NATIONAL ENERGY STRATEGY

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PREFACE

Many important changes have occurred during the past five year's period in the Lithuanian economy and energy sector. On 1st May 2004 Lithuania became a full member of the European Union. This membership opens the entire EU market and provides considerable opportunities for further development of the national economy. National policy harmonised with the EU policy, laws and standards creates favourable conditions for closer cooperation with the other Baltic States, and in particular for sustainable development of the energy sectors.

Lithuania has well-developed energy capacities: power plants, oil refinery, import and export terminals of oil and its products, developed system of natural gas supply and district heating systems, etc. Currently one of the strengths of the Lithuanian energy sector is good structure of the primary energy, which is based on contribution from nuclear energy, natural gas, oil products, and increasing share of local and renewable energy resources. A possibility to use different fuels in the majority of energy enterprises helps to ensure the reliability of energy supply and comparatively low environmental pollution. However, rapid growth of the economy, increasing energy demand, decommissioning of Unit 2 at Ignalina nuclear power plant, depletion of global oil and gas resources accompanied by a fast growing of prices for these energy resources have exacerbated the problem of energy security in Lithuania. An obligation, given to the EU member states, to contribute to the climate change stabilisation as much as possible and the growing dependence on the import of natural gas from single supplier poses new challenges to energy and national security.

The change of the global environment has obliged energy specialists to prepare the new National Energy Strategy based on comprehensive analysis of the energy sector development, forecasts and optimising calculations provided by scientists, structured statistical information, detailed discussions of the most important issues during the conferences, seminars and in the working groups. The strategic provisions regarding the long term development of the energy sector were widely discussed with the political parties, the members of the Lithuanian

Parliament and a society. The Strategy was prepared in compliance with the provisions of sustainable, competitive and secure energy as formulated in the Lithuania's Treaty of Accession, EU legal acts, the Green Paper and other acts.

The Seimas of the Republic of Lithuania, invoking Article 9 of the Law on Energy (*Valstybės Žinio*s, No 56-2224, 2002), has approved by the Resolution No X-1046 of 18 January 2007 (*Valstybės Žinios*, No 11-430, 2007,) the National Energy Strategy, which was prepared by the Government. The National Energy Strategy provides the key provisions on development of the energy sector and directions for their implementation until 2025 by fully adjusting these targets and directions to growing state needs and the most recent international requirements, having regard to the aspects of efficiency, energy security, environmental and management improvement. The Strategy specifies the ways and means of ensuring the strategic security of energy supply, reducing or neutralising the negative impact of dependence on the dominant supplier of primary energy.

A publication "The National Energy Strategy-2007" is designed for the Lithuanian society, specialists of the ministries and energy companies, political parties, mass media, foreign energy companies and all the people having interests in the development of the Lithuanian energy sector. It contains the text of National Energy Strategy complemented by many comments and illustrations, explanations of special definitions and terms giving additional information about already intended or planned ways and instruments for implementation of the Strategy. In addition the publication presents comparison of many indicators regarding the energy sector in Lithuania and other EU countries.

We believe that this publication provides comprehensive view of the Lithuanian energy sector development until 2025. Furthermore, we hope that this National Energy Strategy will be successfully implemented with the combined efforts of the Lithuanian governmental institutions, energy companies, investors and Lithuanian society

Anicetas Ignotas
Secretary of the Ministry of Economy

SEIMAS OF THE REPUBLIC OF LITHUANIA

RESOLUTION

ON THE APPROVAL OF THE NATIONAL ENERGY STRATEGY

18 January 2007 No X-1046

Vilnius

The Seimas of the Republic of Lithuania, invoking Article 9 of the Republic of Lithuania Law on Energy (*Valstybės žinios* (Official Gazette), No 56-2224, 2002) and having considered the National Energy Strategy as drafted by the Government,

a s s e s s i n g:

1) recent changes in global energy trends, the problems posed by global climate change and the impact thereof on a long-term global energy outlook;

2) the Lithuanian state energy development plans as declared in the previous National Energy Strategy and the mutual commitments of Lithuania and the European Union undertaken on their basis and stipulated in Lithuania's Treaty of Accession;

3) an explicit support of the Lithuanian population for the continuity of nuclear energy in Lithuania;

4) recent initiatives of the EU member states and the European Commission regarding European Union energy policy;

5) Lithuania's remaining dependence on the energy resources supplied from Russia, which may grow in the future;

6) the importance of partnership of the Baltic countries and Poland in the area of energy and recent initiatives towards the implementation thereof by specific joint energy infrastructure projects of Lithuania, Poland or the Baltic States region,

h a v i n g r e g a r d t o:

1) Resolution of the Seimas of 29 September 2005 on the Ensuring of Energy Security of the Republic of Lithuania in Implementing Trans-European Gas Infrastructure Projects (*Valstybės žinios*, No 122-4369, 2005) and Resolution of the Seimas of 29 September 2005 on the Continuity of Nuclear Energy and Updating of the National Energy Strategy (*Valstybės žinios*, No 122-4370, 2005);

2) Recommendation of the Seimas Committee on Foreign Affairs of 17 November 2006 on Natural Gas Supply Infrastructure Projects;

3) initiatives of the EU member states and the European Commission regarding European Union energy policy,

h a s r e s o l v e d:

Article 1.

To approve the National Energy Strategy (appended).

Article 2.

To repeal Resolution of the Seimas No IX-1130 of 10 October 2002 on the Approval of the National Energy Strategy (*Valstybės žinios*, No 99-4397, 2002).

SPEAKER OF THE SEIMAS VIKTORAS MUNTIANAS

APPROVED

by Resolution No X-1046
of 18 January 2007

I

GENERAL PROVISIONS

1. The National Energy Strategy (the Strategy) defines the main targets set by the State and directions for their implementation until 2025 by fully adjusting these targets and directions to growing state needs and the most recent international requirements, having regard to the aspects of efficiency, energy security, environmental and management improvement. The Strategy specifies the ways and means of ensuring the strategic security of energy supply, reducing or neutralising the negative impact of dependence on the dominant supplier of primary energy. A fast development of Lithuania's economy, growing dependence on the import of primary energy from a single country, the envisaged decommissioning of the Ignalina Nuclear Power Plant (hereinafter referred to as the "Ignalina NPP") in 2009, substantially increased prices of fossil fuel in world markets and the tension present in them render changes in Lithuania's energy policy and updating of the National Energy Strategy as approved by Resolution of the Seimas No IX-1130 of 10 October 2002 (*Valstybės žinios*, No 99-4397, 2002).

2. Over the past decade, Lithuania has made considerable progress towards implementation of objectives of the National Energy Complex Development Plan (the National Energy Strategy) as approved by Government Resolution No 288 of 19 April 1994 (*Valstybės žinios*, No 30-545, 1994), the National Energy Strategy as approved by Resolution of the Seimas No VIII-1348 of 5 October 1999 (*Valstybės žinios*, No 86-2568, 1999), and the ***National Energy Strategy*** as approved in 2002 and ensuring of a stable and efficient operation of the energy sector: the entire energy economy has been restructured in line with requirements of EU legal acts; preconditions for competition have been created by eliminating vertically integrated monopolies; a considerable number of energy generation and distribution enterprises have been privatised by attracting both the local and foreign private capital; a complex of the measures reducing environmental pollution has been implemented; the safety of the Ignalina NPP has been significantly improved; all required conditions have been provided for the final diversification of supply of oil and petroleum products; accumulation of strategic national stocks of petroleum products and oil equalling 90

Major part of primary energy resources is imported. All the most important resources are imported from Russia (natural gas – 100%, coal – 97%, oil and oil products – 93%, nuclear fuel – 100%). Only small part of energy resources is imprted from other countries: coal from Poland and Ukraine, orimulsion from Venezuela, shale oil from Estonia.

However, according to the principles of international statistics, the share of the energy resources produced in Lithuania amounted to 40% of the country's primary of the year 2006. Due to low dependence on daily supply of nuclear fuel and a big fuel inventory in the core, the electricity generated by nuclear power plants is considered a local energy source, irrespective of the country from which the nuclear fuel was imported.

days' consumption has been nearly completed; technical conditions have been provided for a free choice of suppliers of oil and petroleum products; production and use of biofuel has been initiated; the system of district heating has been preserved and is being gradually modernised. The share of renewable energy resources in the national balance of primary energy increased in 2005 up to 8.7%, and in 2010 one of the country's strategic objectives will be attained – the share of renewable energy resources will increase up to 12%. With the construction of all the wind power plants whose construction has already begun and the power plants working on biofuel, over 7% of electricity will be generated in 2010 by using renewable energy resources.

The efficiency of energy consumption in branches of the economy has improved more rapidly than forecasted. The amount of primary energy consumed in 2005 for the production of a unit of gross domestic product (hereinafter referred to as "GDP") decreased by as much as 1.9 times compared with 1990; however, for this indicator to approach the current average of states of the European Union (hereinafter referred to as the "EU"), the efficiency of energy consumption in Lithuania needs to be increased by another 50%.

The Law on Energy of the Republic of Lithuania establishes the following requirements for the contents, procedure for the adoption and implementation of the National Energy Strategy:

- the Strategy shall determine energy development trends for a twenty-year period;
- the Strategy shall be approved by the Seimas (Parliament) of the Republic of Lithuania upon the recommendation of the Government of the Republic of Lithuania;
- the Strategy shall cover all energy sectors and it shall be subject to revision at least every 5 years. The Strategy shall be prepared, revised and implemented using State budgetary and other funds.

Primary energy intensity, measured as the gross inland consumption per unit of GDP at constant prices, has been decreasing significantly since 1990 (Fig. 1.1). In 2006, primary energy consumed per unit of GDP in Lithuania was 2.1 times less than in 1990. Reduction of ratio of imported energy per GDP was even bigger – it was 2.4 times less because consumption of local energy resources has increased more than 2 times.

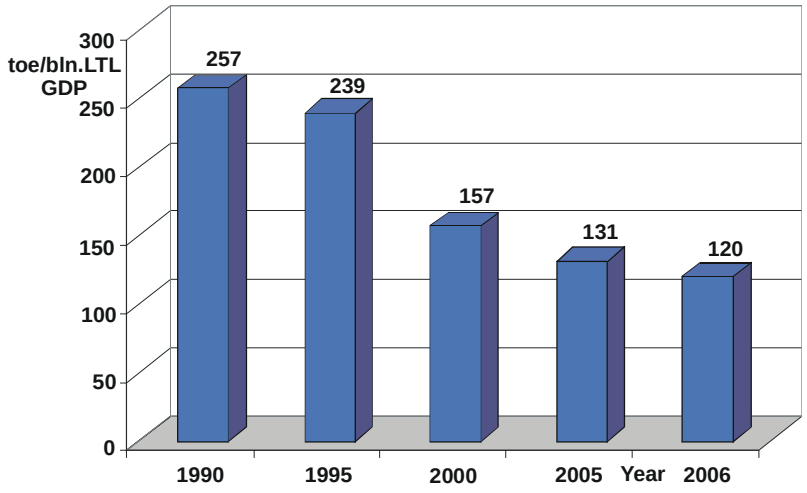

Fig. 1.1. Changes of primary energy intensity

3. Not all the short-term objectives provided for in the National Energy Strategy as approved in 2002 have been implemented: Lithuania's electricity networks are not interconnected with Poland's networks, insufficient progress has been made towards increasing the reliability of natural gas supply, modernisation of the heat sector, particularly that of the equipment belonging to consumers, has been too slow, hence excessive amount of energy is consumed for the heating of buildings, the condition of a large number of heat supply pipelines is critical, and

the probability of large-scale accidents is high. A decision on the decommissioning of the Ignalina NPP in 2009 has exacerbated the problem of Lithuania's ***energy security***.

There exist serious problems in the field of energy security, which it would be highly complicated or nearly impossible for Lithuania to deal with on its own. Key problems include the long-term reliability of natural gas supply, construction of the prospective new nuclear power plant and integration of the electricity system into EU systems. Implementation of these strategic tasks could be facilitated only by close co-operation with other Baltic countries – Estonia, Latvia and Poland.

4. When drafting this National Energy Strategy, account has taken of the main changes which have taken place in recent years in the economy and energy sector of the country and the region, and use has been made of the experience accumulated and the latest information required for the planning of development of separate energy sectors. Account has also been taken of the energy development plans of other Baltic States, global tendencies in the markets of the main energy sources, the fields of energy management and environmental protection.

