DEVELOPMENT AND ASSESSMENT OF MITIGATION CLIMATE CHANGE POLICY PORTFOLIOS FOR ESTONIA

Dr. Nadežda Dementjeva: Power Plants Operation Expert, Energy Trading Department, Eesti Energia AS
Laki 24, Tallinn, Estonia, 12915
Phone: +372 67 467, e-mail: nadezda.dementjeva@energia.ee
Dr. Popi Konidari: Head of Climate Change Policy Unit of the Energy Policy and Development Centre (KEPA)
KEPA Building, Panepistimiopolis, 157 84, Athens, Greece
Phone: +30 210 72 75 830, e-mail: pkonidar@kepa.uoa.gr
Anna Flessa, MSc: Electrical engineer, Fellow researcher, National and Kapodistrian University of Athens, Energy Policy and Development Centre
KEPA Building, Panepistimiopolis, 157 84, Athens, Greece
Phone: +30 210 72 75 718, e-mail: aflessa@kepa.uoa.gr

Overview

Estonia has developed a broad spectrum of policy instruments with the aim to achieve its targets for mitigating GHG emissions under the first commitment period of the Kyoto Protocol. The majority of mitigation efforts are focused on the energy sector since the largest share of Estonian CO_2 emissions is from this sector due to the use of domestic fuels (oil shale, wood and peat) (Greenhouse Gas Emissions in Estonia 1990–2009 (2011)). Today 80% of electric power is generated from domestic oil-shale based power plants and approximately 50% of the converted primary energy is used for electricity generation in Estonia (Statistical Office of Estonia, 2014). Total GHG emissions, excluding emissions and removals from land use, land-use change and forestry (LULUCF), were decreased by 59% between 1990 and 2009. For fulfilling its obligations as an EU Member State, Estonia has set additional objectives for its climate change policy that are included in relevant national documents.

This paper concerns the research study for Estonia under PROMITHEAS-4 FP7 project, whose objectives were the development and evaluation of mitigation/adaptation (M/A) policy portfolios and the prioritization of research needs and gaps. More specifically, the aim of this paper is to present the results of the development and evaluation of mitigation policy portfolios for Estonia.

Method

The policy instruments are analyzed in terms of objectives, target groups, implementation network, rules and influencing mechanisms. They form the base for three policy portfolios each one of which is part of a scenario. Three scenarios (Business-as-usual (BAU), Optimistic (OPT) and Pessimistic (PES)) are developed by using the Long range Energy Alternatives Planning System (LEAP) model for the evolution of Estonian mitigation policy portfolios during the period 2000-2050. The LEAP model is suitable for elaborating the scenarios for the whole energy sector and separately for the electricity or heat sectors alone, including external assumptions such as population and economy growth, energy demand and supply, prices and income elasticities of policy instruments. The names of the scenarios reflect the different synthesis of mitigation policy portfolios and set of assumptions. Part of the outcomes of the LEAP model is used as inputs for the evaluation. The three policy portfolios are assessed with the multi criteria evaluation method AMS, developed by KEPA (Konidari and Mavrakis, 2007; 2006). This method combines three multi-criteria methods: Analytical Hierarchy Process (AHP), Multi-Attribute Utility Theory (MAUT) and Simple Multi-Attribute Ranking Technique (SMART). AMS is developed for evaluating climate policy instruments or relevant policy mixes and with suitable modification for evaluating their interactions as well. It has three criteria: environmental performance, political acceptability and feasibility of implementation supported by the eleven sub-criteria. KEPA has developed the ClimAMS software that is based on AMS that aims to facilitate climate change policy makers, researchers and analysts in performing such evaluations.

Results

This paper concerns the results of development and assessment of these climate change mitigation scenarios for Estonia. Each of them is characterized by a different policy portfolio. All scenarios take into consideration the following national objectives: i) 8% reduction by 2012 of Estonian GHG emissions compared to those of base year 1990; ii) 25% share of RES in the gross final energy consumption by 2020 and iii) 9% reduction of final energy consumption by 2016 in comparison to the average final energy consumption of the period 2001–2005.

According to the outcomes of the LEAP model for the BAU scenario in 2020 the GHG emissions are increased compared to those of year 2005 by almost 90%, but reduced by 35% compared to those of year 2000. The RES share

in the transport sector for year 2020 is 0% (due to the absence of supportive mechanisms) and in electricity generation 20,6%.
Based on LEAP model GHG emissions in OPT scenario will increase by 54% in 2020 compared to those of year 2005, but will be reduced by 46% compared to those of year 2000. The share of RES in the transport sector in 2020 will be 11,25%, and 32% in electricity production. The final energy consumption in 2020 will be reduced by 9% compared to that of BAU for the same year.
GHG emissions in PES will increase by 65% compared to those of year 2005, but will decrease by 34% in 2020 compared to those of year 2000. The share of RES in the transport sector in 2020 will be 5,6% and in the electricity generation it will be 25,5%. The final energy consumption in 2016 will reduced by 4% compared to that of BAU for the same year.
Using the multi-criteria method AMS the weaknesses and strengths of each policy portfolio are identified. The policy portfolio of the OPT scenario has the best performance in political acceptability since it is the most cost effective for the target groups compared to the other two policy portfolios. The performance of all three portfolios under the third criterion is equal.

Conclusions

Due to the changing situation in the Estonian environmental sector, the assessment of mitigation policy portfolios is essential tool in identifying the most appropriate policy instruments and policy mixtures for a country.
The main characteristics of the scenarios of mitigation policy portfolios formulation, the analytical presentation of key assumptions, energy demand and supply for each scenario, the implementation of LEAP model for environmental sector are proved. The assessment of three scenarios using the AMS method is realized.
According to the LEAP model and the AMS method, the OPT policy portfolio has the best performance, introducing the efficient technologies in almost all sectors targeting to the maximum reduction of GHG emissions through the maximum exploitation of the potential of the country in energy efficiency and renewable energy sources (RES). Nevertheless, the success of its policy portfolio requires the encouragement of business investments in RES and energy efficiency projects, the continuation of the demonstrated effectiveness of the implementation network and a more stringent frame for non-compliance.

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