This platform will be integrated with the BuildIn platform which will send signals regarding the consumer's flexibility potential and manage the operation of commercial/residential buildings, thus increasing the profits for the building owners, without compromising the end-user's comfort. **TARGET:** 7 commercial consumers engaged targeting 15% reduction of consumers' energy bill also thanks to revenues gained providing flexibility services

SO2.2: Create a smart interoperability architecture for flexibility in energy markets based on DLT technology ensuring secure access to valuable data while reducing complexity and deployment cost

A new kind of aggregation platform will be developed that unifies all forms of existing and new distributed flexibility assets in a single layer control and simplifies the management by the energy system dispatch centre. This digital platform will be based on a smart architecture for flexibility relying on authentication, software adapters, messaging services, APIs, encryption, and distributed ledger technologies (DLTs) to realize a distributed system establishing interoperability in a trusted environment among several stakeholders without the addition of extra hardware gateways. Building block of this architecture is a matchmaking module that recognizes which service providers,

manufacturers and potential customers could be matched to provide a service, such as primary and secondary control, as well as providing flexibility in the energy consumption by electric vehicles, boilers, and HPs. **TARGET:** Development of a DLT solution that can guarantee 15% reduction of consumers' energy bill also via flexibility services revenues

SO2.3: Develop the EugenioCloud platform to manage power flows of DERs and enable optimized energy trading in the internal or external markets and their participation in the ancillary services market.

A cloud platform, named EugenioCloud, will be developed along with a set of edge devices orchestrated by the Eugenio gateway, which will integrate, on a residential level, smart BESS, smart heat pumps and smart EVs charging stations. The EugenioCloud platform will implement novel optimization models and algorithms including forecasting and predictive analyses of the amount of energy produced, consumed, stored and sold integrating building energy management optimization to manage energy trading/exchange in the market. **TARGET:** 50 consumers engaged targeting 40% increase of traded energy by consumers in the market

S: Linked with SN#1, #2, #3, #4 / Linked Deliverables: D4.1, D4.2
M: Linked outcomes: #O2, #O3, #O4 / Linked Impacts: #1, #2, #3, #4, #5
A : Linked partners: HSLU, UCY, R&D-N, TPAD, TSOC, WW, EEM, IST, EVO, FBK, CEDIS
R: Relation to the work programme topic: #2, #3, #8
T: Linked WP/tasks: WP4 / T4.1, T4.2, T4.4, T4.7

MO3: Activate flexibility resources and provide to system operators state-of-the-art tools enabling a higher level of grid flexibility both on a wholesale and a local market level. – WP4

CINESIS will demonstrate a variety of tools for system operators to activate flexibility resources also by enabling a new cross-sectoral integration of rail and electrical networks to mutually support each other and implementing demand response strategies for maximum RES self-consumption and electricity flows management while enhancing the reliability and stability of the grid. Moreover, to unlock the full potential of smart flexible assets and DR, a P2P grid capacity sharing solution will be demonstrated where customers' main fuse rating can be adjusted close to real-time.

SO3.1: Develop big data and AI driven energy services for TSOs and DSOs in cooperation with prosumers

CINESIS will develop big data and AI solutions for the provision of energy services for TSOs, DSOs in cooperation with prosumers, or owners of assets that can provide flexibility via intermediaries. These solutions will be provided through the F-Channel platform based on improved high-resolution production and consumption predictions through Numerical Weather Predictions and Machine learning algorithms for energy and power system state predictions and will be replicated in different geographies to take into account the different climatic areas. **TARGET:** Increasing the availability of flexibility resources by at least 15%

SO3.2: Explore synergies between the regional rail and electrical network and the potential to maximise their utilisation, as well as the provision of cross-sectoral support

CINESIS will demonstrate how the use of modular power flow controllers in railway electricity networks can enable the railway system operator to dynamically control the power input between substations, and therefore support local voltage control challenges. This solution could be utilised to balance the single-phase power flow and shift demand between substations. It is a low-cost technology that could help alleviate existing voltage issues, facilitate network re-configurations and new line development, optimise substation locations and accelerate the connections of new substations. **TARGET:** Reducing grid losses in both rail and electric network of 2%

SO3.3: Allow P2P grid capacity sharing by adjusting consumers' main fuse rating close to real-time

A technical solution allowing P2P grid capacity sharing and utilizing the grid capacity behind DSO's medium to low voltage (MV/LV) transformer is proposed. A control system platform connected to the DSO's SCADA system, billing and service modules will be developed and consumers interaction/electric panel will be fitted with remotely controllable smart meters and main fuse. **TARGET:** Line capacity utilization increase 5% per grid line km; Transformer capacity utilization increase 5% per MV/LV transformer kVA; 10% lower CAPEX and OPEX compared to current practice

S: Linked with SN#3, #4, #5 / Linked Deliverables: D4.3
M: Linked outcomes: #O2, #O5 / Linked Impacts: #1, #2, #3
A: Linked partners: EIG, ESO, CEZ, STCH, SWE, UNIZG, IRAIL, HOPS, EE, EC, ELV
R: Relation to the work programme topic: #3, #5, #7, #8
T: Linked WP/tasks: WP4 / T5.1, T4.5, T4.6, T5.4, T5.5, T5.6

MO4: Perform a wide Pan-EU demonstration campaign of CINESIS solutions testing them at all geographical scales ensuring the widest possible impact while adopting a sector integration approach both in EU-level and local energy markets planning – WP5 and WP6

CINESIS will demonstrate the project's solutions on a wide geographical scale. The demonstration results will be evaluated and an impact assessment considering also environmental and social factors will be performed. The

scalability and replicability potential of the solutions will be evaluated focusing on achieving the highest sector integration level possible.

SO4.1: Carry out an extensive demonstration campaign in 7 EU countries engaging a wide variety of actors, such as consumers, aggregators, grid operators, RES owners, utilities and energy communities across Europe

CINESIS will support a large-scale demonstration framework across 7 dispersed EU countries, targeting different processes, tools, consumers' needs and existing business models, in different countries and regions, whose local grids engage different assets. **TARGET:** Engage at least 8000 EU citizens in CINESIS demo and achieve 2 GWh of RES self-consumed increase and 50 MWh exchanged between TSO/DSO for grid balancing

SO4.2: Analyse PanEU impact on design, modelling and planning of energy markets in a sector integration approach modelling flexibility services proposed in CINESIS

CINESIS will perform an impact assessment of the project's developed solutions complemented by a scalability and replicability analysis. Additionally, CINESIS will analyse the design, modelling and planning of energy markets impact on EU level through the adoption of a sector integration approach via ENC's commercial planning software, the Scenario Analysis Interface for Energy Systems (SAInt). This tool will be used to run optimization models simulating electricity markets and how CINESIS flexibility services can be remunerative and have a benefit on local grids. Modelling electric markets and grids, CINESIS will be able to quantify the trade-offs between costs and reliability of different investments and of planning or operational decisions. **TARGET:** Analyse at least 5 scenarios with/without CINESIS solutions and their impact on sector coupling

S: Linked with SN#1, SN#3, SN#5 / Linked Deliverables: D5.1, D5.2, D6.1, D6.2, D6.3
M: Linked outcomes: #O1, #O2, #O5 / Linked Impacts: #2, #3, #4, #5
A: Linked partners: RINA-C, UBE, ENC, EE, EEM, WW, HZIN, IRAIL, ESO, CEDIS
R: Relation to the work programme topic: #5, #6, #7
T: Linked WP/tasks: WP5, WP6 / T5.1, T5.2, T5.3, T5.4, T5.5, T5.6, T5.7, T6.1, T6.2, T6.3

MO5: Propose innovative customer-centric business models that promote "energy-as-a-service" and citizen energy community concepts offering optimised demand management and energy efficiency and ensuring increased consumer engagement and acceptance – WP2

The introduction of new business models (Citizen Energy Communities and/or Retailers as Aggregators) in CINESIS ensures prosumer's benefits maximization through their involvement in DR programs. To ensure overcoming of flexibility boundaries and availability constraints imposed by current energy market designs, prosumers will be given the opportunity to involve with aggregators in Flexibility Transactions and DR schemes, with the aim not only to reduce their energy bills, but further increase their benefits through participation in balancing and ancillary services markets. To this aim, EaaS business models are also developed and demonstrated.

SO5.1: Introduce new business models that put consumer at the centre of flexibility services provision and demand management ensuring increased engagement and acceptance

Innovative business models for stakeholders in the energy and mobility sector will be developed, in order to provide added value to the end-user through the establishment of additional revenue streams. Different cross-services solutions that are proposed by CINESIS fit to the EaaS business model, adding value directly to the end-customer. Energy-as-a-service (EaaS), i.e, a business model whereby customers pay for an energy service without having to make upfront capital investments, will be proposed introducing a more customer-centric approach and solutions that promote and realize cross-sector services provision. **TARGET:** At least 50% tenants doesn't report any bothering from the proposed CINESIS services and are satisfied by the BOTHER/BENEFIT ratio of the proposed services

SO5.2: Raise awareness among public bodies and other stakeholders of the benefits of the prosumers' participation in electricity markets through these business models

UBE, as communication and dissemination leader, will oversee the involvement of citizens, public bodies and other relevant stakeholders within the project. Also, CINESIS will deliver policy recommendations to align the main outputs with existing and upcoming legislation, since activities within the project could lead to define new standards or affect already defined standards. **TARGET:** Publishing 10 issues of newsletter with 500 subscribers by the end of project and organizing 4 regional promotional events

S: Linked with SN#2, #4, #5 / Linked Deliverables: D2.1, D2.2, D6.1, D6.2
M: Linked outcomes: #O3, #O4, #O5 / Linked Impacts: #5, #6
A: Linked partners: RINA-C, UBE, ENC, CINT, SWE, UNITN
R: Relation to the work programme topic: #1, #4, #7
T: Linked WP/tasks: WP2, WP6 / T2.1, T2.2, T2.3, T6.2, T6.3

MO6: Establish a robust exploitation and impact creation strategy ensuring efficient stakeholder engagement and enabling knowledge sharing through active involvement in BRIDGE activities – WP7

A series of activities will be conducted towards the definition of a plan for the exploitation of the project's tangible and intangible results. The exploitation activities will be aimed to use innovation results to create value within all

participating organizations and thus to improve their competitive advantages. The project and partner's dissemination and exploitation plans will be updated throughout the project`s lifetime.

SO6.1: Ensure the exploitation of the project results by developing the corresponding business plans while ensuring the uptake of the project results and recommendations from main energy stakeholders

CINESIS aims to facilitate further research and new market opportunities across the energy industry by ensuring an efficient exploitation of the project's outcomes to key stakeholders. The exploitation activities will be strategically planned and implemented via the D7.3a, b Exploitation Plan, IPR management and Stakeholder Involvement (RINA-C, M24, M48). **TARGET:** Organizing two exploitation workshops and publishing at least 10 scientific papers

SO6.2: Exchange knowledge with other Smart Grids and Energy Storage demonstration projects under the BRIDGE initiative

The project will explore clustering with other relevant projects in the Energy pillar and will establish synergies/connections with the projects constituting the BRIDGE initiative, which gathers all the Smart Grids and Energy Storage demonstration projects. **TARGET:** Creating synergies with at least 2 other projects from BRIDGE initiative and co-organise 1 webinar on common research areas

S: Linked with SN#2, #4 / Linked Deliverables: D7.1, D7.2, D7.3
M: Linked outcomes: #O4 / Linked Impacts: #5, #6
A: Linked partners: RINA-C, UBE, ENC, CINT, UCY
R: Relation to the work programme topic: #9
T: Linked WP/tasks: WP7 / T7.1, T7.2, T7.3

1.1.2 Targeting Work Programme and Call for Proposal requests

Call for proposal asks CINESIS to "*test and develop further demonstrated solutions for data-driven energy services for consumers, in cooperation with various actors in the energy system".* CINESIS targets Call's requests as follow:

Call for proposal Scope	How CINESIS Address it	Task
1. New business models for market parties based on energy services and revenue streams for consumers (across energy sectors and beyond, based on valorisation of the flexibility in their energy consumption).	CINESIS proposes innovative business models to EaaS developers, energy utilities, DSO/TSO but also end-users (contractual/bill arrangements) combining energy services with others, including mobility and home automation, as well as individual and collective self-consumption business models, also in order to reward behavioural changes that can facilitate grid effectiveness of CINESIS services.	**T2.3**
2. Enable market parties to provide flexibility services to network operators and the wholesale market based on competitive markets that are easily accessible and at low transaction costs.	CINESIS will implement a smart interoperability architecture for flexibility in energy markets which realises a distributed system establishing interoperability in a trusted environment among several stakeholders without the addition of extra hardware gateways, reducing the cost of deployment dramatically. Moreover, CINESIS will develop tools such as AggreMan, CEDIS VPP and iFLEX which facilitate aggregators and end-consumers access in energy markets.	**T5.2** **T5.3** **T5.6** **T5.7**
3. Increased application of digital technologies to support consumers and market parties to market their flexibility.	CINESIS proposes an interoperable ecosystem for flexibility management that integrates among other tools for aggregators, consumers, BSPs and system operators that enable the provision of flexibility through markets. These tools are utilizing AI-based power system analysis and energy predictions, GIS grid visualisation, distributed ledger technologies (DLTs), advanced forecasting, cloud architectures and IoT technology.	**T4.1** **T4.2** **T4.3** **T4.4** **T4.5** **T4.6** **T4.7**
4. Increased consumer engagement and acceptance.	CINESIS will explore how the market interfaces are reflected on the customer side and specific market solutions will be designed considering the specification of consumer preferences in order to increase and boost the consumer engagement and acceptance. Moreover, a set of customer engagement strategies aiming to extract the best practices on how to raise consumer adoption of CINESIS solutions at panEU level will be developed.	**T2.3**
5. Increased availability of flexibility sources for TSOs and DSOs and enable them to develop markets for flexibility and interact with many distributed resources at the same	CINESIS will develop an interoperable platform of tools that unleashes the cross-vector flexibility potential of consumers to provide energy/flexibility services to DSOs and TSOs. This platform will offer a scalable, simple-to-expand and secure framework, which will allow consumers owning DERs such as PVs, EV charging stations, batteries/storage systems and heat pumps/boilers to provide	**T3.2** **T3.3**

time (via intermediaries such as energy suppliers or aggregators) based on seamless data exchange and interoperability.	flexibility services either directly to the market or through aggregators.	
6. Facilitate 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.	CINESIS will provide a detailed scalability and replicability plan in which the technical innovations provided in CINESIS will be weighed against specific scalability and replicability factors and the EU energy targets in terms of technical, economic, regulatory, stakeholder acceptance issues. A detailed plan of recommendations for rolling-out of the CINESIS hardware, software, solutions, platforms, tools and processes and for adopting the proposed innovations at EU level will be developed. In this context, CINESIS platform interaction with existing platforms from other H2020 projects will be tested.	**T3.3 T6.1 T6.2**
7. Better understanding of market models and regulatory measures that can promote new business models.	CINESIS will analyse existing market set ups and explore existing regulatory barriers for the provision of flexibility services by consumers also considering the local energy requirements in different geographies and climates. CINESIS will propose new business models based on the results of this analysis.	**T2.1 T2.2 T2.3**
8. Contribution to better informed investment decisions by network operators and tariff setting models by NRAs, as the flexibility markets and new business models can postpone or avoid new investments making better use of existing assets.	CINESIS will investigate the synergies between the power system and the railway networks to facilitate network reconfigurations and new line development and to solve network constraints allowing system operators to optimise the topology of railway power system connections with the grid and therefore make better use of the existing infrastructure postponing new investments. Additionally, CINESIS will investigate a P2P capacity sharing solution where customers' main fuse rating can be adjusted close to real-time to allow for more efficient grid capacity utilisation, lower grid fees and more cost-efficient and environmentally friendly and energy consumption..	**T4.6 T4.7 T5.1 T5.4 T5.5**
9. The selected projects are expected to contribute to relevant BRIDGE activities.	CINESIS will interact with flexibility services sister projects (and other relevant Energy Community projects) to promote cluster and dissemination activities, fostering common stakeholders' engagement and knowledge exchange among relevant outcomes of the project WPs and results.	**T7.2 T7.3**

1.1.3 Targeting Relevant EU directives and agendas

The empowerment of consumers of all sizes, industrial, commercial and household, is a key aim of the Clean Energy Package (CEP). As of today, the majority of consumers have no realistic means of accessing the wholesale, retail, balancing, reserves and other system services markets, as few demand response service providers exist in Europe. Only the very largest industrial consumers, with their own bilateral power purchasing agreements can participate and only on a limited level. Aggregation service providers ensure healthy competition in the markets between innovative players, all working to involve consumers in a range of demand response programs. However, today, the market roles and responsibilities are unclear, and do not allow for direct access of consumers to service providers therefore they do not offer them a clear path to market. Moreover, the lack of appropriate definition in most Member States increases risk for all parties and enables abuse. The EU is promoting more and more the role of end-users as active energy actors introducing new rules that enable active consumer participation, individually or through energy communities, in all markets, either by generating, consuming, sharing or selling electricity, or by providing flexibility services through demand-response and storage. To this aim, the revised Renewable Energy Directive (2018/2001/EU) aims to strengthen the role of renewables self-consumers and renewable energy communities, while in the Clean Energy Package active consumers have been formally recognized and the concepts of Citizen Energy Communities (CECs) and Renewable Energy Communities (RECs) have been introduced. In addition, the newly launched Digital Europe programme focuses on bringing technology to businesses, citizens and public administrations and can contribute to supporting the energy transition towards more consumer-oriented structures through the adoption of advanced digital tools and technologies. In this context, CINESIS will develop new business models such as aggregation, virtual power plants and other distributed energy resource platforms that offer great promise for enabling demand-side flexibility and will explore potential recommendations supporting the EU policy and regulatory framework. It will thus provide recommendations in the context of EED regulation, which is being currently revised, with regards to

the role of demand response in energy transformation in relation to transmission and distribution (Directive 2012/27, Art. 15), as well as being in line with the Directive on the internal Electricity market with regards to the cooperation between distribution system operators and transmission system operators (Directive 2012/27, Art. 57). Moreover, CINESIS will exploit any relevant with the project's objective results from other projects carried out under Digital EU programme and will establish synergies with other projects of the BRIDGE initiative.

1.1.4 Ambition and relation to the state of the art

CINESIS relies on several paradigms to achieve its objectives. The project targets the development of advanced solutions that will enable cross-vector flexibility potential of consumers to provide energy/flexibility services to DSOs and TSOs. The Innovative Areas (IAs) tackled by the project, and how CINESIS aspires to address them by going beyond the state-of-the-art, are reported below. **Considering the demonstration of many of these innovations to be performed in CINESIS Demos, it is possible to consider that CINESIS novelties and enabling technologies will be brought up to at least TRL7, thanks to a robust pan-EU demonstration campaign.**

Consumer-owned flexibility resources monetization (All)

***KER**: CINESIS Platform*

SoA: Currently, aggregated small-scale demand has limited opportunities to participate in markets. Flexibility resources operate in most cases "as silos" from an ICT/management, business and hardware (referring to the equipment enabling assets' flexibility) point of view. Although system flexibility markets using conventional generation are more mature and appear as natural extensions of already existing wholesale markets, designed to guarantee system ramping (using almost real time dispatching) while preserving traditional reserves, marketing DER flexibility products is still a matter of research, and although many recommendations and guidelines can be found, no real implementations are in place yet.[10] Therefore, there is a need for the different stakeholders of the energy value chain to cooperate and exchange knowledge regarding how existing balancing and wholesale markets can be developed to enable aggregated small-scale demand to participate.[11]

Beyond SoA: Making the different types of flexibility resources operate in coordination can be achieved through the development of new products in the markets, lowered barriers of entry and digital technologies that enable this coordination from a technical aspect. There are a variety of R&I projects, such as INTERRFACE and OneNet, that assess the optimisation of strategies and IT technologies used for exploiting consumer-centric flexibility potential. Building upon the knowledge gained in this field through the common partners involved also in these projects (UBE, EIG, UCY, CINT), CINESIS interoperable platform will provide in different contexts different services enabling the coordination of diverse energy assets portfolios. Also, CINESIS will investigate the necessary business models to increase consumer-owned flexibility resources' financial exploitation.

TSO-DSO coordination schemes for Balancing and Congestion Management (EIG, SWE)

***KERs**: F-Channel Platform, TRAIN2Grid*

SoA: There is a lot of research being conducted in potential TSO-DSO coordination schemes for providing balancing and congestion management services that will ensure optimal use of distributed energy resources. Some proposed coordination schemes for the collaboration between TSOs and DSOs, in the context of the procurement of ancillary services and local services, are the Centralized AS market model, the Local AS market model, the Shared Balancing Responsibility model, the Common TSO-DSO market model and the Integrated Flexibility market model.[12]

Beyond SoA: Building upon the TSO-DSO coordination schemes for Balancing and Congestion Management proposed by previous H2020 projects (SmartNet, CoordiNet, OneNet), CINESIS promotes data-driven scenarios demonstrating the provision of these services utilizing big data and AI driven energy services and introducing the role of prosumer in this market setup by integrating new features in the already existing **F-Channel platform**. These new features will include innovative AI algorithms for predictive consumer behaviour and congestion predictions, as well as for selection of the optimal points of connection for the DER, considering both the system's technical parameters and their geographical specificities. In addition, CINESIS will test, through the **TRAIN2Grid** tool, coordination schemes between electricity system and regional rail network operators for the provision of power flow control exploiting cross-sectoral flexibility potential to provide demand shifting and voltage control services.

Flexibility provision to the grid through demand response (UBE, R&D Nester, UCY)

***KERs**: AggreMan platform, iFLEX platform*

SoA: As demand-side flexibility platforms diversify, boundaries and labels become less relevant between VPPs, demand response providers and prosumers. Major utility companies further diversify their offerings into VPPs that include DR packaged with other forms of demand-side flexibility and/or generation. DSOs are more frequently sourcing flexibility locally and trying to defer or avoid grid upgrades and reinforcement by using among others local demand-side flexibility. This already is a practice in UK, NL, DE, NO either through third-party platforms or direct

[10] J. Villar, R. Bessa, M. Matos, "Flexibility products and markets: Literature review", Electric Power Systems Research, Vol. 154, 2018, , ISSN 0378-7796
[11] https://www.entsoe.eu/Technopedia/techsheets/aggregation-of-small-scale-demand
[12] H. Gerard, et al. "Coordination between TSO and DSO in the electricity sector: A conceptual framework", Utilities Policy, Vol. 50, 2018, ISSN 0957-1787

procurement by the DSOs[13]. However, data show that service companies have few experiences in DR so far, which is among others caused by the unfavourable regulation to participate in flexibility markets.[14] Other barriers faced are lack of standardization and of a framework for DR providers, data access/sharing and market fragmentation[15].

Beyond SoA: CINESIS proposes a new aggregation platform **iFLEX** that will connect 'horizontally' the flexibility potential of various activities of consumers and provide a digital platform that can facilitate demand response for the network operator in a secure way. Furthermore, the aggregation platform will allow the end users of various consumption profiles (i.e., residential, public authority, commercial, agricultural etc.) to exploit their flexibility on energy consumption while maintaining their comfort. Moreover, the **AggreMan** platform will allow peer-to-peer exchange of flexibility services between producers and consumers that are participating in the same aggregation framework. The **AggreMan** platform will be equipped with stochastic and robust optimization schemes to optimize the utilization of all the available resources in the aggregator's portfolio (i.e., RES, battery systems, etc.).

Cross-energy services and EaaS business models (RINA-C, UBE, UNITN)

***KER**: Business Models for cross-services, Consumer engagement practices*

SoA: EU energy utilities, ESCOs etc are already developing EaaS propositions, also considering the more and more common paradigm of aggregation and energy communities that will facilitate participation of consumers as electric market actors. The collaboration with telecommunications companies is also very relevant in order to guarantee a "Digital energy transition" and such companies are capitalising on their specific strengths to offer services in energy platforms. . The market is at such an early stage of development that companies looking to offer EaaS will need to form partnerships (also with local DSO, platform providers etc.) and collaborate to provide a full range of capabilities.

Beyond SoA: CINESIS proposes innovative business models to EaaS developers, energy utilities, DSO/TSO and end users (contractual/bill arrangements) combining energy services with other services, including mobility and home automation, as well as individual and collective self-consumption business models, also in order to reward behavioural changes that can facilitate grid effectiveness of CINESIS services. Moreover, CINESIS establishes a trusted architecture with an open governance and strong data security and ownership policies, which reduces the barriers to the creation of new EaaS business models for stakeholders in the energy services sector and consumers willing to monetize their flexibility in energy consumption. Aggregation and energy communities-oriented BM and contractual arrangements will be studied too.

Cross-sector flexibility provision (UCY, EVOLVERE, FBK)

***KER**: BuildIn Platform, CEDIS VPP*

SoA: According to an IRENA report, some of the technical requirements for implementing power-to-heat schemes are aggregation software with algorithms calculating the optimal operation of each unit, real-time communication between the aggregator and the hardware system, distribution system management software to ensure reliability and safe operations, while the regulatory requirements include the establishment of local markets for distribution system operators to procure services to avoid grid congestion and ensure reliability.[16] However, the electricity sector and the heating and cooling sector are managed in a decoupled way and therefore any flexibility enabled by their management under a common framework (in an integrated manner) cannot be exploited. Moreover, the massive increase of the solar power generation and the number of electric vehicles in recent years imposes the rapid development of new business models related to power-to-mobility and power-to-power via BESS.

Beyond SoA: CINESIS will explore the integration of electricity and heating/cooling sectors in order to increase the flexibility services provided by the consumer through the offered functionalities of **BuildIn** and **CEDIS VPP** platforms. On the one hand, the aggregator will be able to provide more grid services to the operators and create new business models at the aggregator's level, making the aggregator more dominant into the electricity market. On the other hand, through the proposed framework, the number of flexibility services that will be available for the TSO and DSO will be increased considerably. In addition, CEDIS VPP is promoting not only power-to-heat schemes(via heat pumps), but also power-to-mobility(via EV charging) and power-to-power(via BESS).

P2P capacity sharing (EE)

***KER**: P2P capacity sharing technical solution*

SoA: Both power grids and consumer electrical wiring are planned and built by estimating the potential energy consumption and peak loads. In order to connect a house to the power grid, customer needs to choose their main fuse rating, which should cover customers future peak loads. Based on this, distribution system operators (DSOs) size their grid capacity (power lines, substations etc.) to handle these potential loads from surrounding customers, using simultaneity factor for the load estimation. As the main fuse rating is usually fixed at the time of grid connection, on the one hand, there are a lot of customers who actually do not use their main fuse at its full capacity. On the other hand, there are a lot of customers for whom the rating of the main fuse is sometimes too low to cover their

[13] IEA (2021), Demand Response, IEA, Paris https://www.iea.org/reports/demand-response
[14] K. Wohlfarth, A. Klingler, W. Eichhammer, The flexibility deployment of the service sector - A demand response modelling approach coupled with evidence from a market research survey, Energy Strategy Reviews, Vol. 28, 2020, 100460, ISSN 2211-467X,
[15] European Smart Grids Task Force, Expert Group 3, Final Report on Demand Side Flexibility
[16] IRENA (2019), Innovation landscape brief: Renewable power-to-heat, International Renewable Energy Agency, Abu Dhabi.

consumption. To solve that, customers need to go for costly fuse rating increase and DSOs for grid capacity increases. **Beyond SoA**: The more we have flexible assets such as PV-panels, battery energy storage, smart devices, etc. the more we can adjust the time of consumption and increase the energy flow through the grid, during times of either low electricity prices or, for example, smaller CO2 footprint. However, the potential could stay unutilized due to the fixed and static main fuse. To unlock the full potential of smart flexible assets and demand response, a **P2P grid capacity sharing solution** will be proposed where customers' main fuse rating can be adjusted close to real-time which allows to utilize grid capacity to its full extent.

Relevant Innovation	TRL	Before CINESIS	Improvements of CINESIS
Modelling of CINESIS flexibility services performance on electricity markets	6 to 8	Currently, SAInt can run physical simulations of electricity networks, as well as optimization models of electricity markets.	The expected outcome of CINESIS R&D activity is the development of a new major application of SAInt's modelling capabilities. This new application will enable planners, operators, and other stakeholders to model CINESIS flexibility services in electricity grids/markets, understanding their remuneration and grid impact.
Cypriot demo			
Aggregator's management platform (AggreMan)	4/5 to 7	The aggregator's management platform (AggreMan platform) is based on optimization algorithms that will optimize the aggregator's business strategy, maximizing the profit from the electricity market by providing as many flexibility services to the grid as possible. The algorithms that run behind the AgreeMan platform were tested for proofing the concept of the platform.	In CINESIS, AgreeMan platform will be advanced considering real time data from different resources such as (weather/price/load forecasting data) in order to optimize the resources of the aggregator portfolio maximizing the revenue of the aggregator as well as the flexibility provided to the grid. In addition, the AggreMan platform will be advanced to enable P2P exchange between aggregator resources to maximise grid flexibility AggreMan platform will be developed tested in a relevant environment considering a real wind farm, the UCY campus and a residential prosumer.
Flexible consumer platform (BuildIn)	4/5 to 7	In the concept of the OneNet project a platform will be developed that will enable the communication with the prosumer in order to facilitate demand response capabilities. This platform will be like a middleware between the DSO and the prosumer and signals will be sent from the DSO to the prosumer to provide flexibility.	BuildIn platform will be enhanced, starting from OneNet outcome, enabling the provision of more flexibility by the residential prosumer to the grid via optimized algorithms for facilitating the integration of electricity and heating at building level. In addition, BuildIn tool will manage different flexibility resources such as PVs, BSSs, EV charging stations, and flexible thermal loads and it be designed for residents' comfort.
Portuguese demo			
Flexibility forecasting engine module	6 to 7	The flexibility forecasting module was developed in the IANOS H2020 project and demonstrated in a relevant environment.	CINESIS will further enhance the functionalities of this module, in order to be compatible with the requirements of the iFLEX platform, and it will be demonstrated in an operational

			environment in Madeira.
Matchmaking software component	6 to 8	Semantic reasoners use ontologies to provide inference using forward or backward chaining. Several of these tools are available as open-source software.	CINESIS will implement a matchmaking software component by adapting a reasoning engine to the concepts used in the flexibility services, so that stakeholders whose data / algorithmic requirements / business interests match can be put together automatically.
DLT with smart contracts tailored to the flexibility use case	5 to 7	Permissioned DLTs are used to record transactions in flexibility markets at scale, for instance in the EQUIGY platform.	CINESIS will develop new smart contracts which go beyond transaction recording and include information about data access, data usage and involved algorithms for maximum transparency.
Algorithms for forecasting, aggregation, and dispatch	6 to 8	HSLU has developed several algorithms in national and international projects, such as Energy4Me and KnowlEDGE. These algorithms have been validated on real data.	Within CINESIS, the algorithms will be further refined and adapted to include new features, such as probabilistic forecasting.
Distributed software architecture including DLT, trust management and match making	5 to 8	A concept for the SINA, the distributed architecture that embraces all the needed functionalities has been already developed.	In CINESIS, the software architecture which orchestrates the building blocks mentioned above will be developed and deployed.
Italian demo			
Software for optimized energy scenarios based on EnergyPLAN + MOEA	6 to 8	The EnergyPLAN+MOEA software was developed by FBK in 2016 to be applied in the definition of cost-optimized decarbonisation scenarios in multiple contexts: cities[17], valley[18], counties[19], industry (refinery)[20], considering multiple technologies in electric, thermal, transport and industrial sectors. It was applied in the FP7 CIVIS and H2020 STARDUST project.	EnergyPLAN+MOEA software will be further developed to evaluate the optimized integration of multiple flexibility sources (e.g., BESS, heat pumps, EV charging), evaluate their benefits in the energy system (decarbonisation potential, DSO and TSO grid management) and simulate new business models for consumers
Software for electric grid dynamic modelling based on Modelica and open-source libraries	6 to 8	The Modelica language has been extensively used for modelling complex systems either combining different physics or different components. Some open-source libraries have been developed for dynamic modelling of simple energy communities, electric grids and sector coupling (e.g., NZEC, TransiEnt) however these developments remain separate: the different scales (from consumer to grid) still have to be integrated and integration of measured data is missing.	In CINESIS a new open-source library will be developed exploiting existing libraries whenever possible. The new library will enable multi-scale modelling from single home to electric grid also integrating optimization algorithms for the management of multiple flexibility sources (e.g., BESS, heat pumps, EV charging) and data-driven models based on measured or forecasted data.
AI for predictive analysis of energy flows and	6 to 8	Over the past three years, within industrial research projects, FBK has developed strong skills in predictive energy analysis which	Software will be further developed with the addition of new predictive models for energy flows forecasting

[17] Mahbub, M.S., et al.., 2016. "Combining multi-objective evolutionary algorithms and descriptive analytical modelling in energy scenario design". Applied Energy, 164, pp.140-151
[18] Mahbub, M.S., et al.., 2016. Designing optimized energy scenarios for an Italian Alpine valley: the case of Giudicarie Esteriori. Energy, 116, pp.236-249; Mahbub, M.S., et al.., 2017. An innovative multi-objective optimization approach for long-term energy planning. Applied energy, 208, pp.1487-1504
[19] Viesi, D., et al. 2020. Integrated and dynamic energy modelling of a regional system: A cost-optimized approach in the deep decarbonisation of the Province of Trento (Italy). Energy, 209, p.118378
[20] Lund, H., Mathiesen, B.V., Østergaard, P.A. and Brodersen, H.J., 2021. Book of Abstracts: 7th International Conference on Smart Energy Systems

optimization of building energy management (RiSING tool)		have been translated into a microservices software platform composed of mathematical and AI models applied to big data. In the past, these analyses have been applied to both the industrial and the retail world, always with the aim of optimizing production and energy consumption and minimizing CO2 emissions.	and building energy management optimization. It will apply AI to predict energy produced, consumed, stored and sold based on both historical and real time data for every building in the CEDIS demo site. This information will be made available to users through a personal web dashboard.
Cloud platform called "EugenioCloud" for aggregation of flexibility services	6 to 8	EugenioCloud is a cloud-computing platform developed by Evolvere in 2018 and in constant improvement phase. EugenioCloud operates in the residential sector, monitors PV systems on rooftops, regulates the charge / discharge of residential batteries, maximizes the individual self-consumption, can regulate the operation of household equipment, can coordinate integrated photovoltaic-battery systems so that a community energy supplies a balancing service to the electricity grid operator.	EugenioCloud will be further improved. The control of residential heat pumps and EV charging stations will be applied to a wider variety of manufacturers. EugenioCloud will include energy management optimization for buildings. EugenioCloud will be a more powerful platform because it will be an inclusive part of the smart interoperability architecture for flexibility in energy markets proposed by CINESIS. EugenioCloud will enrich its energy systems management models, adopting the point of view of the electricity grid operator as well as the consumer.
Bulgarian demo			
F-Channel platform new functionalities	6 to 7	The F-channel, which will be developed further in scope of the CINESIS project, was created during the HORIZON 2020 project and demonstrated on the real-life system of Greece.	Platform will be adapted to accommodate the needs of BG power system and expanded, so the new options (locations optimization and the connection points of the RES and the AI-based prediction of demand behaviour, among others) can be included.
Irish/Croatian demo			
TRAIN2Grid tool	6 to 7	Smart Wires technology has been deployed as part of the Horizon 2020 FARCROSS project to demonstrate the technology can support cross border capacity in various way	In CINESIS the technology will be deployed to solve a new problem and facilitate integration of rail and transmission networks.
Estonian demo			
EMS Controller in client premises	6 to 8	The technologies exist and have been used in various demo projects.	The readiness and usability of the technology in the project is confirmed.
Cloud based control (Smart servers)	6 to 8		
Transformer main controller	5 to 7		
Consumer P2P platform	5 to 7	The technology behind the development exists, but the service layer has yet to be developed.	Capacity forecasting and trading tools information will be made available to users through a personal web dashboard.
Capacity forecasting and trading tool	5 to 7		The software will be developed with the addition of new predictive models for energy flows forecasting and building energy management optimization. Specifically, it will

			apply AI to predict the future amount of capacity available based on both historical and real time data for every building in EE demo

