

***Emerging Energy Challenges and European Policy Decision  
Making: a Scientific Support from Member States***

Prof. Francesco Profumo  
IREN S.p.A. – Politecnico di Torino

### *Emerging Energy Challenges in Europe*

Europe faces a crucial period regarding the development of the energy systems and markets. In particular, the EU's transition towards smarter electricity systems would require provision of highly qualified input to the European and national policy decision-making processes. This input will have to be based on solid scientific knowledge of the emerging systems, technologies and services. The EU is defining a new set of energy policies that will shape the evolution of energy systems and markets towards 2030 and 2050. The 2020 targets and the maturity of the [3rd Energy Package](#) prescriptions promoted in the last decade profound changes at both the national and European levels. However, the interplays between many factors influencing those changes (among others, the massive introduction of renewable sources and the related incentives, the unbundling of operators, the setting up of the Emission Trading System, the increase of electricity flows across borders, and the technological modification towards smarter electricity systems,..) have not resulted in a balanced arrangement. As the system will continue this transformation in all its components (technologies, retail and wholesale markets, network codes, financial instruments, institutions), policy decision makers would require scientific support able to analyse and anticipate the effects and impacts of different measures. The new [2030 Climate and Energy Framework](#) was issued in January 2014. On the one hand, it called for the development of *national energy action plans*, which would have to present a coherent picture of the potential unfolding of the energy mix, the needed investments and the satisfaction of the CO2 emission target. On the other hand, it fixed a RES goal at the European level, which should be satisfied by the conjoint efforts of the EU MS. It has been anticipated that the EU energy transition would require the investments amounting to [1 Trillion Euro](#). This poses challenging requirements both to the market conditions that would make those investments possible and to the technological development that would provide the solutions to implement. A crucial point for infrastructural investments is the possibility to take advantage of the European programmes (e.g. Trans-European Networks, Connecting Europe Facility) and of the Cohesion/Structural funds.

### *Science-Base Support for a Unified European Energy Policy*

Energy policy was typically national based, weakly coordinated at the European level with main consideration of energy, as many other areas are like foreign affairs, more a national than communitarian business.

This tendency is evolving towards a more truly unified and European approach that is absolutely needed when we consider energy as a global problem both in terms of the procurement of energy resources and of the impacts that those resources causes. The EU has a high level of dependency in terms of energy from several other countries (Russia, OPEC Countries) and competes with others for those resources (China) (Gross inland consumption in 2012: 1683 Mtoe, Net import of primary energy in 2012: 922.8 Mtoe with a share of import of 54.83%). The costs due to energy imports are huge and represent a remarkable share of the unbalance between import/export. > The effects of this situation threaten the EU both from the point of view of security and market competitiveness.

To possibly face those challenges in a globalized world requires a unified action at the EU level in all respects (forecast, management, research,...) with policy that is decided at the level of the European Commission, with an active participation of the member states, and then be transferred to the member states. The policy making, although unified, needs to be built in a strict connection and with the involvement of the member states to be effective and politically sustainable. The policy making is facing a complex world with many emerging opportunities, unknown and challenging (smart grids, bio-fuels, shale gas,...) and to be reasonably sure to provide appropriate answers to complex problems needs a strong scientific support. In the EU there are a wide set of scientific expertise in the area of energy that can be exploited in a coordinated effort to support the EU policy decision making. The participation of the scientific community of academia and research Institutions, in cooperation with the National Stakeholders, would provide additional expertise and widen its perspective to the Commission while making the member states directly involved, which will result in a boost of confidence and sharing view of the European policy that will be adopted. The idea of the ESEP-N is basically to provide to the Commission an *extended/integrated JRC* in which centres of excellence in the field of energy in member states will be connected in an organic way with JRC, sharing methodologies, tools, data and simulation and test facilities.

#### *The National Perspective of the ESEP-N*

The ESEP-N 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*.

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

From the national point of view of member states, various national stakeholders can benefit from the ESEP.

The *R&D centres* participating in ESEP will find that their technical capabilities are recognised and they are positioned in a central role with respect to authorities and industrial actors. They will witness their models and tools being employed for key policy problems, and in this way they will gain insight on the topics and problems considered prominent by the other actors. As a consequence, they will be in a privilege position to take advantage of funding opportunities at the national and international level, in addition to directly contact with the electric power industry.

The ESEP, for the participating R&D centres, can be a recognition of their competence, and a path for consolidating their activities.

*National authorities* face the rapid changing reality of the electricity sector, which requires crucial decisions on market structures, state intervention, subsidies, infrastructure development, etc. These decisions do not just relate to industrial policy but has consequences onto the level of energy security, fairness in the treatment of all social actors, environmental and climate objectives, and openness to innovation and new business models. Appropriate scientific models and technology assessment are essential for understanding the interaction among the different factors and the potential impact of the various decisions at hand.

The ESEP, for the national authorities, can be a valuable resource for independent studies expanding to the EU dimension.

The *system operators* of the electricity system witness a crucial transformation, within the transition of the whole energy system. There are the increasing weight of distributed generation, the pushforward stable prices and increasing efficiency, the potential role of super grids and massive generation from renewable sources. The well-defined areas of the electricity chain cannot ignore the evolution of the others, and any solution needs to be well integrated with any other proposals. Technical progress demands changes in such a way that values and prices are allocated to different functions in the system (e.g. ancillary services). Therefore, there is a common interest in amalgamating various viewpoints for verifying the feasibility and validity of the diverse technical and market structures.

The ESEP, for the power system operators, can be useful in the assessment of all combined factors, linking the industrial perspective with policy objectives.

*Regulators* look after the network and market rules that can ensure the satisfaction of the policy objectives (e.g. security of supply, open markets, efficiency). Their binding decisions, by setting the framework for the operation of the energy system, shape the offer/demand and prices for energy products and services. The development of the grid codes and changes in the wholesome and retail markets are typically studied before deployment. What is new now is the speed and deepness of the ongoing transformation with increasing interdependence among all levels (generation, transmission, and distribution). Furthermore, the integration of national systems and markets within and beyond the EU requires the assessment of all the implications for ensuring the correct functioning of the systems and markets.

The ESEP, for regulators, can be a technical asset, providing a competent and independent standpoint.

*Sector associations*. The technical associations of the European power sector (of TSOs, DSOs, electricity industry, customer associations) have different missions and objectives, but generally they represent the interest of their affiliates and discuss relevant technical issues, promoting their position to the relevant policy makers at the European level and to the other stakeholders. The current evolution of the electricity sector requires an increasing interaction among the associations because aspects such as grid codes, investments or markets depend upon and influence all different sectors. Any analysis would demand information coming from those various actors in ways much more interactive than in the past. For instance, information on renewable generation is extremely relevant for the TSOs, grid codes for DSOs, capacities and operations for any important investment in generation, etc.

The ESEP can provide to the electricity sector associations a common scientific reference, to share and exchange data and information as needed (and with due confidentiality), with the aim of obtaining results useful for all of them and for interacting with the policy makers.