5. Within the framework of the National Energy Strategy, ensuring of energy security is based on the following provisions:

1) energy security is an integral part of national security;

2) ensuring of energy security requires a predictable, reliable, economically acceptable and environment-friendly energy supply;

3) energy security covers the totality of the conditions ensuring the diversity of traditional and renewable primary sources of energy, diversity and security of energy supply and independence from dictate of a monopolistic supplier, availability of energy to the consumer at acceptable prices in a competitive energy market;

4) Lithuania links its energy security to the integration of the country's energy systems into EU energy systems and with an efficient EU and national energy policy, which should ensure that Lithuania's energy security is on a par with that of other EU states;

5) The Strategy as adopted by the Seimas by national consensus must ensure a consistent implementation thereof that would be independent of a democratic change of the Government and a reliable energy security of energy consumers and the whole country.

Energy security – the whole complex of the State's actions and measures which secure to the degree that fuel and energy services are available to ensure conditions for the stable economic development and protection of national welfare as well as minimization of risks associated with supply and use of fuel and energy services. To preserve national interests, reduce country's vulnerability to pressures and threats, energy security in a wider sense includes energy supply, economic, technological, environmental, social and cultural dimensions.

The National Security Strategy envisages that the country could be threatened by the following problems in sectors of the economy, which are important for national security:

- the excessive dependence of the Republic of Lithuania on strategic raw materials and energy supply from a single country; or a high proportion of foreign capital from an economy with an insecure and unstable free market;
- the takeover of assets for political purposes with a view to pursuing activities damaging economic security in the sectors of economy and facilities that are strategically important;
- poor performance of economic and energy sectors that are strategically important and malfunctioning of particular strategically important facilities, improper use of such facilities or failure to use them, to the prejudice of State interests.

II

CHARACTERISTICS OF THE GLOBAL ENVIRONMENT AND CHALLENGES TO LITHUANIA'S ENERGY SECURITY

6. The following global phenomena posing new challenges to energy and national security are characteristic of the contemporary energy environment:

1) depletion of global oil and gas resources accompanied by a growing demand for the resources, which exceeds the rate of reconnaissance, use and development of new fields;

2) extraction of a considerable amount of world oil and gas resources in the countries which are politically unstable or which are governed by undemocratic regimes carrying out nationalisation of the resources and consolidating political control thereof;

3) complex relations of Western democracies with the countries rich in energy resources;

4) a substantially increased geopolitical role of the states exporters of energy resources and a lever to dictate terms to energy-importing countries;

5) a considerably increased political activity of governments in energy markets;

6) the grown influence of the energy lever in shaping countries' foreign and national security policy as well as identification of energy policy objectives with foreign policy and national security objectives;

7) the growing weight of the political factors which restrict the freedom of the market;

8) consolidation of interaction of the main economies – the United States of America, the EU and China (and, in part, India) – in the markets of energy resources and their interaction with Russia.

In addition to common challenges to the energy sector of the EU states as defined in the Green Paper of the European Commission "A European Strategy for Sustainable, Competitive and Secure Energy" (COM/2006/0105 final) (hereinafter referred to as the "Green Paper"), Lithuania is facing the additional problems related to the absence of a common EU energy policy, lack of alternatives in the field of supply of energy resources, the energy exclusion of separate regions and lack of necessary integrational interconnections, especially in the Baltic States region.

On January 2007 the communication „An Energy Policy for Europe" from the European Commission was presented to the European Council and European Parliament. The purpose of this communication is to encourage Member States to act together and to deliver sustainable, secure and competitive energy. The actions are directed to:

- preparation of new European energy policy which needs to be ambitious, competitive, long-term and to the benefit of all Europeans;
- reduction of greenhouse emissions from energy consumption by 20% by 2020 compared to 1990 and to block the way to climate change;
- limiting the EU's external vulnerability to growing gas and oil imports;
- promoting economic growth and creating new jobs, securing energy supply to consumers at reasonable prices;
- increase of the share of renewable energy sources up to 20% in the overall mix of the EU by 2020;
- implementing the Action Plan for Energy Efficiency and reducing energy consumption in the EU by 20% by 2020;
- increase of electricity production from renewable energy sources by at least one third in the overall mix of the EU by 2020;
- promoting production and use of biofuels binding minimum target for biofuels of 10% of transport petrol and diesel by 2020.

III

EU ENERGY POLICY GUIDELINES

7. EU energy policy aims at ensuring the reliability, competitiveness and sustainable development of energy supply. Energy security and the creation of the internal market are among EU priorities. In dealing with the issues of energy security, the external EU energy policy and uniform response of the EU states to the current situation in energy markets are of utmost importance.

The decisions adopted by the Brussels European Council on 23/24 March 2006 (the Presidency Conclusions, 7775/06, CONCL 1) are a significant step towards formulation of a new energy policy of European countries. They substantially correspond to Lithuania's interests and create more favourable preconditions for the development of Lithuania's energy sector. The following provisions of the mentioned conclusions are important to Lithuania:

1) to pay particular attention to the countries and regions largely isolated from the EU energy market;

2) to charge the European Commission with developing a priority Interconnection Plan and facilitating the realisation of priority infrastructure projects;

3) to speed up diversification of supply of energy resources;

4) to present a Strategic EU Energy Review on a regular basis;

5) to draft proposals regarding a common EU energy strategy, in particular maintaining a dialogue with Russia;

6) to aim at making the EU-Russia dialogue more effective and transparent and at the ratification, by Russia, of the Energy Charter Treaty of 17 December 1994 and the conclusion of the Energy Charter's Transit Protocol.

IV

FACTORS INFLUENCING A STABLE FUNCTIONING OF THE ENERGY SECTOR IN LITHUANIA

8. The following key factors influence a stable functioning of the energy sector in Lithuania:

1) prevalence of import of primary energy resources from Russia, dependence of Lithuania's gas supply and electricity systems on Russia's energy systems as well as absence of interconnections with Western European energy systems;

2) the decommissioning of the Ignalina NPP in 2009, which has a considerable detrimental effect on the structure of electricity sources, primary energy balance and electricity price in 2010–2015;

3) the construction of a new gas pipeline to Europe under the Baltic Sea bypassing the territory of the Baltic States;

4) the strict environmental requirements set forth to energy enterprises, including restrictions on carbon dioxide (hereinafter referred to as "CO_2") emissions.

V

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSIS

9. Lithuania's current energy sector has its strengths and weaknesses. It is facing specific threats, but it also has good opportunities of efficient and reliable operation. With more efficient use of available opportunities and existing potential, Lithuania's energy sector can make significant contribution to the economic growth of the country and strengthening of its competitiveness, protecting against possible threats and avoiding various disturbances.

Strengths:

1) a sound existing structure of the balance of primary energy (prior to the decommissioning of the Ignalina NPP), which consists of nuclear energy, oil and petroleum products, natural gas, a growing share of indigenous energy resources and renewable energy resources ***(Fig. 5.1)*** as well as a possibility to use different types of fuel in the majority of energy enterprises helps to ensure the reliability of energy supply and low environmental pollution;

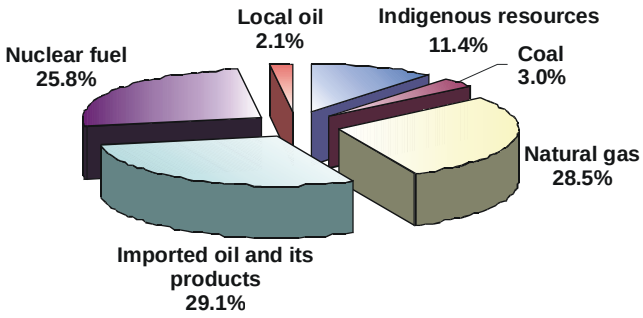

Fig. 5.1. Structure of Lithuanian primary energy balance in 2006

2) well-developed energy capacities: power plants, an oil refinery, oil and petroleum products import and export terminals, natural gas supply system, district heating systems, etc.;

3) accumulated expertise in the production of biofuels, created capacities for and planned development of production thereof will allow to meet EU requirements relating to replacement of approximately

5.75% of the petroleum products used in transportation in the country's fuel market by 2010 with biofuels;

4) restructuring of the electricity economy and preparation for integration into a common Baltic electricity market have been completed;

5) highly qualified specialists work in all sections of the energy sector. The existing system of their training and improvement of qualifications has so far satisfied the country's needs, and Lithuania's universities and scientific establishments are capable of preparing qualified specialists for state government institutions, operation of energy enterprises and carrying out of scientific and technical activities.

Weaknesses:

1) the decommissioning of the Ignalina NPP, lack of certainty in respect of financing of the measures related thereto and other external circumstances prior to Lithuania's accession to the EU in 2004 prevented from making efficient use of the surplus of available capacities, timely renovating them and taking specific decisions regarding the further development of the power system;

2) over the period of the last ten years, the efficiency of energy consumption has increased significantly only in the industry and trade and services sector; however, the situation improved only slightly as regards the public sector (schools, universities, hospitals, etc.) and old residential buildings. Therefore, relative energy consumption for the heating of buildings in Lithuania is twice as high compared to developed European countries;

3) Lithuania's electricity and gas networks do not have any direct links to Western European energy systems;

4) there are no possibilities of joining a common EU electricity market, the reliability of operation of Lithuania's power system and electricity export and import possibilities depend on Russia's state energy company;

5) an alternative supply of natural gas is not possible, dependence on a single supplier of natural gas remains (gas accounts for approximately 75% in the production of district heating, for approximately 14% - in the generation of electricity; after the decommissioning of the Ignalina NPP, the demand for gas will increase up to 75%);

6) natural gas prices, which depend on a monopolistic supplier and are growing substantially; actual competition in the gas market is absent;

7) in the past, insufficient funds were invested in infrastructure modernisation, hence the majority of power plants, electricity networks, transformer substations and pipelines, which are physically and morally worn, must be renovated in the near future;

8) considerable quantities of radioactive waste and spent nuclear fuel have been accumulated; however, no strategy of management and disposal of spent nuclear fuel has been developed so far;

9) with heat demand having considerably decreased during the period of transition to the market economy, the majority of district heating systems do not operate under optimal conditions and hence are used inefficiently. Owing to inappropriate operation and poor quality of construction works, heat supply networks are to a large extent damaged by corrosion. Heat networks are renovated too slowly, hence the probability of accidents in district heating systems is high;

10) the district heating and hot water supply systems of the residential and other buildings constructed before 1990 are worn and are not designed for the rational use of energy. The majority of consumers cannot independently regulate the amount of heat to be consumed;

11) indigenous and renewable energy resources are underused;

12) the State and energy enterprises provide insufficient financing for the scientific research activities necessary for a fast, efficient and sustainable energy development and innovations.

Opportunities:

1) the expertise accumulated during the long period of safe and reliable operation of the Ignalina NPP, positive attitude of Lithuanian political parties and the public towards nuclear energy, and determination of governments and energy companies of the Baltic countries to co-operate in the field of energy create favourable preconditions for the construction of a new nuclear power plant;

2) with the completion of restructuring of the entire energy sector, full compliance with the requirements of EU directives and adoption of the main legal acts regulating the functioning of the sector as well as development of a system required to control the activities of energy enterprises, required preconditions for the creation of a competitive environment in Lithuania and a common electricity market of the Baltic States and for future integration into Western and Northern European markets will be finally created;

3) the use of available energy-saving potential will reduce the growth rates of energy demands and capacity of generating sources and hence the amount of imported fuel and will facilitate the solution

of environmental problems;

4) the country's existing main gas pipelines allow a substantial increase in the supply of natural gas to Lithuanian consumers in the future;

5) with the growth of imported organic fuel prices, indigenous and renewable energy resources, which are available, but are still underused (wood, straw, peat, biogas, municipal and other combustible waste, wind and hydropower and raw materials for the production of biofuels) might increasingly contribute to Lithuania's primary energy balance, reduce dependence on the import of fuel and mitigate detrimental consequences of the growth of organic fuel prices;

6) a new liquefied gas terminal in the Baltic region would substantially reduce dependence on the single source of natural gas from Russia;

7) with the construction of gas pipelines to Eastern Europe from alternative sources (the Caspian Sea region or Norway) and interconnection of gas pipeline networks of Lithuania and Poland, Lithuania would acquire possibilities of alternative gas supply;

8) modernisation of existing district heating systems would make it possible to substantially expand combined heat and power generation, while considerably increasing the efficiency of the use of primary energy resources and strengthening the country's energy security;

9) development of interconnections with the power systems of Poland and Sweden will increase the reliability of energy supply, enable integration into the Western European electricity market, more efficient use of the Kruonis Hydro Pumped Storage Power Plant (hereinafter referred to as the "Kruonis HPSP") and other power plants as well as transit of electricity;

10) the new capacities of gas storage facilities permitting accumulation of the gas stocks equalling 60 days' consumption would increase energy security and ensure uninterrupted supply to consumers in the event of a crisis.

