



Use of renewable energy sources in light of the “New Energy Strategy for Europe 2011–2020”

Karoly Nagy^{a,*}, Krisztina Körmendi^b

^aTriones Institute of Technology, Budapest, Hungary

^bZrínyi Miklós National Defence University, Budapest, Hungary

ARTICLE INFO

Article history:

Received 18 December 2011

Received in revised form 17 February 2012

Accepted 27 February 2012

Available online 27 March 2012

Keywords:

EU Energy Strategy

Energy needs

Knowledge centre

Energy security

Backcasting method

Virtual needs

ABSTRACT

The paper analyses the issues for consideration listed in the stock taking document “New Energy Strategy for Europe 2011–2020” and explores the impact of their implementation on the use of renewable energy sources. The main objective of the paper is to introduce and provide a summary of the theoretical and methodological achievements required for an analysis of the implications of such an EU level strategy. It also provides a summary of the results of the analysis of the impacts of the Strategy on a specific field; namely, on the use of renewable energy sources. Contradictions inherent in the Strategy are discussed as well, and a proposal is put forward to aid the resolution of these contradictions.

The paper also points out that the further development of the theoretical and methodological achievements may result in the creation of a simulation model, the application of which could effectively aid the process of strategic planning and the testing of strategies prior to approval. Finally, the paper discusses how an EU level and/or a global network of energy security centres could promote the development and implementation of an energy policy ensuring the appropriate utilization of renewable energy sources.

© 2012 Elsevier Ltd. All rights reserved.

1. Introduction

Between 7 May and 2 July 2010, the European Union held a debate on the document “Towards a new Energy Strategy 2011–2020” [1]. Based on this debate and the summary of the results of the professional negotiations, [2] the document “Energy 2020 A strategy for competitive, sustainable and secure energy” (hereafter Energy Strategy) was published [3]. In the following the possible impacts of the implementation of the Energy Strategy on the utilization of renewable energy sources in the European Union will be discussed. Due to the long read-in times for energy system changes, theoretical and methodological considerations will also be examined to facilitate the development of a strategic outlook pointing to 2050.

The main aim of an appropriate energy strategy with regard to renewable energy sources should be the harmonization of energy needs and the structure and volume of renewable energy sources. Therefore, the research focuses on how priorities and actions related to renewable energy in the Energy Strategy serve the harmonization process. The paper also discusses the importance of a global approach and points out the role of institutionalized knowledge management support in the harmonization process, in the implementation of a global approach, and in the creation of the institutional conditions and a collaborative environment.

2. Complexities in the increase of renewable energy sources

According to the EU Commission, “renewable sources of energy include wind power (both onshore and offshore), solar power (thermal, photovoltaic and concentrated), hydroelectric power, tidal power, geothermal energy and biomass (including bio fuels and bio liquids). As alternatives to fossil fuels, their use aims at reducing pollution and greenhouse gas emissions. Another role of renewable energy is the diversification of our energy supply, with the potential to reduce dependence on oil and gas” [4].

The Renewable Energy Directive [5] adopted in 2009 sets binding targets for renewable energy. The New Energy Strategy focuses on achieving a 20% share of renewable energy in the EU overall energy mix by 2020. Every member state has to reach individual targets for the overall share of renewable energy in energy consumption. In addition, in the transport sector, all member states have to reach the same target of a 10% share of renewable energy.

2.1. Nuclear versus renewable

The only viable alternative to renewable energy sources is nuclear energy. A comparison by Eerkens [6] clearly demonstrates the dilemma concerning the use of solar and wind energy:

“The typical capacity factor of a nuclear power plant is 90%, so a 1200 MW(e) reactor costing \$2.5 billion can provide 1000 MW(e)

* Corresponding author. Tel.: +36 305350951.

E-mail address: knagy139@gmail.com (K. Nagy).

continuously during a year. ...It takes 238 SOLAR-2 stations occupying 25,000 acres (100 km²) of land and investment of \$10 billion, to replace one nuclear plant occupying 40 acres of land, costing \$2.5 billion (2005 dollars). ...One needs 2000 wind turbines of 2 MW(e) capacity at a cost \$6 billion to provide 1000 MW(e) year around. So many wind turbines must be placed on 100,000 windy acres (400 km²). Besides the high cost of maintaining 2000 windmills, wind farms have the problem of killing hundreds of birds, ruining local ecosystems, and spoiling nature's scenery." [6]

2.2. Biomass–biofuels

The biofuel policy aims to promote the use in transport of fuels made from biomass, as well as other renewable fuels. Biofuels are expected to reduce dependence on imported petroleum with associated political and economic vulnerability, reduce greenhouse gas emissions and other pollutants, and revitalize the economy by increasing demand and prices for agricultural products [7].

