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APPLICATION IN MOLDOVA OF IAEA'S ENERGY PLANNING TOOLS

Abstract: The paper presents an overview of results of application in the Republic of Moldova of IAEA's computer tools for long-term energy planning. The country actively use such tools like: ENPEP, SIMPACTS, MESSAGE, MAED for Windows, WASP – IV, and others, for national studies of power generation sources development. Others than IAEA's distributed tools are also used, like: MARKAL, GAINS, LEAP,… for specific studies depending on the problem to be solved. ENPEP Program is actively used in order to evaluate the energy generation development options up to 2033 for the newly created conditions on energy market of Moldova. It is used for estimation of investment demand in power generation sources and the greenhouse gas emissions. SIMPACTS is used to estimate the damage cost of environmental pollution of energy system in terms of money. According to the results of External Costs Study for Moldova using SIMPACTS, the Damage cost for energy generation has the highest value at the regional level 0.4 c$/kg/year for Nitrates and 0.1 c$/kg/year for Sulphates. MESSAGE Program is used for scenarios assessment of different options of future development of electricity import market. The results of studies using IAEA's tolls are highly appreciated in some valuable reports of the country, like: "Priorities for Governance -2009", Energy of Moldova: Achievement of Expected Security, Efficiency, Quality and Competition; Energy View of BSEC countries; Second National Communication of the Republic of Moldova Under the United Nations Framework Convention on Climate Change.

Key words: *long-term energy planning, energy generation sources, electricity demand, greenhouse gas emissions*

INTRODUCTION

The Republic of Moldova is a European country, located in the South-East of the continent between Romania in the West and Ukraine in the East. Its total area is 33 843 km^2. The Republic of Moldova has a population 3.6 million inhabitants.

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Energy sector of the country has very specific characteristics, mainly because the fact that it was established during 1970th as part of energy system of former USSR. The electricity network of the country has strong interconnections with Ukraine, working in synchronous regime trough 13 high voltage lines. It is important to note that only about one quarter of total electricity consumption relies on national energy generation sources that are located in the Right Bank of Dniester River. The relative high degree of dependence from imported energy sources compared to other states has to be taken into account when selecting the most representative fuel cycles for the planning of energy sector development.

PROBLEM FORMULATION

The objective of this paper is to identify the least cost development path of energy system of the Republic of Moldova. The quantitative analyses conducted using IAEA tools is to generate consistent and coherent information for policy makers to assess the possible impacts of energy decisions and help formulate national energy strategies compatible with long term social and economic objectives of the country.

METHODOLOGY

The energy planning process starts by taking stock of the country's overall energy situation using a set of indicators that encompasses all aspects of sustainable development, and then generating an image of the existing energy system from resource import or extraction to the provision of energy services consistent with the requirements of the IAEA's energy analysis and planning tools [1]. The IAEA models are then calibrated to correctly reflect the current energy infrastructure and energy flows. The design of future socioeconomic and technology development scenarios is the next step, i. e. charting a possible long term national outlook on social and economic development of the country or region from which demand profiles

for energy services are derived. Finally, an evaluation of all present and future energy supply options is undertaken that can meet demand under certain policy targets or constraints.

The country actively use such tools like: ENPEP, SIMPACTS, MESSAGE, MAED for Windows, WASP – IV, and others, for national studies of power generation sources development [2]. Others than IAEA's distributed tools are also used, like: MARKAL [3], GAINS, LEAP,… for specific studies depending on the problem to be solved. ENPEP Program is actively used in order to evaluate the energy generation development options up to 2033 for the newly created conditions on energy market of Moldova. It is used for estimation of investment demand in power generation sources and the greenhouse gas emissions. SIMPACTS is used to estimate the damage cost of environmental pollution of energy system in terms of money.

RESULTS

The main indicator of sustainable development of the country is the energy demand (Figure 1.). According to analyses carried out using ENPEP, the demand for electricity will double during next twenty years, reaching the value of up to 8 mil. kWh by 2030. The analyses are based on 6% GDP grows (MAED study).