Threats:

1) with insufficient own resources of primary energy, Lithuania's economy depends on the import of these resources (gas from a single supplier) and is vulnerable, especially in the event of disruptions of supply or considerable fluctuations in prices;

2) slow accumulation of expertise and insufficient contribution of the country's industry to the introduction of the latest technologies of the use of renewable energy resources will prevent from efficiently

applying them in the future;

3) if the necessary competitive electricity-generating sources are not constructed and the reliability measures of the energy supply network, especially system interconnections with Poland and Sweden, are not implemented in proper time, the decommissioning of the Ignalina NPP and dismantling of reactors thereof, could pose a grave threat to the stable supply of electricity, while increased energy prices could become a heavy burden for consumers and the country's economy;

4) lack of the investments required for renovation of the energy transmission network may pose a threat of large-scale system accidents;

5) due to a slow modernisation of district heating systems, the probability of large-scale accidents remains high, which may cause grave economic and social consequences, moreover, this promotes disconnection of a part of consumers from district heating systems;

6) emigration of qualified specialists and the attitude of the country's youth towards engineering and technical professions as low-prestige ones may complicate the introduction of modern technologies and cause a shortage of qualified specialists in the energy sector as well as in the field of research and development.

VI

VISION OF THE ENERGY SECTOR

10. The future energy sector of Lithuania constitutes an integral part of a modern economy that will ensure a reliable and secure energy supply to all branches of the economy at economically justified prices that are affordable to consumers (do not exceed average prices in the EU states). Its capacities not only ensure a sufficient and uninterrupted supply of energy to the Lithuanian economy and consumers, but also provide an opportunity of energy export to foreign markets at competitive prices. The future energy sector does not pose a threat to the environment, creates favourable conditions for further progress of the country, is integrated into EU energy systems, is interconnected with the systems of Western European and Scandinavian countries and has possibilities of energy exchanges with the Eastern energy systems, is competitive in an open international energy market and has ensured an energy security similar to that of other EU states. These are well-coordinated energy sectors based on state-of-the-art technologies, providing appropriate preconditions for further development of society and for rapid economic growth, and using the greatest possible variety of sources of primary energy.

VII

MISSION OF THE STATE

11. The main functions of the State and directions of actions which would assist in implementing the desired development of the energy sector are as follows:

1) seeking to attain the strategic objectives of the national energy sector, to implement a complex and sustainable domestic (economic, energy and financial) policy of the country, taking account of the key provisions of EU energy policy and prevailing global energy development trends;

2) to take active part in the development of an efficient EU energy policy based on solidarity and in the drafting of EU energy legislation, to employ EU structures when implementing the projects of importance to Lithuania and increasing its energy security;

3) in renovating, modernising and developing the country's energy infrastructure, to efficiently and transparently use EU structural assistance;

4) to provide for the most efficient ways and means of implementing the energy policy on the basis of a regular detailed scenario analysis of the sustainable development of the country's economy and energy sector, optimized calculations and accumulated as well as systematised statistic information, with a view to ensuring the country's energy security, viability and competitiveness of the economy and minimising the hazardous effect on the environment;

5) to adopt the National Energy Strategy, whose objectives are an integral part of national security and foreign policy objectives, by agreement of the political groups of the Seimas of the Republic of Lithuania thus ensuring a consistent long-term stability of implementation of the Strategy;

6) without reducing support for the development of other types of energy resources, to politically and legally support investments into the construction of a new nuclear power plant and construction of a long-term storage facility for spent nuclear fuel;

7) to develop the strategic partnership of Lithuania and the Baltic States and Poland as well as a closer co-operation in all energy sectors (especially electricity, gas and oil sectors);

8) to develop partnership in the energy sector with Scandinavian countries as well as to participate in EU-Russia strategic partnership;

9) to strengthen the institutions of energy management and regulation, to regularly supplement and timely update existing legislation in light of requirements of new EU legal acts.

VIII

STRATEGIC OBJECTIVES OF THE NATIONAL ENERGY STRATEGY

12. In compliance with the requirements for and provisions of Europe's sustainable, competitive and secure energy as formulated in Lithuania's Treaty of Accession (*Valstybės žinios*, No 1-1, 2004), the Energy Charter Treaty of 17 December 1994, EU legal acts and the Green Paper, the following strategic objectives of Lithuania's energy sector, which are common to all EU states, shall be set:

1) energy security;

2) sustainable development of the energy sector;

3) competitiveness;

4) efficient use of energy.

Seeking the common strategic objectives of the energy sector and substantial strengthening of Lithuania's energy security, the following development objectives of the national energy sector shall be set:

1) to seek comprehensive integration of Lithuania's energy systems, especially the electricity and gas supply sectors, into EU systems and the EU energy market;

2) to diversify the sources of primary energy by reviving nuclear energy and to rapidly increase the relative weight of renewable and indigenous energy resources, to ensure that the share of the natural gas supplied from a single country and used for the generation of energy would not exceed 30% in Lithuania's annual fuel balance;

3) to improve the efficiency of energy use and to save energy consumption.

13. Seeking to implement strategic and development objectives as well as assessing results of implementation of the goals as formulated in previous (1994, 1999 and 2002) strategies, the following main tasks shall be set:

1) to complete implementation of the requirements of EU directives with regards to liberalisation of the electricity and gas sectors, taking account of the national interests of energy security;

2) to ensure the continuity and development of safe nuclear energy; to put into the operation of a new regional nuclear power plant not later than by 2015 in order to satisfy the needs of the Baltic countries and the region;

3) to implement EU environmental requirements in the energy sector;

4) by 2010, to accumulate and continuously maintain the stocks of petroleum products and oil equalling 90 days' consumption; by 2013, to develop natural gas storage capacities and maintain the gas stocks equalling up to 60 days' consumption;

5) to renovate the power plants, power and natural gas transmission and distribution systems as well as we district heating systems which are physically and morally worn, while increasing their efficiency and reliability;

6) not later than by 2012, to connect Lithuania's high tension electricity networks with the networks of Scandinavian countries and Poland;

7) to further develop regional co-operation and collaboration seeking to integrate the Baltic States' electricity market into markets of the EU states, while providing conditions for the efficient use of design output of the Kruonis HPSP;

8) to construct a natural gas storage facility in Lithuania, develop a common regional natural gas storage facility that would be in line with the interests of strengthening of Lithuania's energy security as well as construct, upon preparing a feasibility study of Lithuania, Poland and Latvia and taking account of the interests of Lithuania's energy security, a common liquefied gas import terminal in the Baltic region ensuring the promotion of liberalisation of the gas sector by means of these projects;

9) to increase the share of renewable energy resources in the national balance of primary energy at least up to 20% by 2025;

The use of primary energy sources is far more efficient in cogeneration power plants (CHP) with combined heat and power generation **(Fig. 8.1)**.

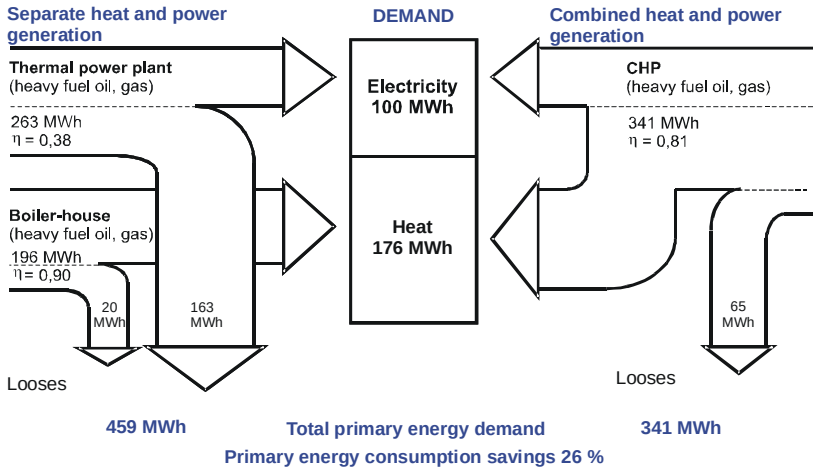

Fig. 8.1. Energy flows for combined and separate heat and power generation

10) to increase the share of the electricity generated by combined heat and power plants during the heating period in the national balance of electricity generation up to 35% in 2025;

11) to increase the share of biofuels in the country's market of the fuel used in transportation up to 15% in 2020 and up to 20% in 2025;

12) as of 1 January 2008, to save 9% of final energy over the period of 9 years in comparison with the level of final energy consumption in 2005;

13) to further improve the efficiency of consumption of all types of energy so that in 2025 relative energy consumption in buildings, various equipment and devices, technological processes and transport systems would approach the indicators of developed EU states;

14) to improve energy sector management: to maintain a uniform approach to all energy sectors exploiting the strengths and favourable opportunities of the energy sector potential and dealing with problems; to agree the principles of regulation of separate energy sectors; to ensure the practical independence of the National Control Commission for Prices and Energy and its responsibility for the decisions taken; to strengthen institutions in the energy sector by improving the knowledge and skills of specialists of those institutions;

15) to maintain and strengthen the scientific research institutions training energy specialists and working in the energy field so that the development of the country's energy sector is based on the application of the latest and most efficient technologies;

16) to ensure that the management scheme and operators of new energy infrastructure facilities comply with EU competition criteria and that these operators act as neutral market participants; to seek their free and unhindered access to EU energy networks.

IX

LITHUANIA'S INTERESTS AND TASKS IN THE BALTIC REGION

14. Lithuania's strategic interests in the region include development of co-operation and collaboration with Estonia, Latvia, Poland and Scandinavian countries and creation of a common electricity market of the Baltic countries, drafting, in co-operation with Estonia and Latvia, of a co-ordinated strategy and action plans of the Baltic States for dealing with the following common energy tasks of importance to the region:

1) the interconnection of Baltic electricity transmission networks with the networks of Western European and Scandinavian countries by 2012; a more efficient use of generating capacities and the Kruonis HPSP for the needs of a wider EU region;

2) application of the Baltic States to the Western European Union for the Co-ordination of Transmission of Electricity (UCTE) for the issuance of technical specifications for synchronous interconnection of the Baltic power system with UCTE zone and creation of required technical, legal and organisational preconditions, while maintaining physical interconnections for energy exchanges with the Russian power system;

3) agreement of regulation of the Baltic States electricity market with regulation of the Scandinavian electricity market;

4) construction of a new nuclear power plant in Lithuania to satisfy the needs of the Baltic countries and the region and its inclusion in the electricity market of the region not later than by 2015;

5) development of the natural gas supply system and system interconnections with EU gas networks providing for consideration, in co-operation with Latvian, Polish and Estonian experts, of the expediency of construction of a regional liquefied natural gas import terminal and for preparation in 2007 of a feasibility study indicating therein the capacity of the terminal, construction site and time;

6) joint actions and mutual assistance in the event of energy emergencies.

UCTE – Union for the Coordination of Transmission of Electricity. This union is the association of transmission system operators of the Western Europe which coordinates operation of 35 transmission system operators from 23 countries. Overall goal of this union is to provide a reliable and stable operation of interconnected power systems and to supply about 2500 TWh of electricity per year. Long-term experience of joint activities ensures the high quality of synchronous operation of the power systems.

