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Sustainable economy development and transition of fuel and energy in Lithuania after integration into the European Union



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ABSTRACT

The article describes sustainable development of Lithuanian economy and transition of fuel and energy after the integration of Lithuania into the European Union (EU), covering the period 2004–2012. In 2004–2008 Lithuanian gross domestic product (GDP) increased approximately 1.8 times and Lithuania was one of the most rapidly developing countries in the EU. The average of the yearly growth rate of GDP was 7.1%. In 2008 GDP growth rate decreased to 2.9% whereas in 2009 – down to – 14.8% (the consequences of the global financial crisis). In 2009–2012 Lithuanian economy recovered and GDP reached the volume before the crisis. GDP per capita at current prices in the period 2004–2012 increased about twice from 18.3 to 37.5 thousands LTL (1 LTL=0.2896€). In Lithuania 70–80% of electricity in 2004–2009 was produced from Lithuanian Ignalina Nuclear Power Plant (INPP). The indigenous and renewable energy sources (RES) in 2009 comprised 14.7% of gross inland energy consumption. At the end of 2009 the Lithuanian INPP was closed for the usage of unsafe technologies and the structure of gross inland fuel and energy consumption changed radically. The sector of RES became the driving force of the country's economy.

In the analysis the growth rate and the index of GDP in Lithuania are shown. The composition and tendencies of changes of gross inland and the final energy consumption are highlighted. The share of the RES in gross inland energy consumption is indicated. Final fuel and energy consumption by different energy sources and various consumer groups is analysed. The indices of energy intensity and labour productivity in different spheres of economy are presented. The environmental pollution indicators, emissions of greenhouse gas and other air pollutants by all kinds of economic activities are analysed.

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Contents

| | |
|--|-----|
| 1. Introduction | 720 |
| 1.1. Some history | 720 |
| 1.2. The integration Lithuania into the EU | 720 |
| 2. Sustainable development of Lithuanian economy | 721 |
| 3. Transition of gross inland fuel and energy in Lithuania | 723 |
| 3.1. Gross inland fuel and energy consumption | 723 |
| 3.2. Renewable and indigenous energy sources | 724 |
| 4. The final fuel and energy consumption in Lithuania | 725 |
| 5. Energy intensity and labour productivity indicators | 727 |
| 5.1. Energy intensity indicators | 727 |
| 5.2. Labour productivity indicators | 727 |

Abbreviations: CHP, Combined Heat and Power; EC, European Commission; EFTA, European Free Trade Association; ENTSO-E, European Network of Transmission System Operators for Electricity; EU, European Union; GDP, Gross Domestic Product; GHG, Greenhouse Gas; GNI, Gross National Income; GVA, Gross Value Added; INPP, Ignalina Nuclear Power Plant; JSC, Joint-Stock Company; LEI, Lithuanian Energy Institute; LNG, Liquefied Natural Gas; LTL, Lithuanian Litas (1LTL=0.2896€); NPP, Nuclear Power Plant; PPS, Purchasing Power Standards; RES, Renewable Energy Sources; SU, Soviet Union; TOE, Tonnes of Oil Equivalent; USA, United States of America

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| | | |
|------|---|-----|
| 6. | Environmental sustainable development indicators | 727 |
| 6.1. | Emissions of greenhouse gas | 728 |
| 6.2. | Emissions of air pollutants | 728 |
| 7. | The integration of Lithuanian energy sector in the EU in compliance with EU directives and policies | 728 |
| 8. | Conclusions and options for the future | 731 |
| | References | 732 |

1. Introduction

1.1. Some history

After the collapse of the former Soviet Union (SU) in 1991, one of the main tasks of political and economic institutions of Lithuania was to stabilise the supply of energy to all consumers: industry, transport and households. Until 1990 Lithuania was fully integrated into the economy of the SU and the energy sector was oriented towards large but inefficient energy consumption as well as considerable export of electricity and petroleum products to neighbouring regions. Development of the power system was based on construction of large power plants such as Lithuanian Thermal Power Plant (with installed capacity of 1800 MW) fired by natural gas and heavy fuel oil and Ignalina Nuclear Power Plant (INPP) (3000 MW_{el}). These power plants were constructed taking into consideration not only internal needs, but also growing electricity demand in the large North–Western region of the former SU. Excess of capacities in the power system, as well as inappropriate management of the national economy and the energy sector were serious deficiencies on a way of integration of Lithuania into the European Union (EU) [1].