Upreti [8] points out that public opposition is one of the major obstacles to promoting biomass energy. According to Upreti, the main sources of public conflict over biomass energy development are related to few economic benefits to local people. He concludes that biomass energy can be promoted only if all actors – the central government, developers, local councils, environmental concern groups and local communities – make a collective effort. Halder holds that it is also desirable to establish an interaction between bio-energy and educational policies to integrate the modern renewable energy concepts in the school curriculum [9].

2.3. Hydro and geothermal power

The limitations inherent in the use of hydro and geothermal power are also pointed out by Eerkans: "Hydroelectric power generation is a controversial issue in the USA. Most suitable rivers have already been dammed to feed hydroelectric turbo generators; in fact environmentalists want to dismantle some hydroelectric dams. In Cobb, California, a geothermal power plant generating 55 MW(e) in the 1960s experienced large drops in steam pressure and after 6 years was shut down. Some recent geothermal projects are more promising but only useful in a few locations for perhaps a few decades" [6].

In light of the above, achieving a 20% share of renewable energy in the EU energy mix is no trivial task. One thing is certain: The solution cannot be limited to increasing volumes alone. The proportion of different energy sources and objective energy needs should also be harmonized in a flexible and interactive way, which means more than just adjusting energy sources to energy needs; we should also exert a positive influence on the changes in these needs.

3. The harmony of energy needs and renewable energy sources

Theoretically, harmonization offers a simple solution to develop energy production capacities to meet energy needs. In practice, however, it has its limitations due to the scarcity of energy sources. A possible key to the solution is provided by Szabó [10]: He holds that in the presence of certain conditions different types of needs can be transformed into each other, or they can eliminate each other. These needs are effective needs, which have to be satisfied at the present, latent or unrecognized needs, and future or virtual needs. In my view, the above transformation process could provide a basis for a more effective form of harmonization. If we are able to recognize and satisfy virtual energy needs, we can eliminate effective needs which could not be satisfied at reasonable costs. With the help of this method it becomes possible to exert an influence

on changes in energy needs, which opens new horizons in the field of energy policy and lays down the foundations of a new type of strategic planning.

The answer to the question of why it is necessary to harmonize efforts directed at the increase of renewable energy sources with the structure and development of energy needs is very simple: Without doing so, problems such as the transfer of energy generated by wind turbines or photovoltaic cells to electrical power grids will recur over and over again.

The volume of the use of sustainable energy sources should only be increased if it can be aligned with existing energy needs and the relationship between different types of renewable energy. However, the alignment cannot be one sided; the flexible adaptation capacities of energy needs should also be continuously developed. One means of alignment is the development of smart grids, which provide a sophisticated interface between sources and needs. This is closely related to the spread of smart metering applications. The main question with regard to the development of smart grids reflects the importance of reckoning with the complex relationship between needs and sources.

According to Laurell [11] smart grids will be required when it comes to:

- heavy wind power installation,
- small scale local electricity power production,
- heavy use of electrical cars,
- energy storage systems.

Consequently, the effective harmonization of the EU energy policy should be should focus on three main directions:

- A. The flexible transformation of the volume and structure of renewable energy sources in accordance with objective social needs for energy.
- B. The continuous development of the conditions aiming to increase the flexibility and adaptability of needs.
- C. The development of technological, institutional and cultural conditions required for the harmonization of the two sides.

It can be state that the above three capabilities and conditions represent the foundations of a desirable future. However, the expression of these capabilities and conditions in specific physical characters and numeric values is an extremely complex task. This complexity is further increased by the necessity of the application of a global approach, meaning that the problem of need satisfaction and its consequences such as the environmental impacts and impacts on the future satisfaction of needs should be treated as part of the same system [12].

As a possible means to decide whether a policy is good or bad – for example, if it serves the interests of member states at the EU level or it is counterproductive –the apparatus of the so called backcasting method should be examined. This method was developed by Lovins [13] in the 1970s – originally called "backward-looking analysis" – as an alternative planning technique for electricity supply and demand, and since then it is still widely used in energy studies and for managing sustainability issues [14]. Backcasting is a new approach to identify attractive and desirable system changes and the way to explore and implement these in practice. The essence of the approach is to define a desirable future (or range of future) and examine how such a desirable state can be achieved. Based on this examination the strategies and policies aimed to support the achievement of the stated goals can be specified. The backcasting method used to be applied primarily to support policy decision making activities, but now it is more widely used. The method is not only suitable to define the way to reach the desirable future, but it can also be used to examine how and

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات