



International Cooperation in Energy Research and Innovation



HORIZON 2020

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International cooperation, Energy System Integration

EU Energy Research, Innovation & policy framework

Examples of on-going co-operation

Energy System Integration activities in Europe

Towards future cooperation



1. EU Energy Research, Innovation & Policy framework



EU Energy R&I & policy framework (1)

Policy framework 2020

- 20% GHG reduction - binding
- 20% renewables - binding
- 20% energy efficiency

Strategic Energy Technology Plan (SET Plan)

- "Technology pillar" of the EU Climate and Energy Policy
- Priority-setting tool for H2020 challenge "Secure, Clean and Efficient Energy"

H2020 challenge "Secure, Clean and Efficient Energy"

- Energy Efficiency
- Competitive low-carbon energy supply
- Smart Cities and Communities



EU Energy R&I policy framework(2)

Policy
framework 2030

- 40% GHG reduction (main target)
- 27% renewables
- 27% energy efficiency

European
Energy Security
Strategy

- Energy Security to be streamlined in energy research and innovation

President
Juncker's
guidelines

- "*A resilient Energy Union with a forward-looking climate change policy*" one of his 10 priorities



European Strategic Energy Technology Plan (SET plan)

- **Development and deployment of low-carbon technologies in a 2020 perspective and beyond**
- **Reference point for EU, national, regional and private investment in energy R&I, increasing leverage through joint actions**
- **Focus on technologies with market impact up to 2020 European Industrial Initiatives – Smart Grids EEGI**
- **Focus on longer-term research actions beyond 2020 EERA European Energy Research Alliance – Smart Grids ELECTRA**
- **Building an Integrated system view covering demand, generation, optimisation of logistics, smart cities, smart consumers**



Horizon 2020 Energy programme

Main RD&D financing instrument at EU level

Main challenges and messages for the energy challenge

Support the transition to a reliable, sustainable and competitive energy system by

- Reducing energy consumption and carbon footprint through smart and sustainable usage
- Boosting the development of renewable and alternative energy technologies and their integration in the energy system
- Making the power system more flexible to include new energy sources and reduce infrastructure upgrade costs
- Decarbonising the power and other industrial sectors

Maintaining/increasing the competitiveness of European industry



2. Examples of on-going cooperation

- **Joint projects**
- **Participation in "standard" projects**
- **Lab-to-lab cooperation with EERA**
- **Cooperation within ISGAN**



Example Joint project: NGCPV

A new generation of concentrator photovoltaic cells, modules and systems

Example of targeted co-operation

EU partners financed by EC, Japanese partners financed by JN

- Consortium of 7 European, 9 Japanese leading research centres
- Boost the efficiency of multi-junction solar cells
- Corresponding modules and systems
- 2011 - 2015
- Europe ~5 M€ - Japan ~ 5 M€

Result of a co-ordinated call



EERA Smart Grids - ELECTRA

International collaboration

ELECTRA assembles 21 Major Laboratories in Europe
Focus on long-term architecture of electricity grid
Developing international cooperation

- Contacts developing with DoE, NEDO, other contacts
- International Cooperation Board
- Developing lab-to-lab cooperation
- Opportunities for researchers exchange



Example Multilateral Cooperation IEA ISGAN

International Smart Grids Action Network European drive for the development (Italy)

- Major Economies Forum
- Clean Energy Ministerial
- ISGAN

**Active network with 25 world-wide contracting parties,
more invited to join**

Implementation through Annexes

- Major European contribution to Annexes



3. Energy System Integration Activities in Europe

- **Current drivers**
- **Long-term drivers**
- **Example activities**



Driver: flexibility in the power system

Variable renewable generation in Europe (end 2013)

- Wind: ≈ 117 GW
- Photovoltaic: ≈ 80 GW
- Peak/average Load: $\approx 530/380$ GW
- Not uniform: much higher concentration in DE, DK, ES, IT, IE,