1.2 Methodology

1.2.1 CINESIS Concept and Approach

CINESIS project **proposes an interoperable platform of tools that unleashes the cross-vector flexibility potential of consumers to provide energy/flexibility services to DSOs and TSOs**. These tools are already being developed in national and international innovation projects and mainly: a) promote data-driven scenarios for TSO-DSO coordination schemes for Balancing and Congestion Management services; b) foster the end-use sector coupling approach in local energy grids as new 'resource' for flexibility provision; c) are built on the basis of a customer-oriented approach for business models and market designs that are explicitly linked to the wholesale markets, so that to incentivize citizens as active energy market participants; d) aim at strongly affecting the system management up to DSO and TSO level for deferring conventional infrastructure investments

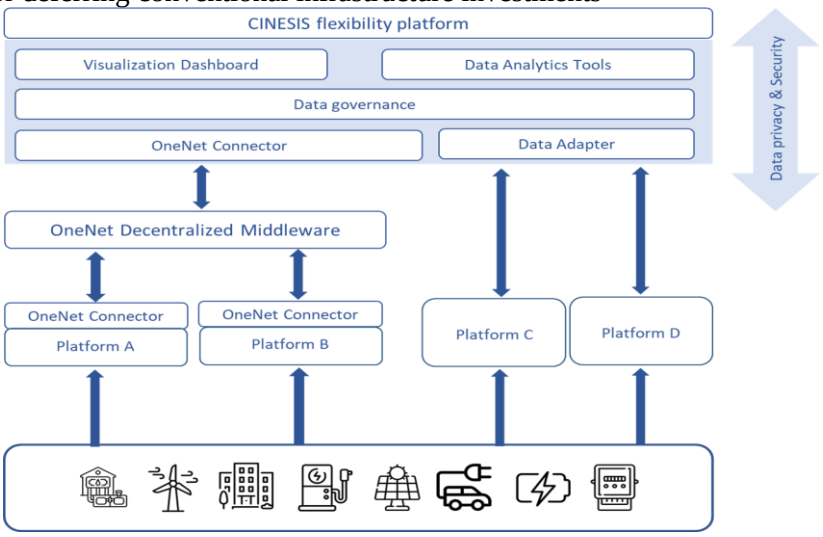


Figure 2 – CINESIS Concept

.The platform offers a scalable, simple-to-expand and secure framework and provides functions that include:
Visualization Dashboard (UBE): Each user according to his role will have access to a different dashboard with content ranging from analytics results, graphs, recommendations, tips and other useful insights. The access to specific views and data will be secured and only authenticated/authorized users will be able to interact with the dashboards.
Data analytics (UBE, RINA-C): The descriptive and predictive analytics will deliver useful insights for each stakeholder, prosumer, TSO, DSO and aggregator. CINESIS platform will offer historic and aggregated analytics, specialized optimization algorithms, correlations between variables, impact of recommendations on energy usage behaviour, impact of the interaction of the users. Through this module flexibility analytics, demand/generation forecasting, and local energy management analytics will be available to the platform's end-users, as well as to flexibility services providers also to develop suitable contractual/rewarding arrangements.
Data governance (UBE, UCY): It comprises the set of components such as connectors, identity provider, broker, etc. which ensures data security, privacy and sovereignty (i.e., the data is shared and utilized according to the specific agreements signed by the different stakeholders).
Data Privacy & Security (UBE, CINT): Vertical layer that assures end-to-end secure data exchange and manipulation during the whole cycle of data processing and handling. This layer keeps all communications in encrypted channels and manages the users' authentication/authorization, keeping logs of all user and system actions.
To ensure as wider interoperability as possible, CINESIS platform will enable the connection of platforms also through the use of a decentralized middleware layer, which is being developed under the OneNet H2020 project[21]. This middleware enables a secure and trust end-to-end data exchange between OneNet participants through the use of OneNet connector, which follows the standard IDS specifications and is responsible for the execution of the complete data exchange process.

CINESIS activities are focused on the **design of an ecosystem of solutions aiming at successfully integrating the aggregators and prosumers in the existing wholesale and local energy markets through advanced digital tools while promoting EaaS business models that combine energy services with home automation and**

[21] https://onenet-project.eu/

mobility services. To do so and to target project's expected outcome various enabling innovations will be developed/tested within 6 demo sites in 7 EU countries.

The CINESIS interoperable ecosystem, that will constitute the backbone for all demonstrators' support, will assure the replicability and scalability potential of the proposed solution by adopting a development approach based on the standardized SGAM framework. CINESIS solution architecture comprises of: 1) A **Components and Communication layer**, which provides the means to collect data being generated by the employed sources of CINESIS architecture. These data sources include SCADA systems, substation meters and power flow controllers from system operators, data collected from the consumers, in terms of the assets and smart appliances they possess, storage systems, RES systems, building sensors etc. 2) A **Function layer**, that will act as a virtual working space for the different tools and modules of CINESIS architecture and will consume the data from the individual tools and use them to offer in the above layer (business layer) the required services. The individual tools include tools focusing more on the consumer side such as BuildIn and P2P capacity sharing platform, on the aggregator side, such as AggreMan, CEDIS VPP and iFLEX, and on the system operators' side, such as F-Channel and TRAIN2Grid, covering that way the full energy value chain needs. 3) A **Business layer**, that will allow the provision of cross-industry services and cross-sector integration and facilitate the maximization of aggregators' revenues. The business layer will also incorporate high level processes for enabling the consumer to take advantage of the data provided and use them for receiving services of better quality and of environmental and innovation value.

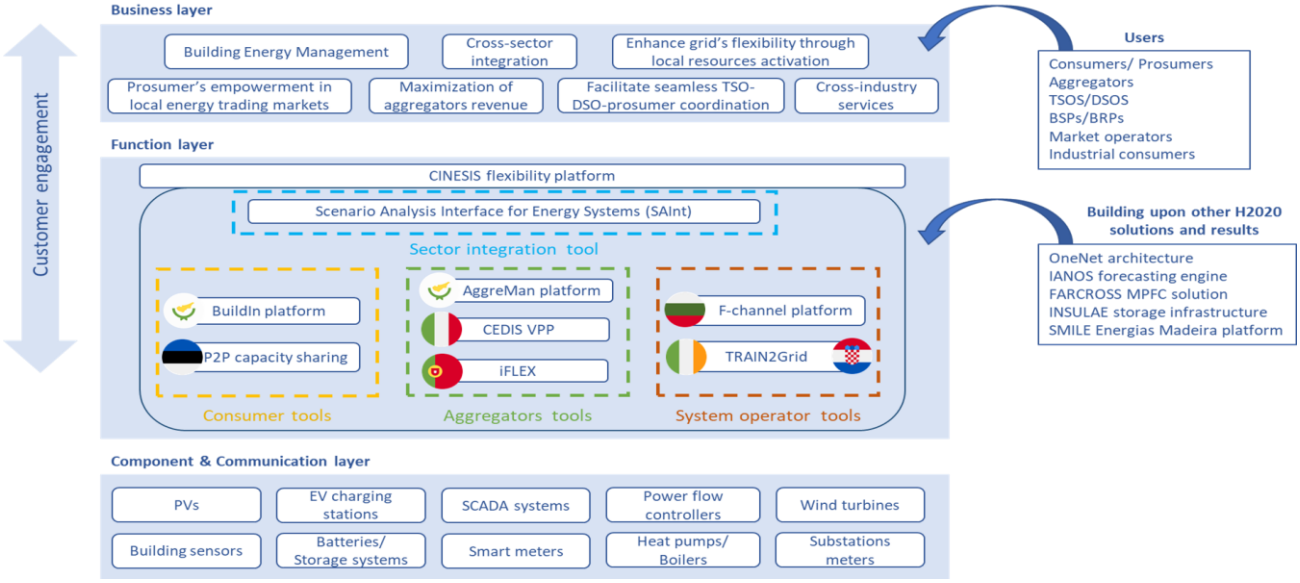


Figure 3: CINESIS platform conceptual architecture

KEY TOOLS

The CINESIS integrated platform for flexibility management and holistic planning, that constitutes the backbone for all demonstrators' support, comprises of the following tools:

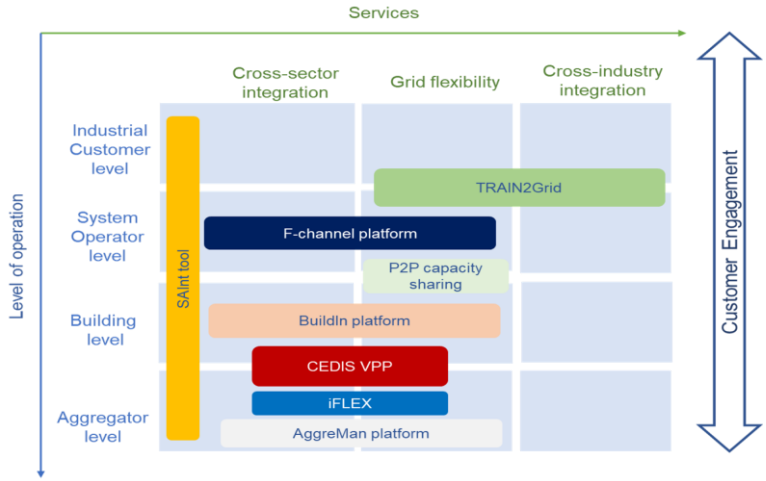


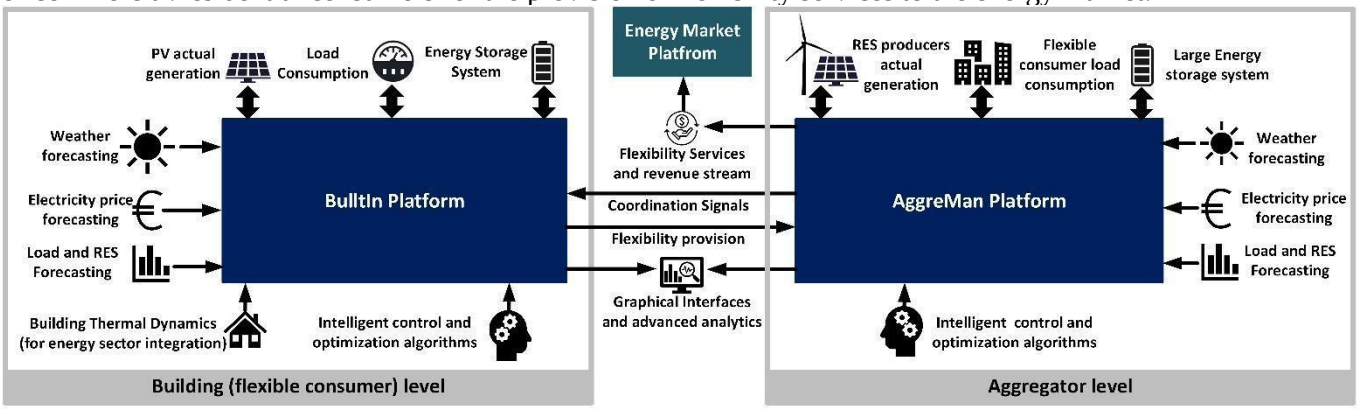
Figure 4: CINESIS individual tools mapping against services/level of operation

Tool	*Partner*	*Flexibility asset to be managed*	*Demo*	*Flexibility services offered*
AggreMan	UCY	Wind power plant, PV plants, ESSs, flexible consumers	Cyprus	Balancing and congestion management

BuildIn	UCY	Campus buildings, central district H&C system, EV-chargers, ESSs, PV plant	Cyprus	Demand response and phase balancing
CEDIS VPP	EVOLVERE	BESSs, Heat pumps, EVs charging stations	Italy	Congestion management and voltage control
iFLEX	UBE	EV-chargers, V2G chargers, PV plants, BSSs, water heaters, and flexible loads from commercial buildings	Portugal	Frequency control, congestion management, black start and voltage control
F-channel	EIG	PV plants, Wind power plant, EV-chargers, flexible loads from residential and commercial buildings	Bulgaria	Congestion management, Demand response, Frequency control, Voltage control
P2P capacity sharing	EE	Residential households	Estonia	Congestion management
TRAIN2Grid	SWE	Traction substations, transmission and distribution lines (grid-side flexibility)	Ireland & Croatia	Power flow control enabling voltage management and demand response
SAInt	ENC	Services and flexibility potential studied in the project	All demo	Model the EU electricity market to study the impact that the flexibility of sector integration, such as the one demonstrated in the pilots, can have on the EU bulk power system level and on the EU electricity market

AggreMan platform (UCY)

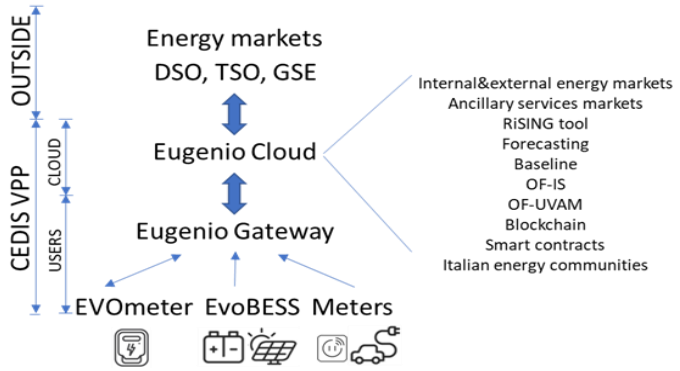
In the Cyprus demo sites two platforms (BuiltIn and AggreMan) will interoperate to maximise the Renewable Grid integration and local self exploitation thanks to an active engagement of residential users, working at aggregator and building level. The aggregator's management platform (AggreMan platform) optimizes the aggregator's business strategy, maximizing the profit from the electricity market by providing as many flexibility services to the grid as possible. The AggreMan platform takes information from the market and weather/price/load forecasting data in order to provide intelligent decision support and coordination signals to the aggregator's assets (i.e., RES producers, flexible consumer, energy storage, etc.) for maximizing the overall revenue. Through the AggreMan platform, coordination signals will be sent to flexible prosumers (through the BuildIn platform) to facilitate the participation of commercial/residential consumers for the provision of flexibility services to the energy market.



BuildIn platform (UCY)

Building upon the knowledge learnt in previous H2020 projects, such as OneNet, a platform for integration of energy sectors at a building level (BuildIn platform) will be developed, facilitating electricity-heating integration (P2H integration), by optimally managing the operation of commercial/residential buildings. Different flexibility resources at the building level can be leveraged, such as PVs, BSSs, EV charging stations, and flexible thermal loads through P2H integration. The potential flexibility can be exploited (through the AggreMan platform) by offering services to the system operators, and thus increasing the profits for the building owners, without compromising the end-user's comfort. The platform will receive measurements from building sensors (i.e., temperature, indoor air quality, etc.), electricity consumption meters, PV inverters, and battery devices to optimally manage the consumer operation considering both the thermal comfortness level of the users and efficient use of electricity.

CEDIS VPP via EugenioCloud Platform (EVOLVERE)

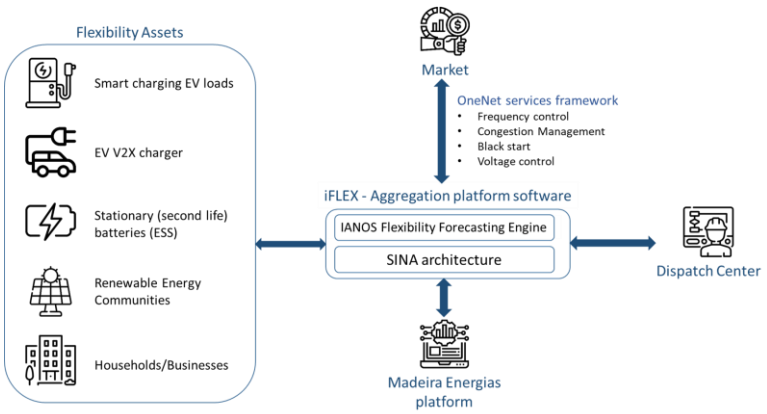


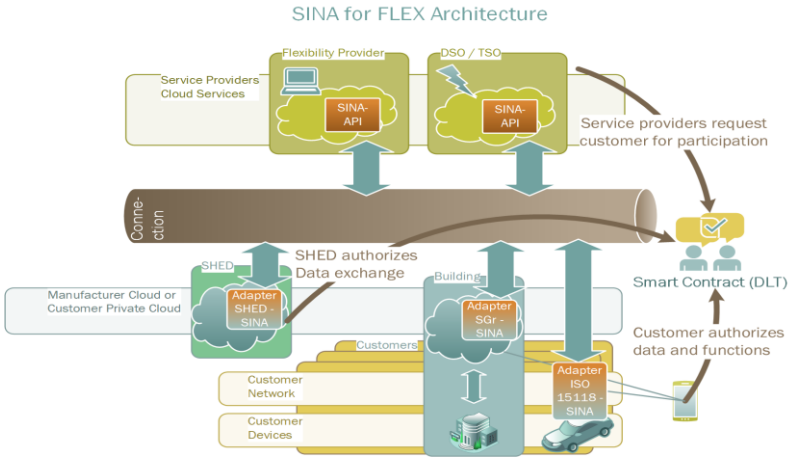
CEDIS VPP aggregates customer-owned flexibility, based on smart BESSs, heat pumps and home EVs charging stations, to monetize them in multiple energy markets and turn them into cash generators. Through the cloud platform called "EugenioCloud", the power flows of hybrid systems composed of PVs, BESSs, heat pumps and EVs charging stations, installed in residential households, are managed. The platform elaborates the aggregated forecasts of productions and loads, identifies the baseline of the virtual aggregation and applies ML and AI algorithms providing innovative solutions in the CEDIS energy community framework. As a cornerstone of CEDIS VPP, the RiSING tool is developed, i.e., a predictive analytics tool using AI techniques for energy flows forecasting and building energy management optimization. Specifically, it conducts predictive analysis using AI techniques of the amount of energy produced, consumed, stored and sold at 24-48h (and longer term if needed) based on both historical and real time data. These data will be accessible for the consumer through a dedicated dashboard. Moreover, optimization of building energy management plans will be carried out, based on the expected consumption, the contractual plan, the weather forecast, the PV production forecast and the availability of the flexibility assets (BESSs, heat pumps, EVs charging stations). This management optimization will be based on the control of energy flows and the management of purchase/storage/sale choices in an automated manner through the Evolvere system. Security aspects of the Evolvere system will be also analysed, suggesting modifications and improvements. EVOLVERE will develop a cloud platform, named EugenioCloud, along with a set of edge devices that Evolvere designs and produces, all orchestrated by the Eugenio gateway. To date, the cloud platform manages the power flows of hundreds of hybrid PV & lithium-storage (PV-BESS) systems installed in as many residential households. The cloud platform elaborates the aggregate forecasts of production and loads, identifying the baseline of the virtual aggregate, and applies ML and AI algorithms to provide the more recent and innovative solutions in the energy community framework. OF-IS and OF-UVAM are the main software the cloud platform executes, while OF-IS optimizes the operation of PV-BESS systems, reducing the overall costs for electricity bills, managing energy trading between the peers and from / to the external market. OF-UVAM optimizes the operation of PV-BESS systems to participate in the dispatching services market. EugenioCloud also integrates the management of renewable energy communities in the Italian regulatory framework, in accordance with the rules established by *Gestore dei Servizi Energetici* (GSE). The local controller, Eugenio gateway, acts as a smart gateway between the cloud platform and Evolvere's edge devices. Eugenio gateway also allows the integration of any edge device of third parts on the condition that such device communicates via Wi-Fi or Z-Wave and implements the open protocol designed by Evolvere based on MQTT protocols. Among Evolvere's edge devices, EvoMeter acts as a smart meter, it measures power flows with a 1-minute time resolution and sends them to the cloud platform. Lastly, a blockchain wallet certifies all energy measurements / transactions. EvoBess is a further Evolvere's edge device that allows the cloud platform to remotely control the charge / discharge of BESSs. Worth noting that cloud-based platforms, available on the market today, control residential BESSs using the application program interfaces (API) of the BESSs manufacturers. On the contrary, EvoBess avoids the use of third-party APIs, adopting a robust local communication to directly regulate the charge/discharge of many BESSs, produced by manufacturers such as Sonnen, Solaredge, ABB/Fimer, Solax, Zucchetti etc. In this project the Eugenio gateway will also integrate, on a residential level, smart heat pumps and smart EVs charging stations, in order to also include these distributed energy resources in the optimization algorithms of the EugenioCloud platform. Moreover, Evolvere's cloud platform will implement the novel optimization models and algorithms developed by FBK (RiSING tool), including forecasting and predictive analyses of the amount of energy produced, consumed, stored and sold. In doing so, the Evolvere's cloud platform will integrate building energy management optimization to manage energy trading/exchange in the internal/external market and the participation in the ancillary services market. This approach will promote the exploitation of renewable energy sources, the strengthening of energy community projects, the application of the functionalities of blockchain technology, and specifically Smart Contracts.

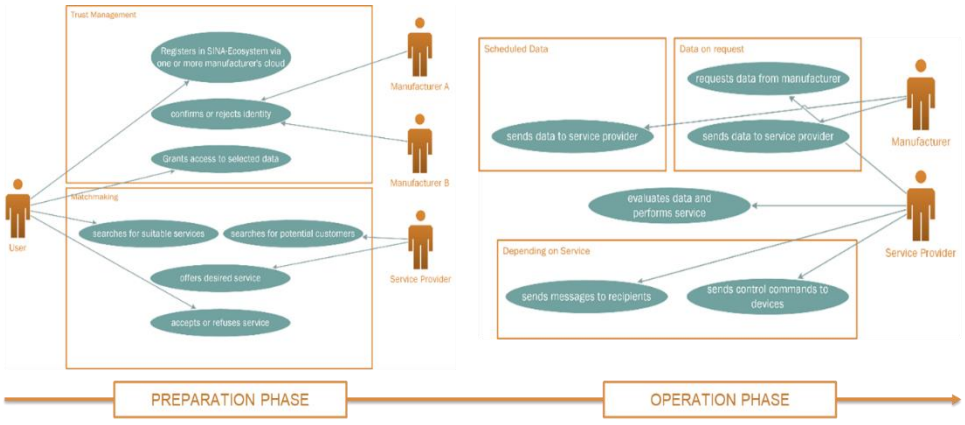
iFLEX (UBE)

A new kind of flexibility aggregation platform (iFLEX platform) will be developed, building upon the work conducted in other H2020 projects, such as IANOS, SMILE, INSULAE and OneNet, that unifies all forms of existing and new distributed flexibility assets in a single control layer and simplifies their management. This new aggregation platform can be leveraged to optimize the aggregator's portfolio by offering services to the operators. It will connect 'horizontally' the flexibility potential of various activities of consumers, by providing a digital platform that can facilitate demand response schemes for the network operator. Furthermore, the aggregation platform will allow the

end-users of various consumption profiles (i.e., residential, public authority, commercial, agricultural etc.) to exploit their demand-side flexibility, while maintaining their comfort. The flexibility assets will come from previous projects developed in the islands, mainly: H2020 SMILE, H2020 INSULAE and "Porto Santo Sustentável - Smart Fossil Free Island", where sector specific control algorithms have been developed and tested. Various flexibility needs on all voltage levels can be tested, considering the product and services frameworks defined in the OneNet H2020 project, including frequency control, congestion management, black start and voltage control.





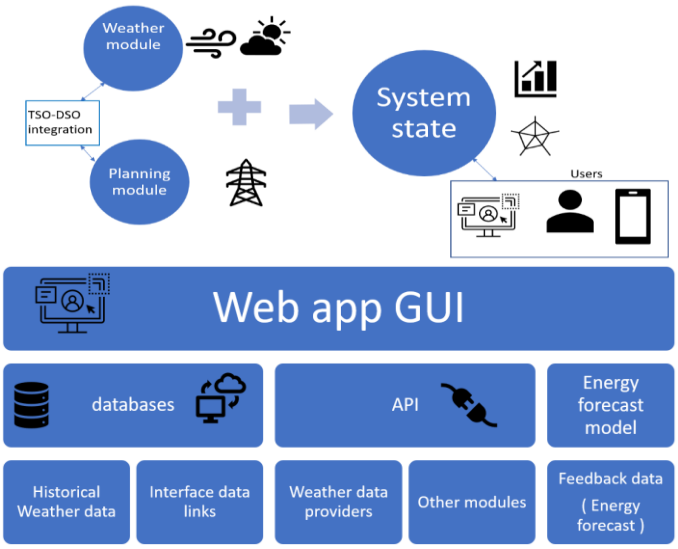


The iFLEX platform will be based on SINA architecture, which relies on established building blocks, i.e., authentication, software adapters, messaging services, APIs, encryption, and distributed ledger technologies (DLTs) to realize a distributed system establishing interoperability in a trusted environment among several stakeholders, without the addition of extra hardware gateways. No extra hardware is needed because SINA leverages manufacturer clouds to serve existing communication channels. The SINA architecture relies on a module to perform functions such as authentication (of customers, manufacturers, and service providers) and matchmaking between stakeholders. The module exposes an API and runs in a software container which is hosted within existing infrastructure by each service provider. Stakeholders using SINA either integrate the SINA module or implement an adapter which can translate the data protocols to be compatible with the SINA ecosystem. No new hardware is needed, which reduces the cost of deployment dramatically. The matchmaking process recognizes which service providers, manufacturers and potential customers could be matched to provide a service. The process relies on descriptions of data type and quality provided by a user or needed by a service provider. Customers willing to opt in for a service use an app to approve the use of their data for the sole purpose of delivering the service. In our demonstrator, the customer is offered remuneration in exchange for providing flexibility in the energy consumption by electric vehicles, boilers, and heat pumps. The demo will showcase primary and secondary control, leading to increased self-consumption for the building owner and load shaving from the point of view of the DSO. The data communication occurs between edge and cloud devices through SINA adapters and APIs. SINA uses adapters to integrate existing protocols, such as SmartGridready (SGr), EEBus, ISO 15118, etc. SINA uses smart contracts which define which user data can be used and how a service provider can act on the available devices. For the demonstration we will use an open-source enterprise-grade permissioned DLT which offers scalability, trust, and performance. The preparation and operation phase implemented by SINA are shown in two pictures on the left.

Moreover, the iFLEX platform will employ the flexibility forecasting engine developed by UBE in the context of the IANOS H2020 project, by further developing enhanced functionalities to include more end-user's assets, with a greater granularity (appliance level flexibility potential forecasting) to fit to the requirements set by the CINESIS demonstrators. Specific business models and market opportunities will be developed and tested for the context of

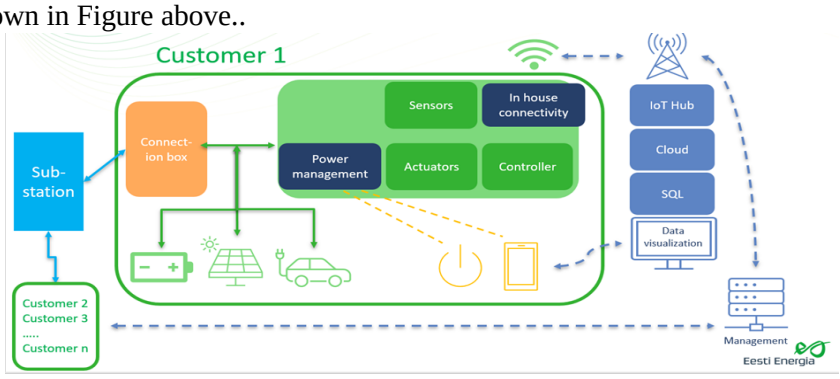
liberalized electricity markets. This could accelerate the adoption of flexibility services provided by the consumers/prosumers while facilitating its integration in the electrical system. The technical validation of the developed solutions for all flexibility services will be demonstrated in a real islanding operational environment, engaging consumers and exploring potential future connection with the mainland in the future from R&D Nester.

F-channel platform (EIG)



The F-Channel is an already existing digital platform that can demonstrate the setting-up of the flexibility market with various common products for TSO-DSO coordination. The core technologies of this platform are the forecasting module (ensuring predictability of the highly volatile RES generation and demand) and the coordination module, which considers the existing functionality and data of TSO-DSO key systems and utilize the flexibility platform for providing grid services (frequency and non-frequency) for the balancing and congestion management challenges. This approach for flexibility provision is built based on already demonstrated solutions in the context of OneNet and INTERRFACE projects. F-channel platform is capable of identifying flexibility resources more precisely and simultaneously for both DSO and TSO grid levels, as well as identifying the power system state and existing needs for flexibility services in a more accurate manner and considering longer time horizons compared to the currently used methodologies, while also covering wider geographical scope than the one covered today by national control centres and/or RSCs. Improved production/consumption predictions for the different voltage level entities are offered through improved forecasting efficiency achieved by increased spatial resolution, NWPs and AI integration into the short to mid-term power system planning simulations. The application itself does not depend on the exact product that is utilized within the market, or the market model itself, so it is possible to use it for different services and products and different market models.
CINESIS aims to build further on the F-channel platform by integrating a new layer in the existing solution that will facilitate the provision of big data and AI-driven energy services for TSOs, DSOs in cooperation with prosumers, or owners of assets that can provide flexibility (e.g., batteries, heating/cooling systems, EVs charging station), via intermediaries such as energy suppliers and aggregators. These new functionalities focus on the lower voltage levels prosumers, including residential consumers and local energy communities, that are usually not covered by the energy predictions in such a detailed way that can be achieved by F-Channel. The existing market models/setups, flexibility services and products based on improved high-resolution production and consumption forecasts will be further improved. The F-Channel architecture is shown in Figure above..

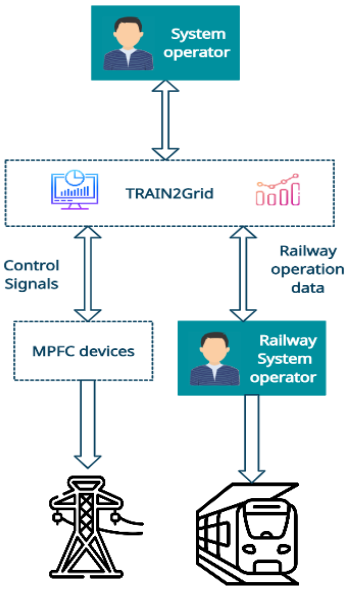
P2P capacity sharing (EE)



technical solution allowing P2P grid capacity sharing and utilizing the grid capacity behind DSO's medium voltage to low voltage (MV/LV) transformer is proposed. A control system platform connected to the DSO's SCADA system, billing and service modules are developed and the electric panels of the consumers are fitted with remotely controllable smart meters and main fuse. The connectivity to the control system is established through a cost-efficient but secure solution. A control system platform, which is connected to the DSO's SCADA system, as well as billing and service modules will be developed. SCADA system, as well as billing and service modules will be developed.

TRAIN2Grid (SWE)

A technical solution allowing the provision of power flow control and thus enabling demand response services by the railway network to the power grid will be deployed. To this aim, Smart Wires Grid Europe will deploy the patented SmartValve™ technology, which are modular, single-phase, static series synchronous compensators (M-SSSC) capable of injecting a variable voltage (leading or lagging) in quadrature with the line current.



This technology effectively increases or decreases a circuit's reactance. This deployment builds upon the work conducted in previous H2020 projects, by using the Smart Wires technology as facilitator for RES-connection (FLEXITRANSTORE) and cross-border trading (FARCROSS).
TRAIN2Grid approach will help operators drive the SmartValves by the analysis of interoperation of the railway system operation data and the grid data identifying areas where synergies between the two systems may increase grid flexibility. By using this analysis, the system will be investigated to determine the required power flow based on data stemming both from the power system operator and the railway operator to determine where the power will need to be controlled. This will allow assessment of the most appropriate place for a deployment and then demonstration that the power flow can be controlled as anticipated. This can be the first iteration of the TRAIN2Grid tool with a scoping document complete of where further development could enhance automated, as well as more dynamic control. Further, a Smart Wires planning tool will be utilised that can optimise the deployment of SmartValve solution's location to facilitate the RES utilisation in railway system operation, and railway network extension connection to the grid. Finally, the train operator will be able to explore modifications in the train timetable to optimize the operation, while respecting grid constraints and providing DR services.

