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EFONET: Assessment of Energy Foresight in the EU

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Purpose

Within the EFONET Coordination Action, an analysis of the state of the art of energy foresight activities in the EU countries has been carried out in order to assess the transferability of the “good practices” learnt from the national foresight experiences towards energy foresight on the European level.

State of the Art of Energy Foresight in the EU

EFONET set out to assess the contribution that current knowledge on energy foresight methods and their practical application can provide to policy making to support the EU vision(s) for a medium and long-term transition to a sustainable, secure and low carbon energy system.

To this end, EFONET also aimed to provide an overview of foresight cultures and dynamics across the EU by reviewing the state of the art of energy foresight in selected European countries. Accordingly, national experts prepared a series of country reports (CR) to provide an updated picture of the energy foresight approaches and practices in the respective countries by illustrating lessons learnt and highlighting strengths and weaknesses identified in applying energy foresight methods and tools.

Coverage of Twelve EU Countries

The countries were selected in order to ensure a good geographical coverage of the EU, taking into consideration the heterogeneity of foresight culture and practices across European countries and that current energy systems as well as future technologies vary considerably from country to country.

Ultimately, twelve CR have been provided. Specifically, reports are available for Czech Republic, France, Germany, Greece, Ireland, Italy, Lithuania, Norway, Poland, Romania, Spain and the UK. Moreover, an overview of the different energy foresight studies and processes at the EC level has been carried out.

Heterogeneity of National Foresight Experiences

In the last few decades, a strong dynamic in the energy foresight activities across the EU has been noted together with a growing role of energy foresight in strategic national planning, although foresight competencies and experiences vary considerably across the individual countries mostly due to different cultural, historical and social backgrounds. In particular, some countries feature a lack of energy foresight experience or in any case of strategic energy planning while for several countries future-oriented studies in the energy field have been regularly performed and their results broadly used for the elaboration of national strategies. The UK seems to display the best available practice in running foresight studies and implementing their results.

Early national foresight exercises aimed mainly to identify future developments in science and technology while the most recent foresight practices are based on a much wider approach that attempts to integrate a broad range of aspects (i.e. envi-



ronmental, economic or social) that nowadays are deemed to be included into the process although rather difficult to quantify.

Significance Not Yet Acknowledged at EU Level

The European Commission started supporting research on energy foresight in the early 1970s. Those works mostly focused on modelling techniques (e.g. optimization, partial equilibrium, bottom-up and back-casting models). In spite of nearly four decades of foresight activities, energy foresight-based policy making has not yet reached the desired state of application at the central EU level. On the other side, the objectives and rationale behind the EU-level foresight exercises vary, notably including rational decision making, identification of new technologies and communication.

Cross Country Evaluation

Based on the CR provided, a cross country evaluation analysis of energy foresight studies and methodologies has been carried out with the twofold goal of

- identifying success and failure factors emerging from national energy foresight experiences and
- determining good practices in view of the possible transferability of proven approaches both at the European level and for the benefit of the individual member states (MS).

To this end, a workshop “*Lessons learned from national energy foresight exercises*” was organized in April 2009 at the University of Athens to gather consensus on the main issues arising from the review of country reports and consequently to provide inputs for the transferability analysis. About 30 experts participated in the debate.

Looking for Best Practice

The cross evaluation procedure was based on selected evaluation criteria aimed at covering the five foresight dimensions of the foresight process that have been considered important:

1. Background: an overview of the cultural and institutional background and the authority initiating the foresight exercise (i.e. private or public, government/ministry).
2. Objectives and decision support: the specific purpose of the foresight exercise and the related decisions to be supported (e.g. R&D policy, climate change policy etc.).
3. Topics covered, for instance, technology costs, energy costs, environmental effects of energy use, security of supply, geopolitics, social questions etc.
4. Methodology applied (e.g. quantitative, qualitative, participatory; forecasts vs. scenarios, explorative or normative) and the level of decision makers’ involvement.
5. Success: shortcomings and success factors of the exercise. Viability of the methodological concepts.

Motivation for Energy Foresights

Setting the framework for future energy sector developments seems to be the most frequent reason stimulating energy foresight initiatives. Notably, the *identification of technologies* is of strategic importance to a given country. Ireland, Greece and Poland have largely carried out energy foresight studies focusing on technological developments. Specifically, this issue is strongly related to problems of *security of supply* across the European countries, depletion of fossil fuels reserves and the subsequent risk of an unstable energy supply.

In recent years, the increasing *environmental awareness*, especially in the field of global climate change caused by the high carbon footprints of the European national economies, is also becoming a crucial factor in launching energy foresight processes (e.g. two UK foresight studies focus on the decarbonisation of the economy¹). On the other side, *economic objectives* usually refer to the optimization of the costs of energy production and the costs to be faced in the transition to a low-carbon economy; other issues concern, for instance, attracting foreign investors for the development of the energy sector (e.g. emerging countries like Romania).