In order to provide the increased demand for electricity it is necessary to invest in new power generation units already after 2011 mainly in combined cycle power plants. Natural gas will remain the main source of energy generation due to economic and environmental benefits of this fuel (WASP-IV study). According to the results of External Costs Study for Moldova using SIMPACTS, the Damage cost

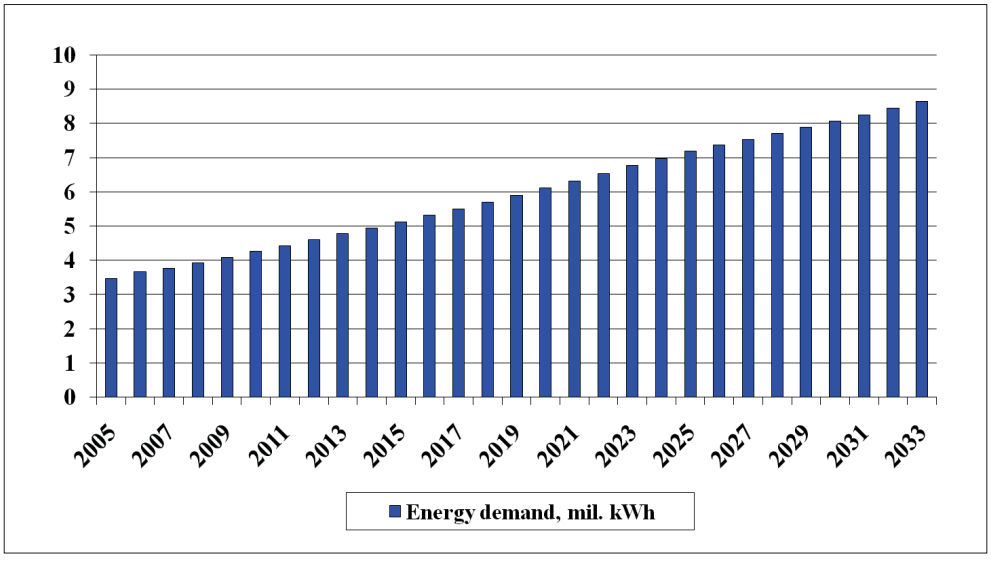

Fig. 1. Energy Demand Forecast for Moldova

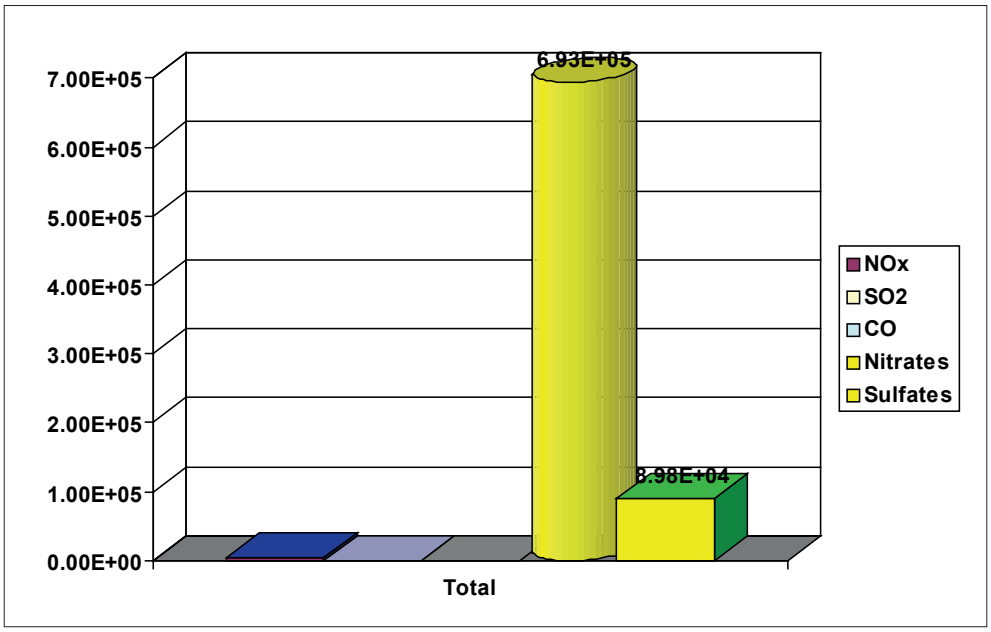

Fig. 2. External costs of energy generation for Moldova

for energy generation has the highest value at the regional level 0.4 c$/kg/year (693 thou. USD/year) for Nitrates and 0.1 c$/kg/year (90 thou. USD/year) for Sulphates (Figure 2.).

The results of implementation of IAEA's planning tools in Moldova are published in many articles and studies [4,5,6,7]. The implementation of long term planning tools in Moldova was possible due to continuous support from IAEA, especially Planning & Economic Studies Section, whose stuff provided all the support to national planning team.

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