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Multi-objective ranking of climate change mitigation policies and measures in Lithuania

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ABSTRACT

The aim of the article is to develop technique for climate change mitigation policies assessment based on priorities of sustainable energy development. There is a close relationship between energy policies and tools aiming at sustainable energy development targets, i.e. promotion of renewable energy sources and energy efficiency measures and climate change mitigation tools. Therefore ranking of climate change mitigation tools based on their impact sustainable energy development targets is necessary seeking to ensure harmonization of policies and their synergy effect. The main tasks of the article are: (i) to define EU sustainable energy development targets, (ii) to analyze EU energy and climate change mitigation policies and their interactions, (iii) to propose a multi-criteria framework for climate change mitigation policies assessment and ranking, and (iv) to apply multi-criteria decision making methodology for climate change mitigation policies ranking in Lithuania. The main findings of paper are related with proposed technique for climate change mitigation policies assessment and application of this technique for ranking of climate change mitigation policies in Lithuania.

Contents

1. Introduction

Energy and climate change are on top of the agenda of the European Union (EU) today. Based on the European Commission's energy policy package entitled "Energy Policy for Europe" [1], which was accompanied by a number of sectoral policies to implement the overall strategy, the Member States adopted an Energy Policy for Europe (EPE) which pursues the three objectives: increasing security of supply, ensuring the competitiveness of European economies and the availability of affordable energy and promoting environmental sustainability and combating climate change.

Therefore energy and climate change mitigation policies are designed for the implementation of concrete environmental, social or economic targets should considered in complex way by applying integrated assessment of these policy measures economic, social and environmental impact. The results of implemented policies and measures targeting sustainable energy development needs to be

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monitored seeking to evaluate their efficiency in moving towards sustainable development. Another important issue is the selection of the best policies and measures and achievement of policies harmonization based on their capability to deliver to sustainable energy development future therefore sustainability monitoring or sustainability assessment is crucial in dealing with sustainable energy development.

There is a close relationship between energy policies and tools aiming at sustainable energy development targets, i.e. promotion of renewable energy sources and energy efficiency measures and climate change mitigation tools. Therefore ranking of climate change mitigation tools based on their impact sustainable energy development targets is necessary seeking to ensure harmonization of policies and their synergy effect. The main tasks of the article are

- to define EU sustainable energy development targets,
- to analyze EU energy and climate change mitigation policies and their interactions,
- to propose framework for climate change mitigation policies assessment and ranking,
- to apply climate change mitigation policies assessment technique for climate change mitigation policies ranking in Lithuania.

The main findings of this paper are related with proposed technique for climate change mitigation policies assessment and application of this technique for ranking of climate change mitigation policies in Lithuania.

The multi-criteria decision making (MCDM) methods are those suitable for providing rationale for sustainable energy policy [2–8]. One of the MCDM methods viz. the MULTIMOORA method was employed for the prioritization of sustainable energy sources [9]. This study applies the MULTIMOORA method for prioritization of the climate change mitigation strategies.

Accordingly the following chapters will develop a framework for climate change mitigation policies assessment to enhance synergies between energy, environmental and climate change mitigation policies. The system of indicators for climate change mitigation policies ranking will be proposed in terms of the EU sustainable energy development priorities. The case study for Lithuania will be presented seeking to illustrate application of developed indicators framework.

2. EU sustainable energy policy targets

In recognition of the risks and challenges to European energy supply, the Heads of State and government of the 27 Member States of the EU at the spring 2007 European Council have committed themselves to a low-carbon energy future [1]. The main aims of Energy Policy for Europe (EPE) are the following:

- increasing security of supply,
- ensuring the competitiveness of European economies and the availability of affordable energy, and
- promoting environmental sustainability and combating climate change.

In the center of the new energy policy is the EU's commitment to reduce its greenhouse gas (GHG) emissions by at least 20% by 2020 compared with 1990 levels, not least because CO_2 emissions from energy make up 80% of EU GHG emissions. By using less energy and using cleaner, locally produced energy, the EU aims to increase energy security by limiting its growing exposure to increasingly volatile prices for oil and gas, while stimulating competitiveness in the European energy market.

In general terms, the EPE is based on five pillars [10]. First, the EU aims at increasing its energy efficiency by saving 20% of its energy by 2020. This will save about 780 million tones of CO_2 from being emitted into the atmosphere. Second, the share of renewable energy sources in the total energy mix is intended to triple to 20% by 2020, while aiming for a 10% biofuel component in vehicle fuel by 2020. The third pillar focuses on reducing the carbon emissions from hydrocarbons. Of particular importance in this context is the role of coal, which is relatively cheap and available in Europe, but "dirty" in environmental terms as compared to other energy sources. The development of carbon capture and storage (CCS) technologies is thus a crucial factor in securing future energy supplies. The fourth and fifth pillars of the EPE are the EU's carbon market and an open and competitive internal energy market.

A competitive market is expected to increase security of supply by improving the conditions for investment in power plants and transmission networks, which in turn will help to avoid interruptions in power or gas supplies. To facilitate its creation, the European Commission has recently published its third legislative package including proposal for a number of measures to increase competition in the EU electricity and gas markets. These include, amongst others, the separation of production and supply from transmission networks ("unbundling"), the facilitation of cross-border energy trade, as well as greater transparency of the markets. These proposals are currently being discussed by the Member States within the Council. In the following paragraphs the main EU policy documents will be briefly reviewed.

The EU Green paper on European Strategy for Sustainable, Competitive and Secure Energy SEC (2006) 317 [11] sets the main priorities for EU energy strategy. The general EU policy objectives considered most relevant to the design of energy policy are: competitiveness of the EU economy, security of supply and environmental protection. These objectives should help to address central policy concerns such as job creation, boosting overall productivity of the EU economy, protection of the environment and climate change. Overall competition of economy is pursued by liberalizing the EU electricity and gas markets and restructuring of energy sector. For fostering competitiveness of the EU economy and concomitant income and added value creation, the promotion of one internal market at Union levels is considered essential. Cross-border trade on level playing-field terms would foster competition.

Security of supply is the priority concern of EU energy policy. The Green Paper on energy supply security COM (2000) 769 [12] states, that the EU will become increasingly dependent on external energy sources. It was stressed in this paper that the EU has very limited scope top influence energy supply conditions but it can intervene on the demand side mainly by promoting energy saving in buildings and transport sector. The EU is not in position to respond to the challenges of climate change and to meet its Kyoto protocol commitments. The Green Paper identifies two main policy priorities: controlling the growth of demand and managing supply dependency.

For the controlling of demand growth the fiscal and financial instruments should be used. Fiscal interventions in energy prices should remove distortions between alternative energy carriers and between member states and make energy prices reflect the real costs including environmental damage costs. The reduction of energy demand growth should be achieved at transportation sector and buildings through stimulation of energy-efficient technology (regulation, certification, fiscal measures and funding of R&D.

The Commission's new Green Paper on energy efficiency COM (2005) 265 [13] stress the importance of energy efficiency