SAInt (ENC)

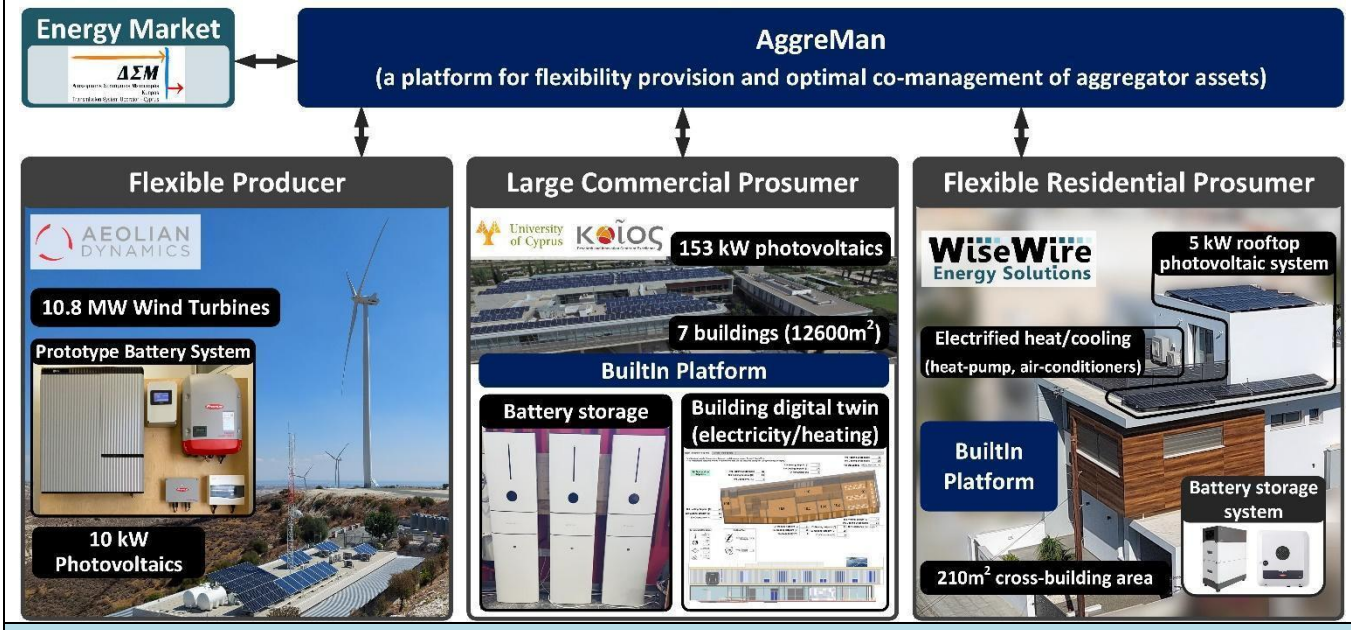
The Scenario Analysis Interface for Energy Systems (SAInt) is a planning software to model energy networks & markets, including electricity and gas. SAInt advances energy planning by allowing users to model coupled energy networks to quantify their interdependencies and synergies and plan their integration and coordination. SAInt's users can run physical simulations and optimization models to quantify the trade-offs between costs and reliability, and study the intersection of markets and physical systems. SAInt is used by a wide range of users for different applications. With SAInt's unique and modular capabilities, as well as its flexible and intuitive interface, you can better inform your planning decisions to reduce capital and operational costs, increase reliability and resiliency, and enable solutions to achieve decarbonization. We propose leveraging SAInt's capabilities to model electricity markets to study the impact of sector integration on the European bulk power system and electricity markets. encoord's commercial software SAInt can model electricity markets by running production cost models (unit commitment economic dispatch optimisation models) that simulate the optimal hourly (or sub-hourly) dispatch decisions of every generation, storage, and demand in an electricity market, taking into consideration generation, transmission, and other operational constraints. For instance, SAInt can be used to model European electricity markets, including day-ahead and balancing markets. The model can include every electricity generator, storage asset, and electricity demand in each balancing zone. It can consider the operational constraints of each generator and storage, the flexibility of each demand, as well as the transmission constraints between bidding zones across Europe. Figure above shows a snapshot of SAInt's Graphical User Interface (GUI) displaying a model of the European electricity market. Under the efforts supported by the CINESIS project, encoord will be able to leverage SAInt's modelling capabilities to model the European electricity market under a range of scenarios and conditions that represent different levels of sector integration at the local/distribution level. A model of the EU electricity market will be developed and implemented in SAInt to model will be used to study the impact of sector integration by considering different electricity consumption patterns and flexibility that results from the integration of different sectors (e.g., heating, transportation) at the local/distribution level, different distributed energy sources (e.g., distributed solar PV, distributed storage, etc.). SAInt's integration with RES resource datasets will be leveraged to model the spatial and temporal variability of wind and solar power on sector integration and the resulting impact on the bulk power system and electricity market.

DEMO INNOVATIONS

CINESIS supports a large-scale demonstration framework across 7 EU countries, with the aim to take under consideration the different processes, tools, business models and data generated/exchanged by multiple actors of the energy value chain, from different countries and regions, whose grids engage different assets.

DEMO 1: Cypriot Demonstrator
Pilot Location and General Description
This pilot demonstration will be located in Cyprus (Nicosia and Larnaca region) and will showcase the provision of flexibility services to grid operators and the wholesale market by the flexible producers and consumers. A key

objective of this pilot is to exploit an aggregator framework to provide new flexibility services to the grid and to facilitate consumers to participate in the electricity market. The main actors in the proposed demonstration are: 1) Aeolian dynamics as a flexible ***RES power producer*** (10.8 MW wind turbines and a pilot storage system); 2) the UCY campus as a ***flexible commercial consumer*** (7 buildings with 12600m2 cross-building area, 153 kW PVs, 15kWh batteries, electrified districted H&C system), 3) the WiseWire pilot building as a ***flexible residential prosumer*** (5 kW PVs, 5 kWh batteries, electrified H&C, web-based platform for automated energy management), and 4) the TSO Cyprus as a market operator. In this context, the BuildIn platform will be developed and integrated at the flexible consumer side for an intelligent energy management of commercial and residential buildings activating new flexibilities through the energy sector integration concept. In addition, the AggreMan platform will optimally manage the aggregator assets/resources to provide additional flexibility services to the grid and market operators and create new business models for the aggregator to maximize their revenue. The figure below briefly showcases the Cyprus demonstration concept.



Specific challenges

This pilot will aim to address the following main challenges:

- The consumers have limited access to the energy market and therefore, flexibility at the consumer level cannot be exploited by the system operator and there is no revenue stream for flexible consumers,
- The electricity sector and the H&C sector are managed in a decoupled way and therefore any flexibility enabled by their management under a common framework (in an integrated manner) cannot be exploited,
- The existing producers and consumers can provide limited flexibility services to the system which consequently affects the maximum penetration level for renewable energy resources.

Innovation addressed

This pilot demonstration will allow flexible producers and consumers to increase their revenue by providing new flexibility services to the wholesale market through the aggregator framework. In this context, the consumers will be able to participate in the market (through the aggregator) providing upward or downward flexibility or energy shifting services by exploiting their flexible resources. Towards this direction, the BuildIn platform will be developed and integrated in consumer facilities to automate the energy management of distributed resources (e.g., PV, batteries) and thermal loads. Intelligent optimization algorithms will be utilized to co-manage electricity resources and H&C facilities to enable the energy sector integration, reduce electricity cost and provide new flexibility services without compromising the users/residents comfort level. The BuildIn platform (at the consumer level) will cooperate with the AggreMan platform (aggregator level) to allow the peer-to-peer exchange of flexibility services between producers and consumers participating in the same aggregation framework.

The AggreMan platform will be equipped with stochastic and robust optimization schemes to optimize the utilization of all the available resources in the aggregator portfolio (i.e., RES, battery systems, flexible consumers, etc.). In this way, the aggregator can provide more grid services to the operators and create new business models at the aggregator's level, increasing the revenue and making the aggregator more dominant to the electricity market. At the same time and through the proposed framework, the number of flexibility services that will be available for the TSO and DSO will be increased considerably.

Assets tools/systems

a) Aeolian Dynamic Renewable Energy Park
   - Wind Power Plant (10.8 MW) with actual generation and forecasting data

- VESTAS SCADA system for monitoring the operating condition of the Wind Farm
- Photovoltaic system (10 kW) and a pilot battery system (9kWh) with a management platform

b) Social Facility Center (SFC) of UCY campus (large commercial prosumer, 7 buildings, 12600 m^2 area)
- Photovoltaic system with 153 kWp installed capacity and smart meters installed in each building
- Battery storage system 15 kWh/15 kW, fully controllable through EMPOWER platform
- A central electrified district Heating Ventilation and Air Conditioning (HVAC) system
- Digital twin of a building for modelling the electricity/heating/cooling behaviour of the building

c) WiseWire flexible residential prosumer (residential building in Nicosia with 210 m^2 cross-building area)
- 5 kWp rooftop photovoltaics, a 5kWh battery storage system, a fast-reporting smart meter
- Electrified heating/cooling system with heat-pumps and air-conditioners
- WiseWire Energy Box (hardware hub & web-platform) for energy management of buildings

d) TSO Cyprus : SCADA system for monitoring and controlling the Cyprus transmission system, Market Management system for the operation of the market

Supervisor and partners involved	Expected Results / Outcomes
UCY will lead the development and demonstration of this pilot, will design and develop the two digital platforms for the aggregator (AggreMan) and the flexible consumer (BuildIn), will provide its building infrastructure to facilitate the demonstration of a flexible commercial prosumer, and will develop intelligent control and optimization methods (that will be integrated into the two platforms) to enable the energy sector integration at the consumer level and to create new business strategies for the aggregator. **TPAD** is the owner of the wind power plant (10.8MW) that is equipped with additional PVs and a pilot storage system and will act as the energy supplier and a potential aggregator in this project. Aeolian will provide generation datasets and will regulate the pilot storage system to enhance the producer flexibility. The aggregator platform will be installed in their premises to regulate the operation of the producer according to new business strategies to increase the provision of flexibility and increase their revenue. **WiseWire** operates an intelligent web-based platform for energy management of a residential building (with PVs, batteries, and flexible thermal loads). WiseWire will contribute to the development of the BuildIn platform and will enhance this platform with management algorithms for reducing electricity cost, monitoring air-quality, and providing additional flexibility services, especially for residential consumers. **TSOC** is the transmission system operator and the market operator in Cyprus. TSO-Cyprus will provide knowledge and useful data for the operation of the market, will provide data about the overall operation of the Cyprus system, will facilitate the direct communication of the aggregator platform with the market, will provide evaluation comments regarding the provision of various services through the aggregator framework, and create different scenarios for validating the demonstration concept.	- Enable the participation of consumer to the energy market to provide flexibility services creating new business opportunities of the consumers, - Facilitate the energy sector integration, between electricity and heating/cooling sectors, to enable the flexible consumer concept through common management of both sectors, - Increase the flexibility services provided by aggregators (flexible producers and consumers) to the TSO level enabling the higher penetration of renewable energy sources. **DEMO KPIs:** 10% power provided by the consumer over the total real power needed for flexibility services; 2 MW flexibility provided through the energy sector integration; 10% MWh inter-exchanged increase between TSO and aggregators

USE CASES

UC#1.1: Optimal aggregation of resources for flexibility provision

Description: This UC has been already decomposed into the following ones:
- Frequency balancing service provision through flexible producers and consumers,
- Increase the controllability of the RES generation output by minimizing the power production variance,
- Peak load shaving at the aggregator level through the optimal management of flexible loads and resources,
- Reduction of the consumer energy cost and increase the revenue stream of producer through the peer-to-peer exchange of flexibility services between the two entities,
- Optimized capacity planning and trading performance of aggregator portfolios for stepped up market positioning (day-ahead, intra-day, balancing & AS markets),
- Close to real-time energy re-dispatch allocation for optimized profit,
- Pro-active day ahead optimization for reducing BRP-related penalties.

Replicability: This UC can be replicated for any aggregator with RES, storage, flexible consumer in its portfolio.

UC#1.2: Cross-sector electricity and heating integration at a building level

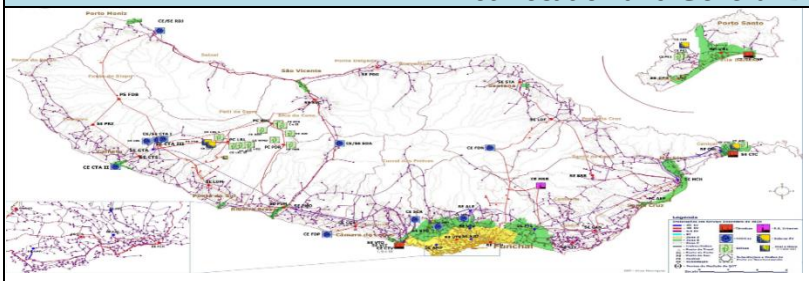
Description: Smart management of advanced ESS and flexible thermal loads at the prosumer level. Initially, this UC has been already decomposed into the following ones:

- Smart management of cooling/heating loads considering the thermal behaviour of the building considering the PV generation and the flexible ESS to facilitate the optimal energy sector integration,
- Enhance consumer power quality through intelligent phase balancing technique for ESS,
- Improve consumer power factor by online regulating the reactive power injection of PV-ESS inverter,
- Congestion management on distribution networks through coordinated, decentralized control,
- Manage the indoor air-quality and thermal comfort of the users/residents.

Replicability: This UC is replicable in any commercial or residential building equipped with flexible resources and thermal loads.

DEMO 2: Portuguese Demonstrator

Pilot Location and General Description



Madeira and Porto Santo islands are located in the Atlantic Ocean, an EU outermost region from the mainland. This demonstration will manage real world assets connected to a real grid environment engaging real consumers/prosumers in Madeira island. The prime mover of the economy is tourism, followed by civil works and agriculture, while in the electrical energy consumption, the residential sector is the main end use of electrical energy, with 32.1% of total energy consumption. Commerce and services, hotels, public lighting, public services and industry counts respectively with 27.4%, 19.0%, 8.9%, 7.2% and 4.1% of the total electrical energy consumption in Madeira island (774.80 GWh verified in 2019). Considering the same year, in terms of electrical energy generation, thermal power plants were responsible for 75.3% of energy emission, while 24.7% was provided by renewable energy sources: wind, hydro, solar and waste incineration. The island has an extension of land of around 801 km2 and a population of 262,000, of which 75% live in Funchal, the region's capital. Funchal, the Island's capital, is the most demanding area, energy consumption is no exception, which in 2019, accounted for 50.2% (388.91 GWh) of all electricity consumed in Madeira. In the west zone of the island, which accounts for 40% (320 PV units) of all distributed PV generation in Madeira (801 PV units), the demo will focus on flexibility that can be provided by the distributed generation units, but also by distributed storage assets.

In one LV grid of this region, there is a MV/LV (6.6/0.4 kV) substation with an installed capacity of 250 kVA, with 9 distributed PV generation units connected, total of 36.28 kW, and a storage unit (BESS installed in the scope of the H2020 SMILE Project) of 40 kW / 80 kWh connected directly to this substation.

All these assets have high potential to be used in flexibility provision to the energy system. In total there are 390 MV/LV substations scattered along the island with distributed PV units connected.

Specific challenges

Both Madeira and Porto Santo islands are electrically isolated and with electrical systems heavily dependent on fossil fuel imports. An important aspect is that finding areas with high potential to install new RES power plants is very difficult, due to the island characteristic (especially in Madeira), making the house rooftops one of the most interesting resources to install decentralized assets and increase the RES integration in the islands' energy mix. Moreover, the high population concentration in specific areas of Madeira island and the high density of commerce, services and hotels, creates an asymmetry of population distribution through the island's area, producing problems and opportunities associated with the particular needs in each area. In more remote areas of the island with less population compared to the urban centres, in some cases, the electrical grid is less stable, mainly due to the extension that the distribution grid must cover to bring power to the dispersed consumers. In one particular location of the grid, located in a rural deep valley, was installed a 100kW / 100kWh storage unit to mitigate the voltage oscillations verified in the area (in the context of H2020 INSULAE Project). This asset will also be included in the aggregation platform, contributing with the provision of flexibility to the power system.

In addition, the complexity of managing the isolated RAM electricity production system increases (even more), with an increasing integration of the share of RES in the production mix, associated with the variability of the endogenous resource. The diversity of energy requirements necessitates the introduction of flexibility services, mainly by using the potential existing in the control of private and public charging points, which have been following the growth of the island's EV fleet, and also from the HVAC systems of hotel facilities and large commercial surfaces. The last one has a high energy demand profile in the summer, which is the year time frame with less RES penetration due to the seasonal decrease of the hydro component in the energy mix.

Furthermore, a seamless integration of service providers exchanging data and performing actions on flexible loads is currently hindered by the need to install extra hardware in the form of gateways which perform an ad-hoc system

integration. Therefore, it is necessary to develop a solution that merges with existing infrastructures, leveraging existing connections to manufacturer clouds to provide the necessary functionalities. Together with a transparent and secure data policy, this will lower the barrier for the creation of flexibility markets.

Innovation addressed

To address the existing challenges, a new kind of aggregation platform will be developed that unifies all forms of existing and new distributed flexibility assets in a single layer control and simplifies the management by the energy system dispatch centre. The platform will utilize a smart interoperability architecture for flexibility which relies on authentication, software adapters, messaging services, APIs, encryption, and distributed ledger technologies (DLTs) to realize a distributed system establishing interoperability in a trusted environment among several stakeholders without the addition of extra hardware gateways. The physical demonstration will be deployed in different areas of the island with the objective of implementing and testing a variety of flexibility services adapted to the local needs.

By introducing flexibility in this type of loads, the system's dispatch will be able to shape better the energy generation plan for the whole island. The demonstration involves the following stakeholders: building inhabitants, facility managers, a DSO/flexibility aggregator and equipment manufacturers. The demonstration shows the matchmaking, where SINA puts the stakeholders in contact. The DSO proposes a predefined profile which describes (i) the data needed from the heat pumps, boilers, buildings, electric vehicles, and a smart meter data repository to compute the potential availability of flexibility and (ii) the financial remuneration for the different partners. The involved actors accept the offer and a smart contract containing the data access profile and algorithms is stored to the distributed ledger. The DSO can then send control signals to use the agreed amount of flexibility, which translates into modulating the electrical energy used by the heating systems and the rate of charge of EVs. The financial transactions are also stored on the ledger. Another great aspect of flexibility services is to reduce new investments and operations of new high-dispatchable power plants, allowing the end-user to be integrated directly in the electrical system, being an active part of its management, allowing the creation of new small-scale businesses. Various flexibility needs on all voltage levels will be tested, including active/reactive power support, frequency reserves, voltage stability etc. Specific business models and market opportunities will be developed for the context of liberalized electricity markets accelerating the adoption of flexibility services provided by the consumers/prosumers while facilitating their integration in the electrical system. The technical validation of the developed solutions for all flexibility services will be demonstrated in a real operational environment, engaging consumers in the Madeira island and a market integration will be demonstrated in a simulated market environment of the electricity system of Portugal.

Assets tools/systems

- EV-chargers, V2G chargers, PV plants, BSSs, water heaters, and flexible loads from different activities, i.e., hotels, restaurants
- Already installed and operated assets from previous projects in the islands
- DLT, DSO cloud infrastructure, user private cloud infrastructure
- Data-driven algorithms for forecasting, resource aggregation and dispatch
- Advanced simulation environment for DER orchestration and modelling
- Simulator for market environment to replicate the flexibility services to the TSO

Supervisor and partners involved	Expected Results / Outcomes
UBE is the developer of the iFLEX platform. **HSLU** will develop the technical implementation of the architecture, as well as the business models which will be tested in the demonstration. HSLU will implement the demonstrator first in a living lab under controlled settings and then at the demo sites provided by EEM. **R&D Nester** will test and validate the aggregation platform on a real time power systems simulator; integrate the aggregation platform in a simulated market environment for provision of ancillary services to TSO.	– Increase Madeira's system stability and resilience with the growth of RES contribution. – Connect the end consumer with flexibility provision and electricity market participation on the highest system level through digital technology and aggregators, – Integration from the prosumers into the energy sector and faster amortization of their electrical assets (if compensated somehow)Connect sectors and consumer activities (H&C, electromobility, water pumping, leisure activities etc. – Enable pre-qualification procedures for the participation in ancillary services markets in the developed aggregation platform. – Handle the data in a transparent and secure manner, gaining the trust of all stakeholders, especially of the data owners; – Standardization of the interface for data exchange and interoperability between distributed flexibility assets and aggregation platforms.

EEM S.A. is the real environment deployment of the platform and integration with the dispatch centre. **IST** will engage with local consumers/prosumers for the recruitment of participants to the flexibility provision; perform hardware/software adaptation of flexibility assets.	– Create a fully decentralized system not relying on extra hardware modules and sinking system costs providing a solution working across different systems (vendors, protocols, etc.) seamlessly, establishing a quasi-standard **DEMO KPIs:** 20 MW flexibility provided through the energy sector integration; 10% power provided by the consumer over the total real power needed for flexibility services; The SINA architecture runs on existing premises or, if not, the amortisation time of extra hardware is minimized; The app developed for the building inhabitants to authorize data usage should obtain at least 75/100 on the system usability scale (SUS); The SINA architecture should allow data exchange with low latency, unlocking also the most challenging frequency restoration scenarios. A latency of at most 2 s between a command being sent and an action taking place should be obtained; The SINA architecture allows the data interoperability for all the needed flexibility scenarios.

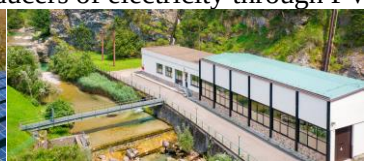
USE CASES

UC#2.1: Use of smart building data/controls for flexibility and assisted living services through iFLEX tool
Description: The main use case that will be covered is to use flexible loads and distributed energy resources to provide flexibilities to the DSO/TSO while offering a remuneration to the building inhabitants. The iFLEX platform, relying on the SINA architecture, will enable transparent exchanges of energy data and services while preserving privacy and data ownership. Energy data will also be used to provide assisted living services to the building inhabitants or their relatives in terms of recognition of anomalies, which could trigger warnings.
Replicability: This use case has a wide replicability, since it can be implemented in any ecosystem where energy data and controllable flexible devices are available.
UC#2.2: Provision of flexibility services to TSO in a simulated market environment.
Description: This use case will test and validate the aggregation platform on a real-time power system simulator considering the Portuguese continental transmission system, integrating the iFLEX platform in a simulated market environment for provision of ancillary services to the TSO.
Replicability: This UC will enable the replicability of the island use case by integrating it in a larger system and in an open market environment, exploiting the additional flexibility that can be provided by the controllable assets.

DEMO 3: Italian Demonstrator

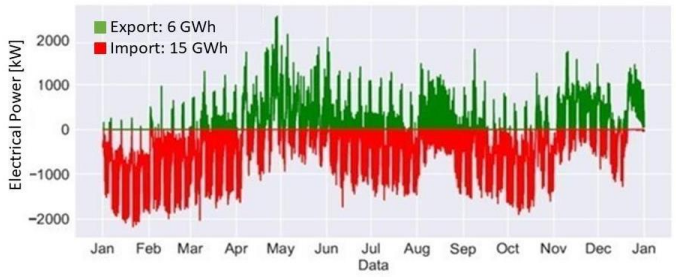
Pilot Location and General Description

CEDIS today produces, distributes and sells electricity, as well as telecommunications services. It has **4,500 customers**, **of which about 3,200 are CEDIS shareholders**. **CEDIS is one of the 77 Italian Electric Historical Cooperatives**: thanks to the ownership of electrical production plants and distribution grids it ensures to its members a **considerable economic saving in the bill** (up to 30-40 % compared to the national average) **correlated to the self-consumption of local energy production**. The supplied area (electric energy) has a surface of 148 km^2, includes 7,805 citizens and 3,136 families. The distribution network consists of a modern MV/MV cabin connecting to the national grid in Gaggio (Storo) and about 84 km of 20kV MV lines, of which about 53km are underground, connecting more than 70 MV/LV transformation cabins, the main ones are remote-controlled so as to minimise the duration of any malfunctions. The LV network is about 260km long and is almost entirely underground. Electronic remote-controlled meters are installed to measure production and consumption with 15min time resolution. The **electricity distributed is about 45 GWh/year (35 GWh/year for the shareholders), of which on average 18 GWh/year is self-produced by CEDIS hydro and PV plants.** Indeed, CEDIS owns **4 hydroelectric plants and 7 PV plants**. The PV plants are installed on roofs or on ground areas adjacent to some warehouses, while the hydroelectric plants are all run-of-river, except one of them that has a small water storage capacity. The total annual energy production of the CEDIS hydro plants is 16 GWh and of the CEDIS PV plants 2 GWh. Moreover, the local energy production does not only concern the CEDIS hydro and PV plants, other customers are in fact also producers of electricity through PV and CHP.


Overall, including CEDIS and all local customers, the production installed on the CEDIS network amounts to 16 MW of which 9 MW are PV, 5 MW hydroelectric and 2 MW (NG) CHP. A large share of the PV installed is self-consumed. Electrical injection shows considerable fluctuations because of hydro and PV variation in productivity.

Hydro injection dominates the overall total RES injection in the CEDIS area (accounts for 74% of the overall injection) and is characterized by a major peak in spring and a secondary peak in autumn. Injection from PV is also important (20%) and is provided by multiple distributed residential and industrial customers. PV productivity is characterized by one major peak in summer. In addition, there are some natural gas (NG) CHP systems (6%).
Figure on the left shows the energy exchange flow between the TSO (Terna) and the DSO (CEDIS) over a whole year. The share of energy fed into the TSO grid is about 6 GWh, while the energy withdrawn is about 15 GWh.



The main goal of CEDIS and its shareholders is to minimize exports by using the electricity produced internally as much as possible (through electrification, storage and other forms of flexibility).
The care and attention paid to the sustainability of local RES production have induced multiple local users to act: **about 10% of the CEDIS customers have their own PV** production plants (**430 PV plants**) and a total capacity of **300 KWh of BESSs** has been implemented in recent years thanks to national incentives (Ecobonus 110%) **for about 27 households**. The same incentives stimulated the installation of **heat pumps (20 installations)** and **EV charging points (10 installations)**. Overall, in scenarios characterized by the progressive electrification of the thermal and transport sector, **CEDIS intends to invest in the smart and aggregated management of new flexibility resources (i.e., BESSs, heat pumps, EV charging stations) in order to maximize self-consumption and at the same time maintain a high-quality management of its own electricity grid avoiding costly investments but making better use of existing assets.**

Specific challenges

The high-RES penetration even at the edge of the distribution grid, while provoking problems in the operation of the power system, offers the opportunity to new actors to increase their revenues. At the same time, a high number of flexibility resources exists (i.e., BESS, heat pumps, EV charging stations), increasing considerably the complexity of their operation due to the different protocols used for their control.

Innovation addressed

This pilot will demonstrate the provision of flexibility services by residential customers to electric grid operators from a VPP approach which optimally manages multiple resources, i.e., BESSs, heat pumps, EV charging stations, in an aggregated way while respecting grid constraints. Therefore, in the context of this demonstrator accurate grid monitoring takes place in synergies with simulation environments. In addition to that, novel optimization models and algorithms (RiSING tool), including forecasting and predictive analyses of the amount of energy produced, consumed, stored and sold will be developed and demonstrated.A cloud platform (EugenioCloud) will optimally manage energy trading/exchange in the internal/external market and the participation in the flexibility services market, favouring RES exploitation, and applying blockchain technology and Smart Contracts.

Assets tools/systems

- PV plants, Hydroelectric plants, NG CHP plants, BESSs, Heat pumps, EVs charging stations,
- CEDIS energy community

Supervisor and partners involved	Expected Results / Outcomes
CEDIS is the owner of the assets. CEDIS is one of the 77 Italian Electric Historical Cooperatives, has about 3200 shareholders, and involves the municipalities of: Storo, Darzo, Tiarno di Sopra, Tiarno di Sotto, Bondone, Lodrone, Baitoni, Riccomassimo, Bezzecca and Condino. **FBK** will offer the modelling capabilities and the development of the RiSING tool that will be demonstrated in this pilot. **EVOLVERE** will provide the EugenioCloud, the Eugenio gateway and the Evolvere's edge devices for the demonstration purposes.	– Dynamic modelling activities using Modelica language customizing existing open-source libraries – Modelling optimized decarbonization scenarios based on sector-coupling electrification and distributed flexibility services (EnergyPLAN+MOEA) – Developing and testing AI for predictive analysis of energy flows and optimization of building energy management (RiSING tool) – Developing and testing a cloud platform (EugenioCloud) for management of flexibility resources (i.e., BESSs, heat pumps, EV charging stations) installed in residential households – Testing data-driven energy services for consumers, in cooperation with various actors in the energy system **DEMO KPIs:** Involving 4,500 customers, 7,805 citizens, 3,136 families, 45 GWh/year of distributed electricity in modelling activities; Involving 50 CEDIS customers in RiSING and EugenioCloud development

USE CASES

The activities of this demo are structured upon two pillars: carrying out modelling activities and developing/testing smart tools for energy management. Hence, the following UCs will be demonstrated in Italian Demonstrator:

UC#3.1: Dynamic modelling activities will be carried out using Modelica language customizing existing open-source libraries.

Description: The Modelica language has been extensively used for modelling complex systems either combining different physics or different components. Some open-source libraries have been developed for dynamic modelling of simple energy communities, electric grids and sector coupling (e.g., NZEC, TransiEnt) however these developments remain separate: the different scales (from consumer to grid) still have to be integrated and integration of measured data is missing. In CINESIS a new open-source library will be developed exploiting existing libraries whenever possible.

The new library will enable multi-scale modelling from single home to electric grid also integrating optimization algorithms for the management of multiple flexibility sources (e.g., BESS, heat pumps, EV charging) and data-driven models based on measured or forecasted data. The representative model of the CEDIS case study will consist of a framework and system models for different subsystems, including hydroelectric plants, PV plants, NG CHP plants, heat pumps, EV charging stations, BESSs, the DSO/TSO electric grids, and so on. The models will include both physics-based ones and data-driven ones, considering different meteorological data, CEDIS network data and RES production data availability (quarter-hourly). Moreover, the final objective is to verify the potential increase in the overall flexibility of the system that will be achieved through the integration for some households of advanced monitoring, control and management systems, among BESSs, heat pumps and EV charging stations. Another result will be the analysis of energy flow variations between the LV/MV network (DSO) and the HV network (TSO). *Replicability:* This modelling activity has a large replicability potential, in particular in energy communities with multiple sources of RES production/flexibility assets.

UC#3.2: Modelling optimized decarbonization scenarios based on sector-coupling electrification and distributed flexibility services

Description: This activity involves the analysis of the current local energy system (Reference Scenario) in the CEDIS Pilot Site and the evaluation of scenarios based on sector-coupling electrification and distributed flexibility services, establishing synergies with large share of renewables, reducing CO2 emission. A dynamic energy flow model will be set up by FBK in EnergyPLAN, where all identified and available information about the energy system will be integrated, including generation, distribution and demand aspects. Then, the model will identify optimized scenarios, based on MOEA, estimating the diffusion of sector-coupling solutions such as electrical vehicles and heat pumps. A power flow analysis will identify if, and eventually when, the pervasive electrification could become a problem for the electrical networks (high, medium and low voltage). Possible flexibility services using load shifting, storage, smart EV-charging, V2G and smart heat pumps will be evaluated identifying the grid-beneficial role and the business models. This evaluation will include simulation studies on the CEDIS grid, considering interactions between consumers-producers-DSO-TSO, application cases in unbalanced characteristics and legal constraints considerations. *Replicability:* This modelling activity has a large replicability potential, in particular in energy communities characterized by multiple sources of renewable production and flexibility assets.

UC#3.3: Developing and testing AI for predictive analysis of energy flows and optimization of building energy management (RiSING tool)

Description: As a cornerstone of CEDIS VPP, the RiSING tool is developed, i.e., a predictive analytics tool using AI techniques for energy flows forecasting and building energy management optimization. Specifically, it conducts predictive analysis using AI techniques of the amount of energy produced, consumed, stored and sold at 24-48h (and longer term if needed) based on both historical and real time data. These data will be accessible for the consumer through a dedicated dashboard. Moreover, optimization of building energy management plans will be carried out, based on the expected consumption, the contractual plan, the weather forecast, the PV production forecast and the availability of the flexibility assets (BESSs, heat pumps, EVs charging stations). This management optimization will be based on the control of energy flows and the management of purchase/storage/sale choices in an automated manner through the Evolvere system. Security aspects of the Evolvere system will be also analysed, suggesting modifications and improvements. This activity will involve 50 CEDIS customers equipped with one or more flexibility resources (BESSs, heat pumps, EV charging stations). Part of these customers will be selected from those who have the PV already installed. *Replicability:* AI tools have a large replicability potential and can bring multiple benefits (technical, economic, and environmental) in energy communities characterized by multiple sources of RES production/flexibility assets.

UC#3.4: Developing and testing a cloud platform (EugenioCloud) for management of flexibility resources (i.e., BESSs, heat pumps, EV charging stations) installed in residential households

Description: The EugenioCloud will be the core tool in the CEDIS VPP and will aggregate customer-owned flexibility, based on smart BESSs, heat pumps and home EVs charging stations, to monetize in multiple energy markets and turn them into cash generators. The platform elaborates the aggregated forecasts of production and

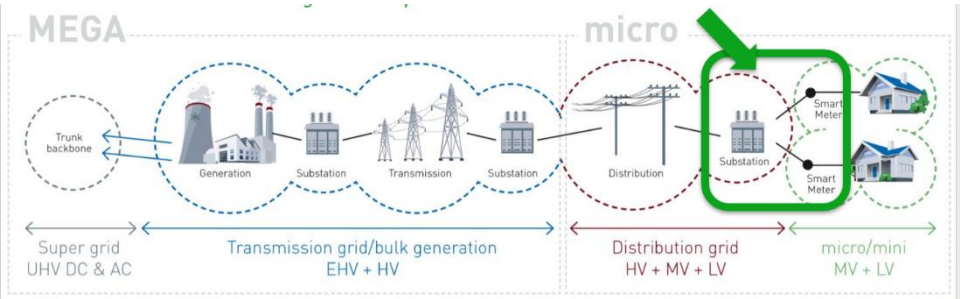
loads, identifies the baseline of the virtual aggregation and applies ML and AI algorithms providing innovative solutions in the CEDIS energy community framework. EVOLVERE will develop the cloud platform along with a set of edge devices that Evolvere designs and produces, all orchestrated by the Eugenio gateway. This activity will involve 50 CEDIS customers equipped with one or more flexibility resources (BESSs, heat pumps, EV charging stations). Part of these customers will be selected from those who have the PV already installed. *Replicability:* Cloud platforms for aggregation have a large replicability potential and can bring multiple benefits (technical, economic, and environmental) in energy communities characterized by multiple RES and flexibility assets.

UC#3.5: Testing data-driven energy services for consumers, in cooperation with actors in the energy system

Description: During the real-life pilot testing, data analysis across the entire CEDIS network, using the collected monitoring data, will be performed by FBK. The impact of the project approach and technologies will be evaluated. This will include an evaluation of effective integration of a large share of variable renewables based on sector-coupling and flexibility services, reducing CO2 emissions. Moreover, recommendations and guidelines will be derived from the results by all participants, determining future market design, decentralized energy management and required regulatory adjustments. *Replicability:* By developing robust measures it will be possible to transfer the approach and technology to other pilots and replicators.