The formation of energy policy and strategy for the next 10 and 20 years has become a priority, but it was a very difficult task as conditions were changing rapidly in the country and abroad. A sharp reduction in energy demand occurred due to fundamental changes in the structure of the economy and the breakdown of economic relations with former partners followed by deep economic crisis. Thus, primary energy consumption of Lithuania, which in 1991 amounted to 17.5 million toe, has decreased to 8 million toe, i.e., more than twice. Electricity consumption and district heat supply decreased at about the same degree. Major energy installations in Lithuania encompass a few large thermal plants, a nuclear power plant, and a refinery designed not only for the needs of Lithuania, but to supply a significant proportion of its production to Lithuania's nearest neighbours, which after 1991 were in the same economic decline. The total capacity of the power plants exceeded domestic and export demand by almost three times [2].

Besides all these difficulties there comes the unexpected demand of the EU to develop a programme of rapid closure of the Ignalina NPP – the cheapest source of electricity throughout the region. The main argument for this demand was that nuclear power reactors are the same type as in the Chernobyl NPP and according to western experts cannot be considered safe. For Lithuania the most important political priority was entry into the EU and Lithuania agreed with the requirement that INPP should be closed within a predetermined period of time. The deadlines were set so that the first unit should be closed at the end of 2004 and the second – at the end of 2009 [3,4].

Major impact on energy policy in Lithuania had preparation for accession to the EU. It was necessary to harmonise the energy policy of Lithuania with EU policy and a number of binding directives. The analysis of all possible scenarios was carried out by the experts of the Lithuanian Energy Institute (LEI), starting from the 1999 Energy Strategy and updating the analysis on a new

2002 National Energy Strategy [5]. The fate of the INPP, the source of the cheapest electricity and which provided nearly 70–80% of the country electricity supply had a special impact on the future of the electricity sector in Lithuania. In order to prepare a more or less reliable and realistic strategy for the period after shutdown of INPP, it was necessary to conduct a thorough modelling of the most probable scenarios for the future development of the energy sector, taking into account the possible developments in international energy markets and actions and plans of Lithuania's neighbours. The tendencies of renewable energy usage and policy in Lithuania in 2001 were analysed by LEI specialists in [6]. The trends of Lithuanian economy development and analysis of fuel and energy consumption in 2000–2004 were analysed by authors of such article in Lithuanian Academy of Sciences journals “Energetika” [7,8].

1.2. The integration Lithuania into the EU

The Treaty of Accession of Lithuania and nine other countries (the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Malta, Poland, Slovakia, and Slovenia) into the EU was signed in Athens on 16 April, 2003. A referendum on the accession to the EU in Lithuania was held on 10–11 May, 2003. The turnout was 63.4%, and 91.1% of those who participated in the referendum were in favour of the EU membership. Lithuania became an EU Member State on 1 May, 2004, along with the nine other states. The First European Parliament election in Lithuania was on 10–13 June, 2004. On 11 November, 2004, the Lithuanian Seimas ratified the EU Constitution – the first Parliament to do so among the Member States. On 21 December, 2007, Lithuania with other 8 countries joined Schengen Area, on this day the internal land and sea border control was abolished. The air border control was removed on the 31st of March.

The new analysis of all possible sustainable development scenarios was carried out by experts of LEI on National Energy Strategy 2007 [9]. The most important strategic objectives outlined in such strategy were (1) energy security; (2) efficient use of energy; (3) introduction of competitive principles in the energy sector; (4) gradual integration into the energy systems of the European Union; (5) diversification of primary energy sources and ways of their imports, the rapid increase of renewable and local energy resources, and reducing the share of natural gas in the energy mix in Lithuania.

In order to achieve these objectives, the most important activities identified in such strategy were (1) implement the EU directives on the liberalisation of electricity and natural gas markets; (2) create a common electricity market of the Baltic countries and continue to integrate with the EU markets; (3) ensure continuity in the use of nuclear energy by building a new nuclear power plant capable of ensuring the needs of all three Baltic States and the region; (4) connect the electrical transmission network of Lithuania with the networks of the Nordic countries and Poland; (5) ensure compliance with the EU directives related to the accumulation of reserves of oil and natural gas; (6) increase the share of renewables in the primary energy balance up to 20% and the share of electricity produced at cogeneration power plants

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