X

LITHUANIA'S INTERESTS AND TASKS IN SHAPING EU ENERGY POLICY

15. Participating in the process of formulation of EU energy policy, Lithuania shall seek:

1) an integrated approach to the issue of ensuring the energy security of the Baltic States;

2) the formulation and implementation of a coherent external policy as the guarantee of competitive and secure energy supply;

3) the widest possible implementation of energy security at EU level by increasing the European Commission's responsibility for the co-ordination of energy projects;

4) contribution of the EU states to combating the energy exclusion of Lithuania and other Baltic States and increasing their energy security as well as synchronising the country's power system with the UCTE system;

5) compensation by the EU of the detrimental effect of the early decommissioning of the Ignalina NPP on the country's balance of generating capacities and diversity of primary energy sources by means of a speedy integration of Lithuania's electricity transmission network and other infrastructure facilities into EU energy systems;

6) provision by the European Commission in a Priority Interconnection Plan for the interconnections of electricity and gas supply networks as required for combating the energy exclusion of the Baltic States with networks of other EU states as well as for the mechanism of their implementation and granting of required financial support;

7) development of EU-Russia partnership in the field of energy in line with provisions of the Energy Charter Treaty of 17 December 1994 and the Energy Charter Transit Protocol, ensuring the freedom of the market and recognising the right of a third country to unimpeded access to the gas transit infrastructure with a view to creating competitive conditions for the alternative routes of supply of energy resources to the EU from the Caspian and Central Asian regions;

8) creation of an efficient, liberal and competitive EU electricity market;

9) representation of the EU by Lithuania in the process of preparation of a study by the EU and Russia on the possibility of synchronously interconnecting systems of Western Europe (UCTE) and the Baltic States as well as countries of the Commonwealth of Independent States (UPS/IPS), although Lithuania's power system physically belongs to the UPS/IPS system, and declaration of the issue of synchronous interconnection of Lithuania's system (and the entire Baltic region) with UCTE as the EU's internal problem to be resolved with the assistance of the European Commission;

10) active support of EU co-operation and dialogue with Turkey, Ukraine, Georgia, Azerbaijan and Central Asian countries in the field of energy and new energy supply projects; continuity and institutionalisation of this co-operation and efficiency of implementation mechanisms.

XI

ECONOMIC DEVELOPMENT FORECASTS

16. In 1995–2004, the growth of national economy was rather fast, with the average growth rates of GDP reaching 5.5%. Such economic growth resulted in the level of GDP produced in Lithuania in 1990 being exceeded in 2005. It is foreseen that the rapid rate of economic growth will persist in the coming two decades and will exceed the rate forecasted in the National Energy Strategy approved in 2002. Three possible development scenarios have been chosen for future forecasts: 1) fast economic growth scenario, 2) basic (most likely) scenario, and 3) slow economic growth scenario ***(Fig. 11.1)***.

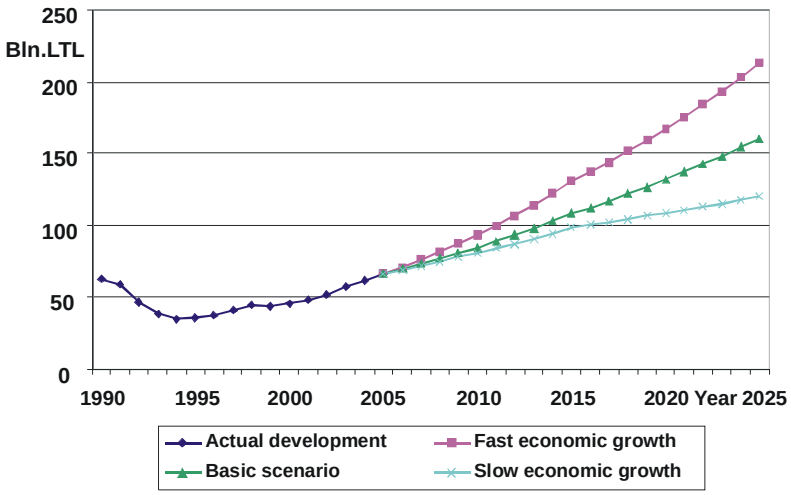

Fig. 11.1. Country's GDP growth scenarios

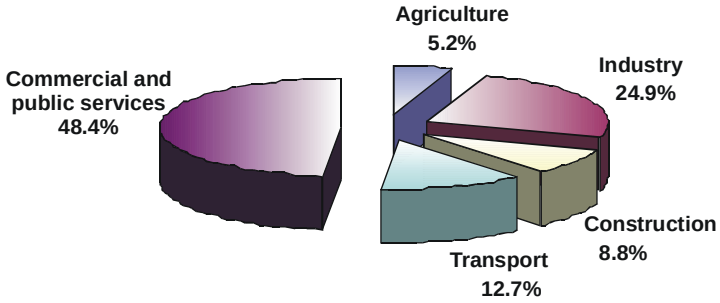

Fig. 11.2. Structure of country's gross value added in 2006

Gross domestic product (GDP) is the value of domestic goods and services produced for final consumption in market prices in the period under review (within a year, as a rule). GDP at market prices is the sum of gross value added at basic prices of the all economic activities or the institutional sectors plus taxes less subsidies on products which are not allocated to activities or sectors. GDP is one of the key statistical figures characterizing the development of the national economy, widely used for drawing international comparisons and making economic analyses. Normally, GDP is expressed either at current prices or constant prices. Since the year 2005 Statistics Lithuania has implemented method of chain-linking in the annual national accounts to measure the development of eceonomic indicators in volume terms. Chain-linking improves the accuracy of estimates of economic growth. Currently, change of GDP growth is presented according to previous year and the year 2000. The dynamics of GDP serves as a base for measuring the country's economic growth and forecasting future growth. Statistics Lithuania provides, on an yearly basis, the assessment of the contributions made by branches of economy (**Fig. 11.2**) and since 1998 by different regions to the country's GDP.

The fast economic growth scenario foresees high rates of economic growth in Lithuania during the period until 2025, i.e. on the average 6% per year (the annual rate of 7% until 2015 and 5% after 2015) assuming that: 1) the expansion of the Lithuanian industry would be particularly fast; 2) the common policy of economic development would be favourable for large-scale investment in the modernisation of the economy and the adoption of new technologies; 3) financial assistance from the EU structural and other funds would be efficiently used. Having realised all the assumptions of this scenario, GDP produced in Lithuania per capita and measured in ***purchasing power parity*** terms would achieve the current average of the EU states in 2015.

During the period 2000–2006 economic growth in Lithuania was very rapid – average GDP growth rate was 7.8% per annum. Such rapid growth was helpful to reduce difference in the level of economic development of Lithuania and developed countries. The level of economic development in the EU Member States is based on indicator of GDP per capita in purchasing power standards (PPS). In 2006, GDP per capita in Lithuania was equal to 13600 PPS or 58% from the average in the EU-27 countries. In the case of the fast economic growth scenario, Lithuania will reach in ten year period the actual level of economic development in the EU-27 (**Fig. 11.3**), and by 2024 country's GDP per capita will be the same as on average in the EU-27 (based on the assumption that this indicator will growth in all Member States by 2.5% per annum).

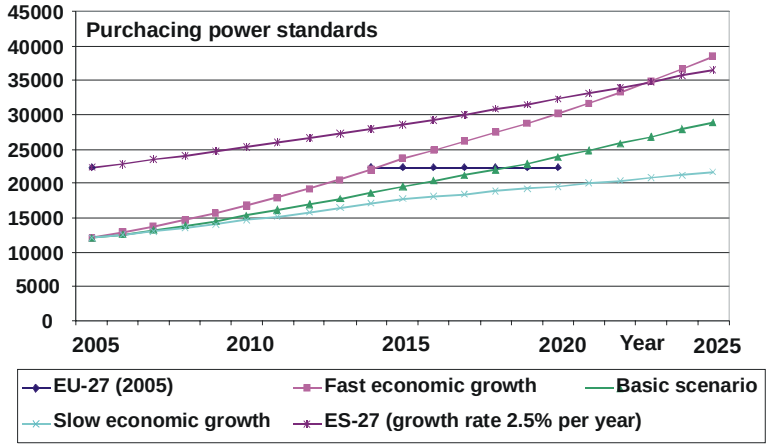

Fig. 11.3. Possibilities of Lithuania to reach the level of economic development in the EU-27 countries

The low annual growth of GDP in Lithuania by 3% on the average (4% until 2015 and 2% in 2016–2025) forecasted in the slow economic growth scenario could be conditioned by a slow pace of the modernisation of the economy, the irrational use of domestic and foreign investment, unexpected economic and political crises, mistaken choices of priorities determining the future of the State, emigration, ageing population, etc. In this case, the current economic level of the EU states could be reached only at the end of the forecasting period, i.e. after 2025.

The basic scenario is based on the most likely economic development trends, assuming that a GDP growth rate would be 5% until 2015, and 4% after 2015 (on the average 4.5% during the period from 2005 to 2025). The underlying assumption of this scenario is that the legislative basis, investment-friendly policy and competitive environment create appropriate conditions for the Lithuanian economy to attain the current economic level of the EU states within the next 15 years.

XII

ENERGY DEMAND FORECASTS

17. An increase in energy demand is considerably influenced by the dynamics of macroeconomic indicators (GDP growth, structure of branches of the economy, etc.), increasing fuel and energy prices, consumer response to rising income and increasing energy prices, energy efficiency enhancement and other factors. An econometric model is applied in forecasting, describing energy demand at any given time as a function dependent on the key factors determining its changes. With a view to estimating the uncertainty of economic growth and other factors, uncertainty analysis methods were employed for forecasting, which allow analysing changes in energy consumption in economic sectors, taking into account interrelationship between the factors determining consumption, as well as assessing tendencies of their changes.

18. Final energy demand has been predicted by estimating energy saving potential in particular economic sectors in accordance with the National Energy Efficiency Programme for 2006–2010 approved by Resolution No 443 of the Government of the Republic of Lithuania of 11 May 2006 (*Valstybės žinios*, No 54-1956, 2006). The total increase in energy efficiency has been estimated by taking into account the reduction in energy intensity, i.e. the consumption of final energy per GDP unit. Final energy means the share of primary natural resources (coal, natural gas, oil, etc.) and secondary energy resources (electricity, petroleum products, district heat, etc.) which is directly consumed by final consumers (enterprises in the industry, agriculture, transport, trade and services sectors, individual consumers, etc.) in their equipment.

During the forecasting period, final energy demand would increase 1.4 to 2.1 times depending on the chosen economic growth scenario. According to the basic scenario, the consumption of fuel and energy by branches of the Lithuanian economy in 2025 would be 7.4 million toe (tons of oil equivalent), or 77% of the amount in 1990 ***(Table 12.1)***. In this case, the ***final energy intensity*** index at the end of the forecasting period would amount to 67%, as against 2004, while energy efficiency according to this indicator would be higher than the current average of the EU states.

The main phases of energy transformation and energy flows (starting with imports of primary energy resources or their production in Lithuania and ending with final consumption) characterizing the present status of the country's energy sector are represented in **Fig. 12.1**.

The country's total energy consumption is most frequently estimated in terms of **million tons of oil equivalent (Mtoe)**, petajoules (1 PJ = 10^{15} J) or terawatt-hours (1 TWh = 10^{12} Wh).

1 Mtoe = 41.861 PJ = 11.628 TWh,
1 PJ = 0.278 TWh = 0.0239 Mtoe,
1 TWh = 3.6 PJ = 0.086 Mtoe

In 2006, the primary energy consumption in Lithuania was equal to 8.60 Mtoe (i.e. 360.02 PJ or 100.0 TWh), electricity exports amounted to 0.43 TWh (i.e. 0.04 Mtoe or 1.54 PJ), and the final energy consumption by the branches of economy was estimated at 4.77 Mtoe (i.e. 199.51 PJ or 55.42 TWh).