Challenges

- Events with renewable generation > load at local, national level
- Inaccuracies in prediction of wind / solar power
example: unforeseen fog leading to 8800 MW PV day-ahead error in DE
- Very high ramp rates
- High frequency volatility
- "Trading errors" due to trading on 1hr basis



Driver: long-term very low-GHG scenarios

Many detailed studies at national level. Examples:

Consumption: heating – optimise the input from

- ✓ Solar heating, ground heat pumps, air heat pumps
- ✓ Biomass CHP;
- ✓ District heating/cooling grids, heat storage

Consumption: transport

- ✓ Battery electric vehicles, fuel-cell electric vehicles
- ✓ ICE-based vehicles: from power-to-gas, power-to-fuel, biofuel

Consumption: other electricity

- ✓ From wind – onshore & offshore, solar, hydro, biomass

Integrate the logistics in time and space:

- ✓ cross-energy vector, storage, power-to-x, etc?



Integrated System Initiatives - examples

- **European Electricity Grids Initiative** – Integrating existing and new forms of generation, loads and storage
- **Smart Cities Initiative** - Integrating Energy, Buildings, Transport and ICT solutions at city level
- **Hydrogen & Fuel Cells Initiative** – Developing technology for transport and stationary applications
- **European Green Vehicles Initiative** – Developing vehicles, infrastructure, transport system integration
- **Energy Efficient Buildings Initiative** – Developing solutions for new buildings and for renovation
- **Joint Programmes of the EERA Research Alliance**



4. Towards future cooperation



Cooperation opportunities

Cooperation opportunities within Horizon 2020

- Participation of European subsidiaries
- Participation of non-European organisations
- Joint projects

Lab-to-lab collaboration under EERA

Multilateral cooperation e.g. ISGAN



Conclusions

Important needs, ambitions and experience in Europe on Energy Systems Integration

Europe, US, Japan have shared interest in bringing more intelligence to the grid

Europe, Japan have a similar dependency on external energy resources: limited coal resources, some nuclear, no oil, limited gas

Shared drivers in energy security, energy efficiency, shared interest for renewable energy

Different options possible for international cooperation



International cooperation strategy for Research and Innovation

<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1405329617697&uri=CELEX:52012DC0497>

European energy security strategy

<http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1405329617697&uri=CELEX:52014DC0330>

International cooperation with Japan

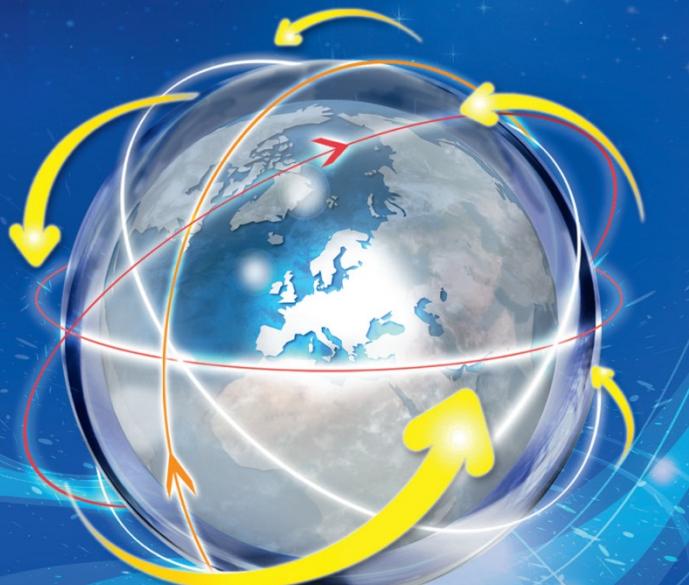
<http://ec.europa.eu/research/iscp/index.cfm?lg=en&pg=japan>

Strategic energy technologies Plan implementation

<http://setis.ec.europa.eu/implementation>

Pdt Juncker - A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change

http://ec.europa.eu/about/juncker-commission/docs/pg_en.pdf



Thank You

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