DEMO 4: Estonian Demonstrator

Pilot Location and General Description



Within this project EE develops and test a technical solution to allow for P2P grid capacity sharing and develop business models. We test this project in three urban/suburban locations with approximately 10 residential electricity consumers each with power 3x16-3x32A each. The goal of these pilots is to utilize the grid capacity behind a DSO's medium voltage to low voltage (MV/LV) transformer

Specific challenges

Both power grids and consumer electrical wiring are planned and built by estimating the potential energy consumption and peak loads. In order to connect your houses to the power grid, you need to choose your main fuse rating, which should cover your future peak loads. Based on this, distribution system operators (DSOs) size their grid capacity (power lines, substations etc.) to handle these potential loads from surrounding customers, using simultaneity factor for the load estimation.

As the main fuse rating is usually fixed at the time of grid connection, on the one hand, there are a lot of customers who actually do not use their main fuse at its full capacity. On the other hand, there are a lot of customers for whom the rating of the main fuse is sometimes too low to cover their consumption. To resolve that, the customers need to go for costly fuse rating increases. In the future, the more we have flexible assets such as PV-panels, battery energy storage, smart devices, etc. the more we can adjust the time of consumption and increase the energy flow through the grid during times of either low electricity prices or, for example, smaller CO2 footprint. However, the potential could stay unutilized due to the fixed and static main fuse. In order to unlock the full potential of smart flexible assets and demand response, we propose a P2P grid capacity sharing solution where customers' main fuse rating can be adjusted close to real-time.

Innovation addressed

Interestingly, the concept of peer-to-peer grid capacity sharing as a potential means to avoid large-scale and costly grid reinforcements in light of wide-spread electrification (especially electric vehicles and heating) and residential renewable energy production has been analysed only to a limited extent. Within the EUniversal project[22] various market mechanisms to unlock flexibility potential were analysed. Among others, also flexible access and connection agreements (Deliverable 5.1). Within the scope of CoordiNet[23], a peer-to-peer market on the Swedish island Gotland was tested to avoid wind generation curtailment. In the scope of OneNet project[24], it can be read in Deliverable 2.2, Table 6-9 that "locational congestion management service of existing congested secondary MV/LV transformer (substation)" will be tested during the Slovenian Demo. At this moment, we lack further information regarding the scope of the test. A theoretical simulation of peer-to-peer capacity trading has been carried out in Bjarghov, et al[25]. It reaches a conclusion that the P2P market reduces neighbourhood peak loads as

[22] https://euniversal.eu/wp-content/uploads/2021/02/EUniversal_D5.1.pdf
[23] https://coordinet-project.eu/publications/deliverables
[24] https://onenet-project.eu/
[25] https://ntnuopen.ntnu.no/ntnu-xmlui/bitstream/handle/11250/2729893/Bjarghov-Preprint__Peer_to_peer_trading_under_capacity_tariffs__EEM.pdf?sequence=2

well as agent costs, implying synergy between the tariff structure and a local P2P market. Based on the results of the Bjarghov et al simulations and valuable input from previous Horizon projects, we would like to move one step further and test the P2P capacity trading concept in an actual distribution grid environment. Therefore, the demo project addresses innovation in different service layers: a) Hardware - optimal hardware setup that would allow the flexible controlling and billing of consumption; b) Software layer -what are the best and scalable solutions for DSO-s legacy systems; c) Connectivity – what kind of connection will enable us to control, measure and bill to needed timeframes and quality; d) Service layer – what kind of new tariffing / pricing models will enable and motivate both DSO-s and customers to use this solution; e) Regulatory – what kind of new regulations are there needed what would enable and motivate DSO-s and customers to use it

Assets tools/systems

Prosumers with smart meters, SCADA, HES (Head End System), Substations

Supervisor and partners involved	Expected Results / Outcomes
ELV is a distribution system owner and will be responsible for the site selection, integration with systems, and subsequent demo consulting. **EC** is a distribution system day-to-day operator and will be responsible for the equipment installation, integration and technical work management. **EE** is the R&D, that will lead the development and demonstration of this pilot from a project management aspect.	– Electricity consumers can optimize their fuse size rating to match their consumption close to real-time, therefore saving money due to lower grid connection and grid fees of the electricity bill – Electricity consumers can decarbonize their living and transportation, since more powerful electrical devices (HVAC, electric vehicle etc.) do not immediately bring about higher monthly grid fees. – DSOs can utilize their power grid more effectively as more kWh of energy flow through every kilometer of power line – DSOs do not have to overbuild their network, reducing capital expenditure and therefore also lowering grid fees to the electricity consumers – Less costly electrification of the system and including flexible electricity production and consumption assets – Smaller price tag for society for going green DEMO KPIs: Capacity increase 10% per user connection; Line capacity utilization increase 5% per grid line km; Transformer capacity utilization increase 5% per MV/LV transformer kVA; 10% lower CAPEX and OPEX compared to building grid as usual

USE CASES

UC#4.1: P2P capacity power sharing solution for optimized future energy network (EST)

Description: Future proof energy solution in the MV/LV grid. Customers can use more electricity consumption and local production assets and DSOs do not have to over build the grids. EE will be supported by ELV and EC

1. Assessment phase – EE (with ELV support) will analyse the potential pilot locations from historical consumption data and suggest some pilot areas to the demo partners.
2. Demonstration phase - EC will plan, design, build and integrate with systems the technical setup of the pilot sites. When the pilot sites are working then ELV will monitor the demosites (for fine tuning to)
3. Business models and regulatory framework – EE will collect the data and develop business models and regulatory suggestions. Innovative and scalable solutions for future networks will be proposed.

Replicability: As most of the grids are built with the same technical setup, it can be scaled to all new grid developments. If we can find a financially solid solution also for retrofitting already built customer electric panels and substations, it can be scaled also in the already built grid.

DEMO 5: Bulgarian Demonstrator

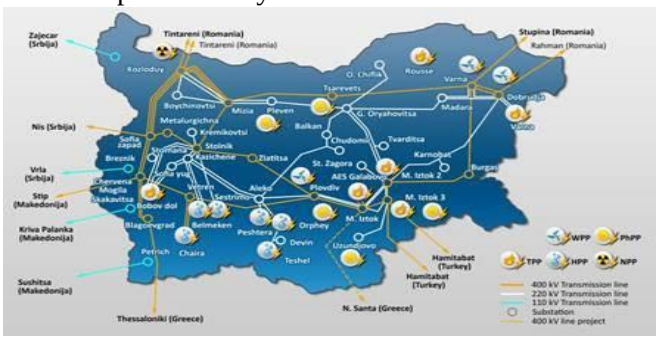
Pilot Location and General Description

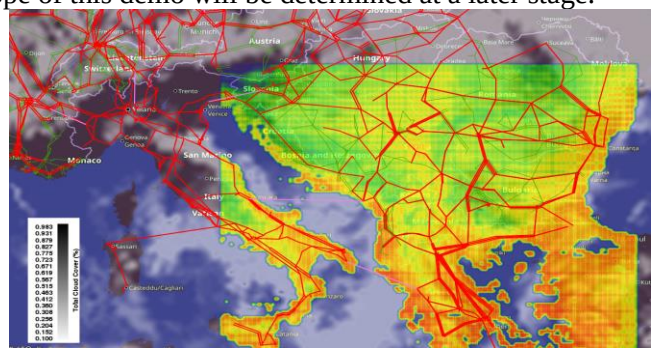
As the demo includes the application of the F-channel platform, which will be developed in such a way that it will be applicable to a wide spectre of cases, there is no strict limitation regarding the location of the demo being imposed by the capabilities of the platform itself. This allowed choosing the location for this pilot based primarily on selected geographical and technical characteristics, thus enhancing the comprehensiveness of the obtained results and the relevance of the conclusions that will later be drawn from them.

One of the main improvements, that was introduced by the F-channel platform during the early stages of its development, was the combination of the reliable high-resolution weather forecast and the knowledge of the impact that the climatic conditions may have on the state of the power system, referring to everything from the predictions of the generation and consumption powers to the transmission capacities of the lines.

Thus, it was decided that the chosen location should have weather conditions that are variable throughout the year and a high percentage of sensitive renewable sources and demand, upon which the effect of the weather variation can be clearly noticed and studied.

Based on these criteria, the power system of Bulgaria was deemed to be the perfect candidate for this role, although the exact part of the system that will be treated in the scope of this demo will be determined at a later stage.





Basic, multi-layered GIS based GUI showing on the same screen: grid topology, flexibility sources, weather forecasts, energy forecasts, consumer behaviour (load) forecast, as well as grid analysis results with the heat-map view available for different functionalities

Specific challenges

The primary aim of the pilot is the examination of some of the most prominent challenges that the system operators, regardless of the voltage level of the system itself, face in the environment that is dictated by the rapidly growing penetration levels of the distributed energy sources (DER), with the pilot foreseeing the adaptation and further improvement of the already existing F-channel platform in order to offer the adequate responses to those issues, while simultaneously allowing the system actors located at the lowest voltage levels (consumers, prosumers or DERs) the non-discriminatory opportunity to participate in the process of providing the services necessary for the proper operation of the system. The communication between the operators, on the one side, and the consumers, prosumers and DERs, on the other side, taking place in real time, can be seen as a means of ensuring the amount of flexibility that the system needs at any moment. This task is already a challenge on its own and is bound to become even more complicated with the further increase of the variability of the consumption and the renewable energy sources, leading to the additional difficulties for the operators. This is especially the case with the high integration of the generating units whose production power can change almost instantly, forcing the operators to turn to thinking in advance and relying upon the predictions of the generation and demand in order to be prepared for any scenario that may occur in the system. However, the reliability of these predictions can be seen as questionable, as the behaviour of both the generators and the consumers is mostly caused by different weather conditions (wind speed, temperature, icing, insolation and so on), with the current state of play lacking in the domain of the real-time connection of the weather forecast and the appropriate prediction of the state of power system. This open issue leads to the main improvement that can and will be achieved by the potential widespread usage of the F-channel and its built-in functionalities, primarily the ones that are related to accurate weather data and implementing them in the system analyses. To meet above challenges, this demo has the following objectives:

- Collection of sufficient data related to both the market functioning and the limitations of the power network in the selected area and creation of the network model of the area that will be utilized for future analyses;
- Creation of the market model that will envelop different aspects of Bulgaria electricity market
- Obtaining the real-time reliable weather forecasts for the chosen region and the analysis of the influence that the climatic conditions have on the state of the power system in that area;
- Producing forecasts of RES production and demand based upon relevant climatic conditions;
- Analysis of the impact that the previously mentioned forecasts may have on the congestion management and the frequency and voltage stability of the system;
- From a development point of view, incorporation of the optimization methods in order to determine the best possible locations and connection points for the new DERs;
- Creation of a universal platform that will be accessible to all of the relevant market participants and that will include all of the aforementioned functionalities, as well as their graphical representation;
- Review of the current BG legislation related to this topic and the compliance of CINESIS solutions

Innovation addressed

This demonstrator will make use of an operational digital platform (including AI based power system analysis tool and energy predictions, GIS visualised grid with all relevant elements of interest, utilising high resolution numerical weather predictions) and data exchange infrastructure being developed under the ongoing OneNet project. A new layer will be integrated in F-channel platform, that will enable the provision of big data and AI driven energy services for TSOs, DSOs in cooperation with prosumers, or owners of assets that can provide flexibility like batteries, heating/cooling systems, charging point operators, gas systems, via intermediaries such as energy suppliers and aggregators.

The approach adopted in OneNet project including market models/setups, flexibility services and products will be further improved, customized and replicated in different geographies, moving from the island and shore-based transmission and distribution grids of Peloponnese and Crete with modest Mediterranean climate conditions, to the meshed continental European grid with many different climatic areas varying from very hot summers to very cold and long winters, which is for example the case of Bulgaria. Solutions and new custom-made market setups will be tested against different system needs and consumer behaviours in this new geographical area. Integrated energy services will be custom-made and adapted to local energy requirements aiming at increasing consumer satisfaction and willingness to take active role in the energy market activities.

Assets tools/systems

- Physical assets:

o PVs and Wind Parks connected to MV/LV grid,
o Prosumers, EV chargers and Energy communities in MV/LV (optionally virtual ones for simulation purposes),
o DSO grid MV/LV, TSO grid HV and EHV when necessary,
o Local weather stations (available data from local weather stations)

- F-channel platform
- Interoperability aspect: IEC CIM, CGMES, GEOTIFF, RAW, JSON, XML
- Data sources: NASA Weather Forecast Database & European Weather Forecast Database; Energoinfo weather and energy forecasting database; Local DSO assets database; TSO network models & DSO network models - Potential connections with the TSO and DSO SCADA systems, as well as with the market management system can be established in order to exchange data and information.

Supervisor and partners involved	Expected Results / Outcomes
EIG will lead the development and demonstration of this pilot, will design and develop the big data and AI tools and integrate them in the Coordination platform. Also, EIG will provide the infrastructure to facilitate the demonstration. **ESO** and more specifically the TSO/Short to mid-term planning department will offer IGM updates, DACF and 2DACF process, contingency analysis, capacity calculations, reserves forecasting, grid losses forecasting and compliance monitoring for the newly connected units. Also, the TSO/Long-term planning department will be responsible for grid connections and compliance monitoring. **CEZ** and more specifically the DSO/Short-term planning department will cover production forecasting for volatile distributed generation in a short-term, mid-term and long-term time horizons, load forecasting and outage planning. Later on, it will offer security checks and grid expansion planning inputs.	**DEMO KPIs:** - **Demand side:** Increased consumer engagement and acceptance by 5%; Predictive consumer behaviour regarding demand side flexibility resources usage utilizing big data and AI techniques allowing for better demand side available flexibility reserve predictions for 10% - **Production side:** Localised DERs energy production forecasts (prosumer energy production/consumption predictions) and its utilisation as FSP. Improved production forecast for 5%. - **Grid side:** Predictive local grid / micro grid congestion management. Improvement of contingency identification rate for 10%; Improved identification rate of the available flexibility resources from Geo and Location in the grid point of view for 10%; Improved identification of the optimal point of DER (VRES) connection for further exploitation from both grid and flexibility needs points of view, by 10%;

USE CASES

UC#5.1: Optimal DERs location selection and connection point

Description: The solution would, as a main component, contain the methodology by which the optimal points of connection for the DER (VRES) could be selected, considering both the technical parameters of the system (such as the characteristics of the generators, lines and transformers in it) and the geographical specificities that are relevant for the VRES exploitation planning step.

The optimization technique that will be applied is going to be selected during the demo development based on the consistency of the provided results and the efficiency (both timewise and resource-wise), with the initial set that will be considered enveloping some of the methods usual for the system planning tasks, such as the differential evolution, the particle swarm optimization, and the genetic algorithm. Each of these methods will be coupled with the georeferenced data and then tested individually against the results obtained by the brute force approach to confirm the reliability of the suggestions given by them. The method that ends up as selected after this step will be implemented as the default one, after which the usability of the developed method and procedure will be demonstrated in Bulgarian power system.

Replicability: With the proper modification UC can be applied to any region.

UC#5.2: Localised DERs energy production forecasts (prosumer energy production/consumption predictions) and its utilisation as FSP

Description: Approach from OneNet including market models/setups, flexibility services and products, all based on improved high-resolution production and consumption predictions through Numerical Weather Predictions and Machine learning algorithms for energy and power system state predictions will be further improved, customized and replicated in Bulgaria. The management of variable powers, as well as portfolio expansion with new DRERs through advanced forecasting methods and proactive day ahead optimization for reducing BRP-related penalties will be tested.
Replicability: With the proper modification UC can be applied to any region.

UC#5.3: Predictive consumer behaviour for increased consumer engagement and acceptance

Description: New concepts that use available open datasets for predictive consumer behaviour, load forecast power flow and congestion predictions, especially focusing on new emerging needs for the EV charging points and remote, distributed energy needs, will be tested. This use case aims to increase consumer engagement by providing to micro grid operators, or any local energy community operator, including any individual prosumer the ability to observe the trends from more than just a local system operated by him and better prepare and react accordingly to the overall power system state and/or market needs. These concepts include:

- Usage of traffic data for purpose of load flow, congestions and power flow forecasting;
- Usage of RSS news feed for gathering data relevant for load and production forecasting (information for heat plant availability, unplanned outages etc);
- Usage of various publicly already available GIS data;
- Usage of information available through different market and system transparency platforms;

The technologies which will be employed are AI algorithms coupled with usage of web scraping techniques to gather relevant data for improving power flow forecasts, energy needs with a dynamic, location wise, logic behind. The basic idea of this use case is to create an Automated Load (Flow) Forecast Assistant that will send periodical recommendations based on data gathered from different energy subsystems and AI algorithms. It will explore how a large amount of publicly available data can be used to perform accurate correlation of grid state and faults to intermittent vRES units' operation. It will also test the provision of ancillary services based on enhanced flexibility capacity and smart grid management tools (both within regional and locally induced triggers).
Replicability: With the proper modification UC can be applied to any region.

DEMO 6: Irish-Croatian Demonstrator

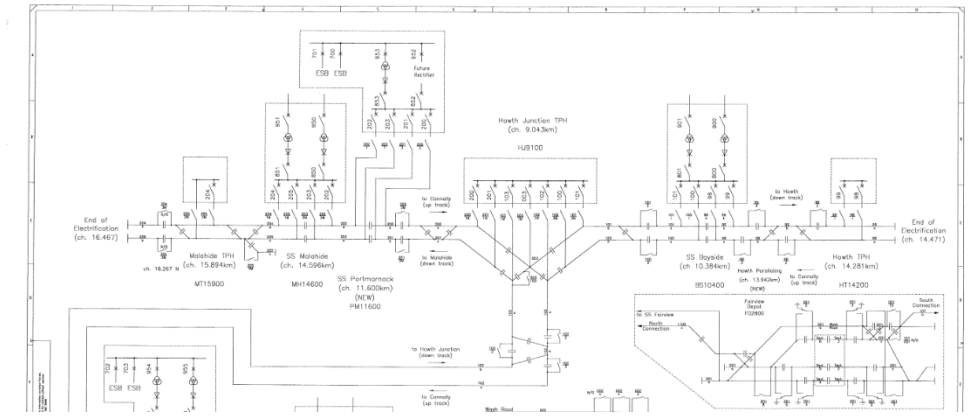
Pilot Location and General Description

This demo will investigate the synergies between the power system and the railway networks utilizing data driven solutions. The intention is to demonstrate through a combination of power system studies and physical demonstration how flexible AC transmission devices can be used to support power system and rail network interaction further enabling electrification of transportation and supporting the use of renewable energy sources in this process.

A Modular Static Series Synchronous Compensator (M-SSSC) solution will be used to diversify the railway system technology and power system operation and enhance the reliability and resilience of the grid in two pilot sites: Ireland and Croatia. Ireland's 1500V Direct Current (DC) railway networks and Croatia's 25kV, 50Hz Alternating Current (AC) networks, which are widely used electrical systems for railway in Europe, will be studied with the interaction on to the main transmission network.. The studies will assess the optimal location, and determine the key considerations needed in this optimisation process. This will be documented into an optimisation guide that can be used as a tool for future assessments of railway and electric grid interaction, allowing the learnings to be replicated across Europe. Following the power system study, a demonstration of how M-SSSC technology can be used to support rail and distribution system interaction in Croatia. The objective of the demonstration in Croatia will be to validate the output of system studies and provide real world learning and experience of how M-SSSC technology can enable the railway system to provide demand response services and voltage violation reduction, as a second order effect of this power flow control to the grid. Within the following corresponding demonstrations, the SmartValve (an M-SSSC solution) will be installed in the Croatian network. The consortium partners will document and disseminate the nuances of how M-SSSC can increase the market coupling in Croatia.

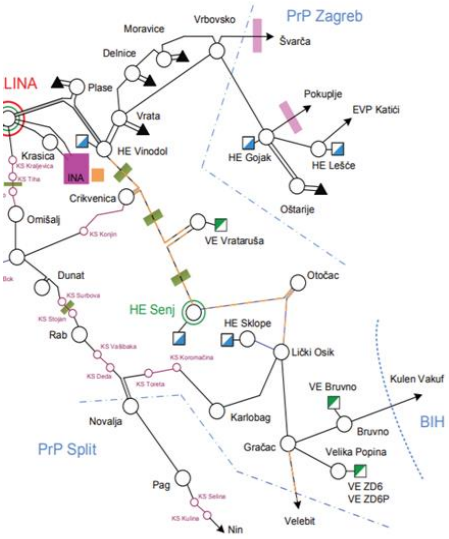
1) IRISH FEASIBILITY STUDY: The Dublin metropolitan rail service – Dublin Area Rapid Transit (DART), is facing voltage drop issues and expected for a significant expansion, is targeted for analysis to investigate the benefits M-SSSC technology can provide the network. The DART network is a 1,500V DC Overhead Line Catenary System with traction return path through the track (running rails). It comprises some 45km of double tracks, 10km of single tracks and necessary stabling sidings in the Dublin area. The total length of contact wire is approximately 130km. The power for the DART is supplied via 13 Substations and 7 Switch Houses (also known as Track Paralleling Huts or TPHs).

This project with Irish rail will be a feasibility analysis-based study to explore synergies between the regional rail and electrical network, and its potential to maximise their utilization to provide cross-sectoral support.



In general, the SmartValve Solution potentially enables the railway system operator to dynamically control the power input between substations, as a secondary effect of controlling the power flow support can also stabilise voltage levels, and shift demand between substations. This will enable railway operators to redirect the system power flows by varying the reactance of the lines to manage railway system demand and provide additional services for transmission and distribution system operations. It expects to demonstrate the mitigation of the risks of outages and the railway operational network demand management by using SmartValve Solution.

2) CROATIAN PILOT: In Croatia, the electrified railway system is operated at 25 kV, 50 Hz that is fed by a 110 kV network operated by Croatian Transmission System Operator (TSO) - HOPS via traction transformers. Total 980 km of the rail is electrified and is supplied from 21 traction substations. These 980 km makes only 37.2 % of total rail length in Croatia, which means there is a big potential and tendency for further electrification. Unelectrified rails are mostly in the south part of the country, where the penetration of RES is the greatest and where the overhead lines experience congestion, especially during the summer season. It is obvious that future electrification and increase of RES in these regions will bring to consideration solutions like MSSSC.



Analysing the existing TSO grid, and the existing electrified part of the rail, as well as TSO's and Croatian Railway Operator's plans in the near future, a west part of the county outlined as the best location for potential pilot projects. Contribution analysis of MSSSC will be shown on real examples from western part of Croatian power transmission system., transmission area Rijeka. Designated system area is loaded with high power flows from east to west (or from Dalmatia and Bosnia and Herzegovina toward Slovenia and Italy) and is characterized by significant disproportion between production and consumption of electric energy as well as significant amount of installed RES, which have stochastic production. Close future plans in this area considers:

- Connection of new traction substations due to construction of the new lowland railway for faster connection between Zagreb and Rijeka (yellow dashed line in the photo below on the right), which is a part of an important Mediterranean Corridor in the Trans-European Transport Network. Due to the new part of the rail, three new traction substations are being considered for railway power supply (new substation Josipdol or existing substation Oštarije, new substation Ledenice, new substation Krasica) in this area.
- Power supply for the future motorway A7 from Križišće to Žuta Lokve
- Capacity increase of WPP Vrataruša
- Announced increase of capacity in HPP Senj.

Hence, the transmission area Rijeka is a perfect example to study the benefits of flexibility that MSSSC would bring to the transmission network. Expected use cases can be on the following transmission line routes: OHL 220kV Melina- Senj- Brinje, OHL 110kV Vinodol- Crikvenica- Vrataruša- Senj, OHL 110kV Vinodol- Vrata- Delnice- Moravice- Vrbovsko. The methodology to study and solve the congestions and mutual interaction of future rail and transmission networks will first involve comprehensive analytical studies. A physical deployment can be assessed following positive analysis results.

Specific challenges

Irish Feasibility Study Challenges: The regional dynamics in the rail transport sector are one of the largest users of electricity in Ireland. According to the annual report and strategy development of the Irish Rail, the carbon emissions were decreased by 16.1 % in 2020, which corresponds to the National Energy and Climate Plan in Ireland. It is expected that railway transport in Ireland will achieve its decarbonised targets and proposed 50% greenhouse gas emissions reduction by 2030[26]. The regional Irish Rail network is mainly operated by diesel fleets, and following the climate challenges, Irish Rail is planning to accelerate the electrification of the railway system in the next decade. However, the availability of electrical system connection capacity and voltage issues has hurdled development of the electrified railway system. In terms of that, a project is proposed to study the effects of the M-SSSC technology on both the electrified railway system and the wider electricity network[27].

Croatian pilot challenges: Aside to the described challenges in the western part of Croatia, some previous studies have shown problems with voltage deviation due to the railway system operation. Due to the dynamic changes of the loads caused by railway system operation, the voltage unbalance and power quality issues can be observed, which negatively affect the stability and reliability of the local power system. The non-linear change of the railway load can contribute to harmonic current injection into the main power system, causing harmonic voltages throughout the network. These impacts have a significant effect on the security and efficiency of electricity usage. Following the rapid development of Croatian railway networks, the connections between railway electrical systems and the transmission networks are hardly managed in some locations, due to the distribution network configuration. This can delay new substation construction, limit power exchange capacity, and necessitate high project investment.

To sum up, following the initial assessments in both locations, the following challenges are identified:

- The voltage deviation in the railway power system and transmission/distribution system;
- The harmonic issues in the transmission/distribution system, caused by varying railway system demand;
- The numbers, scale and voltage level constraints of new traction substation connections; and
- The integration of the regeneration system and energy storage system in the railway system and the grid.

To address some of these challenges, the synergies of the power system and the railway networks with data driven solutions will be explored.

A Modular Static Series Synchronous Compensators (M-SSSC) technology-based solution will be used to alleviate some of these issues. The use of this power flow technology will give greater control to the power system operators to be able to react to the large change in loads from the railway network and as a second order effect, help maintain the desired voltage level.

Innovation addressed

Smart Wires Europe will deploy the patented SmartValve™, which are M-SSSC capable of injecting a variable voltage (leading or lagging) in quadrature with the line current. This technology effectively increases or decreases a circuit's reactance. The dynamic controllability of the M-SSSC solution enables it to accommodate the variable renewable energy sources (RES) and the dynamic demand changes, increasing the flexibility of the grid. This technology can be utilized to facilitate network reconfigurations and new line development, optimise substation locations and accelerate the connections of new substations. SmartValve Solution will solve network constraints that limit railway system and system operation in Croatia, also study the issue in Ireland, and will provide flexible energy sources that would benefit TSOs and DSOs. This will allow system operators to optimise the topology of railway power system connections with the grid and therefore increase the utilisation of the infrastructure as well as the utilisation of RES in the railway system.

The first part of this demo involves comprehensive analytical studies, including M-SSSC solution application for demand shifting and second order voltage control, business model and network expansion, as well as the application of battery storage and regeneration system study. Following the positive study results, a physical deployment will be developed in Croatia to validate the analysis results.

Demand shifting:The moving trains generally lead to a large amount of moving loads along the distribution system. The local power system operators face a challenge when trying to manage the moving loads with existing tools.

In order to manage the changing demand more effectively, the system operators can use SmartValve to control the input power flows between two adjacent substations. For example, the SmartValve Systems deployment at a substation can enable the system operators to shift the demand between substations when the trains are travelling along the route. As a result, the railway operators can maximise the utilisation of their Maximum Import Capacity (MIC). Meanwhile, it is expected that the demand management services can facilitate new substation constructions and reduce the demand for new substations by maximising the utilisation of the existing infrastructure.

[26] *https://www.irishrail.ie/Admin/getmedia/df8a02dd-a5ad-411d-8591-c3cb485c9c42/Iarnrod-Eireann-Annual-Report-2020.pdf*

[27] Galzina, D., Banovac, E., Tomiša, T. (2020). 'RAILWAY SYSTEM IMPACT ON VOLTAGE QUALITY AT THE LEVEL OF THE CROATIAN TRANSMISSION NETWORK', Journal of Energy, 69(2), str. 0-0. https://doi.org/10.37798/202069229

Voltage Control: SmartValve Solution will be analysed along with feasibility assessment at the traction substation to control the inflow power from the transmission or distribution networks by varying the impedance of inflow lines. This approach of implementing a control system allows the operators to vary the line impedance, and therefore change the inflow power from a specific point. This approach supports system operators to manage the flow of power, and this can affect the voltage deviations and reduce the voltage drops occurring in the networks.
Battery Storage Study & Regeneration Study: When braking, trains are returning regenerative energy into the transmission system - energy flows in reverse direction and feeds power back to the main AC grid.
Even though the energy from regenerative braking flows back into the transmission system, there is no regulation for it yet of sophisticated solutions for its reuse that would benefit both railway and transmission system operators. There are several tendencies for reuse of regenerative energy: i) train timetable optimization (for example, one train is braking while others on the same feeder are using regenerative energy – this reduces costs related to energy imported from TSO grid and consequently reduces CO2 emissions; ii) usage of energy storage systems (in this case regenerative energy can be stored and used later on in railway or transmission system); iii) returning regenerative energy into the transmission system, which is the current situation in Croatia, but there is no regulation for it yet. The Battery Systems are especially interesting regarding the storage of the energy from regenerative braking since it could benefit both transmission and railway operators.
This would consider development of appropriate regulatory and market models regarding the regenerative energy exchange. There are several technical issues that could be investigated regarding regenerative braking: a) Influence on power quality parameters in transmission grid; b) Influence on inverse currents in synchronous generators which cause heating problems (generators connected to the transmission grid in the vicinity of traction substation); c) Problems with relay protection settings in traction substation. As an environmental benefit, effects of regenerative braking on cost reduction (reduced imported energy) and reduction of CO2 emissions can be studied and approximated.
Facilitate lower cost and more rapid extensions to the rail network: The rapid development of modernisation and electrification of the railway network requires new stations and probably the introduction of new voltages in the form of higher voltage direct transformation to provide the additional network capacity required. This additional infrastructure will be expensive and time consuming. The cost benefit analysis and environmental impact of these extensions may be improved by the use of a SmartValve solution to reduce the number of stations by managing the power flow to supply these extensions and optimizing the deployment locations and sizing of the substations. Such a scheme can also provide much of the same benefits outlined above.

Assets tools/systems

Transmission and distribution lines, Substations - Modular Power Flow Control devices - SCADA System for Power Network Operation, SCADA System for Railway Power Network Operation - EMS System for Power Network Operation, EMS System for Railway Power Network Operation - Traction transformer (TBC), Electrical Protection System for Railway Power Network Operation

Supervisor and partners involved	Expected Results / Outcomes
SWE – As a provider and developer of M-SSSC,, SWE will lead the demo group, and provide the modular power flow control solutions and associated analysis study services. **IRAIL** – As Irish Railway System Operator, Irish Rail will provide the Railway System Power Network operational data. **UNIZAG-FER** – As a research institute, FER will provide research and analysis services to identify the system demand and assess the impacts of this demo. **HZIN** – As Croatian Railway System Operator, HZI will provide the Railway System Power Network operational data, services and assets for the demos. **HOPS** – As Croatian Transmission System Operator, HOPS will provide power network operational data that are influenced by railway system operation, analysis services and assets for the physical pilot.	- Enhance synergies between the regional rail and electrical network and its potential to maximise their utilisation to provide cross-sectoral support in a friendly and cost-efficient way. - Deliver improvements in communication and grid operations tools for intra-day and real-time regional markets. - Define and test new synergies between the regional rail and electrical network that increase RES share Implement techniques to integrate real-time markets and increase wholesale market efficiency. Leverage the experience and lessons learned from the demonstrations. **DEMO KPIs**: + 3% improvement of average voltage deviation ; - 2% alleviation of harmonic issues; - 2% grid losses reduction in both rail and electric network

USE CASES

UC#6.1: Cross-industry support between rail and electricity network though SmartValve technology
Description: In this use case, it will be explored how the SWE's M-SSSC solution can support system operators on mitigating the impacts of railway system operation on the grid by balancing the power flows. The demand response services can be enabled by dynamic power flows management to meet the railway system demand. A

tool to enable the assessment of M-SSSC by providing a guide of items to consider in the assessment process will be produced. Within this scenario, a M-SSSC solution performance metric will be evaluated to assess the impacts of the on the synergies of railway system and power system, with and without the devices throughout the demonstration. The metrics will include RES utilization in the railway system, utilization of existing infrastructures, CO_2 avoidance and voltage variance reduction. Furthermore, a regeneration and energy storage system management function will be developed to facilitate the implementation of regeneration and energy storage technologies in the railway system, as well as the synergies of railway system and distribution system.

Replicability: The M-SSSC solution will be studied based on Croatian railway's 25 kV, 50 Hz AC power supply system and studies conducted on the Irish Railway's 1500V DC power supply system, which are widely used in Europe. Therefore, the learning outcomes are highly replicable in the Pan-European networks.

SWE equipment has already been successfully deployed to manage congestion issues in transmission and distribution networks in other European countries such as Greece, Bulgaria, UK and France. The use of this technology that has been installed in different locations and its technical assessment on two different networks enables the standardization of an overall solution. Although no analysis has been performed yet to study the influence of economic factors on the replicability capacity of the proposed solution in Croatia, it is estimated that technology evolutions in the short to medium term will have a positive influence on the cost-benefit ratio of the proposed solution from a replicability point of view. Furthermore, no immediate economic barriers have been identified. In addition, no regulatory barriers to implement similar demo projects are anticipated at this stage, but additional legal incentives would be required to give more scope for these solutions in the future.

This aspect will be further analysed during project implementation, with one of the key objectives being the improvement of the associated regulatory conditions in Croatia.

From a preliminary evaluation of the extent to which acceptance problems are expected, when exporting the solutions to other places /countries, the stakeholder's acceptance is considered crucial in deciding to transfer the CINESIS proposed solution to a different location or industry.

