



Energy Transition in Europe: European Science for Energy Policy (ESEP-N)

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The transition to a decarbonised economy requires dramatic changes to Europe's energy system and market.

In this context of transformation, national and European policy-decision making goes far beyond the technicalities of regulatory reform. It has important implications for Europe's industrial, social and economic policies and presents us with challenges in foreign policy and international negotiation. An evolving energy system demands solid technical knowledge on the emerging technologies and services, and requires behavioural change from all of Europe's energy consumers - homes, businesses and industries.

The JRC proposes to tackle these challenges by the setting up of a European Scientific Network for Energy Policy. The network will be a federation of interoperable labs, pooling together available resources and expertise in key European research Institutions. The resulting European Scientific Network would have as main goal the production of scientific and technical instruments relevant to policies of the European Commission and the Member States, in close contact with the relevant industrial and regulatory actors.

A RESILIENT ENERGY UNION WITH A FORWARD-LOOKING CLIMATE CHANGE POLICY

The new President of the European Commission, Jean-Claude Juncker, has recently announced an ambitious program for the next five years, where the reform and reorganisation of Europe's energy policy into a "European Energy Union with a forward-looking climate change policy" lays on top of his priorities. To fulfil this vision, particularly in light of current geopolitical events, the EU would also require an ambitious and comprehensive master plan for energy security (under development), whereas designing and building a well-functioning and fully integrated internal market is a prerequisite. It has been anticipated that key elements of the plan would also include: diversifying sources and routes of energy imports, combining the EU negotiating power vis-à-vis external suppliers, investing in infrastructure development and modernization in order to support diversification, promoting energy efficiency and developing new and renewable energy sources.

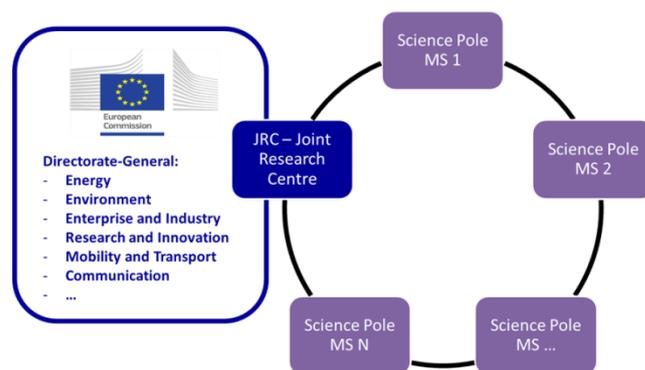
It is even more vital now that the Commission addresses all identified challenges in close cooperation with the Member States, trying to balance traditionally different national attitudes towards the three policy objectives of ensuring EU energy is secure, competitive and sustainable. Moreover, with negotiations on the political agreement on the 2030 energy and climate framework coming to an end, policy decision makers would particularly require scientific support, able to analyse and anticipate the effects and impact of different measures, in the preparation of crucial decisions and legislative instruments that will follow up.

ESEP-N A EUROPEAN SCIENCE FOR ENERGY POLICY NETWORK

The Joint Research Centre of the European Commission (JRC) is the in-house scientific service of the Commission providing sound support for a *science based decision making* in various areas and, particularly, in the energy sector. The idea of ESEP is basically to provide an *extended/integrated JRC* in which centres of excellence in the field of energy in the Member States will be connected in an organic way with JRC sharing methodologies, tool, data, simulation and test facilities.

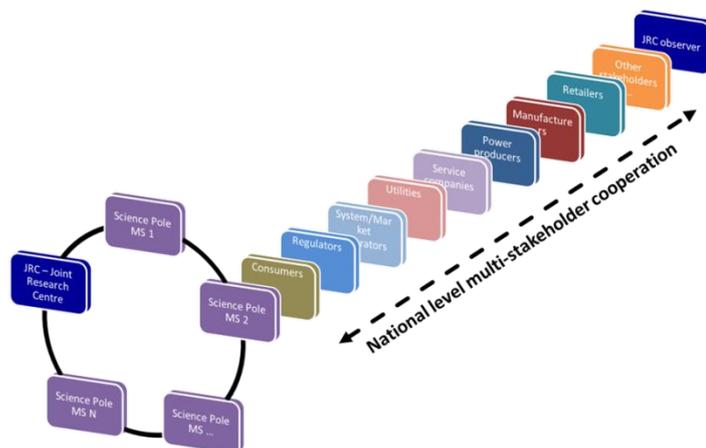
In this way, the scientific *support from JRC* can be *widen* (in terms of areas covered and possibility of studies), *more powerful* (in terms of knowledge and available facilities) and *more European representative* (in terms of the involvement and sharing of the scientific activities with the MS), *connected with the key players* (in terms of getting various European stakeholders, from TSO, DSO to customer associations, involved through the National science poles).