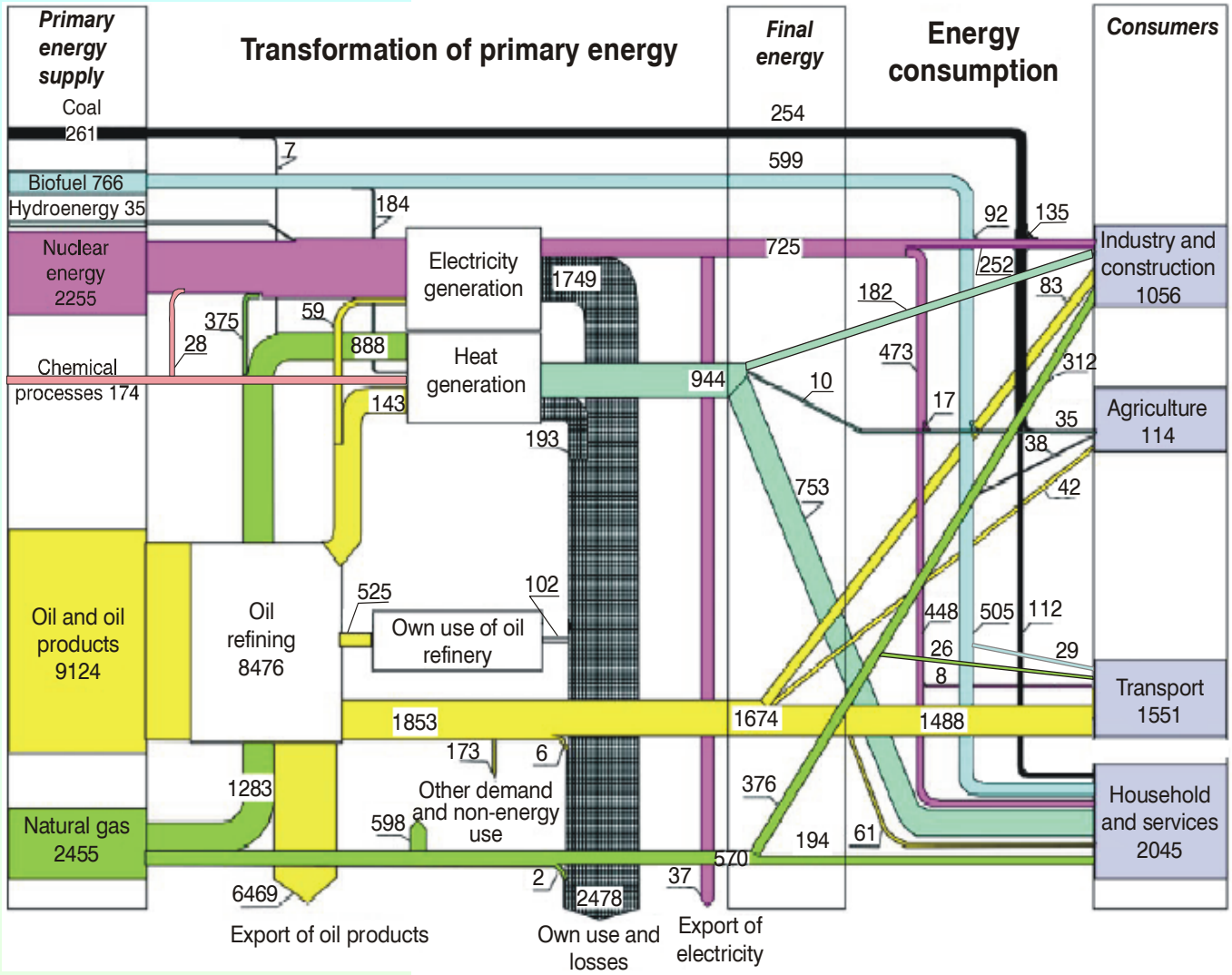

Fig.12.1 Diagram of the main fuel and energy flows in 2006 m., ktoe

In 2006, the share of end use of primary energy resources in the structure of final energy consumption was equal to 28.6%, the share of electricity amounted to 15.2%, the share of district heat – 19.8%, and the share of petroleum products and other transformed primary energy sources – 36.4%. Currently, the final energy balance is dominated by the household and transport sectors **(Fig. 12.2)** consuming over 60% of the energy supplied for the final consumers. During the period 2000–2006 energy consumption was growing rapidly (5.2% per annum) in manufacturing and its share in the final energy balance is equal to 21%.

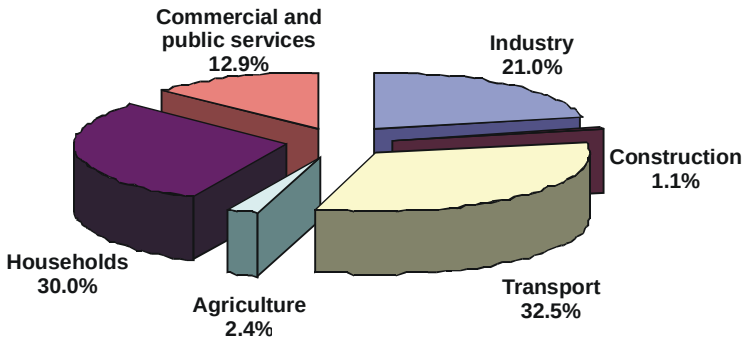

Fig.12.2 Structure of final energy balance of Lithuania in 2006

Table 12.1. Forecast of final energy demand in Lithuania

Year	Slow growth scenario	Basic scenario	Fast growth scenario
	Energy demand, Mtoe		
1990	9,7	9,7	9,7
1995	4,6	4,6	4,6
2000	3,7	3,7	3,7
2005	4,5	4,5	4,5
2010	4,8	5,0	5,4
2015	5,2	5,7	6,5
2020	5,7	6,5	7,9
2025	6,2	7,4	9,5
Index (1990 = 100)			
1990	100	100	100
1995	47,5	47,5	47,5
2000	38,7	38,7	38,7
2005	46,4	46,4	46,4
2010	49,6	52,1	56,0
2015	54,0	59,1	67,5
2020	58,7	67,2	81,3
2025	63,9	76,6	97,9

Energy efficiency is most frequently judged by the indicator of **energy** (primary or final) **intensity.** Currently in various statistical publications and special studies the indicator of the final energy intensity, i.e. the ratio between the final energy consumption and national GDP, is more frequently used. Final energy intensity describes energy required by final consumers for the production of various goods and for the delivery of services per unit of GDP. In order to compare the energy intensity in different countries, GDP is recalculated using the constant prices of 2000 and national currencies are estimated in USD according to the official exchange rates. Based on this indicator, the energy intensity in many Central and East European countries is 2–3 times (in Lithuania – 2.5 times, in Romania – 4.2 times and in Bulgaria – 5.1 times) higher than the average for countries of the European Union **(Fig. 12.3)**.

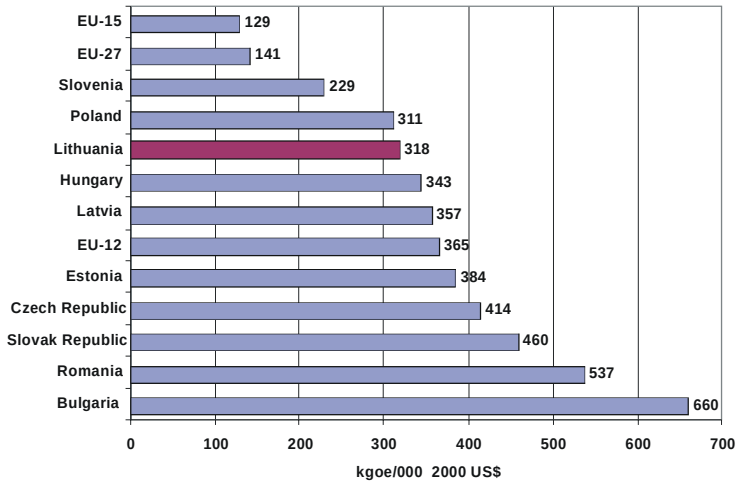

Fig.12.3. Final energy intensity in the EU countries in 2005, GDP is determined using exchange rate

Such a great difference in final energy intensities calculated using this method is mainly determined by different principles of the methodology used for GDP estimation (particularly the differences in the prices of goods and services) in the developed countries (EU-15) and new Member States (EU-12). To take into account these factors and to reduce the effect of price distortions, GDP is determined using estimates of Purchasing Power Parity (PPP) in every country. This indicator can much better reflect the real living standard of different countries, because GDP estimation is based on PPP and the internal purchasing power of every country is taken into account. In this case, in the countries of the former Eastern Block with previously centrally planned economy, **the final energy intensity** in 2005 was 1.2–1.6 times higher than the average for countries of the European Union **(Fig. 12.4)**.

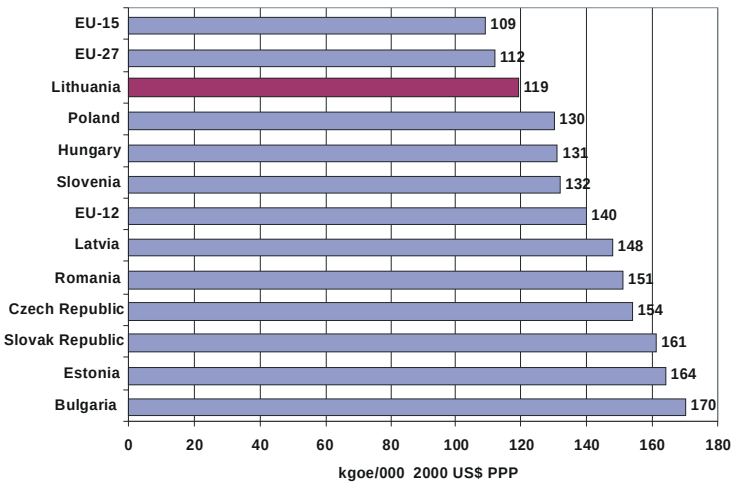

Fig. 12.4. Final energy intensity in the EU countries in 2005, GDP is determined using indicators of Purchasing Power Parity

19. Although electricity consumption over the last five years showed the most rapid increase as compared to the consumption of other energy forms, at present Lithuania is considerably lagging behind developed European countries in terms of the comparative indicator of final electricity consumption per capita by economic sectors (2230 kWh per capita). In 2005, the average electricity consumption per capita in the enlarged EU was about 2.5 times higher than in Lithuania. According to forecasts, the envisaged modernisation of the national economy could stimulate a fast growth in electricity demand, and its share in the structure of final energy would increase according to all scenarios and in all branches of the economy. During the period until 2025, the basic scenario forecasts an annual average increase in electricity demand in branches of the economy by 3.7%. According to this scenario, electricity consumption at the end of the forecasting period would be about twice as much as in 2004.

The electricity consumption per capita in Lithuania is by several times lower than in the majority of the developed countries. This indicator in many countries of the former Eastern Block is also 1.3–2.3 times higher than in Lithuania **(Fig. 12.5)**. Therefore the energy demand forecast was based on the assumption that the modernization of the Lithuanian economy would require the rapid growth of the electricity demand. According to the forecast, the final electricity demand in the branches of economy would reach and exceed the level of 1990 by the year 2015–2016, for both the basic and fast economic growth scenarios **(Fig. 12.6)**. In the case of the basic scenario, final electricity demand in 2025 would amount to 16.4 TWh, and the net electricity generation for country's needs (gross production minus own use by power plants) would amount to 19.5 TWh. In this case electricity consumption per capita would be approximate to the present average in the EU-27. In the case of the fast economic growth, final electricity consumption per capita would be about 6100 kWh. With this indicator Lithuania would exceed the present electricity consumption per capita in Ireland, Spain, United Kingdom and other developed European countries.

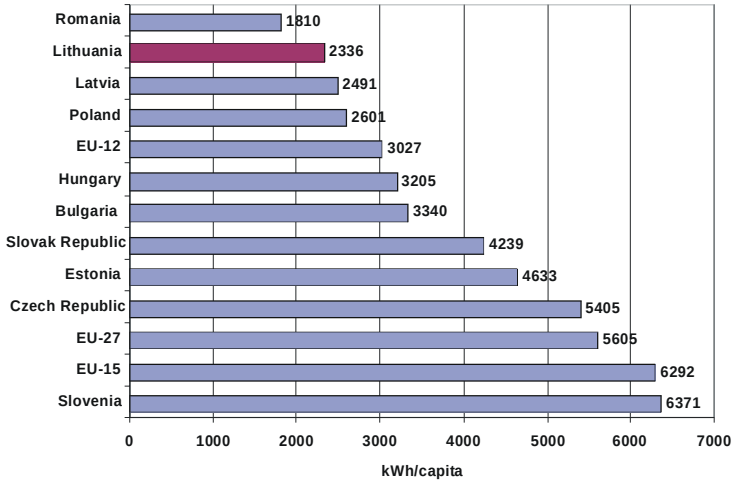

Fig. 12.5. Final electricity consumption per capita in 2005

Electricity demand growth is dependent on energy saving effect which could be realised by the use of modern appliances in all branches of economy or due to structural changes in manufacturing. On the basis of analysis performed it was determined that electricity demand due to large implementation of modern technologies could be reduced at the end of the planning period by 20%.