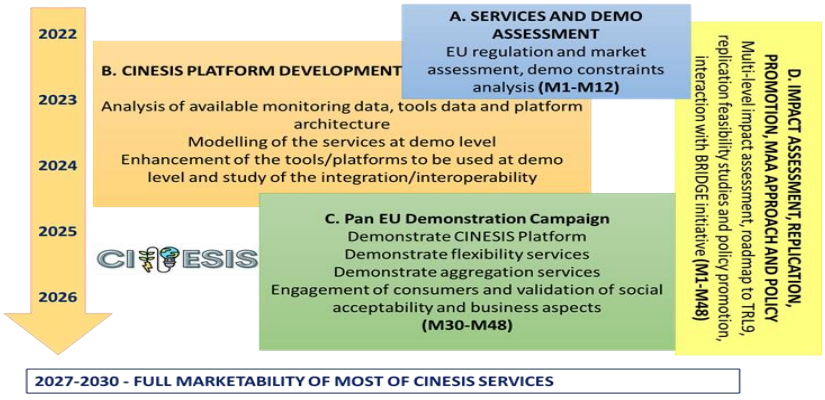
BUSINESS INNOVATIONS

CINESIS will test innovative business models through its demonstrations such as:

Business model for electrified railway system demand management and flexible Maximum Import Capacity management consumption: An innovative business model of SmartValve™ technology will be developed to enable the railway system to provide a demand response system for the transmission or distribution system, as well as to increase the RES utilisations in the railway system operation. This expects to facilitate the implementation of SmartValve™ technology in railway electrical systems and transmission/distribution management. The Smart Wires M-SSSCcontrol solution has already been deployed in the UK, IE, FR, GR, BG (in the last two countries as part of previous H2020 projects) for various applications. Further to this, a number of business models have been developed with European TSOs, such as: (a) enhancement of interconnection capacity, (b) curative post N-1 response, (c) outage management, (d) contingency management, (e) enhancement of RES integration and (f) system separation avoidance.

Business model for aggregators for maximizing the revenue by managing consumer and producer under a common framework: Through AggreMan platform, an aggregator can optimise his business strategy, maximizing the profit from the electricity market by providing as many flexibility services to the grid as possible. The AggreMan platform uses as input information from the market, weather/price/load forecasting data and information from the BuildIn platform, which optimally manages the flexibility assets of commercial/residential buildings. By coordinating the management of individual consumer and aggregator assets, the overall revenue is maximized.

Business model for reducing consumers' electricity cost through the self-consumption mode or participation in the wholesale energy market: Through the Eugenio Cloud platform, owners of flexibility assets such as smart BESSs, heat pumps and home EVs charging stations, can monetize them in multiple energy markets and turn them into cash generators. Utilizing building energy management optimization algorithms, consumers can manage energy trading/exchange in the internal/external market and their participation in the ancillary services market.



1.2.2 CINESIS methodology

The project will last 48 months and has been divided into 7 WPs, each one targeting partial development concurring as a whole to the achievement of the project targets. CINESIS methodology allows the project to smoothly move from research to experiments in parallel to continuous

improvement and finetuning of the overall approach. The methodology can be split into three phases as illustrated in Figure on the right

Phase 1: The current EU regulatory measures and existing flexibility market models will be analysed and CINESIS business models for energy services and consumer engagement strategies will be developed (WP2).

Phase 2: The research methodology, tools and recipes (WP3, WP4) will be defined. At the end of this phase the 1st set of tools and the CINESIS flexibility platform will be ready, and pilots can start.

Phase 3: In this phase the flexibility tools enabling services provision in building level, aggregators' participation in market and grid operation, as well as the CINESIS's platform will be demonstrated (WP5) and the obtained results will be evaluated. Although impact assessment will be a continuous process along project's lifecycle, after preliminary results from demo phase are produced, the scalability and replicability analysis will be performed (WP6).

1.2.3 Relevant national & international R&I activities linked with the project

CINESIS will exploit already existing technologies, algorithms, datasets and services together with results from previous and on-going research projects as summarized in the following table (full reference in §4).

Project-programme-partners	Subject	Inputs for CINESIS
ONENET H2020 GA. 957739 *(UBE, EIG, CINT, UCY, R&D Nester)*	OneNet aims to provide a seamless near real time integration of all the actors in the electricity network across countries with a view to create the conditions for a synergistic operation that optimizes the overall energy management while creating an open and fair market structure.	CINESIS will build upon the solutions developed in the OneNet project such as F-Channel and ABCM platform. In addition, the defined services and products in D2.2 of OneNet will be used in Demo 2.
INTERRFACE H2020 GA. 824330 *(CINT, ESO, ELV)*	The INTERRFACE project will design, develop and exploit an Interoperable pan-European Grid Services Architecture (IEGSA) to act as the interface between the power system (TSO and DSO) and the customers and allow the seamless and coordinated operation of all stakeholders to use and procure common services.	While INTERRFACE is focusing on engaging consumers into electricity markets through peer-to-peer markets, CINESIS focuses on fortifying the role of energy communities within the energy markets utilizing IoT technology and innovative cross-energy business models.
INSULAE H2020 GA. 824433 *(RINA-C, EEM)*	The INSULAE project proposes specific solutions in island Madeira, as one of the 3 lighthouse islands in the project (other are Bornholm, Unije), that deals with RES-storage coordination, water management and smart boxes for optimizing energy consumption.	CINESIS will utilize the solutions developed by INSULAE project and will create a complete flexibility services aggregation platform unifying all forms of existing and new distributed flexibility assets in a single layer control and improving stability and reliability of supply.
IANOS H2020 GA. 957810 *(RINA-C, UBE)*	IANOS will demonstrate a VPP that uses AI to optimise the generation of energy and balance demand and supply of energy on the islands. One of the VPP's core functionalities is the forecasting engine that provides production and consumption forecasting mechanisms considering multiple time scales, for the short and shortest-term forecasts for day-ahead and intra-day markets.	The flexibility forecasting module developed will be used as a basis to build upon for the iFLEX tool.
FARCROSS H2020 GA. 864274 *(UBE, SWE, CINT)*	FARCROSS aims to connect major stakeholders of the energy value chain and demonstrate integrated hardware and software solutions that will facilitate the "unlocking" of the resources for the cross-border electricity flows and regional cooperation and will enhance the exploitation/capacity efficiency of the transmission grid assets.	While the main idea of FARCROSS is enabling the inter- and intra- TSO collaboration and operation through the use of hardware and software tools, CINESIS will introduce a more holistic approach that will facilitate the coordination between not only TSOs and DSOs, but also with aggregators and prosumers.

FLEXITRANSTORE H2020 GA. 774407 *(UCY, SWE)*	FLEXITRANSTORE aims to contribute to the evolution towards a pan-EU transmission network with high flexibility and high interconnection levels and to promote increased cross-border electricity flows through the valorisation of flexibility services.	The Smart Wires technology was demonstrated as a facilitator for connecting RES. Building upon this, the Train2Grid platform will use the same technology to facilitate the smooth operation and electrification of the train sector.
CIVIS FP7 GA 608774 *(CEDIS, UNITN)*	CIVIS implemented a distributed ICT system to manage communities' energy needs, negotiate individual and collective energy services agreements and contracts	CINESIS will build upon the business models and consumer engagement aspects explored in the CIVIS project focusing on energy services agreements and test new models in the Italian demonstration.
COMESTO National project - 2015-2020 Pon promoted by Miur *(FBK, EVOLVERE)*	COMESTO aims to understand how storage can be efficiently managed in Energy Communities and what repercussions could have in economically depressed regions, to create energy communities with distributed storage, to identify critical issues, are most suitable technologies, while investigating the environmental and social impact.	CINESIS will build upon the business models explored in the COMESTO project focusing on power-to-mobility services and power-to-power via BESS services.

CINESIS aims to exploit current EU initiatives and create synergies with them to collect/share know how for project:

EU initiative	Description	How CINESIS will collaborate with it
BRIDGE Initiative *(UBE, RINA-C, UCY, R&D Nester)*	BRIDGE is a European Commission initiative, which unites Horizon 2020 Smart Grid and Energy Storage Projects to create a structured view of cross-cutting issues which are encountered in the demonstration projects and may constitute an obstacle to innovation. The BRIDGE process fosters continuous knowledge sharing amongst projects thus allowing them to deliver conclusions and recommendations.	CINESIS will position itself in the context of the BRIDGE initiative by building upon the achievements of existing projects which propose specific technical solutions for increasing system flexibility and enabling cross-sector integration. CINESIS also incorporates common partners (UBE, UCY, EIG, RINA-C) with most of BRIDGE on-going projects in energy system flexibility topics, i.e., OneNet, TIGON, MUSE GRIDS and will focus to coordinate its efforts and build upon this experience.
ETIP-SNET *(R&D Nester)*	European Technology & Innovation Platforms (ETIPs) have been created by the European Commission in the framework of the new Integrated Roadmap Strategic Energy Technology Plan (SET Plan) by bringing together a multitude of stakeholders and experts from the energy sector.	CINESIS will position itself in the context of ETIP-SNET initiative by proposing and demonstrating solutions that are related to the WG2 (storage and system flexibilities), WG3 (flexible generation), WG4 (Digitalization and customer engagement) and WG5 (innovation implementation in the business environment)
OPEN DEI *(UBE)*	The digital transformation strategy of the European Union has, among others, a particular priority: the creation of common data platforms based on a unified architecture and an established standard. As part of the H2020 programme, the OPEN DEI project focuses on "Platforms and Pilots" to support the implementation of next generation digital platforms in four basic industrial domains: Manufacturing, Agriculture, Energy and Healthcare.	CINESIS will contribute to the ambitions of the OPEN DEI initiative, specifically in the domain of smart grids and energy digitalization, by proposing a platform for flexibility valorisation along with cross-industry services provision. The validation of its applicability will be showcased in seven demonstrators in eight different locations across Europe in geographically dispersed environments with different existing regulatory frameworks.

1.2.4 Multidisciplinary Expertise and Methods Interaction

CINESIS scientific disciplines are recognized to be Science, Technology, Engineering and Mathematics (STEM) but with a clear integration of Energy (primarily) and Social Sciences and Humanities (SSH) (secondarily), and it is

committed to use the project's outputs to shape the policy strategy and plans of the European Commission. CINESIS applies the **ShapeEnergy[28] collaborative research framework** to interlink the expertise and methods from those different disciplines in pursuit of the CINESIS objectives. In specific, CINESIS focuses on the internal and external alignment of goals and ambitions and their **conversion to practical opportunities** and possibilities based on the extensive experience of the coordinator and the consortium partners (in Section 3.2 the various roles and complementarity of CINESIS consortium are presented in detail). It ensures social interaction and social legitimacy through the inclusion of diverse participants and the creation of a level playing field, in which relationships of trust can be built to negotiate and deliberate ideas and perspectives. CINESIS also focuses on **building the necessary skills and competences** (WP5), therefore creating and facilitating engagements that allow **social learning**, scaling up transition and productive interaction in relevant fields in society for producing impact. To achieve this, CINESIS adopts an iterative process that enables stakeholders from each scientific domain to reflect on underlying and often hidden assumptions, values and norms by making sure that the information is user-friendly. Finally CINESIS **monitors, evaluates and learns** from the inter-disciplinary scientific domains recognized in this project and shall ensure: **a)** reflexivity by creating a safe environment in which participants are reassured that their ideas, perspectives and feelings are taken into account, **b)** creating value added support for various actors to initiate and support new constellations, **c)** measure the impact of both the output and the outcomes including both qualitative and quantitative indicators and include all participants in monitoring.

1.2.5 Social dimension

The key role of the Social Sciences and Humanities (SSH) in addressing the human dimensions related to sector integration towards the creation of a "system of systems" is highly taken into account within the CINESIS concept. CINESIS builds upon a proper combination of SSH and STEM, in order to create active energy communities working on **understanding human behaviour**, **unlocking community-based flexibility**, **promoting social acceptance**, **protecting vulnerable people**, **households** and **regions**, **improving indoor conditions**, **tackling energy poverty** and **facilitating decarbonisation** and **smartification**. CINESIS aims to further integrate SSH disciplines such as Behavioural Economics, Business and Project Management, Sociology, History and Culture, Law and Ethics in its approach. CINESIS will capitalize UNITN expertise **in stakeholder engagement, communication and dissemination activities, participatory methods, living labs, mentoring/coaching and/or practical experience**, to figure out the impact and the upgrade potential that the different solutions, ontologies, and disciplines bring in the project. CINESIS intends to capture and present how these SSH disciplines are integrated in the project in terms of budget, countries, sectors, activity type, number of experts, and impact, based on a carefully drawn selection of criteria, indicators and parameters (WP4). CINESIS will also exploit the outcomes of SHAPE ENERGY initiative (as well as previous UNITN experiences like in the CIVIS FP7 project) in order to enable greater integration of social aspects in assisting energy communities' actors capacity building.

SOCIAL ACCEPTANCE approach – (UNITN, RINA-C)

To ensure the development of a **meaningful and contextually sensitive set of social impact indicators** CINESIS will leverage a mix of theory, practice, and empirically informed sources. A thorough **review of state-of-the-art scientific/theoretical insights on social dynamics, challenges and indicators** in the context of EU energy system transitions will be conducted also leveraging UNITN expertise in CINESIS. These insights will be complemented by consulting insights gained in (ongoing) practice, e.g., within knowledge exchange platforms such as BRIDGE (in where RINA-C is active in consumer engagement WG). Importantly, in order to account for the **specific context of each demo site, qualitative research** will be carried out in situ with demo leader support. This involves field **visits, and observations as well as in-depth focus groups** interviews and individual and **key informant interviews**. Research will investigate current contexts, practices, capabilities, needs and aspirations of potential users and relevant stakeholders and industry partners/clusters. **Broader policy and institutional contexts play** a potential role in the performance of the demo sites and will be part of the socio-contextual research. To the extent possible, research will include qualitative interviews with local stakeholders (e.g., representatives of the local authorities etc.). Based on this rich socio-contextual research, key social performance indicators will be developed. CINESIS differentiates different levels of action, i.e., EU, national and local level- and CINESIS indicators will take this into consideration. In the development of the indicators, **inputs retrieved from the respective demo-sites and local citizens as well as core stakeholder groups** will be integrated. Indicators are likely to include measuring social dynamics, empowerment, social cohesion, but also issues of gendered impacts, safety and participation. Taking user- and stakeholder feedback seriously from the beginning has been a key insight for ensuring social acceptance of technological interventions. Unlike many one-time assessment approaches PARSEC will **monitor the social impacts** detected at the respective demosites **at several instances** throughout the project. This ensures a **continued feedback loop and learning** as

[28] Jeuken, Y.R.H., Mourik, R.M., 2018. Collaborative research strategies in energy and sustainability related Social Sciences and Humanities: A literature review and practical guide. Cambridge: SHAPE ENERGY, https://shapeenergy.eu/wp-content/uploads/2019/01/Report_Interdisciplinarity_ACENTO_v4-1.pdf

well as **multi-sites comparisons over time**. Social dynamics at sites will be monitored based on a **mixed method approach**, combining more qualitative and quantitative social research methods (e.g., in-depth interviews and surveys). Centrally, insights gained will be **fed back to technology providers and developers** to **design user- and context-sensitive interventions**. This will provide broader lessons relating to **social acceptance** of PARSEC interventions- and engagement approaches to reach this.

1.2.6 Gender dimension

In accordance with EU's Gender Equality Strategy 2020-2025[29] and SDG#5 (Achieve gender equality and empower all women and girls), CINESIS integrates gender dimension into its R&I content. CINESIS aims to explore whether and how the developed solutions and services affect or concern women and men differently as end-users. Ideas and approaches from the **GEAR tool**[30] will be capitalized. In that context, a type of **sex, gender and intersectional behavioural and sensitivity analysis** will be conducted to identify potential gender differences pertaining to satisfaction, preference and perception issues regarding the proposed technologies, activities and services. Special attention will be given during the implementation of WP1-6 in giving equal opportunities to **both genders** regardless of religions, age, income, education, disability, ethnicity etc. to be involved in the end users' groups that will play a crucial role in the **definition of the end users' requirements**. In addition, the impact assessment to be implemented under T4.2 will focus on taking measures and establishing good practices that consider critical gender factors and challenges contributing to gender equality and meeting the particular needs of each gender. Sex, Gender and intersectional equality will be also a priority of the project **during the validation cases implementation** (WP7). In particular, the involved EU Energy stakeholders will be selected after a detailed examination and pre-selection procedures, in order to succeed the best-balanced group of end-users regarding gender and intersectional equality. **Concerning the dissemination of CINESIS results** a special attention will be given to disaggregating reported results by sex and gender and report all results: positive and negative; c) Ensure that gender variations are properly reported in tables, figures, and conclusions; d) Considering following the SAGER[31] publication guidelines. Lastly, UNITN, RINA-C, UBE will be responsible for the integration of the gender dimension in the execution of the project in order to ensure gender balance in research and decision-making towards the implementation of the activities, evaluation panels and other relevant advisory boards/groups of expert and foster women's empowerment covering the full energy value chain, according to "Horizon Europe" requirements[32].

1.2.7 Research data management

CINESIS involves carrying out data collection, including personal data and metadata. All processing of personal data will be conducted in accordance with the provisions of: **a)** the GDPR (Regulation (EU) 2016/679)[33], **b)** the Universal Declaration of Human Rights and the Convention 108 for the Protection of Individuals with Regard to Automatic Processing of Personal Data, and **c)** the national laws. Data managed during the project will be processed only under the following preconditions: **(i)** When the data subject has given her/his consent; **(ii)** When the processing is necessary for the performance of or the entering into a contract; **(iii)** When processing is necessary for compliance with a legal obligation; **(iv)** When processing is necessary in order to protect the vital interests of the data subject. Personal data managed within CINESIS will be anonymized and stored in a form which does not permit identification of users. CINESIS will establish a data management framework that guarantees security of collected data from potential abuse, theft, or loss. The D1.2a,b Data management plan (UBE, M6, M42**),** will detail what data the project will generate (i.e., content, type, format, volume), which standards and methodologies will be used for data collection and management, whether and how it will be exploited and how they will be made findable, accessible, interoperable and reusable (**FAIR**). Management of research data will be done in accordance with the related soft law instruments governing scientific research (e.g., the European Code of Conduct for Research Integrity, the Guidelines to rules on Open Access and on Data Management in Horizon Europe.

1.2.8 Open Science practices

CINESIS will follow thoroughly all the required actions in order to be aligned with the Open Science practices as they are also defined in Horizon Europe guidelines. In particular, CINESIS will address the following:

- **Early and open sharing of research**: During the project all the partners will follow methods and steps that assure the early and open sharing of the project outcomes. Preregistrations of the research plans in advance of the study implementation, as well as registered reports will be submitted to Open Access Repositories. Methods as pre-printing and crowdsourcing will take place by taking under consideration only repositories and journals that accept preprints. Indicatively, some repositories for general research fields are Figshare, PeerJ, OSF Preprints, Zenodo while some discipline specific repositories are arXiv, engrXiv, SocArXiv, etc.

[29] A Union of Equality: Gender Equality Strategy 2020-2025, COM(2020) 152 Final, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0152&from=EN
[30] https://eige.europa.eu/gender-mainstreaming/toolkits/gear
[31] https://ease.org.uk/communities/gender-policy-committee/the-sager-guidelines/
[32] Gender Equality – A strengthened commitment in Horizon Europe, European Union 2021, ISBN 978-92-76-28425-3 doi:10.2777/410001
[33] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2016.119.01.0001.01.ENG

- **Research output management and measures to ensure reproducibility of research outputs:** CINESIS will cover the three main research processes that reproducibility is based on: reproduction, replication, and re-use.
- **Open access to research outputs and participation in open peer-review:** All the research outputs will be aligned with the Open Access and Open Science regulations of the EU. More specifically, the publications of the project will be published in **Open Access Journals** which will be initially checked from the SHERPA/RoMEO platform and DOAJ and **Open Access Repositories** (e.g. PubMed, Zenodo, arXiv, etc.) which will be identified through platforms as ROAR, OpenDOAR, OpenAIRE and OAD. In order to succeed the optimum level of impact along with the most cost-efficient method, the involved researchers will utilize both **Green Open Access** (self-archiving in open repositories) and **Gold Open Access** (peer reviewed publications in open access journals or/and repositories) strategies according to the content of the outputs.
- **Involvement of relevant knowledge actors including citizens, civil society and end users in the co-creation of R&I agendas and contents**: During CINESIS the active involvement of the general public and the non-professional scientists will be highlighted in all the project's phases. In particular, during WP3 a detailed definition of the end users' needs will take place, while during the validation cases campaigns and implementation activities in WP6 will be crucial for the best evaluation of the projects' results. Best practices and know-how from other H2020 projects and initiatives will be taken under consideration in order to succeed the best R&I results (e.g. GAIA-X (as most significant) EU-Citizen.Science, CitieS-Health, DITOs, WeObserve, LandSense, SCENT, GroundTruth 2.0, GROW, etc.).

2 IMPACT

2.1 Project's Pathway towards impacts

The main expected impacts of CINESIS project are summarized in table below and will be monitored through **5 main KPIs to be monitored/studied in all the demos**: mobilized investments – CO_2 emissions saved – MWh interchanged between energy community and national grid via self-consumption (with a focus on RES exploitation) – amount of citizens engaged, and -views on social media

Impact	Direct impact of CINESIS project activities (by 2025)	Impact at EU level triggered by CINESIS replication strategy by 2030
Economic	**KPI: 3 M€ of investments**[34] by the local partners in the CINESIS demos	**KPI: 30M€ of investments** all around EU within 2030 (leverage on EU funding 1:10) [35]
Environmental	**KPI: 120 tCO2,eq/yr potential** savings in project demos thanks to a better management of the current energy system[36]	**KPI: 500 ktCO2,eq/yr potential** savings in average per end-user utilizing the CINESIS technologies.
Technology	**KPI: 2 GWh of RES self-consumed increase** and **3.5 GWh not Inter-exchanged**[37] with National electric grid thanks to solutions and business models introduced by the CINESIS project	**KPI: At least 100 GWh of RES self-consumed** and **150 GWh not Inter-exchanged** with National electric grid thanks to the innovative business models introduced by the CINESIS project.
Social	**KPI: 1000 citizens engaged in** CINESIS **30 new jobs** will be created in the context of the demos and partners during project lifetime. Awareness and better understanding of energy communities and energy system transformation by end-users	**KPI: 30000 citizens engaged in** CINESIS **500 new jobs.** Increase the participation of consumers in the market thanks to increased awareness of energy communities' potential, **reducing the price of energy and prevent discrimination** of citizens at risk of exclusion or poverty
D&C	**>50000 views on social media** in 4 years **At least 4000 views per year** on CINESIS website Quarterly newsletter	

Generally speaking, CINESIS will have two main impacts:

1) Promote data-driven sector-integration energy services for consumers

The CINESIS platform creates an interoperable solution focusing on two dimensions; the first one is related to the energy carrier, i.e., electricity, heating, cooling, and the second one is related to the cross-industry, i.e., energy, mobility, health services. The flexibility services and products (T2.1) that the CINESIS platform enables, focus on

[34] *Estimation based on data collected from the partners engaged in the CINESIS demos*
[35] *It is envisioned that a ten-fold increase is anticipated across Europe, after the adoption of the CINESIS platform*
[36] *Considering in a conservative approach only residential emissions savings and an overall engagement in VCs of 200 users it is possible to enable an overall self-consumption of 1400 MWhe/yr with and EU emission factor of 0.281 kgCO2/kWhe*
[37] *An initial estimation based on the existing infrastructure and the upgrades that will take place in the context of CINESIS.*

alleviating problems existing in both TSOs and DSOs. Consumers are considered as the main elements in the revenue value chain, and the flexibility existing in their assets (edge of the distribution grid) can be used as a lever not only from the perspective of flexibility provision, but also from the perspective of potential parallel revenue streams while experiencing cross-industry services.

2) Promote innovative business models valuable for grid and mobility operators, aggregators and consumers

CINESIS will promote innovative business models for multiple stakeholders in the energy sector and beyond, trying to facilitate cross-industry integration. The innovative business models that CINESIS proposes will enable the railway system to operate smoothly under a high electrification scenario, the aggregators to leverage the flexibility potentials of the assets existing even at a building level to optimize their economic performance in electricity wholesale and local markets, the grid operators to enhance their operational processes regarding grid reliability and prequalification for participation in the markets, and the consumers (building level, industrial) to increase their revenue streams by fully exploiting the investment opportunities in renewable technologies.

2.1.1 Specific contribution to the expected outcomes mentioned in CL5-D3-02-06

With the European Green Deal and the Paris Agreement's climate targets, the EU has committed itself to achieve a carbon-neutral economy by 2050. In order to meet these decarbonization targets, the sector coupling integration has been included as a key strategy in the EU's ESI published in 2020[38]. Moreover, the Clean Energy Package[39], agreed by the EU in 2018, states that consumers shall be entitled to have an active role in the EU energy system, leveraging on the possibilities offered by RES integration. The possibilities offered by technology and digitalisation are deemed crucial to increase power system efficiency and increase awareness of end-customers, and thus fulfilling the above-mentioned objectives. Flexibility and energy-data platforms have emerged in the last years to facilitate the smooth planning and real-time operation of transmission and distribution systems under high-RES penetration conditions, by valorising the flexibility potential existing even at the edge of the distribution grids and in different energy sectors (gas, heating/cooling), and creating flexibility and space data marketplaces, respectively, that provide economic benefits for the participants. Those marketplaces are related closely with innovative business models that are consumer-centric and connect different industries (mobility, home automation, health), providing significantly added value to the end-customer. Several actors from the energy domain, such as operators, aggregators, end-customers, participate in flexibility markets with different business objectives. For the realization of those objectives, advanced digital tools are necessary to be developed, offering technical solutions to processes such as flexibility aggregation, building management, grid side flexibility provision, flexibility needs forecasting, FSPs pre-qualification and asset's optimal scheduling. **CINESIS platform aims to act as a lighthouse demonstrating innovative flexibility Services along with cross-sector and industry coupling, addressing the ambitions of the EU towards energy sector's decarbonization and digitalization, by realizing specific impacts, as mentioned in CL5-2021-D3-02-06. Specifically, the project outcomes particularly contribute to the call's expected outcomes (EO) as follows:**

EO#1: CINESIS develops new business models for market parties based on energy services and revenue streams for consumers

CINESIS develops innovative business models for stakeholders in the energy and mobility sector, in order to provide added value to the end-user through the establishment of additional revenue streams (Task 2.2). CINESIS aims to reduce the barriers to the creation of new business models for stakeholders in the energy services sector and consumers willing to monetize their flexibility in energy consumption. This is achieved by establishing a trusted architecture with an open governance and strong data security and ownership policies. Different cross-services solutions that are proposed by CINESIS fit to the EaaS business model, adding value directly to the end-customer. Energy-as-a-service (EaaS), i.e., a business model whereby customers pay for an energy service without having to make upfront capital investments, market share is expected to grow from $57.6Bn in 2020 to reach $106.6Bn by 2026, at 10.8% annual Compound Annual Growth Rate (CAGR) growth during forecast period of 2021-2026. The business models that will be proposed and demonstrated in CINESIS introduce a more customer-centric approach and are reliant on customer interactivity. Solutions that promote and realize cross-sector services provision is an impact that CINESIS wants to fulfil. There are several opportunities in market domains emerging from that, such as mobility and smart home markets, that the solutions provided by CINESIS can be exploited. Under this model companies offer the physical product and CAPEX for installation of the highly expensive but highly integrated solutions, are kept under the service provider budget who is able to completely manage the energy assets and make revenues from providing services. Particularly, the mobility as a service (MaaS) market size was valued at $49.67Bn in 2019 and is projected to reach $271.66Bn by 2027, growing at a CAGR of 23.7% from 2020 to 2027[40]. Moreover, smart home market revenue is expected to show an annual growth rate (CAGR 2021-2025) of 15.75%, resulting in a projected market volume of US$187,429m by 2025[41].

[38] *https://ec.europa.eu/energy/sites/ener/files/energy_system_integration_strategy_.pdf*
[39] *https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en*
[40] *https://www.verifiedmarketresearch.com/product/mobility-as-a-service-market/*
[41] *https://www.statista.com/outlook/dmo/smart-home/worldwide*

EO#2: CINESIS enables market parties to provide flexibility services to network operators and the wholesale market based on competitive markets that are easily accessible and at low transaction costs.

The adoption of market related concepts promoted in CINESIS will allow commercial activities around flexibility provision and therefore new business opportunities for existing and new stakeholders in the energy value chain of both local and wholesale markets. CINESIS will demonstrate solutions that enable end-consumers to actively participate in flexibility markets, providing specific products to satisfy needs and scarcities (Task 2.1). At the epicenter of this evolution stands the consumer that actively participate in the market, as long as the market rules (and the associated regulatory framework) are transparent and non-discriminatory, and due attention is given to data privacy. CINESIS has a direct impact on the procurement of flexibility services from assets existing even at the edge of the distribution grid. There are numerous opportunities for financial cost savings by exploiting the project outcomes in this specific area. Specifically, the complete integration of Balancing Markets and the exchanging and sharing of reserves could achieve operational cost savings in the order of €3billion/year and reduced (up to 40%) requirements for reserve capacity, according to the EG GL impact assessment (COM,2013)[42]. In addition to that, the procurement of innovative flexibility services reduces investments in generation and grids, i.e., peak load reductions and shifting can lead to avoided or delayed peak generator and network investment, and reduces marginal costs/ prices during extreme events, providing additional economic benefits for the entire energy ecosystem.

Another important market that belongs to the broader area of flexibility is the demand response market; the size is expected to reach $24.71Bn by 2022[43]. Specifically, the residential segment is poised to grow at a CAGR higher than the global average, which is a direct consequence of financial incentives, rebates and new business models introduced and offered by utilities, retailers, and aggregators to domestic customers to persuade them in the participation of several demand response schemes. Smart buildings can create truly value-adding positions at the nexus of buildings and home management. The rate of take-up of smart home and building technology along with the wider digital offerings to end-customer (consumers at the edge of the distribution grid), will be determined by consumer's perception of ease of use, relevance, cost, and privacy. The CINESIS platform will offer the tools, such as automation, forecasting modules, aggregation modules, thus leveraging the full consumer flexibility potential. Finally, besides demand and supply-side flexibility, CINESIS through the TRAIN2Grid tool leverages grid-side flexibility to alleviate problems existing in power systems.. Therefore, there is a huge potential impact directly regarding that specific sector and the corresponding market segment.

EO#3: CINESIS uses an increased application of digital technologies to support consumers and market parties to market their flexibility.

CINESIS offers an interoperable, scalable platform which allows communication and data exchange among all the market players and provides a set of functionalities that enables them to market their flexibility and increase their revenue. Specific tools, such as iFLEX, increase the interoperability by using a set of adapters, and will provide an embodiment of the digital technologies which are needed to obtain a high penetration of the flexibility market to customers and network operators. In addition, CINESIS employs DLTs to facilitate energy democratization processes through the reduction of consumer's energy consumption cost. This creates a fertile ground and has a direct impact and added value to consumers existing even at the edge of the distribution grid. The DLT market revenue was $897m in 2019, and will reach $3.9Bn in 2025, with a CAGR of 27.62% during 2020-2025[44]. CINESIS offers cloud-based solutions for valorisation and management of flexibility from energy communities (CEDIS VPP tool), thus increasing the opportunities for scalable applications in the energy sector. Cloud applications are emerging in the energy and power sector and provide scalable computational capacity for applications such as asset aggregation and management, outage management, power trading, risk analytics, etc. The cloud market for energy industry was valued at $1.786Bn in 2017 and is projected to expand at a CAGR of 25.68% over the forecast period to reach $7.037Bn by 2023[45].

EO#4: CINESIS promotes consumer engagement and acceptance

CINESIS promotes consumer's kinesis (mobilization) in the seven dispersed demonstration areas, by enhancing acceptance and engagement in the green transformation of the energy sector through the activities of both Tasks 2.1 and 2.3. Specifically, the different needs and characteristics of the consumers will be collected and analysed in order to explore the socio-economic drivers of engagement, group building, governance models and assessment methods. This will be achieved by setting specific customized strategies per consumers' group, proposing efficient methodologies to improve the quality of formation and operation of the consumer group, exploring the impact of policy to support the development of democratically governed legal forms to allow citizens to engage in more collective actions, and finally by exploring more metrics and indicators to better understand and assess starting

[42] *https://ec.europa.eu/energy/sites/ener/files/documents/20130610_eu_balancing_master.pdf*
[43] *https://www.grandviewresearch.com/press-release/global-smart-demand-response-market*
[44] *https://www.marketwatch.com/press-release/blockchain-distributed-ledger-technology-dlt-market-size-2021-global-opportunities-trends-regional-overview-global-growth-leading-company-analysis-and-key-country-forecast-to-2025-2021-08-30*
[45] *https://www.businesswire.com/news/home/20181206005446/en/Analysis-on-the-Cloud-Storage-Market-for-the-Energy-Power-Industry---Global-Outlook-to-2023-A-7-Billion-Opportunity---ResearchAndMarkets.com*

community-based initiatives. All these activities will have a tremendous direct impact on mobilizing the consumer participation, initially in the context of the CINESIS project's demonstrators, and in a next level, on the adoption of tools proposed by CINESIS by consumers/aggregators and other market parties across EU. Last but not least, the methods introduced for customer engagement can have an impact the following years in next initiatives in both Horizon Europe (through the BRIDGE initiative) and commercial projects.

EO#5: CINESIS increases availability of flexibility sources for TSOs and DSOs and enables them to develop markets for flexibility and interact with many distributed resources at the same time (via intermediaries such as energy suppliers or aggregators) based on seamless data exchange and interoperability.

CINESIS project strives to harvest flexibility from the edge of the distribution grid (appliance and building level), cross-industry customers (demand response from trains), V-RES connected directly to distribution and transmission grid, cross-sector energy carriers (heat pumps), EV-charging stations and grid-side flexibility solutions (SmartValves in TRAIN2Grid). The different tools and platforms that are connected through the interoperable CINESIS platform are used by market parties, such as aggregators, VPP owners and industrial consumers (train operators) to optimally manage their flexibility and provide innovative flexibility services to fulfil both TSOs' and DSOs' scarcities. Hence, the increased availability of flexibility sources for TSOs and DSOs interacting through intermediaries is a direct impact that CINESIS will offer, along with tools for the grid operators that increase visibility in power system's operation and facilitate grid prequalification process (F-channel). A future impact of the CINESIS platform is the adoption of this end-to-end architecture, that enables different flexibility assets to participate in local and wholesale markets, by several users across the EU and thus increasing financial benefits for market participants and security of supply for the end-customer.

EO#6: CINESIS contributes to the better understanding of market models and regulatory measures that can promote new business models.

CINESIS through the activities in WP2 will conduct a study on applicable international, European and national regulatory frameworks in order to investigate the relevant regulatory and legal aspects related to the flexibility's stakeholders and consumers. Features and characteristics of the operating markets and mechanisms in Europe, along with the experience from implementing models and directives of the related Network Codes will be explored. In addition, specific measures will be proposed ensuring the efficient participation of all types of market participants to the proposed markets and flexibility services, taking into consideration the goals, needs, and perspectives of suppliers, aggregators, flexibility providers, and system operators. All those activities will create a set of business models that has a direct impact on facilitating the penetration of renewables in the energy mix, the optimal coupling of multiple energy carriers, the smooth operation and electrification of the mobility sector, and the guarantee of a high level of quality living for the end-consumer. The replicability activities of the demonstrators will provide a robust framework for creating a holistic impact across the European region the following decades, employing business models that directly exploit multiple sectors and industries having as a priority the end-customer.