Moreover, the need for policies and strategies at a more general level can support not only the elaboration of the national energy plans but can also provide relevant input for the formulation of other policies and the investigation into future R&D strategies. Finally, *mapping the current energy market* situation usually creates the base ground and the starting point of all energy foresight exercises, but the survey carried out indicates that it can also be a specific objective of the foresight study itself. Mapping for exploratory purposes has been conducted in Greece.

Shortcomings and Success Factors

The review of the national energy foresight experiences showed a number of shortcomings and success factors that provide useful input for the planning and running of future foresight activities. Their main findings are the following:

Process initiation and institutional setting: a clear and appropriate institutional setting is a prerequisite for robust foresight exercises that otherwise can incur many methodological and organizational problems and lead to biased outcomes (i.e. “scientism” when too many scholars are involved and “corporatism” when too many participants representing interests of a particular group of stakeholders are involved). An inappropriate institutional setting, mostly due to inexperience, can also result in poorly structured coordination, insufficient collaboration and a lack of continuity of the foresight process. At present, there is no country in Europe that has established independent bodies within the policy-making system explicitly in charge of foresight.

¹ Decarbonising the UK – Energy for a Climate-Conscious Future (Tyndall Centre for Climate Change Research, 2005) and UK Hydrogen Futures to 2050 (Tyndall Centre for Climate Change Research, 2004)

In many cases, government or national agencies are responsible for launching energy foresight exercises. Notably, the level of authority mainly depends on the topics and fields of interest; at the same time, the wide scope of energy-related issues can lead to process initiation involving different ministers and governmental agencies (e.g. Poland, Czech Republic and Spain). In some countries, an official national foresight programme exists, like in the UK, and has been directly instrumental in creating a common platform for a wide range of foresight activities. When the foresight process aims at setting R&D strategies, it is primarily initiated by the scientific and education ministries (e.g. Spain, Germany).

Involvement of stakeholders: the lack of involvement of external stakeholders appears to be the most evident weakness. The direct engagement of stakeholders starts from the exercise design process through workshops and panels to final document preparation. The indirect participation usually takes place by partial process participation, e.g. as experts in Delphi surveys. Engagement of the decision makers seems to be necessary throughout the whole foresight process, including panel discussions and other participatory activities. It leads to a comprehensive perception and understanding of the issues arising during the foresight process, thus providing a basis for sharing responsibility for the final outcomes and their implementation. Participatory foresight experiences have been mainly identified in the UK, Ireland and Greece case studies. Policy and decision makers were involved in some of the exercises as sponsors or members of expert panels. In other cases, stakeholders were involved through workshops and consultation processes.

Methodological aspects: Explorative and normative approaches are the most common ones that have been used. Each of them employs different techniques for gathering initial input data, integrating them into scenarios and checking for consistency. Among the wide range of methodological approaches applied, some relied on purely quantitative modelling using tools like MARKAL, GEM-E3, WASP and MESSAGE, which generally apply the normative back-casting scenario building technique. The inclusion of such an approach in foresight activities is being discussed due to the fact that quantitative modelling usually results in linear (or at least continuous) predictions of future developments in which other factors also play a crucial role. However, the results of the quantitative modelling are more understandable and the visions generated are usually more complete compared to qualitative approaches.

Undoubtedly, the inclusion of social and economic changes as well as geo-political aspects into foresight is a very challenging task; nevertheless feasible options already exist, like the Delphi surveying techniques already used in the Greek and Polish national energy foresight exercises and on the EU level in the Eurendel project.

Most of the foresight exercises analysed have employed methodologies integrating quantitative tools with qualitative methods, like expert panels, brainstorming, workshops, literature review and SWOT analysis. In some examples common semi-quantitative methods, that is Delphi surveying and cross-

impact or structural analysis, were also applied. The benefits of the integration of qualitative forecasting with quantitative modelling are immediately evident when evaluating foresight exercises carried out in the UK and Ireland.

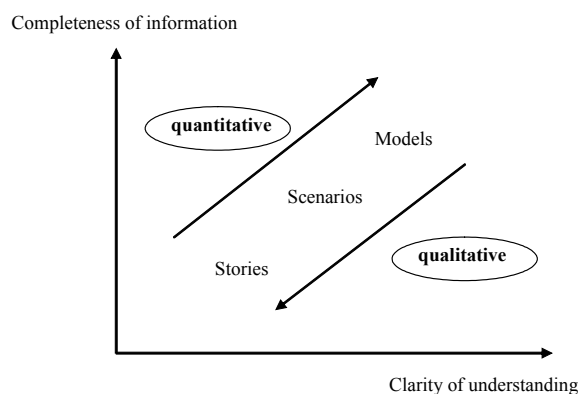


Fig.: Quantitative vs. qualitative modelling

It is important to highlight three other evident methodological weaknesses: i) the use of (pre)existing scenarios can produce duplications of mistakes made in the studies the scenarios were taken from; ii) a fair amount of subjectivity in the methodology applied by purposeful exclusion of specific groups of technologies or thematic areas; iii) national experiences indicate that models are frequently used beyond the limits of their validity, whereby short-term models are often applied to generate long-term forecasts and vice versa.