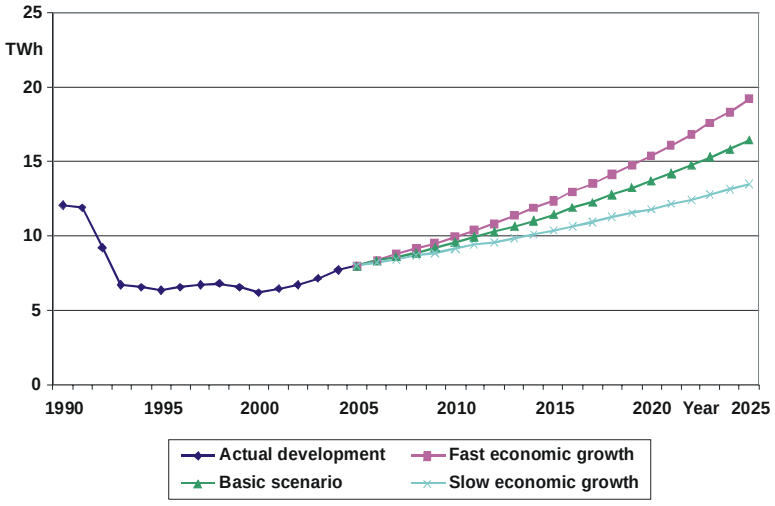

Fig. 12.6. Forecast of final electricity demand

In the opinion of the experts working in the field of district heating, demand for the district heat supplied to consumers would not rise until 2025, as energy demand could be cut almost by half through the implementation of necessary programmes of the renovation of residential and public buildings (schools, universities, hospitals), and the energy characteristics of buildings under construction are based on the EU standards, hence, total district heat demand in 2025 is expected to be even lower than in 2004.

20. With the final shutdown of Unit 2 of the Ignalina NPP at the end of 2009 and without constructing a new nuclear power plant, demand for primary energy resources would increase only by approximately 25% during the period until 2025 according to the basic scenario, however, total demand for fossil fuel would increase almost 1.7 times within 20 years, i.e. from 6 million toe in 2005 to 10.5 million toe in 2025. Natural gas demand would double – from 2.4 million toe in 2005 to 4.8 million toe in 2025, and the share of natural gas in the national balance of primary energy resources would increase from 28.4% to 45% during the forecasting period. The forecasts predict that the share of indigenous (excluding indigenous oil) and renewable energy resources in the total balance of primary energy resources would grow by up to 20% in 2025, while the share of petroleum products, including orimulsion, would constitute about 35%. Having constructed a new nuclear power plant, primary energy demand would be higher due to poorer energy conversion properties of the nuclear power plant but demand for natural gas and petroleum products would decline and the diversity of primary energy resources would increase. In this case, the share of natural gas in the fuel balance could remain almost steady, i.e. close to 30%.

Primary energy means the energy contained in natural resources such as chemical energy dormant in fossil fuel; potential water energy; solar energy; energy released in nuclear reactions; wind energy etc. The best part of the primary energy sources is transformed into electricity and heat energy or converted into the fuels used by consumers, eg. gasoline, diesel fuel, heavy fuel oil, liquefied gas, peat, etc. The energy resources obtained through transformation and conversion of the primary energy are referred to as secondary energy.

XXIV

FORECASTS FOR ENERGY PRICES

21. In 2005, the share of oil and petroleum products constituted 30.8%, natural gas – 28.4%, and nuclear energy – 27.9% in the national balance of primary energy resources. This conditions the heaviest dependence of domestic electricity prices on oil and natural gas prices.

The average oil price in global markets was USD 37 per barrel in 2004, USD 55 per barrel in 2005, and it reached the level between USD 63 and USD 71 per barrel in 2006. It seems likely that from 2007–2008 oil prices would stabilise, gradually start going down and fluctuate between USD 50 and USD 55 per barrel after 2010.

The natural gas price in Lithuania is virtually dependent on the price of natural gas imports from Russia. In 2005, the price of gas imports stood at about USD 84 per 1000 m^3, and it rose from USD 125 to USD 145 per 1000 m^3 in 2006. In 2007, the natural gas price in Lithuania will get close to prices in Western Europe and amount to USD 220 per 1000 m^3. Since the gas price is related to the price of oil and petroleum products (fuel oil), it seems likely that the stabilisation of oil prices would contribute to the stabilisation of the respective price of natural gas imports.

Recent years have seen a marked global upward trend in nuclear fuel prices (the current nuclear fuel price is approximately USD 29 per ton of oil equivalent). Nuclear fuel prices are expected to rise in future; however, they will not have any significant effect on the final electricity price.

22. In 2005, around 70% of the total domestic electricity production was generated by the Ignalina NPP (about 21% – by thermal power plants). In 2005, the average electricity generation cost was about 8.44 Lithuanian cent/kWh (taking into account the public interest component), and the average electricity price for the final consumer – about 23 Lithuanian cent/kWh. Taking into account the decommissioning of Unit 2 of the Ignalina NPP and the forecasted rise in the natural gas price, the average electricity generation cost in 2010 could stand at 16 Lithuanian cent/kWh, and the price for the final consumer could go up by 39% and amount to 32 Lithuanian cent/kWh. A price should remain

at similar levels until the planned construction of a new nuclear power plant in 2015. In the current and coming periods, the electricity price should also depend on the establishment of new electricity interconnections with Western European and Scandinavian countries and the level of electricity prices in these markets, as well as on the scope of the use of renewable energy resources in Lithuania. The evaluation of all the circumstances allows making forecasts that the electricity price in Lithuania should be somewhat lower than that in the markets of Western European or Scandinavian countries.

23. For ease of use, natural gas is mostly used for the generation of district heat in Lithuania, and its share in the fuel balance stabilised at around 80% in 2003–2005. While predicting an increase in the gas price and seeking to diversify the risk, heating utilities started using biofuel whose share in the fuel balance increased from 2% in 2000 to 12% in 2005. With gas prices going up, the intensive use of biofuel allowed partially neutralising the influence of gas prices on heat prices, as well as stabilising the latter which fluctuated around 11.5 Lithuanian cent/kWh on the average in Lithuania in 2000-2005. This factor had a decisive influence on a growth in the number of heat consumers in Lithuania as it increased from 0.45 million in 2000 to 0.6 million in 2005.

In 2006, heat prices in Lithuania increased by 30% on the average and exceeded the level of 15 Lithuanian cent/kWh. Heat suppliers generating all energy by burning biofuel did not raise their heat prices at all or increased them by several percent.

Having taken into account the forecasted further increase in natural gas prices and the fact that the fuel component constitutes about 50% in the heat price, the heat price, with a future increase in gas prices by 30–50%, should rise up to 20% and amount to some 18 Lithuanian cent/kWh.

XXIV

DEVELOPMENT OF THE ELECTRIC POWER SECTOR

24. The total installed electricity-generating capacity (nuclear and non-nuclear) amounts to nearly 5 000 MW (***Table 14.1***) and exceeds the present domestic needs of Lithuania by more than two times, while the main source of electricity in the country is the Ignalina NPP which generates cheaper electricity than thermal power plants using fossil fuel. After the decommissioning of Unit 2 of the Ignalina NPP at the end of 2009, the current generating capacities, including small capacity CHP plants that are planned to be constructed, will be sufficient to meet the national demand until 2013 in all cases of the growth in national economic needs and supply with systemic services necessary for the functioning of the system, but the Lithuanian Power Plant and the existing CHP plants with the lowest electricity generation cost during the heating season should be modernised. After the decommissioning of Unit 2 of the Ignalina NPP, the Lithuanian Power Plant will become the major electricity generating source until the construction of a new nuclear power plant, hence, it is required to carry out the necessary testing and adjustments of the power plant equipment and to ensure its reliable operation with a capacity of at least 1500 MW from the beginning of 2010.

Table 14.1. Installed capacity of power plants in Lithuania in 2006

Power plant	Installed capacity, MW
Lithuanian Power Plant	1800
Vilnius CHP	384
Kaunas CHP	170
Petrašiūnai CHP	8
Mažeikiai CHP	160
Klaipėda CHP	11
Other thermal power plants	108
Ignalina NPP	1300
Kruonis HPSP	900
Kaunas HPP	101
Small HPP	27
Wind PP	49
Total	**5018**

However, the price of electricity generated by the existing generating units of the Lithuanian Power Plant using natural gas will not be competitive in the market. It will also be one of the factors determining the price of imported electricity. Therefore, it is necessary to accelerate the development of the capacities of more efficient CHP plants, to enhance the efficiency of the Lithuanian Power Plant and to reduce the price of electricity generated by the Lithuanian Power Plant. To this end, by 2010, the Lithuanian Power Plant should have a ***combined cycle gas turbine unit*** with a capacity of up to 400 MW (investment in this unit amounting to approximately LTL 720 million) installed, inefficient units of 150 MW capacity closed, as well as minimise the use of natural gas by substituting petroleum products for natural gas in other units. At the same time, it is necessary to consider the possibility and economic feasibility of constructing a coal-burning power plant with a capacity of about 400 MW in the Baltic region. Having implemented the planned projects, the current electricity generating capacities will be sufficient to meet the demands of domestic consumers until a new nuclear power plant is put into operation; however, if economically feasible, a part of electricity could be imported. It is expedient to consider possibilities of electricity import from Ukraine via Belarus.

Combined cycle gas turbine unit consists of gas turbine generator equipped with heat recovery steam generator to capture heat from the gas turbine exhaust. Gas turbine can convert only about 35–40% of natural gas energy into electricity. Exhausted gases contain heat which is utilized in steam turbine generator to produce additional electricity. Overall efficiency of such power plant can reach 55–60%, i.e. he same amount of electricity could be produced consuming by one third less of natural gas. Additional efficiency can be gained when exhausted heat from the steam generator is used for space heating or technology purposes. In this case overall efficiency of power plant can exceed 90%.

25. With increasing capacity demand and subject to economic feasibility, new CHP plants should be constructed in Klaipėda, Šiauliai, Panevėžys, Alytus, Marijampolė and other cities with well-developed district heating systems, as well as in industrial enterprises with high heat consumption, etc. When assessing the feasibility of constructing new CHP plants, the economic appeal of the use of renewable energy resources in these plants should be evaluated on a case-by-case basis because this would help comply with the EU requirements in the areas of "green" energy production and environmental pollution reduction, as well as improve the energy security of the country. With increasing prices of fossil fuel and with electricity demand growing faster than heat demand, the replacement of the existing units by new combined cycle units in Kaunas and Vilnius CHP plants will become more relevant. At the end of the forecasting period, the share of CHP plants in the total electricity generation balance should reach 35%.

26. After the decommissioning of the Ignalina NPP, a new nuclear power plant should be constructed in Lithuania (investments totalling approximately LTL 10 billion) with a view to avoiding heavy dependence on imports of fossil fuel whose prices are difficult to forecast, reducing pollutant emissions into the atmosphere and mitigating related economic

consequences. The issue of the management and final disposal of nuclear waste should be dealt with at the same time.

27. Due to a relatively light load of the power system of the Baltic States (about 6 000 MW in 2015), the optimum maximum capacity of one power unit without additional measures would in principle be about 800 MW. Should larger capacity units be constructed, additional generating sources will also be needed to ensure systemic services of the required scope. Having connected the power systems of the Baltic countries to the power systems of Western European and Scandinavian countries until a new nuclear power plant is put into operation, the reserve capacities of Western European and Scandinavian countries could be used. In the event of failure to construct necessary interconnections in time, it may be required to co-ordinate the reservation of large capacity units with the joint power system of Russia.

28. Lithuania will implement its commitments to the EU on the use of renewable energy resources for generating electricity. With wind power plants, small hydropower plants and biofuel burning CHP plants being constructed within the next five years, the share of renewable energy resources in the total electricity generation balance will account for over 7% in 2010, while at the end of the forecasting period their input should increase to 10%. The possibilities of constructing hydropower plants complying with environmental requirements will be considered, exploiting the potential of the River Neris and its basin.

To implement the 2001/77/EC Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market, the Government of Republic of Lithuania has adopted by its Decision No 25 from 13 January 2004 the Procedure for promotion of production and purchase of electricity produced from renewable energy sources. This Decision foresees that the share of electricity produced from renewable energy sources would exceed 7% in 2010. Pursuant to the Regulations, feed-in tariffs for electricity generated from renewable energy sources are established. Planned electricity generation amounts, which correspond to the country's obligations, are shown in the **Fig. 14.1**.