EO#7: CINESIS 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.

CINESIS proposes an end-to-end interoperable platform, that is also compatible with architectures and components built on previous H2020 projects, which connects tools to valorize flexibility by facilitating various processes of grid operators, aggregators, VPP owners, and consumers. In addition, the functionalities of the F-channel tool enable grid operators to conduct automated and robust grid prequalification services to assets that are willing to connect to the flexibility register. Those elements will have a direct impact on the flexibility markets uptake; reduce considerably the temporal barriers for verification of the newly introduced flexibility providers, and thus increase the incentives for participation in the markets for several stakeholders regardless their size. The scaling up potentials of the CINESIS platform (WP6) can have great impacts on the high RES (towards 100% in 2050) penetrated European electricity markets (both local and wholesale) ecosystem of the future, where TSOs and DSOs can exploit the automated grid prequalification functionalities and thus ensuring a carbon neutral, reliable electricity sector.

EO#8: CINESIS contributes to better informed investment decisions by network operators and tariff setting models by NRAs, as flexibility markets and new business models can postpone or avoid new investments making better use of existing assets

CINESIS' P2P capacity sharing tool directly contributes to that expected outcome by reducing the bill for the end-consumers through optimizing the capacity-cost of each consumer (household level) based on the actual utilization rate. This tool has a direct impact on both the planning processes of DSOs (fewer capital investments need to host the same amount of active consumers) and the actual cost the consumers billed for the used energy (cost reflects the actual volume-based utilization in real-time). NRAs can leverage the outcome of CINESIS to propose this approach in the existing methodologies for electricity tariffs calculation.

2.1.2 Contribution to destination's Key Strategic Orientations (KSOs)

CINESIS project contributes to the following two KSOs of the strategic plan for Horizon Europe[46] as follows:

KSO_A: CINESIS promotes an open strategic autonomy by leading the development of key digital, enabling, and emerging technologies, sectors and value chains to accelerate and steer the digital and green transitions through human-centered technologies and innovations

CINESIS aims at promoting digital transformation of the energy sector by proposing an interoperable platform of tools that unleashes the cross-vector flexibility potential of consumers to provide flexibility services to both DSOs and TSOs. This unique platform empowers the flexibility markets' establishment across different dispersed areas in Europe, while enhancing the connection of the electricity sector with other industries, such as home automation and mobility. A direct impact is that consumers and operators across Europe will adopt CINESIS tools, business models and practises in their daily operations, and thus further augmenting the market revenues in European electricity markets. An indirect impact of the CINESIS platform is that different stakeholders and technology providers (with the support of regulators and policymakers) can steer the efforts and build upon CINESIS, towards the development of human-centred technologies in the cross-energy domain, such as co-optimization of flexibility in multiple energy vectors including electricity, gas, heating/ cooling, waste, recycled material etc., to accelerate RES penetration in EU

KSO_C: CINESIS contributes making Europe the first digitally enabled circular, climate-neutral and sustainable economy through the transformation of its mobility, energy, construction, and production systems

CINESIS contributes towards KSO_C by offering a robust, scalable and sustainable solution for vertical industries, i.e., energy, mobility, home automation and life-assisted services, with requirements and demonstrations of high quality that allow the extraction of valid outcomes for enabling similar-scalable practices to be adopted in a pan-European level, and thus creating a clear pathway towards a circular, climate-neutral European region. CINESIS has a direct impact towards the aforementioned vision by proposing a direct solution that encapsulates different industries under a unified concept that ensures all the requirements of the three pillars for a sustainable development; *People* by explicitly focusing on consumer; *Planet* by reducing dependency of fossil fuels in electricity (enabling RES penetration increase) and railway industry (electrification in high RES scenarios); and, *Prosperity* by proposing sophisticated business models that aim at increasing revenue of the end-consumer.

2.1.3 Contribution to the wider impacts specified in CL5-D3 of the work program

GENERAL MAIN EXPECTED IMPACT-1*: CINESIS fosters the European global leadership in affordable, secure and sustainable renewable energy technologies.*

CINESIS platform promotes a digital solution to the energy sector, offering optimal utilization of flexibility existing in assets connected to transmission and distribution systems, along with other sectors, e.g., heating and cooling sector. The solutions provided by CINESIS directly tackle the problems arising from RES, and therefore act as a lever to further increase the capacity of DERs that power systems can host. CINESIS will develop innovative business models for enhanced and economically viable market uptake of RES. Moreover, customer engagement practices will be introduced in order to attract the interest of end-customers, promoting further the benefits that CINESIS provides towards a sustainable future. CINESIS contributes to a more resilient, secure EU energy system that further reduces the dependence on fossil-fuels and has a direct impact on achieving the goals set by the EU, exploiting flexibility potential from different stakeholders in the energy value chain. Therefore, the project enhances the EU's global position and leadership in sustainable development, energy technology and innovation, further contributing to the ongoing technological shift in Europe to reach its 2050 targets[47].

GENERAL MAIN EXPECTED IMPACT-2*: CINESIS ensures cost-effective uninterrupted and affordable supply of energy to households and industries in a scenario of high penetration of variable renewables and other new low carbon energy supply. This includes more efficient approaches to managing smart and cyber-secure energy grids and optimisation of the interaction between producers, consumers, networks, infrastructures and vectors.*

CINESIS exploits flexibility existing in renewable assets and grid in order to increase grid resilience based on improved and/or new technologies to control the system and maintain system stability under difficult circumstances. Specifically, the optimal operation of energy assets from a building to a regional level through the deployment of smart, carbon-neutral technologies in combination with ICT solutions, will enhance the sustainable performance of communities, cities, regions and entire islands. The increased flexibility and resilience of the energy system, based on technologies and tools to plan and operate different networks for different energy carriers (power, heating/cooling), simultaneously, in a coordinated manner that will also contribute to climate neutrality of hard-to-electrify sectors. Moreover, the CINESIS project enhances consumer awareness, satisfaction, and welfare through the development of consumer-centric business models and customer engagement practices, facilitating the investments in energy transition, through the enhancement of self-consumption, empowerment of demand response schemes, reduction in capacity tariffs, and high investments in renewables. CINESIS fosters the European market for innovative flexibility services as well as tested standardized and open interfaces of energy devices through a

[46] *https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/strategic-plan_en*
[47] *https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf*

higher degree of interoperability, increased data availability and easier data exchange among stakeholders in the energy domain.

2.1.4 Contribution to ENTSO-E's R&D Roadmap 2020-2030

The CINESIS project is in alignment with the ENTSO-E's R&D Roadmap 2020-2030, by contributing to the two following activities:

Flagship 1: Optimise cross-sector integration

Flagship 2: Develop an ecosystem for deep electrification

Therefore, ENTSO-E expressed his warm support and great interest through a Letter of support (Figure in previous page), written and signed by the Secretary-General. ENTSO-E will closely observe the activities of the project, by actively contributing with possible participation as a member of the Stakeholders Advisory Board and through consultations that will be launched during the project.


Letter of Support

entsoe

ENTSO-E will observe the on-going activities of the project with great interest and actively contribute to the success of the project as possible member of the Stakeholders Advisory Board by participating to the meetings of this body and to possible consultations that will be launched during the activities of the project.

Yours sincerely,

Sonya Twohig

Secretary-General, ENTSO-E


Letter of Support

entsoe

Sonya Twohig
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To: Alessandra Cuneo, PhD
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Brussels, 15 December 2021

CONSUMER MOBILIZATION FOR ENERGY SERVICES THAT INCREASE SYSTEM FLEXIBILITY (CINESIS) project proposal answering the HORIZON-CL5-2021-D3-02-06: Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs) call

To whom it may concern,

We hereby confirm the interest of European Network of Transmission System Operators for Electricity (ENTSO-E) to support the above-mentioned project led by **RINA-C**.

CINESIS project will propose an interoperable platform of tools that unleash the cross-vector flexibility potential of consumers to provide energy/flexibility services to TSOs and DSOs, as well as:

(i) promote data-driven scenarios for engaging consumers for energy services provision, by valorizing the flexibility capabilities of their multi vector assets, in coordination with various actors in the value chain

(ii) foster the end-use sector coupling approach in local energy grids as new 'resource' for flexibility provision

(iii) are built on the basis of a customer-oriented approach for business models and market designs that are explicitly linked to the wholesale markets, so that to incentivize citizens as active energy market participants, and

(iv) aim at affecting strongly the system management up to TSO and DSO level for deferring conventional infrastructure investments.

Key partners of the project are: HOPS, Cyprus TSO, ESO, and 21 other members including manufacturers, research institutions, service/technology providers.

This proposal is in line with ENTSO-E R&D Roadmap 2020-2030 and especially the activities:

Flagship 1: Optimise cross-sector integration

Flagship 2: Develop an ecosystem for deep electrification.

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2.1.5 Societal, Environmental and other Impacts

Category	Impact
Societal	**Job Creation:** The introduction of new innovative business models and the solution proposed through CINESIS platform will create new jobs during the project's lifetime and beyond. New skills' set and thus expertise-needed jobs in the energy and IT sectors for managing the advanced proposed solution will be of high demand. • **Reduction of energy poverty:** through the proposal of innovative business models that increase added value for the end-consumer. By leveraging the flexibility of the energy system even at a household level, the share of electricity produced can be further increased, providing additional income for the participants. • **Awareness raising regarding smart grid solutions:** The knowledge building and information sharing activities that will take place in the context of the different demos will increase the awareness in the engaged stakeholders about the benefits that smart grid solutions offer, especially regarding sustainability.
Policy	**Contribution to EU energy policy:** Integrating distributed generation and flexible demand requires innovative solutions and an appropriate regulatory framework. In Europe, demand side flexibility (DSF) is recognized as an instrument for the best utilization of current distribution grids and consequently to the best allocation of resources for grid investments. In this context, CINESIS will develop new business models and it will thus provide recommendations in the context of EED regulation, which is being currently revised, with regards to the role of demand response in energy transformation in relation to transmission and distribution (Directive 2012/27, Art. 15), as well as being in line with the Directive on the internal Electricity market with regards to the cooperation between DSO and TSO (Directive 2012/27, Art. 57).
Environmental	**Tackle climate change:** CINESIS serves as a catalyst for communities regarding their local energy plans for implementation, helping involved actors to meet the EU climate mitigation and adaptation goal, in line with the transition requirements for climate action highlighted by Fit for 55 package[48]. **Electricity efficiency:** Efficiency of electricity usage at a building, community and regional level is going to be achieved by the proposed solutions, realizing savings in electricity use. **Growth in RES penetration and decarbonization acceleration:** CINESIS accelerates decarbonization of the EU electricity sector, impacting climate change and the environment, by increasing the ability to efficiently utilize the flexibility even at the edge of the distribution grid to alleviate problems arising due to the stochasticity of DER's production, and thus increasing the capacity of DERs that the power systems can foster.

2.1.6 Potential barriers to CINESIS widespread

An analysis in order to take into account diverse factors that can affect positively or negatively to the CINESIS results deployment in the market has been carried out using the PESTLE approach[49]:

P / L	Political and Legal factors
(i) Regulations with respect to electricity markets, energy domain infrastructure, sector coupling, and energy data market are evolving, due to the rapid scientific and technological progress in various domains such as Machine Learning, flexibility markets etc., and due to the EU's mandate to achieve decarbonization in the energy industry.	

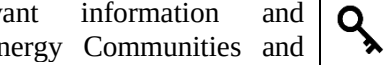
[48] *https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0550*

[49] Business Analysis Techniques bcs. The Chartered Institute for IT_ 2010_James Cadle, Debra Paul and Paul Turner. 2010.

Mitigation Action: CINESIS aims to closely follow the regulatory environment, thus ensuring the project is aligned with the current and upcoming regulatory framework. During the project's lifetime, the consortium and the responsible partners for each demonstrator will be informed of any differentiation in the regulatory framework that may have affected them. || (ii) Issues regarding compliance to GDPR. Mitigation Action: GDPR guidelines will be strictly followed from the design phase of the project, and it is a prerequisite for the developed CINESIS platform, the tools/platforms developed in the demos, and the demonstration activities || (iii) Despite the existence of a comprehensive European energy policy framework, at national level the progress of enabling flexibility services in the distribution grid and the operation of flexibility markets varies significantly among the different European countries. This mainly depends on the national policies and regulatory framework. Mitigation Action: Sandboxes could be created for regulation in specific elements/processes, in case that there is no one in place.
E Economic factors
(i) Lack of willingness of operators and aggregators to invest initially in innovative technologies which also exhibit high maintenance costs, (ii) Concerns regarding the innovative Business models introduced in CINESIS. Mitigation Action: These barriers could be overcome by increasing the awareness of the stakeholders that CINESIS solutions could help them operate efficiently their electricity assets, thus also enhancing the overall quality of service of other cross-industries (e.g., mobility) and increase the economic benefits in the long-term.
S Social factors
Customer acceptance and engagement in CINESIS project's demonstrators may not be at an adequate level Mitigation Action: CINESIS aims at developing customer engagement practices, building upon the work conducted in previous H2020 projects and has been properly reported by BRIDGE. ll these practices will boost customer engagement during the project and beyond. Project outcomes will validate the CINESIS' solutions.
T Technological factors
(i) Various design, operation, monitoring, control problems of the proposed architectures and energy assets Mitigation Action: From the very beginning of the project, thorough discussions and workshops with the demonstrators will be conducted to alleviate fast and efficient the arising technological barriers || (ii) Cybersecurity issues that may arise during the design, deployment and implementation phase of the CINESIS platform. Mitigation Action: During the demonstration activities, CINESIS project will strive to showcase to the involved operators, aggregators and end-consumers the benefits that the innovative solutions provide for their daily operations || (iii) Scaling up the proposed CINESIS solutions is not realized. Mitigation Action: The demonstration and assessment of advanced solutions will provide evidence about the applicability of the proposed tools.
E Environmental factors
Lack of systematic approach of the operators to tackle the reliability and adequacy issues without using solutions with high environmental footprint, i.e., flexibility markets' adoption compared to installation of new transmission lines. Mitigation Action: CINESIS offers an interoperable platform to system operators, to make efficient decisions about grid resilience without using solutions with high environmental footprint.

2.2 Measures to maximise impact

Measures to maximize impact will be distinguished into i) activities aimed at **promoting the action**, at **awareness raising and communication** beyond the project's internal as well as external communities to wider audiences, including the media and the general public, ii) activities aimed at **raising interest among stakeholders and the exploitation-oriented dissemination** of the benefits provided by the innovative technology proposed in the project toward potential target end-users/adopters, and iii) activities aimed at the **exploitation** of the project's results. The main stages for the dissemination and exploitation of project results is provided in the scheme below. Se**t of measures below will be deployed both during the project as well as after its completion**,

Engage 	The main priority at a first stage is to identify and engage key stakeholders by providing relevant information and awareness on Energy Communities and CINESIS innovations	**Produce** 	Main results that enable CINESIS services widespread and energy communities' deployment will be identified together with partners responsible for their exploitation.
Share 	Gathered insights and derived outcomes must be communicated to the general audience and all stakeholders via different channels/tools that maximize the dissemination of the project.	**Exchange** 	The exchange of information is crucial to understand the needs of key stakeholders and end users, define an exploitation strategy and replicate the project results.

Activities will target a wide range of stakeholders, spanning from **potential end-users/adopters (energy communities, energy data expert, DSO, cooperatives, energy utilities), ICT developers and to the R&D community** gravitating around energy communities and services, and, last but not least, **the civil society as a whole**.

CINESIS Target group

Dissemination activities will particularly aim, in a first instance, at raising interest (both from a technological and policy/SET Plan oriented point of view), in the proposed technology, of potentially interested parties across relevant stakeholders. In a second instance, exploitation-oriented dissemination activities will be aimed at promoting CINESIS Innovations/enabling services/business models along with the benefits it can provide, toward potential target end-users/adopters to speed up its adoption and take-up. Target audiences for dissemination activities will be the different end-users, the R&D and regulatory and financial community. The impacts and results of the project will be different based on the reference target group, that will be disseminated differently. In the table below, the main impact (Scientific/Economic/Social) is reported with the related expected outcomes as detailed in Section 2.1

Target group	Scientific impact	Economic impact	Societal impact
Scientific community and researchers (also coming from sister projects)	CINESIS will ensure interoperability among different flexibility platforms (coming also from other H2020 projects) to enable the provision of services from the consumer.	The new business models proposed by CINESIS will be available for further research on the energy field having a direct impact on the EU energy economy.	CINESIS partners will work towards broader data interoperability for the energy industry, enabling exchange of energy data for all the stakeholders of the energy value chain.
DSO/ TSO and grid operators	CINESIS toolbox will offer support to grid operators to improve network operation and will allow cross-sectoral integration of rail and electrical networks to mutually support each other.	CINESIS flexibility services and the achieved market integration will have a direct impact on the economy providing new revenue sources. Different services will help reduce actors' energy costs and to minimise their impact on the grid. All these factors will allow reduced curtailment resulting in economic benefits for the whole value chain	The services provided through CINESIS will support the penetration of RES in the grid directly linked to a reduction of CO2 emissions.
Energy consumers/ citizens	Sharing energy consumption data and influencing consumption patterns can offer flexibility services and increase energy autonomy.	Via the utilizing DLT technology and the CINESIS toolbox, sharing consumption/ production data will have a direct economic impact to the consumers and citizens. The services promoted through CINESIS could result in direct reduction of energy bills and subsequently energy poverty.	The increase of RES share is directly linked to a reduction of CO2 emission, increasing the quality of life. Moreover, CINESIS aims to promote inclusions and collaborative behaviours amongst end users.
ICT developers	CINESIS will integrate additional functionalities for other projects to make the models and data accessible with an easy user interface to facilitate the integration of services from the different actors.	Economic benefits will come out from the establishment of a smart interoperability architecture for flexibility, since it will lead to lower hardware costs and lower costs of data use.	The different CINESIS opportunities should benefit ICT partners, service providers and SMEs that generally do not participate in standardization activities.
Public sector	The development and/or enhancement of flexibility services is only possible due the seamless data exchange of multiple actors (SOs, aggregators, prosumers). Replication of these services in similar contexts will leverage existing infrastructures.	Better use of data in energy sector can lead to more efficient and relevant public service and thus increased quality of life, as well as more efficient services in the context of supporting the energy transition to achieve affordable and clean energy goals	CINESIS will further support RES integration in the grid contributing to the reduction of CO2-content of the energy mix in the local grid.

Other energy market actors/ industries	Some of the services available via CINESIS could be of interest to other sectors such as Industry 4.0 for improvement of energy efficiency and carbon impact of industrial processes. The innovations towards interoperability of energy data could be adopted by other industries as well.	Data driven flexibility services could be used in other related industries to develop their business.	From a societal point of view, mutual aid between communities, association of communities having a greater impact in its ecosystem.

2.2.1 Communication activities

Communication activities will promote the project to various audiences through the communication channels grounded in the EU R&D community, including BRIDGE, ETIP SNET and others. They aim at: i) creating **project visual identity and public image**; ii) **providing project up-to-date information;** iii) sustaining the **results promotion to the general public**; and iv) **translating the scientific/technical results into messages for public outreach**, comprehensible also by the common public. **Communication activities** will be based on the following **channels and evaluated via KPIs**:

Means/ channel	Objective, target and quantifiable indicators
Project visual identity and public image	Development of a common public image / branding for the project to allow an easier identification by the public and ensure visibility and recognition. CINESIS will adopt a **captivating project logo** and a **common graphics** for any project template (e.g., presentation, template, report, etc.) and any public material (brochures, flyers, posters, etc.)
Digital Marketing Strategy	A **captivating website** will be developed (D7.1, generating periodically new content) also including a **Download area.** Social media profiles (e.g., LinkedIn, Twitter, YouTube, the content will be shared) and newsletter (including periodically las news on the website) will be activated since early beginning of the project, creating world-wide scale visibility and synergies with other initiatives and partners' profiles. ❖ Visits per year: <5000 = poor; 5000-10,000 = good; >10,000 = excellent ❖ Material downloads per year: <100 = poor; 100-250 = good; >250 = excellent
Project newsletter	After the starting phase of the project (after month 6), the project will start issuing a regular subscription-based newsletter distributing website and project updates to interested parties. By this means, the consortium will build a database of dissemination contacts that can be approached with targeted information suiting exactly their needs. Existing networking and media contacts will be used to promote the project wherever possible. The consortium will also look for opportunities to include feature articles in third party newsletters ❖ 10 issues of newsletter 500 subscribers by end of project
Project communication toolkit materials (brochure, flyers, poster, banners)	A **promotional project brochure/leaflet and/or flyers for the large non-specialist community** as well as the community of relevant stakeholders will be developed. **A general project poster along with banners/roll-ups will also be developed in order to be used for events and exhibitions**, while a first leaflet/brochure shortly after the beginning of the project, oriented to raise awareness and provide visibility ❖ Shared flyers: <1000 copies/yr=poor; 1000-2500 copies/yr=good; >2500 copies= excellent
Project video and/or video-interviews	Two **project videos and/or video-interviews also with a storytelling video approach** will be created, which will present 1st: project's objectives, vision; 2nd: lessons learnt from VCs and how use CINESIS (linked to training) ❖ Video promoted via YouTube and Website
Project media presentations	The opportunity to present the project on generalist and/or specialised media, such as local or national press, magazines, radio or TV programmes will also be sought.

2.2.2 Dissemination and exploitation of results

2.2.2.1 Dissemination of results

Provisional dissemination plan

A detailed dissemination action plan will be elaborated within WP7 and issued shortly after the beginning of the project; a **provisional dissemination strategy is presented hereinafter**. Dissemination activities will be undertaken **starting from the beginning of the project targeting all relevant stakeholders**.

Means/channel	Objective, target and quantifiable indicators
Project e-handbook and practice abstracts	A **project e-handbook (**included in "D7.2c Dissemination and Communication Plan including communication material"**) collecting project lessons learnt** will be prepared within the end of the project thus giving comprehensive evidence of CINESIS advantages **KPI: Project e-publication downloads**: <50 = poor; 50-100 = good; >100 = excellent
Scientific/ technical publications and oral/poster presentations at conferences, symposia, seminars, workshops, etc.	The **project's results will be published in Open Access international scientific/technical literature**, such as MDPI journals or in ASME and ELSEVIER journals if Green OA will be guaranteed **as well as in relevant scientific/technical literature at national level mainly in the member states where the partners are established.** Results will also be **presented at relevant conferences** such as IEEE ISGT, either through oral or poster presentations. The highest impact OA journals within the relevant sector will be identified. All publications will be collected in a dedicated space within the project website for open access/download. **KPI: Number of papers submitted: <7 = poor, 7-10 = good, >10 = excellent;** **Number of conference/Event presentations: <10 = poor, 10-15 = good, >15 = excellent**
Special innovation/ lesson	The action 'Special innovation/lesson' will start at Month 13 of the project. Regular presentation and special promotion of selected project highlights and outcomes (beyond deliverables) will take place on the website under a section especially designed for this purpose, and by selected channels, such as target audience related press distribution lists, blogs, local promotional events, social media etc. ❖ 10 special features - 4 regional promotional events at demo level
Collaboration with relevant stakeholders and EU communities and projects	Thanks to the UBE's acknowledged presence in Brussels, CINESIS consortium will seek liaison with the **most relevant European communities involving potentially interested stakeholders**, including the relevant **European Technology Platforms (ETPs) and associations such as** BRIDGE and ETIP SNET to promote project results at policy-making level (T7.3) and collect relevant stakeholders' insights. At this purpose CINESIS is committed to create synergies with **sisters' projects related to data spaces**

Any dissemination activity will display the EU emblem and include information on the EU funding.

2.2.2.2 Exploitation of results

Perfectly aligned and coordinated with communication as well as dissemination activities, exploitation activities will aim at preparing the playground for the exploitation of the developed technological solutions. To this end, under the guidance of the Exploitation and Innovation Manager appointed by RINA-C, the consortium will deal with the protection of IPR, and with the definition of a detailed business model and a subsequent business plan for each project result also capitalizing involved SMEs exploitation intentions. Starting from the Positioning of the project previously described, CINESIS innovations and services marketability passes through some key R&D Steps towards the complete development of Key Exploitable Results (KERs) and services have been already identified with a specific Technology Roadmap towards TRL9/market overcoming technical/non-technical barriers.

CINESIS KERs	Partner	Further R&D Needed beyond project end	Exploitation Perspective	Market Launch
CINESIS platform	UBE	Increase platform interoperability with market platforms used and conduct extensive testing in operational environments in several European countries in order to scale up the market potential of the CINESIS platform	Direct licensing	2028
AggreMan	UCY	Conduct demonstration activities with a significant number of aggregated assets (>=300) in order to validate the platform in a high dimensional data space.	Software licensing and recurring maintenance	2027
BuildIn platform	UCY	Demonstration in different type of buildings in order to fine-tune the algorithms to be valid and robust regardless the buildings specific characteristics	Software licensing and recurring maintenance	2027
F-Channel platform	EIG	Achieve maximum interoperability with the existing assets in order to be compliant with the tools already applicable and the regulatory framework.	SaaS (Software-as-a-Service)	2027
CEDIS VPP	EVO	Additional drivers to test the remote control of residential storages on a wider set of manufacturers than	SaaS	2027

		those already successfully tested so far. Further application protocols for the control of HPs and EVs.		
iFLEX	UBE HSLU	Demonstration of the platform's interaction with a real market framework in order to validate concept robustness in a fully operational environment.	SaaS	2027
TRAIN2Grid	SWE	Further demonstrations in different countries and grid/rail protocols in order to achieve a TRL 9.	SaaS	2027
P2P capacity sharing	EE	Demonstration of the software in different grid topologies (different voltage level, RES penetration level, type of RES)	SaaS// licensing and maintenance	2027
SAInt	ENC	Further development of the tool to enlarge its capabilities to model EU electric market models/power grids (also modelling other energy models/grids). The tool is already commercial but CINESIS will enable ENC to enhance its continuous development and modelling capabilities.	Consulting services/Software licensing	Even during the project
Services Business Models	RINA-C	Fine-tuning of all the aspects of each business model based on the specific requirements (regulatory, market) of each country to be promoted.	Consulting Service	2027
Consumer engagement practises	UNITN RINA-C	Demonstration of consumer engagement practises in operational environments across Europe to derive more holistic validation results and refine them accordingly.	Consulting Service	2027

Exploitation workshops toward the formulation of a final exploitation plan as well as business models/plans

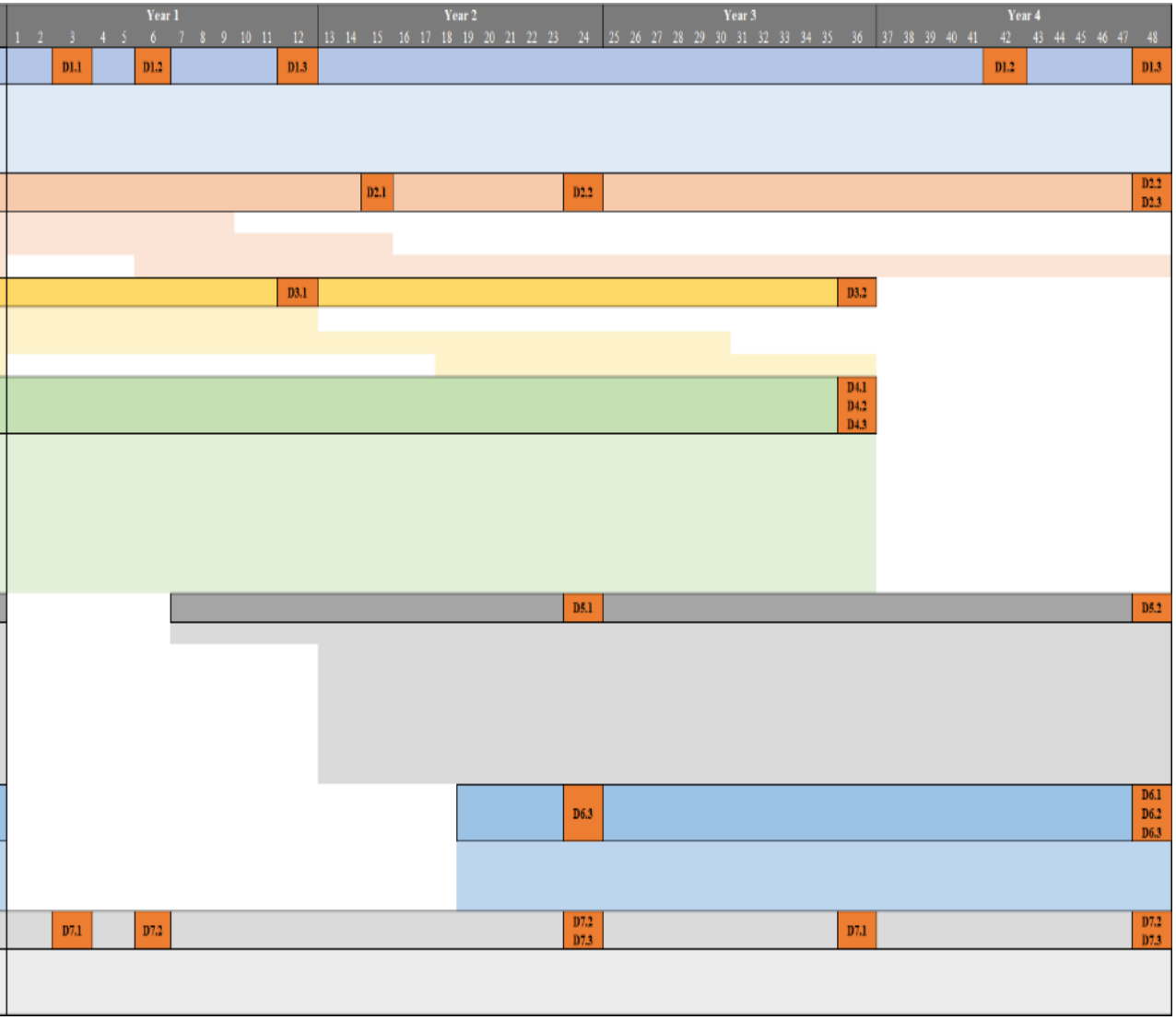
All partners will be strongly involved in exploitation activities, through **exploitation workshops** to be held under the guidance of **RINA-C also with the support of EC experts**. The aim of these exploitation workshops will be to guide the consortium through the finalization of the provisional exploitation plan and strategy defined at proposal level based on the actual results of the project. Goals of these workshops are to discuss the most promising exploitable results and obtain agreement for the final exploitation action plan. Before workshops, a responsible person will be identified within each partner organization. **Guided by the project' Digital Innovation Manager (*Katerina Drivakou* from UBE)**, they shall contribute to identify internal as well as external threats and potential obstacles to exploitation as well as to define measures to overcome them. Potential internal threats may consist of i.e., conflicts of interests between partners (e.g., related to IPR or future potential market competition); issues which could endanger the end phase of the project that might have an influence on the consortium's exploitation action plan, such as changed interests of partners, or any form of lack of support to the definition of the exploitation action plan from any of the partner organizations. **Two exploitation workshops are planned (one with the support of EC experts), whose goals are**: i) to discuss the most promising results (shortly after project mid-term) and formulate first hypotheses related to the related potential business model(s), and ii) to obtain agreement on final exploitation actions to be undertaken thus providing input for the finalization of the exploitation strategy for the further R&D/commercial deployment of project results, which will be released by month 40. **The final workshop will also particularly give input to the business model as well as plan**.