Throughout this network the input that JRC can provide to the various DGs, and particularly to DG ENER, would be richer and much more effectively European based. This Scientific Network will accompany the EU in its energy transition, with reference to the electricity sector, towards smarter electricity systems, providing input to the *policy decision-making* and implementing apposite *R&D activities, assessing the emerging systems, technologies and services.*



Core partners of the ESEP

The network is structured into national poles that, under the coordination of a research institution, would aggregate the main national stakeholders in the area.



National Pole Structure

EXAMPLES OF TOPICAL ACTIVITIES FOR ESEP-N

A. *Supporting the assessment of priorities for Projects of Common Interest in Europe*

Existing relevant EC initiative(s): Electricity Regulatory Forum, Regional Initiatives

The Regulation (EU) 347/2013 on guidelines for trans-European energy infrastructure reads: *Regional groups should be established for the purpose of proposing and reviewing projects of common interest, leading to the establishment of regional lists of projects of common interest.* In order to ensure broad consensus, these regional groups should ensure close cooperation between Member States, national regulatory authorities, project promoters and relevant stakeholders. The cooperation should rely as much as possible on existing regional cooperation structures of national regulatory authorities and TSOs and *other structures established by the Member States and the Commission.*

A new Union list should be established every two years. Projects of common interest that are completed or that no longer fulfil the relevant criteria and requirements as set out in this Regulation should not appear on the next Union list. *Projects of common interest should comply with common, transparent and objective criteria in view of their contribution to the energy policy objectives.*

The establishment of PCIs represents a leap forward in research applied to Smart Grids. Up to now, JRC IET contributed significantly to basic research questions like:

- What is going on about Smart Grids in the EU? The JRC IET periodical inventory of Smart Grids projects takes a snapshot of Smart Grids projects in the EU.

- Is it worth to realise a specific Smart Grid project? In order to answer, JRC IET developed a Cost-Benefits Analysis methodology and tested it to a practical Smart Grid project: Inovgrid project in Evora, Portugal. Further cooperation is undergoing with major stakeholders to continue testing further.

With the Regulation on Trans-European energy infrastructure coming into force, policy makers are moving towards other research questions, e.g.: "assuming that there are several Smart Grids projects worth to be realised, which among them are also bringing benefits at EU-wide level?". To answer to this question, JRC IET applied its Cost-Benefit Analysis in conjunction with a Key Performance Indicators (KPIs) analysis, building the basis for a multi-criteria analysis. The advantages of this multi-dimensional method are: the ability to capture not only the economic dimension of projects, but also their contribution towards specific policy criteria (e.g having a cross-border impact); assessment transparency, fundamental when not only assessing but comparing different projects among them, also ensured by the participation of interested stakeholders to the definition and application of the methodology, within the framework of the Smart Grids Task Force.

B. *Supporting the assessment of options for future electricity retail markets*

Existing relevant EC initiative(s): Smart Grids Task Force

The role of consumers in the power system hides an enormous potential: through information and communication technologies, *consumers* can be "empowered" and *can take part more effectively to the retail market* and evolve towards active consumers and prosumers. Crucial research questions, that might yield revolutionary impact in the retail energy market, still need to be thoroughly answered: How much will consumers actively react to proper incentives and adjust their consumption/production accordingly (demand responsiveness)? As seen in few innovative pilot projects, how can consumers effectively interact with the power system?

The *Commission gives guidance to Member States on how to enhance the role of consumers in the electricity market* by providing them with incentives to use electricity when it is cheapest and most plentiful. Consumers can contribute to ensuring sufficient energy flow at peak times and this will help to avoid costly investments in new power plants. Additional policy and legislation initiatives are expected to be continued in the coming years.

In order to dig further into the complexity of consumers' role in the energy market, several dimensions should be taken into account: regulatory and social, of course, are those in the spotlight, however JRC IET proposes a vision of the problem that encompasses all the interactions that might take place in a power system as a whole: Agent-Based Modeling allows to model consumers behaviour, e.g. their response to dynamic prices. In order to have a sustainable business model also the technical dimension of electricity power supply is fundamental, to establish how these dynamic prices could be feasible from a technical point of view and how reliability and safe operation of the power grid is ensured when so many stakeholders interact. Moreover, current studies lack quantitative estimations of e.g. potential savings due to demand response or other forms of consumer engagement (due to lack of technical background and modelling capabilities).