As far as data availability is concerned, poor data quality seems to be particularly significant for countries with quite weak foresight experiences (e.g. Czech Republic, Lithuania); most of the energy and economic data used in the models originate from EUROSTAT or similar systems (IEA, Enerdata). The review also shows that energy efficiency and renewables are not properly covered by the databases and that there exist only weak interconnections between regional and national policy documents.

Consensus on conclusions constitutes a necessary element for a successful implementation of the project findings. In general, a lack of consensus stems from different points of view of the particular groups of participants on the targeted issues.

Appropriate implementation and dissemination activities are crucial for the concrete utilisation of the results. On the other side, UK experiences show that a project including an action plan can be expected to produce more concrete results and to provide a real chance of monitoring its implementation. The main reasons behind implementation failures across the EU national experiences analysed can be classified as follows:

- Lack of synthesis of final conclusions and recommendations.
- Lack of procedures that would make it possible to transpose results into concrete decisions.
- Lack of continuity after new elections.

Foresight Results Deserve More Acknowledgement at Policy Level

An important observation is that the energy foresight activities as well as foresight-based energy policy making have not yet reached the desired state of application at the central EU level.

Due to accelerated technological and social changes, a new European culture of future-oriented thinking aimed at providing frameworks for strategic policy making is necessary. **The new culture should be based on participatory and flexible foresight initiatives** in the face of the complexity and large variety of energy issues and objectives.

As far as the institutional setting is concerned, no common EU foresight institution has been designated so far. The open question remains whether a **EU energy foresight institution** should be formally established at one or the other institutional level of the EU (i.e. Council, Parliament or Commission) or whether the aim should be integrating and engaging all of them in the foresight process.

It seems to be clear that no “one-fits-all” methodological approach exists while it is quite obvious that the methodologies have to be rigorously linked to the foresight objectives. On the other hand, the success of a foresight exercise can only be measured against its specific objective.

Appropriately adopted foresight methodology determines the quality, validity and robustness of its results. The past EC efforts in supporting quantitative tools development should now be consolidated by **merging qualitative scenarios with quantitative modelling** since it seems to be the most effective energy foresight option.

It is worth underlining that **availability, high quality and robustness of databases** on energy, economic as well as technological aspects, especially for what concerns energy efficiency and new emerging technologies (i.e. renewables) are needed. Accordingly, further efforts are required to free results as much as possible from bias arising from limited assumptions and to develop data standardization, which is crucial to keep the information derived from different sources homogenous.

Clear methodological assumptions of the whole foresight process should be transparent both for the foresight exercise participants and for all people interested including the final foresight outcomes’ users.

An important issue highlighted in this cross analysis is that the foresight activities seem to be becoming **increasingly participatory**. The involvement of a broad range of stakeholders from different scientific, industrial or societal sectors and civil society has led to significant changes in the methodologies applied and in the nature of foresight results. The interaction between the participants can stimulate the development of new and innovative ideas and thematic synergies by building interdisciplinary perspectives. The collaboration of different “competitors” can lead to several conflicts; therefore the challenge remains of how to optimize their interaction while avoiding irritation, redundancy, blockades and language or cultural barriers in transnational exercises. This is particularly significant when thinking about EU-level foresight initiatives.

The various energy-related foresight activities across the Europe show that the **implementation of the foresight results** should not only be considered as the phase mechanically following formulation, rather it should be conceived as an integral part of the whole foresight process. Strong engagement of policy makers in the whole foresight process is essential also for the execution of its results due to the fact that the implementation of the foresight outcomes inevitably requires legislative measures.

On the same hand, **monitoring of foresight results** should be an integrated feature of foresight initiatives to fully assess the suitability of the applied approaches and to avoid mistakes in future activities. To this end, disseminating foresight results as widely as possible is a crucial element. Finally, **learning processes** are important to raise awareness of many relevant aspects both at the national and European level. While expertise on quantitative modelling appears to be rather well developed, it is evident that issues connected with “soft” aspects of tools and methodologies for foresight process (i.e. scenario planning, combining quantitative and qualitative approaches, methods and management of the relationship to decision making) are rather poorly developed and show many gaps.

Sources and References

This article is based on the EFONET Deliverable “*Summary Country Reports: State of the art of MS energy foresight – transferability to European energy foresight*” drafted by GIG - Glowny Instytut Gornictwa in cooperation with IZT - Institute for Futures Studies and Technology Assessment and ISIS – Istituto di Studi per l’Integrazione dei Sistemi.

Other documents and presentations are available on the EFONET website www.efonet.org.

About the EFP: Policy professionals dealing with RTD, innovation and economic development increasingly recognize a need to base decisions on broadly based participative processes of deliberation and consultation with stakeholders. Among the most important tools they apply are foresight and forward looking studies. The EFP supports policy professionals by monitoring and analyzing foresight activities and forward looking studies in the European Union, its neighbours and the world. The EFP helps those involved in policy development to stay up to date on current practice in foresight and forward looking studies. It helps them to tap into a network of know-how and experience on issues related to the day to day design, management and execution of foresight and foresight related processes.