2.3 Summary

SPECIFIC NEEDS	EXPECTED RESULTS	D & E & C MEASURES
#SN1: High penetration rate of renewables even at the edge of the distribution grid and new consumption patterns require advanced tools to operate assets, **#SN2:** Democratization of energy through consumer-centric business models in order to eliminate energy poverty in the EU, **#SN3:** Increased flexibility needs for both TSOs & DSOs for frequency and non-frequency services **#SN4:** Strong behavioural change in consumers' preferences and willingness to adopt new technologies **#SN5:** Electrification and smooth operation of mobility sector	**Different tools composing the CINESIS platform** ▪ AggreMan ▪ BuildIn platform ▪ F-Channel platform ▪ CEDIS VPP ▪ iFLEX ▪ TRAIN2Grid ▪ P2P capacity sharing ▪ SAInt tool ▪ Business Models for cross-services ▪ Consumer engagement practises	**Exploitation via CINESIS:** 2 exploitation workshops; direct licencing; SaaS licencing; consulting services via CINESIS **Exploitation without CINESIS indirect exploitation:** 1) Direct licensing of tools/software/algorithms; 2) External consulting service; 3) Other services in the non-energy sector (health, transport) **Non-Commercial Exploitation:** future R&D projects; policies promotion **Dissemination towards the scientific community and Energy Community operators:** >10 papers submission; >15 number of conference/ Event presentations; 4 regional promotional events **Communication towards citizens:** 10 issues of newsletter; website; project communication toolkit; project video

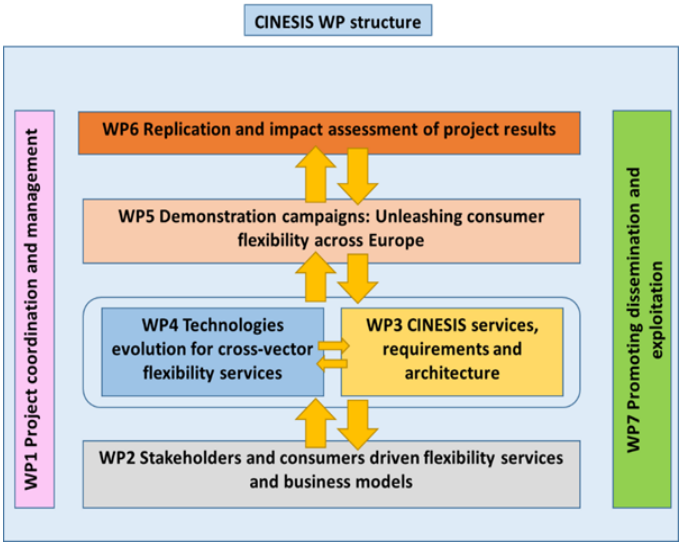
TARGET GROUPS	OUTCOMES	IMPACTS (achieved during project duration)
▪ **Scientific community** and researchers (also coming from sister projects) ▪ **DSO/ TSO and grid operators** ▪ **Energy consumers/ citizens** as EC would like to put them at the centre, LEC facilitate citizens to be part of energy transition ▪ **ICT developers** ▪ **Public sector** ▪ **Other energy market actors/ industries**	**#O1:** An interoperable platform for flexibility management and holistic planning **#O2:** State-of-the-art tools enabling flexibility harvesting at a building, VPP and aggregation level, providing services to both DSOs and TSOs **#O3:** Validated consumer-centric business models promoting EaaS and energy Communities concept **#O4:** Approved and widely accepted consumer acceptance and engagement practises **#O5:** Smooth operation of train sector due to cross-industry services proposed by CINESIS	**#1 Scientific:** Algorithms for forecasting (production, consumers pattern), management, aggregation, DLT framework, **#2 Economic:** 3 M€ of investments **#3 Environmental:** Tackling climate change through accelerating RES penetration in the grid and energy efficiency **#4 Economic/Technological:** 2 GWh of RES self-consumed increase and 3.5GWh not Inter-exchanged with the grid **#5 Societal:** 100 citizens engaged in CINESIS & 30 new jobs only during the project duration **#6 Regulatory/Policy:** Contribution to EU policy through the testing of innovative business models

ACTIVITY		D	S	E	LEADER
WP1	**Project coordination and management**	**48**	**1**	**48**	**RINA-C**
Task 1.1	Administrative and financial management	48	1	48	RINA-C
Task 1.2	Technical management	48	1	48	RINA-C
Task 1.3	Quality assurance, risk and innovation management	48	1	48	UBE
Task 1.4	Data management	48	1	48	UBE
WP2	**Stakeholder and consumer driven flexibility services and business models**	**48**	**1**	**48**	**RINA-C**
Task 2.1	Local energy requirements in different geographies, needs and climate	9	1	9	RINA-C
Task 2.2	Regulation analysis, market and flexibility services design	15	1	15	UBE
Task 2.3	Business models and customer engagement	43	6	48	RINA-C
WP3	**CINESIS services, requirements and architecture**	**48**	**1**	**36**	**UBE**
Task 3.1	Definition of system use cases and functional requirements	12	1	12	UCY
Task 3.2	Architecture of the CINESIS platform	30	1	30	UBE
Task 3.3	Integration and interaction with existing H2020 platforms, testing and validation activities	19	18	36	UBE
WP4	**Technologies evolution for cross-vector flexibility services**	**36**	**1**	**36**	**UCY**
Task 4.1	Smart inteoperability architecture for flexibility	36	1	36	HSLU
Task 4.2	Development of AggreMan and BuildIn platforms	36	1	36	UVY
Task 4.3	Development of iFLEX flexibility aggregation platform	36	1	36	UBE
Task 4.4	Integration of energy management optimization algorithms in CEDIS VPP	36	1	36	EVOL
Task 4.5	Development of AI and big data tools for F-Channel platform upgrade	36	1	36	EIG
Task 4.6	Development of Train2Grid system for cross-sectoral support	36	1	36	SWE
Task 4.7	Development of control system platform for P2P capacity sharing	36	1	36	EE
WP5	**Demonstration campaigns: Unleashing consumer flexibility across Europe**	**42**	**7**	**48**	**FBK**
Task 5.1	Estonia: Reducing capacity costs for consumers	42	7	48	EE
Task 5.2	Portugal: Advancing isolated markets	36	13	48	EEM
Task 5.3	Cyprus: Releasing consumer's access in market	36	13	48	WW
Task 5.4	Croatia: Smoothing mobility operation	36	13	48	HZINFRA
Task 5.5	Ireland: Accelarating railway electrification	36	13	48	IRAIL
Task 5.6	Bulgaria: Enhancing decentralized system operation	36	13	48	ESO
Task 5.7	Italy: Empowering energy communities participation in markets	36	13	48	CEDIS
WP6	**Replication and impact assessment of project results**	**30**	**19**	**48**	**RINA-C**
Task 6.1	Evaluation of demonstration results and social, environmental and technical impact assessment	30	19	48	RINA-C
Task 6.2	Scalability and replicability plan	30	19	48	UBE
Task 6.3	PanEU impact on design, modelling and planning of energy markets in a sector integration	30	19	48	ENC
WP7	**Exploitation, dissemination and communication**	**48**	**1**	**48**	**UBE**
Task 7.1	Communication, dissemination and awareness-raising activities	48	1	48	UBE
Task 7.2	Exploitation, impact and value creation	48	1	48	RINA-C
Task 7.3	Stakeholder involvement and BRIDGE activities	48	1	48	UBE



CINESIS GANTT Chart

3 QUALITY AND EFFICIENCY OF THE IMPLEMENTATION



3.1 Work plan and resources

3.1.4 Overall structure of work plan

CINESIS has a duration of 48 months and it is divided into 7 Work Packages (WPs), supervised in WP1 by RINA-C as project coordinator, guaranteeing a proper technical and scientific monitoring and evaluation of project progress. WP2 will propose new stakeholders and consumers driven flexibility services and business models while WP3 will define the CINESIS services, requirements and architecture. In WP4, the technologies for cross-vector flexibility services will be further developed and will be used for the demonstration campaigns (WP5) aiming to unleash consumer flexibility across Europe. WP6 will focus on the replication and the impact assessment of the project results and WP7 will continuously promote the dissemination, communication and exploitation activities.

3.1.5 Timing of the different work packages and their components

Please check Pag.53

3.1.6 Work Description

Table 3.1a: List of work packages

WP#	WP Title	Leader	PMs	Start	End
WP1	Project coordination and management	RINA-C	79	M1	M48
WP2	Stakeholders and consumers driven flexibility services and business models	RINA-C	101,5	M1	M48
WP3	CINESIS services, requirements and architecture	UBE	135	M1	M36
WP4	Technologies evolution for cross-vector flexibility services	UCY	337	M1	M36
WP5	Demo campaign:Unleashing consumer flexibility across EU	FBK	502,5	M7	M48
WP6	Replication and impact assessment of project results	RINA-C	122	M19	M48
WP7	Exploitation, dissemination and communication	UBE	78	M1	M48
		Total PMs	1355		

Table 3.1b: WP Description

WP n. 1	Lead beneficiary: RINA-C	Start Month: 1	End Month: 48

Title	Project coordination and management																										
#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Partner	RINA-C	UBE	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	38	6	1	2,5	1	2,5	1	1	1	1	1	2,5	1	2,5	1	1	1	2,5	0,5	0,5	2,5	0,5	2,5	1	1	1	1	1

Objectives: to coordinate all administrative, financial, technical and scientific activities of the project including the documentation of a data management plan and a clear risk analysis and contingency plan.

Task 1.1: Administrative and financial management (M01-M48, RINA-C, all) The goal of this task is to ensure that the project is managed according to the rules and regulations set by the EC and that progress of work and production of deliverables are carried out according to the project time schedule. The task includes the overall legal, ethics, contractual, financial and administrative management of the project including resources allocation. Furthermore, it ensures that the project's scientific and technical outcomes meet high quality standards.

Task 1.2: Technical management (M01-M48, RINA-C, UBE) This task covers the technical coordination of the project, which will ensure a strong consistency between the scientific and technical WPs. The Technical Manager will cooperate closely with the project's technical providers and WP Leaders and support the Project Coordinator in ensuring that the scientific and technological objectives of the project are met with quality and in time.

A Technical & Scientific Committee (TSC) will be formulated which will assist WP Leaders on respective issues and will undertake initiatives to propose technical solutions and fine-tune technical and scientific orientations

whenever necessary. It will also control the technical work carried out in the related tasks and propose technical modifications and reallocation of resources as necessary for achieving the project objectives. The technical management will report about technical and scientific deviations from the project work plan and constantly co-operate with the Project Coordinator and the administrative management.

Task 1.3: Quality assurance, risk and innovation management (M01-M48, UBE, RINA-C, UCY, FBK, ENC) This task deals with planning, managing, and controlling the quality of activities and deliverables, while it monitors, manages IPR and makes recommendations for ownership assurance. It will contain quality, risk management and innovation management procedures. The Quality procedures will be guarantee by RINA-C as coordinator with WP leaders' support also to draft and constantly update the Project Executive Action Plan (D1.1), to assure the quality and the conformity of all project deliverables with their requirements and to perform internal assessment of the project on a 6-month basis. The Risk Management will be the responsibility of the Coordination Team and will be included in the project's Periodic Progress Reports. Risk Management will constantly assess and evaluate potential risks within the whole project duration, also in the event of technological changes. Innovation management procedures will ensure the efficient management of Intellectual Property Rights (IPR) and establish a link between market trends analysis and innovation to find possible mechanisms for attracting risk financing for the CINESIS solutions. Innovation Management within the context of CINESIS will be "regulated" by the IPR handling strategy and will be tightly interrelated with the exploitation and business planning activities.

Task 1.4: Data management (M01-M48, UBE, RINA-C, EE, EEM, FBK, UCY, EIG, SWE, UNIZAG, ENC) Effective data management and IPR protection procedures will be used to manage (amongst other things) the ownership and access to key knowledge. The purpose of the Data Management Plan (D1.2), to be drafted by UBE with Demo and WP leaders support is to provide an analysis of the main elements of the data management policy that will be used by the participants of the CINESIS project with regard to all the datasets that will be generated by the project. It describes the data management life cycle for all data sets that will be collected, processed or generated by the research project. It is a document outlining how research data will be handled during a research project, and even after the project is completed, describing what data and following what methodology and standards, whether and how this data will be shared and/or made open, and how it will be curated and preserved.

Role of Partners: As coordinator RINA-C leads this WP which targets, to the coordination of project activities and its proper reporting internally and externally to the EC. Quality of project activities is guaranteed by the support of UBE who, as main CINESIS platform developer, will also guarantee proper data management with the support of WP and demo leaders. RINA-C will lead T 1.1-1.2 while UBE will lead T1.3-T1.4.

Deliverables

D1.1 Project executive action plan (RINA-C, M3, SEN, R) A detailed action plan describing the project management, quality control and risk assessment procedures adopted in the project. In addition, D1.1 will be delivered at the early project stages and will result in defining tangible KPIs for each WP that will be constantly monitored and reported within Periodic Progress Reports.

D1.2 a, b Data management plan (UBE, M6, M42, SEN, DMP) The DMP will provide an analysis of the main elements of the data management policy that will be used by the applications regarding all the research datasets that will be generated by the project.

D1.3 a, b Legal and ethical issues and guidelines (UBE, M12, M48, SEN, ETHICS): A Legal/Ethics Manual will be prepared and issued to assure the ethical assurance, the gender equality and the compliance with national and EU legislation. An initial version will be reported on M12 and the final version at the end of the project.

WP n. 2	**Lead beneficiary: RINA-C**																**Start Month: 1**										**End Month: 48**
Title	Stakeholders and consumers driven flexibility services and business models																										
#	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
Partner	RINA-C	UBE	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	26	10	1,5	11,5	1,5	6	2	3	2	4	1	1	1	2	2	1	1	4	0	1	1,5	0	3,5	0,5	0,5	9	4	1

Objectives: to investigate and analyse the applicable regulatory frameworks, to design the relevant market and flexibility services, to create new business models that will boost the consumers engagement and define the local energy requirements in different geographies.

Task 2.1: Local energy requirements in different geographies, needs and climate (M01-M09, RINA-C, FBK, CEDIS, UCY, R&D-N EEM, STHC, EIG, EE, UNIZAG) The goal of this task is to scale up the CINESIS solutions

taking into consideration the local energy requirements in different geographies, needs and climate. These energetic needs can be broken down into the main components of heating and cooling demands, hot-water supply and electricity consumption. CINESIS will analyse the locally induced energy requirements of the demonstration areas and will raise them to a EU level to create the starting point for the analysis carried out in T2.2 and T2.3.

Task 2.2: Regulation analysis, market and flexibility services design (M01- M15, UBE, RINA-C, FBK, CEDIS, TSCO, CNIT, UCY, EEM, EE, UNIZAG, HSLU, ENC, ESO, CEZ) Within this task, a study on applicable international, European and national regulatory frameworks will take place in order to investigate the relevant regulatory and legal aspects related to the flexibility stakeholders and consumers. Features and characteristics of the operating markets and mechanisms in Europe will be considered, along with the experience from implementing models and directives of the related Network Codes. In addition, task 2.2 will analyze and propose specific measures ensuring the efficient participation of all types of market participants to the proposed markets and flexibility services, taking into consideration the goals, needs, and perspectives of suppliers, aggregators, flexibility providers, and system operators.

Task 2.3: Business models and customer engagement (M06-M48, RINA-C, CNIT, UBE, FBK, UCY, STHC, EIG, UNIZAG, ENC, UNITN, EE) The different solutions tested in CINESIS can provide new business models for market agents, including flexibility service providers or third-party aggregators as new opportunities to provide system services to TSOs and DSOs will be opened. In addition, data and platforms related business models will be identified. The business models analysis that will be carried out will be based on the conclusions of T2.2 regarding the gaps in the existing regulatory framework and the market flexibility services design. Furthermore, this task will consider how market conditions and other local specificities affect the deployment of the different solutions for the key identified actors. Finally, this task is to also define how the market interfaces are reflected on the customer side. Specific market solutions will be designed considering the specification of individual preferences in order to increase and boost the consumer engagement and acceptance.

Role of Partners: RINA-C will lead the WP2, task 2.1 and task 2.3. UBE will lead task 2.2. UNITN will take care of all the aspects related to customer engagement and SSH activities, while demo leaders and grid operators will provide inputs to the three tasks regarding the local contexts, needs and constraints

Deliverables

D2.1 Regulation analysis, market and flexibility services assessment towards CINESIS services design (UBE, M15, PU, R) D2.1 is presenting a study on applicable international, European and national regulatory frameworks. Moreover, it will describe the flexibility services design, taking into consideration the local energy requirements in different geographies, needs and climate. This deliverable is related to tasks 2.1 and 2.2.

D2.2 a, b Business models and contractual arrangements (RINA-C, M24, M48, PU, R) D2.2 will provide new business models for market agents and will consider how market conditions and other local specificities affect the deployment of the different solutions for the key identified actors. In addition, it will define how the market interfaces are reflected on the customer side. This deliverable is related to task 2.3.

D2.3 Customer engagement practices (UNITN, M48, PU, R) D2.3 will provide a set of well-defined customer engagement practices taking into account specific factors for increasing consumers' acceptance regarding flexibility services. This deliverable is related to task 2.3.

WP n. 3	Lead beneficiary: UBE	Start Month: 1	End Month:36

Title	CINESIS services, requirements and architecture

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Partner	RINA-C	**UBE**	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	4	40	1	12	12	22,5	0	1	0	8	4	3	2	6	5	3	2	2	0	1	2	0	2	0,5	0,5	0	0	1,5

Objectives: The objective of WP3 is to describe and develop CINESIS middleware platform that enables the interconnection of energy actors and their seamless data exchange. This WP aims to analyse the system use cases and functional requirements, based on this to describe CINESIS platform architecture and finally to validate the developed platform and test its interaction with other existing H2020 platforms.

Task 3.1: Definition of system use cases and functional requirements (M01-M12, UCY, UBE, UNIZAG, HSLU, R&D-N, STHC, EIG, EVO, FBK, CNIT, EE, RINA-C*)* The main pillar for the design of CINESIS platform architecture is the formulation/analysis of the overall system use cases and functional requirements both from the perspective of the legacy flexibility platforms of the demos as well as the CINESIS platform on top of them.

Task 3.1.1 Demonstrators requirements: This sub-task involves the use cases formulation for each legacy flexibility demonstrator platform. Each use case will be used for the extraction of a list of functional requirements concerning not only internal platform functionality at a demo level but also requirements regarding how the CINESIS platform will add value on top of that.

Task 3.1.2 CINESIS platform requirements: This sub-task involves the definition of the general use cases of CINESIS system and the elicitation of requirements from the previous stage, towards the final list of CINESIS platform requirements, that task 3.3 will use to derive the CINESIS platform components and features.

Task 3.2: Architecture of the CINESIS platform (M01-M30, UBE, UCY, EVO, CNIT, UNIZAG, HSLU, R&D-N; STHC, EIG, EE, UNIZAG, FBK) This task will use the results of T3.1 to deliver the architecture of the CINESIS platform, by identifying the key components and modules of the overall system, their specific functionalities, and their internal and external interactions. Also, it will design and deliver the communication interfaces between the individual tools/services and the CINESIS platform. The appropriate interfaces will be developed as plugins, always following open standards. More specifically, the adoption of REST based architecture will be followed through the use of http/https requests between each legacy platform and the CINESIS system. At the very basics, the 3-layer architecture is divided into:

Task 3.2.1 Data Governance Layer: This layer is responsible for the integration, cleansing and profiling of the various data assets, tools and services provided by each legacy flexibility platform. A common data model that accurately describes the data entities of the integrated energy, mobility and home automation services that each legacy platform will deliver, is needed to ensure a smooth integration and interoperability of the various legacy systems with the CINESIS one.

Task 3.2.2 Data Analytics Layer: This layer is responsible for offering on top data analytics for the upper data visualization layer. The descriptive and predictive analytics will deliver useful insights for each different stakeholder, prosumer, TSO, DSO and Aggregator. Historic and aggregated analytics, specialized optimization algorithms, correlations between variables, impact of recommendations on energy usage behaviour, impact of the interaction of the users with the CINESIS platform are some examples of features that will be covered.

Task 3.2.3 Data Visualization Layer: This layer will deliver the different dashboards for the end users as described in 3.2.2. Each user according to his role will have access to a different view with content ranging from analytics results, graphs, recommendations, tips and other useful insights. The access to specific views and data will be secured and only authenticated and authorized users will be able to interact with the dashboards. The security at an application level of the open APIs exposed to the users and the internal APIs between the frontend and the backend part of the CINESIS system will also be developed in this sub-task.

Task 3.3: Integration and interaction with existing H2020 platforms, testing and validation activities (M18-M36, UBE, UCY, UNIZAG, HSLU, R&D-N, STHC, EIG, EVO, FBK, CNIT, EE) This task will cover all integration, testing and validation activities needed to ensure the correct and anticipated operation of the integrated CINESIS system. Functional and performance testing are of crucial importance and an agile methodology of development-testing-deployment cycles will be followed. In addition, this task will test CINESIS platform interaction with existing platforms from other H2020 projects.

Role of Partners: UBE will lead the WP3, task 3.2 and task 3.3. UCY will lead task 3.1. R&D partners, platform developers (like EVO) and demo leaders and grid operators will provide inputs to the three tasks regarding the local contexts, needs and constraints and how to make CINESIS Platform interact with local context.

Deliverables

D3.1 CINESIS system use cases and functional requirements (UCY, M12, PU, R) D3.1 will present a list of system use cases for the CINESIS system. The system use case will reflect the perspective of the legacy flexibility platforms of the demonstrators as well as the CINESIS platform on top of them. In addition, the functional requirements will be analysed. This deliverable is related to task 3.1.

D3.2 CINESIS platform architecture, integration and interaction with existing H2020 platforms (UBE, M36, PU, R) D3.2 will provide the description of the CINESIS platform architecture. It will also describe the integration and interaction of the CINESIS platform with the existing H2020 platforms. This deliverable is related to tasks 3.2 and 3.3.

WP n. 4	Lead beneficiary: UCY	Start Month: 1	End Month: 36
Title	Technologies evolution for cross-vector flexibility services		

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

Partner	RINA-C	UBE	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	5	20	4	31	16,5	30	4	12	2,5	2,5	4	13,5	4	42,5	15	5	5	47	6,5	33	4	5	4	2	2	1	1	15

Objectives: to develop the individual tools, which will be then integrated with the CINESIS platform. This WP aims to develop user-centric energy analytics tools that guarantee personalised energy management and compliance with the user' comfort requirements, to develop tools for supporting aggregators' participation in energy markets, to produce algorithms for advanced profiling/forecasting of prosumers' generation and demand curves, to enable novel DR scheme utilizing the flexibility offered by the rail network, to implement blockchain technology for prosumers smart contracts and to implement a technical solution for capacity sharing.

Task 4.1: Smart interoperability architecture for flexibility (M01-M36, HSLU, UCY, UBE, EVO, FBK, WW, R&D-N, UNIZAG, EIG, STHC, EE, RINA-C) The goal of this task is the detailed design, model, engineering and development of the smart interoperability architecture. The activities of this task include: mapping system architecture and interface points between SINA and IANOS (M1-M3), development of governance structure for the SINA deployment (M1-M3), development of business cases enabled by the SINA architecture (M1-M12), design of data models and software adapters to integrate relevant subsets of existing protocols (M1-M24), evaluation of alternative high-performance, permissioned DLTs (M1-M6), creation of ad-hoc smart contracts to be run in the DLT to permanently store policies regarding data access and usage (M6-M12), integration and testing of system components towards complete system (M13-M36).

Task 4.2: Development of AggreMan and BuildIn platforms (M01-M36, UCY, TPAD, WW, TSCO, CNIT, UBE): This task will deal with the development of the AggreMan and BuildIn platform which will enable the provision of flexibility services to the grid by both the aggregators and the flexible prosumers.

Subtask 4.2.1 Development of the AggreMan platform: In this subtask the architecture of the AggreMan platform will be designed considering the interaction of the platform with the market, weather and load forecasting data as well as the communication with the flexible resources of the aggregator platform. In addition, stochastic and robust optimization algorithms will be developed aiming at maximizing the aggregator's revenue and increasing the flexibility services that are provided to the grid. Based on the output of the optimization toolbox, a decision support mechanism will be designed and included to the platform that will support the business strategy of the aggregator.

Subtask 4.2.2 Development of the BuildIn platform: In this subtask the BuildIn platform will be designed and developed in order to manage the energy resources (power and heating/cooling) of the building enabling the energy sector integration in the building level. Intelligent robust optimization algorithms will be developed and included in the platform in order to coordinate electricity resources and H&C facilities. The objectives of the algorithms will be the reduction of the electricity cost in the prosumer level as well as to provide new flexibility services without compromising the users/residents comfort level. Further to that, the communication framework with the AggreMan platform will be designed in this subtask facilitating in that way the communication and co-operation of the two platforms.

Task 4.3: Development of iFLEX flexibility aggregation platform (M01-M36, UBE, EEM, R&D-N, IST,): In this task, a new kind of flexibility aggregation platform (iFLEX platform) will be developed, building upon the work conducted in other H2020 projects, such as IANOS, SMILE, INSULAE and OneNet, that unifies all forms of existing and new distributed flexibility assets in a single control layer and simplifies their management. The iFLEX platform will be based on SINA architecture, which relies on established building blocks, i.e., authentication, software adapters, messaging services, APIs, encryption, and distributed ledger technologies (DLTs) to realize a distributed system establishing interoperability in a trusted environment among several stakeholders, without the addition of extra hardware gateways.

Moreover, the iFLEX platform will employ the flexibility forecasting engine developed by UBE in the context of the IANOS H2020 project, by further developing enhanced functionalities to include more end-user's assets, with a greater granularity (appliance level flexibility potential forecasting) to fit to the requirements set by the CINESIS demonstrators. Specific business models and market opportunities will be developed and tested for the context of liberalized electricity markets.

Task 4.4: Integration of energy management optimization algorithms in CEDIS VPP (M01-M36, EVOL, FBK**,** CEDIS, RINA-C, UBE): In this task EVOLVERE and FBK will develop the CEDIS VPP to aggregate customer-owned flexibility, based on smart BESSs, heat pumps and EVs charging stations, to monetize them in multiple energy markets and turn them into cash generators. Two activities will be performed: (I) development of the RiSING tool (lead: FBK), (II) development of the EugenioCloud (lead: EVOLVERE). Concerning the RiSING

tool, it will be developed by FBK as a predictive analytics tool using AI techniques for energy flows forecasting and building energy management optimization. These data will be accessible for the consumer through a dedicated dashboard. Concerning the EugenioCloud, EVOLVERE will integrate, in addition to the already existing features of smart BESSs, also smart heat pumps and smart EVs charging stations, in order to include all these distributed energy resources in the optimization algorithms of the EugenioCloud platform. Moreover, Evolvere's cloud platform will implement the novel optimization models and algorithms developed by FBK (RiSING tool). This approach will promote the exploitation of RES, the strengthening of energy community projects, the application of the functionalities of blockchain technology, and specifically the use of Smart Contracts.

Task 4.5: Development of AI and big data tools for F-Channel platform upgrade (M01-M36, EIG, UBE, STHC, CEZ, ESO): In order to fulfil all of the goals set in front of it by the description of this project, the F-channel will have to go through the series of updates and improvements, from its adjustment to the format of the data exchange between the participants in the processes enveloped by CINESIS, all the way to the incorporation of the modern techniques that will be necessary to respond to the tasks listed in the UC chapter. These techniques include the coding and selection of the most efficient optimization method by which the location and connection points of the new renewable sources and the next generation concepts that will be used to predict the behaviour of the consumers and the development of the Automated Load (Flow) Forecast Assistant. Along with the technical aspect of these techniques and the calculations that will be conducted in relation to them, the appropriate ways of the visualization of the obtained results and their inclusion in the existing user-friendly environment of the F-channel platform will also represent one of the main benchmarks of the entire process.

Task 4.6: Development of TRAIN2Grid system for cross-sectoral support (M01-M36, SWE, IRAIL, HZIN, HOPS, UNIZAG, UBE): A technical solution allowing the provision of power flow control and thus enabling demand response services by the railway network to the power grid will be developed. TRAIN2Grid approach will allow SmartValves to optimally manage real time network flows by the analysis of interoperation of the railway system operation data and the grid data identifying areas where synergies between the two systems may increase grid flexibility. By using this analysis, the system will be investigated to determine the required power flow based on data stemming both from the power system operator and the railway operator to determine where the power will need to be controlled. Then, control system within the SmartValve will be set up accordingly. A Smart Wires planning tool will be utilised that can optimise the deployment of SmartValve solution's location to facilitate RES utilisation in railway system operation, and railway network extension connection to the grid.

Task 4.7: Development of control system platform for P2P capacity sharing (M01-M36, EE, ELV, EC, UBE): The goal of this task is to develop and validate on pilot sites P2P capacity sharing platform capability to be scaled for other DSO networks. To this end, historical consumption data will be analysed and potential consumption data after electrification (adding more EV-s, heat-pumps etc) will be simulated. The optimal and future proof technical solution for pilot sites will be chosen. Under this task the devices will be installed, monitored and controlled. The service layer for automatic flexibility sharing will be developed and the gains of the solution will be analysed. In the end, the optimal and future proof technological setup will be extracted, and the necessary tariff and regulatory changes and business model will be proposed.

Role of Partners: UCY will lead the WP4 and task 4.2. HSLU will lead task 4.1, while each platform developer will then lead its own task: UBE - T4.3, EVO - T4.4, EIG – T4.5, SWE - T4.6 and EE – T4.7. Task leaders will be supported by the rest of partners of each demosite ecosystem, local grid operators and R&D partners

Deliverables *(per each of these SEN deliverables a public report will be prepared and shared on project website)*

D4.1 Tools for consumers: Smart interoperability architecture for flexibility and iFLEX tool (HSLU, M36, SEN, R+O) D4.1 will present the development activities for the consumers' tools. More specifically, the Smart interoperability architecture for flexibility and the iFLEX tool will be described in detail. This deliverable is related to tasks 4.1 and 4.3.

D4.2 Tools for aggregators: AggreMan, BuildIn and CEDIS VPP tools (FBK, M36, SEN, R+O)
D4.2 will present the development activities for the aggregators' tools. More specifically, the AggreMan, BuildIn and CEDIS VPP tools will be described in detail. This deliverable is related to tasks 4.2 and 4.4.

D4.3 Tools for system operators: TRAIN2Grid, P2P capacity sharing and F-Channel (SWE, M36, SEN, R+O) D4.3 will present the development activities for the system operators' tools. More specifically, the TRAIN2Grid, P2P capacity sharing, and F-Channel tools will be described in detail. This deliverable is related to tasks 4.5, 4.6 and 4.7.

WP n. 5	Lead beneficiary: FBK	Start Month: 7	End Month: 48
Title	Demo campaign: Unleashing consumer flexibility across EU		

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

HORIZON-CL5-2021-D3-02-06 - Increasing energy system flexibility based on sector-integration services to consumers (that benefits system management by DSOs and TSOs)

Partner	RINA-C	UBE	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	10	8	28	31	16,5	18	8	14	8,5	2,5	36	13,5	26	28	23	15	15	47	1	10	5	5,5	42	31	35	8	2	15

Objectives: The main objective of WP5 is to perform the demonstrations of the tools developed in WP4, in order to collected evidences of CINESIS Services and tools effectiveness also towards their replication

Task 5.1: Estonia: Reducing capacity costs for consumers (M7-M48 – EE, ELV, EC**):** The goal of this task is to find an economically optimal solution for future grid connection solutions with flexible virtual main fuse solution, what would allow to transport more kWh in the same grid. Hence making the investment (CAPEX) and operational costs (OPEX) lower for DSO and the capacity costs/tariffs lower for the end customer.

Task 5.2: Portugal: Advancing isolated markets (M13-M48, EEM, R&D-N, UBE, IST): This task aims to demonstrate the implementation of SINA architecture at Madeira demo site (M25- M48) and perform an extension of simulation environment for DER orchestration to include SINA use cases (M13-M24). In addition, iFLEX platform functionalities will be tested in real-rife scenarios, starting from assets already in place.

Task 5.3: Cyprus: Releasing consumer's access in market (M13-M48, WW, UCY, CNIT, TSCO, TPAD, UBE): This task will showcase the functionality of the AggreMan and BuildIn platform in a real life demonstration scenario in Cyprus. In this pilot the provision of flexibility services by a consumer and an aggregator to the grid will be demonstrated showing the importance of the two platforms (AggreMan and BuildIn) to the coordination of the flexible resources in the portfolio of the aggregator and the prosumer. For demonstration purposes the portfolio of the aggregator will include a flexible producer with a 10.8 MW wind park (Aeolian dynamics), the Social Facility Center (SFC) of UCY campus as large scale building, and the pilot building of the WiseWire as a flexible prosumer. A special attention in this task will be given to the demonstration of the sector integration by optimally managing the electricity and heating/cooling facilities in the two buildings of the demonstration.

Task 5.4: Croatia: Smoothing mobility operation (M13-M48, HZINFRA, SWE, IRAIL, UNIZAG, UBE, HZIN, HOPS):This task will analyse the existing TSO grid, and the existing electrified part of the rail, as well as TSO's and Croatian Railway Operator's plans in the near future, a west part of the county outlined as the best location for potential pilot projects. Contribution analysis of M-SSSC will be shown on real examples from western part of Croatian power transmission system., transmission area Rijeka. Designated system area is loaded with high power flows from east to west (or from Dalmatia and Bosnia and Herzegovina toward Slovenia and Italy) and is characterized by significant disproportion between production and consumption of electric energy as well as significant amount of installed RES, which have stochastic production..

Task 5.5: Ireland: Accelerating railway electrification (M13-M48, IRAIL, SWE, UNIZAG, UBE): This task aims to carry a feasibility analysis-based study to explore synergies between the regional rail and electrical network, and its potential to maximise their utilization to provide cross-sectoral support. In general, the SmartValve solution potentially enables the railway system operator to dynamically control the power input between substations, as a secondary effect of controlling the power flow support can also stabilise voltage levels, and shift demand between substations. This will enable railway operators to redirect the system power flows by varying the reactance of the lines to manage railway system demand and provide additional services for transmission and distribution system operations. It expects to demonstrate the mitigation of the risks of outages and the railway operational network demand management by using SmartValve Solution.

Task 5.6: Bulgaria: Enhancing decentralized system operation (M13-M48, ESO, UBE, STHC, CEZ, EIG): The functionalities of the F-channel platform that will be developed and upgraded in the scope of the CINESIS project will be demonstrated on the part of the power system of Bulgaria, selected due to the variable weather conditions throughout the year and the high penetration of the renewable sources, leading to the numerous relatively sudden changes of the generation capabilities and the consequential rapid switches in the load flows, providing the proper environment for the illustration of the real-time cooperation between process participants

Task 5.7: Italy: Empowering energy communities' participation in markets (M13-M48, CEDIS, FBK, EVO, RINA-C, UNITN): This task will perform the demonstration campaign for the CEDIS VPP. The Italian pilot will demonstrate the provision of flexibility services by 50 residential customers to a local DSO (CEDIS) from a VPP approach which optimally manages multiple resources, i.e., BESSs, heat pumps, EV charging stations, in an aggregated way while respecting grid constraints. In the context of this demonstrator accurate grid monitoring takes place in synergies with simulation environments. In addition to that, novel optimization models and algorithms (RiSING tool), including forecasting and predictive analyses of the amount of energy produced, consumed, stored and sold will be demonstrated. In so doing, a cloud platform (EugenioCloud) will optimally

manage energy trading/exchange in the internal/external market and the participation in the flexibility services market, favouring the exploitation of RES, and applying the functionalities of blockchain and Smart Contracts.
Role of Partners: FBK will lead the WP5 where all demosites activities will be followed by a specific task:.EE will lead T5.1, EEM T5.2, WW T5.3, HZIN T5.4, IRAIL T5.5, ESO T5.6 and CEDIS will lead T5.7. Task leaders will be supported by the rest of partners of each demosite ecosystem, local grid operators and R&D partners
Deliverables *(per each of these SEN deliverables a public report will be prepared and shared on project website)*
D5.1 Demonstrators deployment plan (UBE, M24, SEN, R) D5.1 will provide a detailed deployment plan (pre-engineering studies, implementation time plan) for the demonstrators that will take place in Estonia, Portugal, Cyprus, Croatia, Ireland, Bulgaria and Italy. It is related to all tasks of this work package.
D5.2 Report on demonstrators activities and operation (FBK, M48, PU, R) Related to all WP tasks, D5.2 will report the demonstration activities related to design, testing, deployment, operation, data collection and validation.

WP n. 6	Lead beneficiary: RINA-C	Start Month: 19	End Month: 48

Title	Replication and impact assessment of project results

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Partner	RINA-C	UBE	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	26	8	2,5	5	1,5	4	0	5	0	2	1	2,5	1	2	3	1,5	1,5	4	0	1	2	0	3	1	1	6	36	1,5

Objectives: to evaluate WP5 results in respect with targets set at the beginning of the project, to conduct an impact assessment of project results in a local level, to develop a detailed scalability and replicability plan at EU level for the innovations proposed in the project and based on the results to perform a wider pan-EU impact assessment in the context of designing, modelling and planning of energy markets through a sector integration approach.