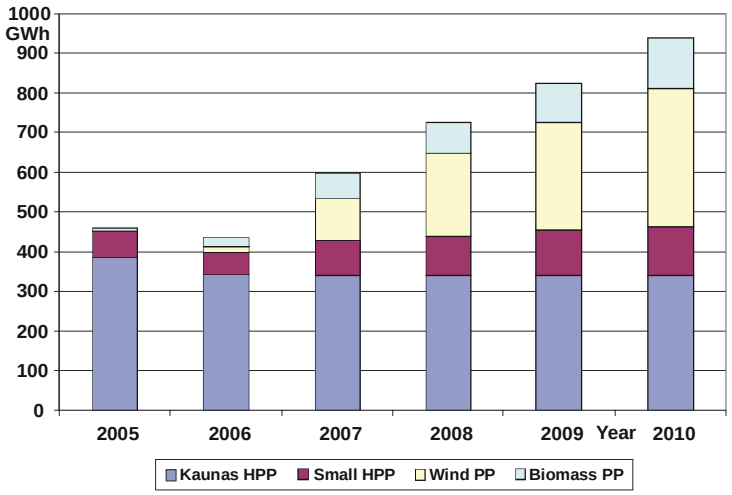

Fig. 14.1. Electricity production from renewable energy sources

29. Lithuania's integration into the EU, closer co-operation with the other Baltic States, Scandinavian countries and Poland, as well as the forecasted location of demand and generating capacities call for

changes in the structure of the national electricity grid. The three Baltic States should make joint efforts to draw up a strategy for the development of the electricity transmission network and action plans for its implementation, as well as to plan a sequence of actions and financing sources.

30. Electricity ***transmission*** and ***distribution networks*** in principle can satisfy the current needs of the power system; however, owing to the uneven development of different Lithuanian regions and with a view to connecting to the power systems of other countries, the electricity transmission networks should be substantially upgraded in Klaipėda, Vilnius and other regions, as well as new transformer

Power transmission network means the highest voltage level(s) of the power grid linking the whole electricity system and thus further referred to as the national electricity network (**Fig. 14.2**). Power plants supply the electricity generated for the entire country into this network, which is also used for transmission of transit flows to other systems. In Lithuania and the Baltic States region, the voltages in the transmission network are 330 and 110 kV, while in Western and Northern Europe, the voltage levels are 400 and 220 kV.

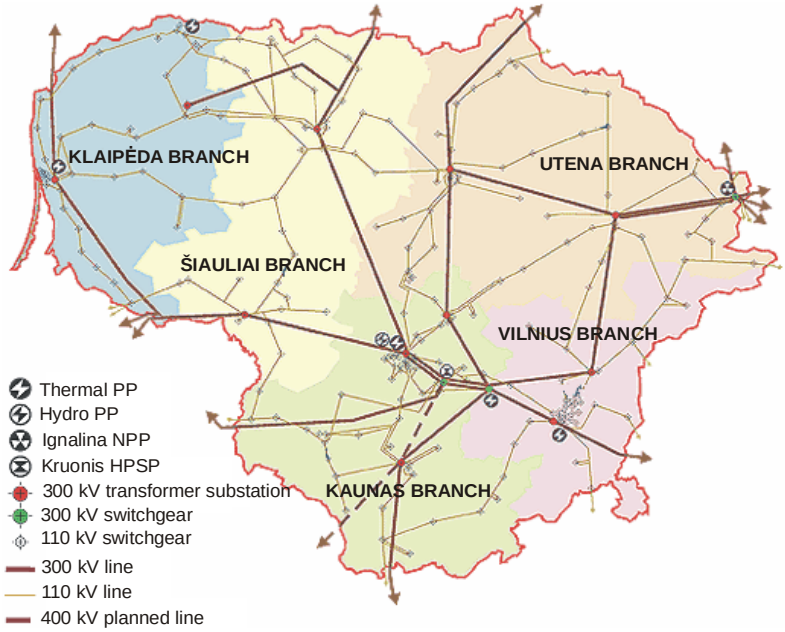

Fig.14.2. Lithuanian power transmission network

Power distribution networks mean the high voltage (110 and 35 kV), medium voltage (10 kV) and low voltage (0.4 kV) power networks of local significance. They are used to distribute the electricity received from the transmission network or small local generators to consumers. Distribution, supply and public supply services are provided in the Lithuanian electricity market by two companies- West Distribution Network (VST) and East Distribution Network (**Fig. 14.3**)

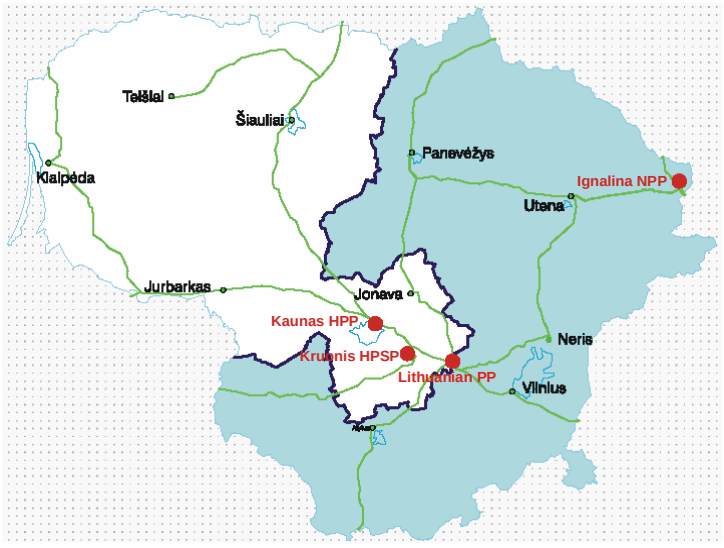

Fig.14.3. Territories of power distribution companies

substations should be built. In order to ensure the reliability of electricity supply in the western part of Lithuania, 330 kV line Telšiai – Klaipėda should be constructed by 2010, and 330 kV line Panevėžys – Šiauliai by 2013 (investments in these two lines – about LTL 170 million). In addition, it is necessary to connect Vilnius and Neris transformer substations by 330 kV line by 2020.

A part of the electricity grid and a number of substations have been renovated in the recent years; however, about 60% of the transmission and distribution equipment is more than 20 years old, and one fourth of this equipment is more than 30 years old. Hence, it is necessary to continue the reconstruction and modernisation of the existing transformer substations, to rapidly improve the condition of the transmission grid and distribution networks by complying with the increasing requirements for the reliability and stability of energy supply, especially with a view to creating a stable common electricity market of the three Baltic States.

In order to achieve an efficient electricity market, all possible economic and political measures should be aimed at promoting and constructing powerful interconnections with the power systems of Poland and Sweden (investments amounting to LTL 1.5 billion and LTL 1.4 billion respectively) as soon as possible. In future, these interconnections would allow the integration of the Baltic countries into the Western European electricity market. It is also necessary to enhance the reliability of energy supply and to create conditions for competition.

31. With a view to attaining the objectives of the development of the electric power sector, namely, ensuring the strategic reliability of electricity supply and integration into the EU market, the following measures are necessary:

1) to strengthen co-operation and collaboration with the Baltic countries, i.e. to develop a common electricity market and optimally exploit the common opportunities of the power systems of the Baltic countries in neighbouring markets as well as to foresee perspectives of further use of the Kruonis HPSP for the exchange of energy between the Baltic, Central and Western European and Scandinavian markets, following the decommissioning of Unit 2 of the Ignalina NPP and the construction of strategic interconnections;

2) to work out, together with Latvia and Estonia, an action plan for integration into the networks of Western European and Scandinavian countries envisaging better utilisation of available and future generating capacities and the enhancement of the reliability of electricity supply;

To integrate the Lithuanian power system for synchronous operation with the UCTE system, the following measures are necessary:

- to modify existing regulation systems at Lithuanian power plants according requirements of UCTE;
- to implement measures necessary for indication of parameters of primary frequency regulation at dispatch centre of AB „Lietuvos energija";
- to connect generating capacities to the automatic secondary frequency regulation system at dispatch centre of AB „Lietuvos energija";
- to modernize exciting systems of generators at Kruonis HPSP, to ensure reliability and quality;
- to implement the system for registration of transient processes at AB „Lietuvos energija", Kruonis HPSP, Klaipėda and Ignalina NPP 330/110 kV transformer substations;
- to construct transmission lines of required capacity for connection of Lithuanian and Polish power systems;
- to modernize, in conjunction with other Baltic States, Russian and Belarus, power transmission networks of these countries as well as power plants in Latvia and Estonia for synchronous operation of the Baltic power system with the UCTE system.

3) to construct strategic interconnections with Poland and Sweden by 2012;

4) to implement technical measures by 2015 necessary for the synchronised operation of the Lithuanian power system with the UCTE system;

5) to reconstruct and restore physically and morally worn electricity ransmission and distribution networks with a view to serving the increasing loads and complying with the requirements for electricity supply reliability and quality (investments totalling approximately LTL 1.0 billion);

6) to construct 330 kV electricity transmission line Telšiai – Klaipėda by 2010, and 330 kV line Panevėžys – Šiauliai by 2013;

7) to put into operation a new nuclear power plant in 2015 at the latest;

8) to co-operate with the neighbouring countries to provide reserve capacity;

9) to exploit, to a maximum extent, development possibilities and positive features of distributed (decentralised) energy generation.

Distributed energy generation – the integrated (installed within the distribution network) or stand alone (installed at a consumer's side) small electricity generation sources. They are constructed seeking to meet specific capacity and reliability needs in applications that benefit the power system, specific end-user or both. Rapid development of small generation sources in many European Union countries is stipulated by many factors: liberalisation of electricity markets, development of technologies linked to distributed electricity generation, limitations for construction of new power transmission lines, growing need of consumers to ensure high reliability of electricity supply, growing worries on climate change, etc. The development of distributed electricity generation is based on construction of small generators (50 MW or less) producing electricity from renewable energy sources and cogeneration power plants.

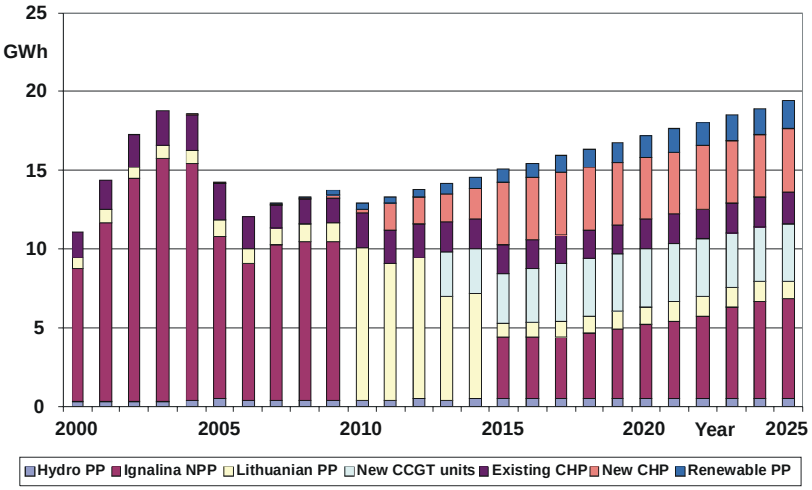

Fig. 14.4. Forecast of electricity generation (new nuclear power plant is commissioned in 2015)

XV

DEVELOPMENT OF THE DISTRICT HEATING SECTOR

32. About 75% of residential buildings in Lithuania's towns are supplied with heat from district heating systems. The method of district heating, prevailing in Lithuania, is insufficiently efficient due to various economic, technical and social reasons. It is necessary to ensure further development of modern district heating systems by combining them with other methods of heating, as well as to improve and modernize them.