Task 6.1: Evaluation of demonstration results and social, environmental and technical impact assessment (M19-M48, RINA-C, UBE, FBK, UNITN, EEM, UCY, STHC, EE, UNIZAG, EIG) The results of the demonstration projects and the experience gained throughout the duration of WP5 will be summed up and evaluated following a holistic approach. The major findings and benefits of the testing period on site will be presented for all demonstrations, while practical problems and solutions will also be highlighted. The benefits will be weighed against the respective targets set at the project proposal stage. Furthermore, the effect of innovations (i.e., hardware, software, solutions, platforms, tools and processes) will be studied and evaluated for each CINESIS demonstrator and technology, but their (innovations' evaluations) scope will be widened to describe the general context regarding the increased market flexibility through consumer participation. An impact/ market assessment evaluation for each tool will be performed also considering social and regulatory acceptance aspects.
Task 6.2: Scalability and replicability plan (M19-M48, UBE, RINA-C, CNIT, STHC, HSLU, WW, FBK, UNIZAG, HSLU, UCY, SWE, ENC, EVO, EE, UNITN, IST): The technical innovations provided in CINESIS will be weighed against specific scalability and replicability factors and the EU energy targets.
These factors affect 4 common areas of interest: technical, economic, regulatory, stakeholder acceptance. The outcome of this task will be a detailed plan of recommendations for rolling-out of the hardware, software, solutions, platforms, tools and processes and adopting the proposed innovations at EU level.
The outputs of WP2 – where a thorough review of existing services, business models, challenges and shortcomings, regulation, and policy will be conducted– will be a critical input to this task.
Task 6.3: Impact of sector integration on the European electricity market (**M19-M48, ENC,** CEZ, CEDIS, FBK, RINA-C, EEM, UBE, ESO, STHC, SWE, HSLU) This task develops a model of the European electricity market implemented in encoord's commercial software SAInt to study the impact of sector integration on the operation of the bulk power system, electricity prices, and renewable integration. The model simulates the European electricity market under a range of scenarios and conditions that represent different levels of sector integration at the local/distribution level. The scenarios and conditions will be based on the outcomes of Tasks 6.1 and 6.2. The impact of sector integration on the electricity market will be modelled by considering different electricity consumption patterns and flexibility that results from the integration of different sectors (e.g., heating, transportation) at the local/distribution level, different distributed energy sources (e.g., distributed solar PV, distributed storage, etc.). This Task will study the flexibility that sector integration services studied in CINESIS can offer to the European electricity market.
Role of Partners: ENC will lead the WP6 and task 6.3 studying with demo leaders and grid operators support the impact of CINESIS services on the EU energy markets and grids. RINA-C will lead T6.1 while UBE will lead

T6.2 collecting inputs from demosite partners and technology developers to study the impact of proposed technologies at socio (with UNITN support), environmental and economic level as well as their replicability.

Deliverables

D6.1 Evaluation of demonstration results and overall impact assessment (RINA-C, M48, PU, R) D6.1 will present the evaluation of the demonstrators' results. It will include the social, environmental and technical impact assessment and will also focus on the pan-European impact on design, modelling and planning of energy markets in a sector integration approach. This deliverable is related to tasks 6.1 and 6.3.

D6.2 CINESIS scalability and replicability plan (UBE, M48, PU, R) D6.2 will provide a detailed scalability and replicability plan for the CINESIS tools/services. Related to T6.2, it valorises modelling results from T6.3.

D6.3 (a, b) Modeling tools and simulation analysis for PanEU CINESIS replicability (ENC, M24, 48, SEN, OTHER) D6.3 will present the results of T6.3 study about flexibility that sector integration can offer to the European electricity market. Its contents will also provide inputs to D6.2

WP n. 7	Lead beneficiary: UBE	Start Month: 1	End Month: 48

Title	Exploitation, dissemination and communication

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Partner	RINA-C	**UBE**	CEDIS	FBK	EVO	UCY	TPAD	WW	TSCO	CINT	R&D-N	EEM	IST	EIG	STHC	ESO	CEZ	EE	EC	ELV	SWE	IRAIL	UNIZAG	HZIN	HOPS	UNITN	ENC	HSLU
PM	14	10	1	2	1	4	1	1	1	10	2	2,5	2	2	3	1,5	1,5	3,5	0,5	0,5	2	0,5	4	1	1	2	2	2

Objectives: The main objective of this WP is to raise awareness about the project and to promote its outcomes, by achieving wide communication and dissemination of the project's innovative results to the research and academic community, industry, and public through conferences, workshops, and publications. It also targets the exploitation and business planning of the developed concepts and tools to the market in order to maximize its impact by creating new products and services.

Task 7.1: Communication, dissemination and awareness-raising activities (M1-M48, UBE, all partners) This task gathers all the activities related to the design of the project identity and branding, together with the dissemination and communication planning, development of CINESIS materials as well as the coordination of a workshop for the diffusion of CINESIS results. Four dissemination channels will be used: a) special platforms (project website) b) electronic dissemination, c) non-electronic dissemination and d) interactive dissemination and new media. Using these channels, the project will reach the following target groups: a) relevant European Industry sectors and potential markets and customers, b) Researchers and professionals (Scientific community) both from industry and the academic world and c) Industrial partners and the wider public who are interested to adopt solutions, d) policy makers and regulators of the energy sector.

Communication in the scientific domain will use traditional means like peer-reviewed scientific journals and international Conferences and Symposia on the field, to transfer knowledge to other European and International Scientists addressing a wider scientific impact. All feedback gathered will be used to improve the service offered which will be a continuous action.

A thorough Dissemination plan aiming at raising awareness on the developments done in the project will be detailed in the early stages of the project. A clear dissemination path for each deliverable will be developed, respecting the confidential nature of some of the project outcomes. A Communication Plan will be created to ensure the project creates a strong awareness among the target groups and achieves its full potential impact. A target audience analysis will ensure that the relevant target audiences with their needs and motivations are addressed adequately. The project will contribute, upon invitation by the INEA, to common information and dissemination activities to increase the visibility and synergies between H2020 supported actions."

Task 7.2: Exploitation, impact and value creation (M1-M48, RINA-C, all partners) A series of activities will be conducted towards the definition of a plan for the exploitation of the project's tangible and intangible results. The exploitation activities will be aimed to use innovation results to create value within all participating organizations and thus to improve their competitive advantages. The project and partner's exploitation plans will be updated throughout the project`s lifetime. The main goal of the task is the development of coherent detailed business models, including economic, strategic, and commercial analysis of the exploitable assets developed during the project and the efficient management of IPRs. Specifically, will be developed a comprehensive business plan describing the value proposition of the project to be introduced in the market, analysis of the targeted market

segments, and relevant financial projections. This task will also capture the current and emerging market trends and as the project evolves, the market studies will be updated periodically to reflect the current status of the market. Finally, activities within the project could lead to defining new standards or affect already defined standards. Planned outcomes of the project may result in standardization proposals. Thus, a standardization punch-list will be prepared and promoted to the respective standardization bodies, committees, and working groups.

Task 7.3: Stakeholder involvement and BRIDGE activities (M1-M48, UBE, RINA-C, UCY, STHC, FBK, UNITN, SWE, EEM, IST, EIG, CNIT, STHC, UNIZAG) This Task will provide an approach on how CINESIS can be introduced and widely used by relevant user communities. The focus lies on stakeholders across the energy value chain, including –but not limited to- network operators, aggregators, producers, and policy makers. Therefore, as it is apparent, the task will consider several levels at which activities need to be carried out ranging from technological to political level. All necessary activities at the specific levels will be related by means of creating a straightforward way for the introduction and the widespread deployment of the CINESIS solutions, including the dependencies between these activities, constraints and prerequisites. CINESIS will cluster with the projects of the BRIDGE initiative, will pursue to benefit from the existing available knowledge and include it in its design and implementation. Significant project outcomes presentation will be planned to the different working groups (data management, regulations, business models) of BRIDGE, to share know-how for mutual benefit

Role of Partners: UBE will lead the WP7, coordinating and tracking all D&C activities, with RINA-C support for activities related to exploitation and valorisation of project results. Thanks to their relevant presence in BRIDGE and their activities in parallel H2020/HEU projects, RINA-C and UBE will coordinate all partners' inputs in WP7 as a whole, where all partners will be required to actively participate to vaorise project outcomes.

Deliverables

D7.1 (a, b) Project web portal and flyer (UBE, M3, M36, PU, DEC) Website with all project information and related documentation report. The deliverable is related to T7.1..

D7.2 (a, b, c) Dissemination and communication plan including communication material (UBE, M6, M24, M48, PU, R) Report on the planned dissemination and communication activities.

D7.3 (a, b) Exploitation plan, IPR management and stakeholder evolvement (RINA-C, M24, M48 SEN, R) Periodic presentation of stakeholders' involvement and appeal of CINESIS solutions to users' communities across the energy value chain. Participation in all BRIDGE activities and how CINESIS partners contribute to the WGs and collected insights for the project. The deliverable is related to T7.2 and T7.3.

3.1.3.2 List of Deliverables (Table 3.1c)

As required by Horizon EU/EC guidelines, project deliverables are related to project major outputs in order to limit the number of deliverables[50]. For some SEN deliverables a public version will be uploaded on project website

D#	Deliverable name	WP	Lead	Type	Diss. level	Date (M#)
D1.1	Project executive action plan	1	RINA-C	R	SEN	3
D1.2 a, b	Data management plan	1	UBE	DMP	SEN	6, 42
D1.3 a, b	Legal and ethical issues and guidelines	1	UBE	ETHICS	SEN	12, 48
D2.1	Regulation analysis, market and flexibility services assessment towards CINESIS services design	2	UBE	R	PU	15
D2.2 a, b	Business models and contractual arrangements	2	RINA-C	R	SEN	24, 48
D2.3	Customer engagement practices	2	UNITN	R	PU	48
D3.1	CINESIS system use cases and functional requirements	3	UCY	R	SEN	12
D3.2	CINESIS platform architecture, integration and interaction with existing H2020 platforms	3	UBE	R	PU	36
D4.1	Tools for consumers: Smart interoperability architecture for flexibility and iFLEX tool	4	HSLU	R+O	SEN	36
D4.2	Tools for aggregators: AggreMan, BuildIn and CEDIS VPP tools	4	FBK	R+O	SEN	36
D4.3	Tools for system operators: TRAIN2Grid, P2P capacity sharing and F-Channel	4	SWE	R+O	SEN	36
D5.1	Demonstrators deployment plan	5	UBE	SEN	PU	24

[50] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/om_en.pdf#page=34

D5.2	Report on demonstrators activities and operation	5	FBK	R	PU	48
D6.1	Evaluation of demonstration results and overall impact assessment	6	RINA-C	R	PU	48
D6.2	CINESIS scalability and replicability plan	6	UBE	R	PU	48
D6.3 a, b	Modeling tools for PanEU replicability	6	ENC	OTHER	SEN	24, 48
D7.1 a, b	Project web portal and flyer	7	UBE	DEC	PU	3, 36
D7.2 a, b, c	Dissemination and communication plan including communication material	7	UBE	R	PU	6, 24, 48
D7.3 a,b	Exploitation plan, IPR management and stakeholder evolvement	7	RINA-C	R	SEN	24, 48

3.1.3.3 List of Milestones (Table 3.1d)

#	Milestone	Lead	WP	Month	Means of verification
1	Business model and related customer engagement strategy identified	RINA-C	2	36	D2.3a submitted and T3.1 ended, matching BMs, UCs and EU assessment
2	Local energy requirements defined	RINA-C	2	9	T2.1 performed, regulatory and grid constraints assessed
3	Initial architecture of CINESIS platform	UBE	3	18	Draft D3.2 prepared based on validation over CINESIS architecture
4	Design of data models and software tools	UCY	4	18	Assessment of how to enhance existing tool to be integrated in CINESIS platform and how to deploy them in demosites (how to use the tools with local monitoring data)
5	Integration plan	FBK	4	18	
6	Demonstrators deployment plan ready	UBE	5	24	Preparatory activities ended for demos, drivers and barriers identified(D5.1)
7	Intermediate report on demonstrators operation	FBK	5	36	Demosites operation has started in all demo, first datasets are shared within the consortium and to validate tools/models
8	Initial scalability and replicability analysis performed	UBE	6	36	T6.2 started, scalability factors have been agreed by the consortium, initial version of D6.2 is validated
9	Project web portal online and flyer developed	UBE	7	3	Website available at designated address and flyer uploaded on it
10	Stakeholders identified and plan to engage them prepared	UBE	7	6	Initial D&C plan submitted (D7.2) including the list of relevant stakeholders and paths to engage them
11	KERs identified and initial exploitation plan prepared	RINA-C	7	24	D7.3a submitted, first ESS organized and KERs identified and related first suitable exploitation plan

3.1.3.4 Risk Table (Table 3.1e) – Legenda: P = Probability – I = Impact – R = Risk – MR = Mitigated Risk

	Description of risk	Proposed risk-mitigation measures
Technical Risks	Poor alignment between stakeholders needs and the developed technology (WP1, 3, 5) – **P:** M – **I:** M – **R**: M	Development of technical workshops to guarantee interactions and discuss eventual mis-alignments or foreseen barriers. - **MR**: L
	Full-fledged distributed system is too resource-intensive to run in parallel to existing software on the gateways deployed in the demo sites (WP4) - P: M – I: M – R: M	Simplify parts of the architecture, especially focusing on using light-weight implementations of DLT. - **MR**: L

	Pilot activities are delayed due to COVID-19 pandemic or other causes - **P:**M - **I:**H - **R:**H	Task 1.2 will assure close collaboration between Project coordinator and demo coordinators, developing risk assessment and mitigation actions in advance. Project partners have the experience to compensate for any delays due to the COVID-19 pandemic since they are all involved in several demonstration activities in H2020 projects during the last years of the pandemic. - **MR**: M
	Proposed methodologies in the demonstration are not performed as planned - **P:** M – **I:** H – **R**: M	The partners have the expertise to come up with several solutions for making the methodologies to work as planned. Furthermore, a time interval for fine tuning the methodologies is planned in each demonstration. - **MR**: L
	Boundary conditions and regulatory framework are too different to ensure a consistent development of CINESIS through the different MS - **P:** M – **I:** M – **R**: M	The initial tasks of the projects will focus on the development of use cases and related business models and customer engagement strategies: a detailed analysis will focus on similarities and differences to leverage them. The possibility to access regulatory sandboxes will be explored if needed. **MR**: L
	Difficulty in involving 50 customers to test the CEDIS VPP based on EugenioCloud and RiSING tool - **P:** M – **I:** M – **R**: M	The local DSO CEDIS is a partner of the CINESIS project and guarantees direct contacts with its customers. Moreover, CEDIS has already been involved in another European project (FP7 CIVIS) in the past, managing to involve about 50 customers. - **MR**: L
	Low consumer/prosumer engagement in flexibility provision (WP5) - **P:** L – **I:** H – **R:** M	Close interaction between pilot partners and demo participants, early in the project engagement phase will start. Participants should be fairly rewarded by its active role on the activities (flexibility provision). **MR**: L
	Lack of data and required data sets (grid data, weather data, market data) for modelling activities (i.e. Modelica + open source libraries + MOEA, etc.) **P:** M – **I:** H – **R**: M	TSO/DSO partners are engaged and investigated the required sets of data. Non-participating TSO grid data might be inaccessible. The latter can be mitigated by using anonymous, publicly available data sets (e.g. ENTSO-E grid kit), or ENTSO-E will be asked to provide data for the demonstration region if necessary (engaged via letter of support). Open data sources will be used as far as possible. **MR**: L
	Legal/regulatory framework barriers which can prevent the real world implementation, lack of clear framework. **P:** L – **I:** H – **R**: M	Experts involved in demo preparation will identify regulatory and legal constraints during use case definition and will identify backup options for demonstration countries.
	Difficulty in integrating the flexibility technologies of 50 customers with the EugenioCloud - **P:** M – **I:** H – **R**: M	The involvement of CEDIS as a partner makes it possible to select the most suitable customers. Furthermore, Evolvere has already successfully tested the integration of the EugenioCloud with several types of BESSs and already has the similar integration of heat pumps and EV charging stations in its development plans. - **MR**: L
Management Risks	WPs resources not well balanced – **P:** L – **I:** M – **R**: M	Constant monitoring by coordinator. If needed, resources will be reallocated by coordinator with approval of WP leaders. - **MR**: L
	COVID-19 pandemic situation or other external threats do not allow organizing	Project partners are all well experienced in managing project activities thanks to web collaborative tools also for remote technical support and meeting organization - **MR**: L

	physical meetings/visits etc. – **P:** M – **I:** H – **R**: M	
	Slow or ineffective communication between coordinator and consortium– **P:** M – **I:** H – **R**: M	A project management tool/repository will be prepared by RINA-C to facilitate internal communication/data handling. If needed, resolutions initiatives will be organised (i.e., problem solving workshops) - **MR**: L

3.1.3.5 Resources to be committed

Table 3.1f: Summary of staff effort

Total PMs	WP1	WP2	WP3	WP4	WP5	WP6	WP7	**Total PMs per Participant**
1 RINA-C	38	26	4	5	10	26	14	**123**
2 UBE	6	10	40	20	8	8	10	**102**
3 CEDIS	1	1,5	1	4	28	2,5	1	**39**
4 FBK	2,5	11,5	12	31	31	5	2	**95**
5 EVO	1	1,5	12	16,5	16,5	1,5	1	**50**
6 UCY	2,5	6	22,5	30	18	4	4	**87**
7 TPAD	1	2	0	4	8	0	1	**16**
8 WW	1	3	1	12	14	5	1	**37**
9 TSOC	1	2	0	2,5	8,5	0	1	**15**
10 CINT	1	4	8	2,5	2,5	2	10	**30**
11 R&D-N	1	1	4	4	36	1	2	**49**
12 EEM	2,5	1	3	13,5	13,5	2,5	2,5	**38,5**
13 IST	1	1	2	4	26	1	2	**37**
14 EIG	2,5	2	6	42,5	28	2	2	**85**
15 STHC	1	2	5	15	23	3	3	**52**
16 ESO	1	1	3	5	15	1,5	1,5	**28**
17 CEZ	1	1	2	5	15	1,5	1,5	**27**
18 EE	2,5	4	2	47	47	4	3,5	**110**
19 EC	0,5	0	0	6,5	1	0	0,5	**8,5**
20 ELV	0,5	1	1	33	10	1	0,5	**47**
21 SWE	2,5	1,5	2	4	5	2	2	**19**
22 IRAIL	0,5	0	0	5	5,5	0	0,5	**11,5**
23 UNIZAG	2,5	3,5	2	4	42	3	4	**61**
24 HZIN	1	0,5	0,5	2	31	1	1	**37**
25 HOPS	1	0,5	0,5	2	35	1	1	**41**
26 UNITN	1	9	0	1	8	6	2	**27**
27 ENC	1	4	0	1	2	36	2	**46**
28 HSLU	1	1	1,5	15	15	1,5	2	**37**
Total PMs	**79**	**101,5**	**135**	**337**	**502,5**	**122**	**78**	**1355**

Table 3.1g: 'Subcontracting costs' items

19/EC	**Cost (€)**	**Description of tasks and justification**
Subcontracting	60.900	Technical installation work for pilots (under Task 4.7) is subcontracted by Enefit Connect through one public procurement accordingly to the procurement rules (most economically advantageous tender, ensuring real competition etc). The expected cost is based on optimal technical setup.

Table 3.1h: 'Purchase costs' items (travel and subsistence, equipment and other goods, works and services)

3/CEDIS	**Cost (€)**	**Justification**
Other goods, works and services	20.000	**WP5**: Update of local monitoring and sensoring infrastructure to guarantee CINESIS Activities

Travel	12.328	**WP1:** 9x1000 participation to project meetings; **WP5**: visit to demosites and participation to local technical workshops; **WP7**: Participation to D&C events
Total	32.328	

5/EVO	**Cost (€)**	**Justification**
Other goods, works and services	92.250	**WP5**: CEDIS Demo: Cost to supply and install on-site edge devices (for monitoring and control electric meters, PV plants, batteries, heat pumps, EV charging stations) and (Eugenio) gateways as part of the District EMS in the CEDIS VPP. (50 Eugenio; 50 EVOPV; 35 EVOBESS; 30 EVOHP and 30 EVOEV); CEDIS demo: Costs for the start-up and release of the entire IaaS infrastructure, hardware and software, in which the application solution of the Aggregator Platform / CEDIS VPP.
Remaining purchase costs	10.607	**(<15% of pers. Costs)**
Total	102.857	

7/TPAD	**Cost (€)**	**Justification**
Travel	11.000	**WP1**: 9x1000 participation to project meetings; **WP5**: visit to demosites; **WP7**: Participation to D&C events;
Equipment	2.000	**WP5**: Monitor/TV for dissemination activities of the pilot and a local Server/PC to concentrate, M, and communicate data regarding the wind farm operation
Total	13.000	

9/TSOC	**Cost (€)**	**Justification**
Equipment	56.200	**WP5:** Hardware (server, storage, switches firewalls) and Software (including licences) for creating a robust and secure zone for interconnecting Systems; Extra modules for SCADA System Digsilent and MatLlab/Simulink for real time communication these systems.
Remaining purchase costs	10.000	**(<15% of pers. Costs)**
Total	66.200	

11/R&D-N	**Cost (€)**	**Justification**
Other goods, works and services	60.000	30.000 € for usage of RTPSS software license and processing; 10.000 € for license purchase (IEC-104 communication in RTPSS software) ; 10.000€ for PSSE to RTPSS software converter license; 10.000€ for MATLAB + Simulink + Matlab Coder + Simulink Coder license.
Remaining purchase costs	15.000	**(<15% of pers. Costs)**
Total	80.000	

13/IST	**Cost (€)**	**Justification**
Equipment	15.000	Prototyping Hardware & Servers Fees
Remaining purchase costs	23.000	**(<15% of pers. Costs)**
Total	38.000	

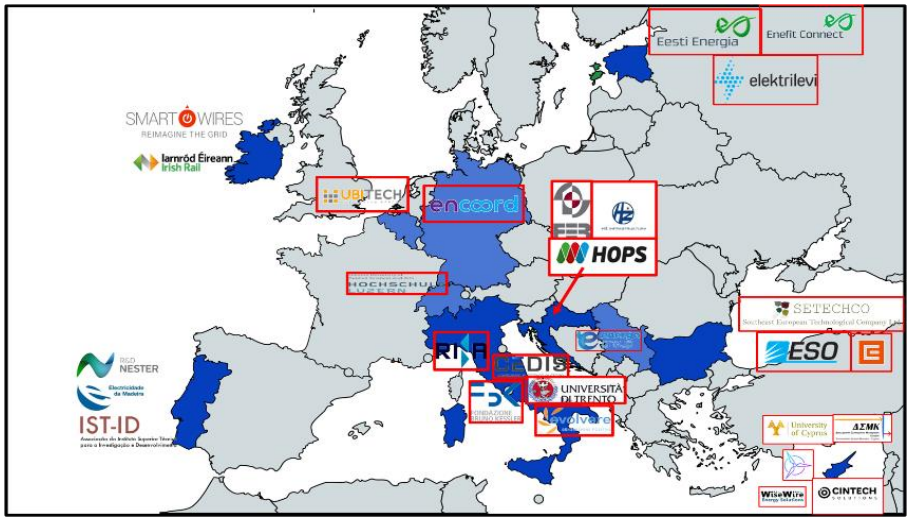
17/CEZ	**Cost (€)**	**Justification**
Travel	15.000	**WP1**: 9x1000 participation to project GA; **WP5**: visits and meetings at demosites; **WP7**: participation to D&C events and BRIDGE initiative events;
Total	15.000	

18/EE	**Cost (€)**	**Justification**
Equipment	126.000	**WP4**: The cost of devices (sensors, panel boxes, control units) ca 3000€/per premise. (3x10x3000 3 demos in minimum 10 customer premises) 2. Substation central control equipment (3x12000) - EE will build a dual system to validate this solution, and later these devices will not provide any benefit to the operation of the existing network.
Remaining purchase costs	132.500	**(<15% of pers. Costs)**
Total	258.500	

21/SWE	**Cost (€)**	**Justification**

Other goods, works and services	340.371	Deployment administration costs i.e. insurance, on site translator, leaflets and training materials (€24,436); SmartValve Mobile Deployment installation, commissioning, shipping and removal (€203,155); International travel fand services or commissioning and communication specialists to facilitate installation (€108,280); Audit (€3000); D&C Material (€2000)
Remaining purchase costs	307.173	**(<15% of pers. Costs)**
Total	647.544	

25/HOPS	**Cost (€)**	**Justification**
Other goods, works and services	55.000	**WP5** Demosite: preparation of the site for installation of the Smartwires equipment (both civil and electrical works), transportation costs, preparation of overhead lines, installation of auxiliary equipment (e.g. measurement and protection equipment) **WP7**: D&C material for local promotion
Remaining purchase costs	12.000	**(<15% of pers. Costs)**
Total	67. 000	



3.2 Capacity of Participants and Consortium As A Whole

The consortium is an exceptional mix of industrial expertise and top-class research centres to achieve the ambitious project objectives. The CINESIS consortium is made up of 28 partners from 9 EU countries (Italy, Belgium, Cyprus, Portugal, Bulgaria, Estonia, Ireland, Croatia and Germany) and 2 associated countries (Serbia and Switzerland) which contains industry partners, academia and research centres, SMEs and public bodies, combining business know-how, social sciences, ICT, energy, and deep technical insights. **RINA-C, which has a long-standing expertise in the coordination of large EU collaborative research projects and its commitment to supporting the energy transition of big industrial players, one of its business areas, will act as Project Coordinator**, leading WP1 Project coordination and management, as well as leading WP2 Stakeholders and consumers driven flexibility services and business models. UBE will lead WP3 CINESIS services, requirements and architecture and WP7 Promoting dissemination and exploitation. UCY will be responsible for the leadership of WP4 Technologies evolution for cross-vector flexibility services and FBK will be the leader of the WP5 Demonstration campaigns: Unleashing consumer flexibility across Europe. Last but not least, ENC will lead the WP6 Replication and impact assessment of project results.

To summarise, the consortium brings together **well-established, consolidated research networks with documented relevant capacity** in the proposal topic. The successful implementation of such an ambitious project, as first step of the marketability and widespread of CINESIS innovations, requires a **balanced, focused and committed consortium aiming to address the interdisciplinary approach needed as presented in table below** showing the complementarities of the partners and how the composition of the consortium is well-balanced counting with the adequate actors capable of achieving the project aims (darker shades refer to the main role and lighter ones to less developed competences and involvement).

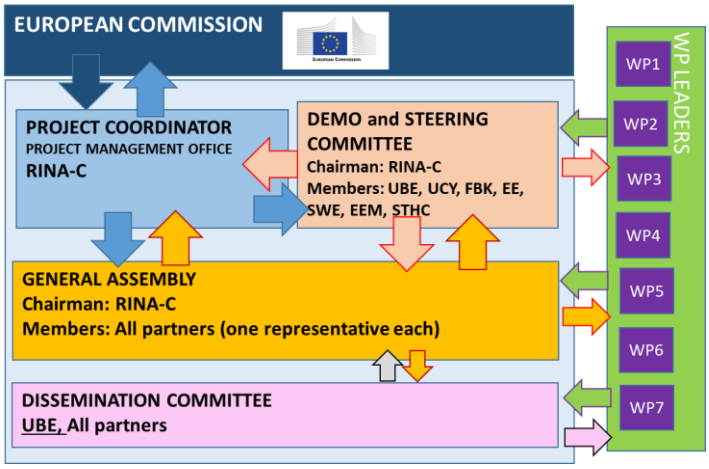
Table 1. Multidisciplinary and complementarity of competences in the CINESIS consortium. Rating: 1- Indicates zero contribution, 2- Partial contribution, 3- Significant contribution in CINESIS.

	ICT for energy	*Hardware for energy*	*Impact assessment*	*Dissemination and exploitation*	*Business models*	*System use cases*	*System operation*	*Regulatory analysis*	*Data management*
RINA-C	2	1	3	3	3	2	1	2	2
UBE	3	1	2	3	3	3	1	3	3
CEDIS	1	2	2	2	2	2	3	1	2

FBK	3	1	2	2	2	2	1	2	3
EVO	3	3	2	2	2	2	3	1	2
UCY	3	2	3	2	3	3	1	2	2
TPAD	1	2	2	2	2	2	3	1	2
WW	3	1	2	2	2	2	1	2	2
TSOC	1	1	2	2	2	2	3	1	2
CINT	3	1	3	2	3	3	1	3	3
R&D-N	3	1	3	2	3	2	1	2	3
EEM	1	2	2	2	2	2	3	1	2
IST	3	3	2	2	2	2	2	1	2
EIG	3	1	3	2	3	3	1	3	3
STCH	2	1	3	2	3	3	1	3	3
ESO	1	2	2	2	2	2	3	1	2
CEZ	1	2	2	2	2	2	3	1	2
EE	2	2	2	2	2	2	3	1	2
EC	1	2	2	2	2	2	3	1	2
ELV	1	2	2	2	2	2	3	1	2
SWE	2	3	3	2	3	3	1	2	2
IRAIL	1	2	2	2	2	2	3	1	2
UNIZAG	2	1	3	2	3	3	1	2	2
HZIN	1	2	2	2	2	2	3	1	2
HOPS	1	2	2	2	2	2	3	1	2
UNITN	3	2	3	2	3	3	1	2	2
ENC	3	1	3	2	3	3	1	3	3
HSLU	3	2	3	2	3	2	1	2	3

In addition to an excellent **complementarity of expertise**, a track-record of **successful collaborations among the partners** ensure effective communication across different countries, cultures and disciplines, and high-quality productivity. It is also worth mentioning that some of the partners are **European centres of excellence with strong links to EU/international networks.** This extensive collaboration network facilitates the communication flow and minimises the overall risks of cooperation.

3.2.1 Organisational Structure and decision-making



To ensure a fluid coordination of the project, CINESIS will propose a coherent management structure for the activities monitoring and the decision-making processes. A tentative management structure is provided in this section. The General Assembly (GA) is the highest-level decision-making body and would be composed by one representative of each project partner. The Demo and Steering Committee, consisting of the Coordinator, demo leaders and WPs leaders (RINA-C, UBE, UCY, FBK, STHC, EEM, SWE and EE), executes the day-to-day management of the project, being the main execution body, being also responsible to oversee the demonstrators overall progress and the innovation level in all tasks. The Dissemination Committee will focus on maximizing the CINESIS impact and overseeing the dissemination, communication and exploitation activities: led by UBE (with RINA-C Support) it will be composed by all partners. In any case, the management structure and the main bodies and their responsibilities, as well as the management processes will be agreed by all project partners and reflected within the Consortium Agreement (CA) prior to the project start. The Project coordination core team consists of:

Project Coordinator – *Alessandra Cuneo* (*female, RINA-C***)**: she is a Senior Environmental Engineer and she is received her PhD in Turbomachinery and Energy Systems Engineering at University of Genoa in 2017. She is expert in advanced energy systems, renewable energy sources, technoeconomic feasibility studies, research activities on uncertainty quantification, due diligence, innovation and technology transfer. She is employed at RINA-C since

January 2019 working in different European Projects dealing with smart energy solutions for energy districts. She is the H2020 MUSE GRIDS and FLEXnCONFU project coordinator.

Admin and Financial Coordinator – *Chiara Longo* (*female, RINA-C*): Chiara Longo, female. She has a degree in foreign languages and literature and a master's degree in management of Hospitality Facility for Refugees, Asylum Seekers & Migrants. She has two years' experience in EU Funded Research Projects, having worked as the coordinator of two Interreg Europe Projects for Genoa Municipality and as an accountant in Italian Institute of Technology, before joining RINA-C in 2021.

Digital and Innovation manager – Katerina Drivakou (*female, UBE*): She holds an integrated master's degree from the Electrical and Computer Engineering Department, University of Patras. She has participated in various Horizon 2020 EU R&D projects (OneNet, IANOS, TIGON, frESCO) and has been a member of the technical coordination team in the FARCROSS EU project. Her main research interests include energy efficiency, renewable energy, power electronics, motor control and electricity markets.

ANNEX – Participation of Swiss Partner HSLU

Partner 28 FACHHOCHSCHULE ZENTRALSCHWEIZ - HOCHSCHULE LUZERN [HSLU], will participate to CINESIS providing high level know-how on development of ICT Services for energy grids and the promotion of flexibility services and TSO/DSO cooperation.

HSLU Budget will not be covered by EU funding, but, in case of a successful proposal, a request of funding will be elaborated by HSLU to the Swiss Government – SERI.

Here below a recap of contribution required by HSLU.

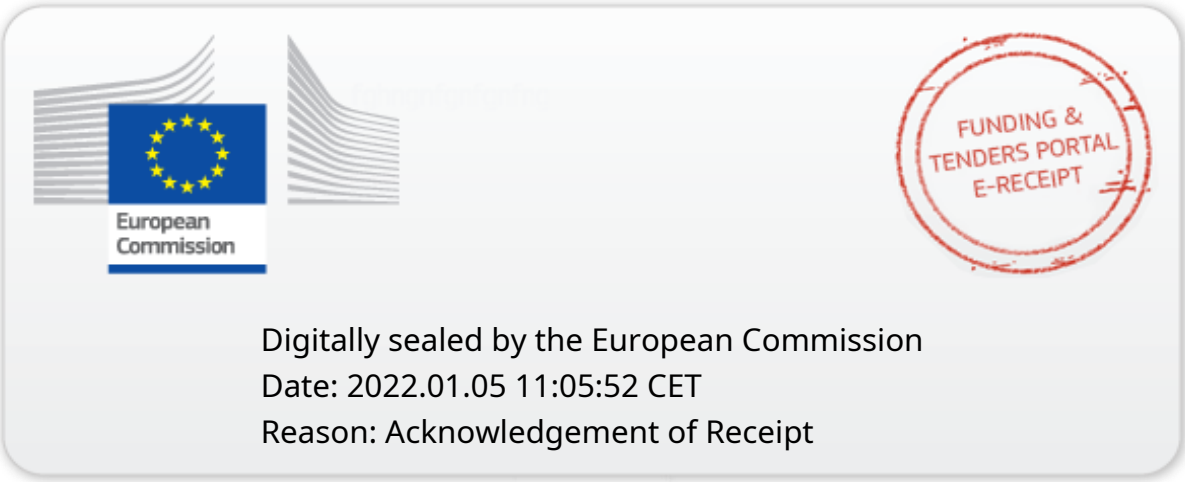
- **PERSONNEL COSTS** (to cover activities in CINESIS WPs): 370.222 €

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total PMs
HSLU	1	1	1,5	15	15	1,5	2	**37**

- **OTHER DIRECT COSTS**: 18.000 €

18/HSLU	Cost (€)	Justification
Travel	13.000	WP1: 9x1000 participation to project meetings; WP4: visit to demosites; WP7: participation to D&C events;
Remaining purchase costs	5.000	
Total	18.000	

- **INDIRECT COSTS**: 97.056 €
- **TOTAL COSTS**: 485.278 €
- **MAXIMUM FUNDING REQUEST** (100% of reimbursement rata as HEE partner): 485.278 €



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