Based on the data of the Lithuanian Department of Statistics, during the period 1990–2000 the volume of the district heat decreased 2.5 times but during the period 2000–2006 was increasing on average by 2.2% per annum **(Fig. 15.1).** In 2006, district heat consumption in agriculture was by 7.4 times, in industry and construction – by 3.9 times, in the services sector – by 2.7 times and the household sector – by 1.4 times lower than in 1990. At present, household and service sectors dominate in the structure of district heat consumption **(Fig. 15.2).**

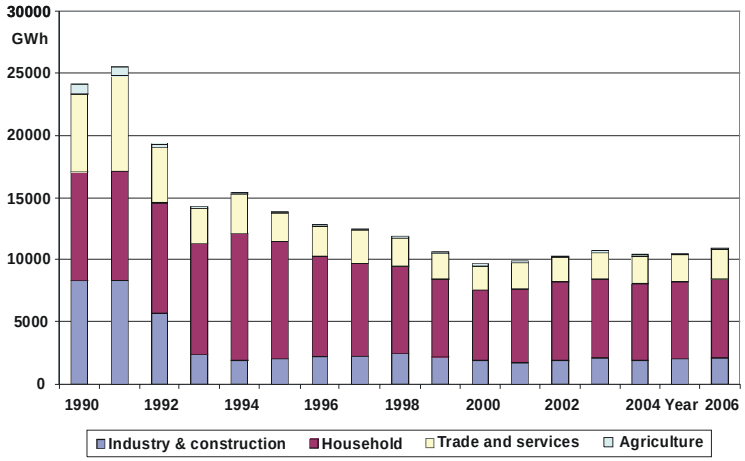

Fig. 15.1. Dynamics of district heat consumption in branches of economy

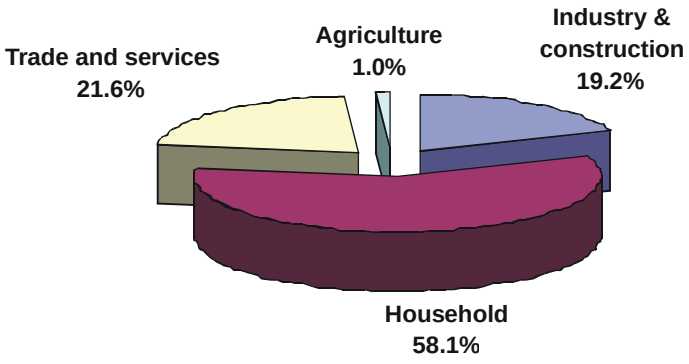

Fig. 15.2. Structure of district heat consumption in 2006

33. With a view to attaining the objective of the development of the district heating sector, namely, ensuring reliable and high quality supply of heat to consumers at minimum costs, encouraging competition

between the types of fuel and the methods of heat production within the heat sector, increasing the efficiency of heat production, transmission and consumption, when producing heat, to more widely use indigenous fuel, biofuel and other renewable energy resources, reducing negative impact of the heat sector on the environment, the following measures are necessary:

1) management of the heat sector in accordance with the agreed national priorities of the energy sector and special plans of the heat sector approved by municipalities, the purpose whereof is to satisfy the consumers' need for heating with minimum costs and minimum negative impact on the environment; The plans must provide for long-term decisions concerning the modernisation and development of the heat sector, including the development of co-generation of electricity and heat, as well as zoning according to economically justifiable principal method of heat supply and regulating the conditions for connecting and disconnecting.

2) gradual set up of combined heat and power (CHP) plants at district heating enterprises able to generate electricity at a price that would be competitive on the open electricity market; To more widely use waste heat from industrial enterprises for heating residential and public buildings. To fully implement the provisions of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC;

3) imposing of an obligation on heat suppliers to purchase heat conforming to quality, supply reliability and environmental requirements from independent heat producers selling heat at a price lower than the cost of heat offered by suppliers;

4) constructing of CHP plants with a total capacity of 400 MW in Klaipėda, Panevėžys, Šiauliai, Alytus, Marijampolė and other cities by 2020 (investments amount to approximately LTL 2 billion);

5) encouraging heat and electricity generation from indigenous and renewable energy resources, as well as from combustible waste; This would reduce fuel imports and contribute to the solution of the waste storage problem. A possibility to use waste for co-generation of heat and electricity must be assessed on a case-by-case basis;

6) using the municipal waste collected by municipalities for heat and electricity generation provided it is economically and ecologically feasible. To this end, to construct a waste incineration facility, with the intended annual capacity of approximately 200 000 tons of such waste,

by 2010 in Vilnius. During the period 2010–2025, to construct similar facilities in Kaunas, Klaipėda, Šiauliai and Panevėžys.

7) modernising heat supply systems by 2015: to construct reserve pipelines that would ensure their reliability and to replace up to 75% of the current heat supply pipelines by using the support from the EU structural funds (investments amount to approximately LTL 1.4 billion);

8) revising the state policy by assuming responsibility for the formation and administration of the required sources of financing, creating legal and economic preconditions for enabling the participation of entities of all management and ownership forms in modernisation processes and providing favourable economic and legal conditions for renovating buildings: to thermally insulate the external envelope, to reconstruct heating and hot water systems and to gradually implement heat regulation and metering for all consumers;

9) establishing the procedure for the purchase of electricity generated by CHP plants that would promote co-generation of heat and electricity;

10) encouraging participation of private capital in the projects of modernisation of the heat sector through enterprises providing energy services and in any other ways meeting the public interest;

11) providing conditions for heat consumers to take part in the management and modernisation of the heat sector. To control natural monopolies and to balance the interests of the suppliers and consumers.

12) ensuring the accumulation of the reserve fuel stocks stipulated in legal acts.

34. To satisfy the consumers' need for heating, intensively use indigenous and renewable energy resources or least pollution causing fuel has to be used and the most advanced technologies for their use have to be employed. The State will promote the establishment of the required infrastructure and activities of consulting companies under the conditions of open competition.

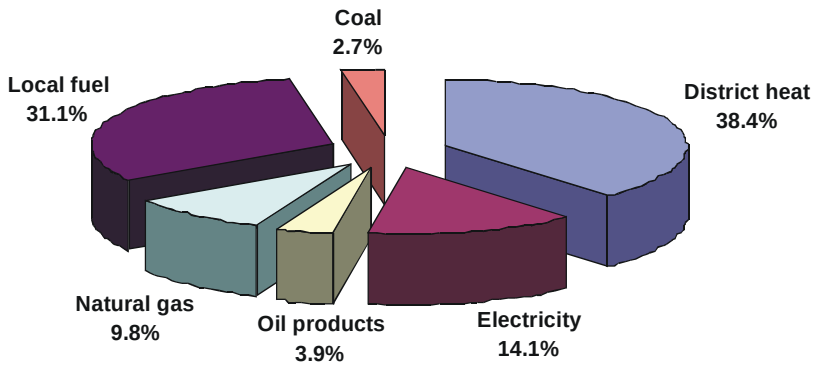

Fig. 15.3. Structure of final energy consumption in the household sector in 2006

XVI

DEVELOPMENT OF THE NATURAL GAS SECTOR

35. The share of natural gas in the national balance of primary energy resources amounted to approximately 28.4% in 2005. In 2005, 3.1 billion m^3 of gas was imported for domestic needs, and 0.72 billion m^3 of gas was supplied in transit to the Kaliningrad Region. In 2005, after the increase in the capacity of gas transit, the reliability of gas supply to Lithuanian consumers increased as well. The capacity of two gas pipelines entering Lithuania from Belarus (Minsk – Vilnius and Ivatsevichi – Vilnius) (over 6 billion m^3 per year) is in excess of the current natural gas consumption needs. Having implemented the measures specified in the previous strategy, a natural gas metering station was constructed on the Lithuanian – Latvian border and therefore Lithuania may use services provided by gas storage facility in Inchukalns in the wintertime. In case of emergency, this interconnection may satisfy up to 50% of the national demand, but there are no long-term agreements regulating the use of this interconnection.

Technologically and ecologically, natural gas is the most effective fossil fuel and it is increasingly widely used, especially in the EU states. Therefore, taking into consideration more stringent environmental requirements, natural gas would be one of the most promising types of fossil fuel in Lithuania over the reporting period, but, due to the increasing gas prices, the comparative economic efficiency of their use is decreasing and will be further decreasing in the future. As gas is supplied to Lithuania from the single source – the Russian Federation – and the new gas export routes from Russia and the alternative regions to the West will be unfavourable for Lithuania, it is necessary to create all the required technical measures to ensure their supply reliability.

36. With a view to attaining the objective of the development of the gas sector, namely, ensuring safe, efficient and reliable supply of natural gas, its distribution, transmission and storage, promoting the development of the internal market of the supply, distribution and transmission of natural gas, as well as integrating the natural gas supply systems into the EU natural gas systems, the following measures are necessary:

1) expansion and modernisation of the national gas transmission networks and ensuring the increase of natural gas transit through

At present natural gas is supplied from Russia to Lithuania through a single 1200 mm diameter gas pipeline from Minsk compressor station at the main Jamal – Western Europe gas pipeline (**Fig. 16.1**). This pipeline is also used for transit of natural gas to Kaliningrad region across the territory of Lithuania through the main pipeline Vilnius – Kaunas – Šakiai. The Lithuanian gas system is also connected with the Latvian gas system.

Fig.16.1. Natural gas transmission network in Lithuania

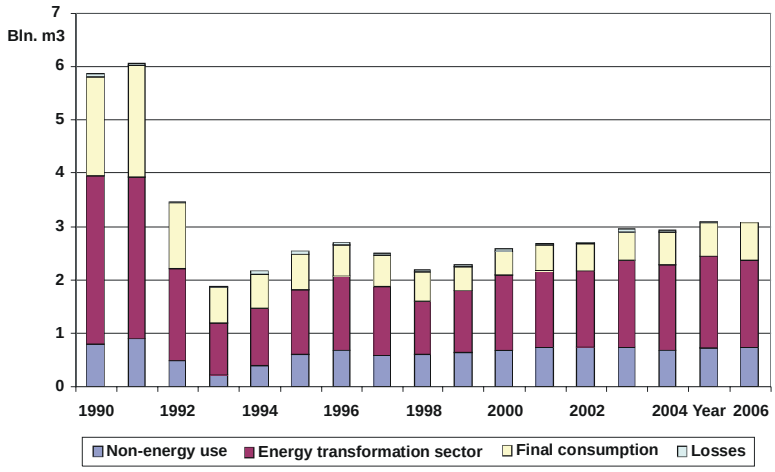

Fig.16.2. Dynamics of natural gas consumption

Following the restoration of the independence of Lithuania, consumption of natural gas fell sharply due to rapid increase of prices – in 1993 consumption of natural gas was 3.3 times less than in 1991. Since 1998 consumption of gas is increasing (**Fig. 16.2**) – with an average growth rate 4.3% per annum and the share of natural gas in the primary energy balance increased from 18.8 % in 1998 to 28.5 % in 2006. During this period consumption of natural gas for electricity and heat production was growing even faster (6.1% per annum) because heavy fuel oil was replaced by natural gas due to stronger environmental requirements. In 2006, the share of natural gas consumed in energy transformation sector amounted to 52.4%, the share of non-energy use (for fertilizer production) – 24.4% and direct consumption in economy branches – 23.2%.

Lithuania, and that the conditions applied for transit are in line with the EU legal acts and their practical implementation;

2) upon completion of the research and having chosen the site, the construction of an underground gas storage facility, whose useful capacity would be at least 500 million m^3, in Lithuania (investments amount to approximately LTL 500 million);

3) the creation of economic and legal preconditions for long-term agreements with the owners of the Latvian gas system concerning the use of part of the capacities of their underground storage facility to satisfy the needs of the Lithuanian consumers in case of emergency or

during the winter load peak, and participation in projects aimed at developing the Latvian storage facilities, if they comply with liberalisation and competition criteria;

4) the preparation of a feasibility study on the construction of a liquefied natural gas import terminal required to satisfy Lithuania's needs and specifying therein the possibilities and forms of attracting private capital for the construction of the terminal, as well as ways of providing incentives for it;

5) in cooperation with Poland, the preparation of a feasibility study on the interconnection of the Polish and Lithuanian gas pipeline network and joining of the gas supply network of the Baltic States to diversified Central European gas supply flows from the Caspian, Central Asian and North African basins, especially from the Nabucco, and other alternative gas supply sources by 2011;

6) under circumstances possible due to the EU assistance, the implementation of strategically important projects for interconnecting the Baltic States gas supply systems with the Polish ones by 2015, and thus ensuring access to alternative natural gas supply flows and making use of the EU gas market;

7) increasing of reliability of supplying Western Lithuania with natural gas; constructing the line Šakiai – Klaipėda using the support from the EU structural funds;

8) drafting of a scheme and programme for further installation of gas supply lines in Lithuania, taking into consideration the competition between natural gas and coal, liquefied petroleum gas, indigenous and renewable energy resources, as well as continuing installation of gas supply lines in cities and settlements.

37. The national natural gas sector will be developed in accordance with the open market principles. The natural gas market will be developed and regulated in accordance with the provisions laid down in the EU directives and other EU legal acts, as well as obligations assumed in respect of the EU. The State shall provide support for projects of strategic importance, necessary for ensuring gas supply reliability and environmental standards. The forms and measures of the support will be determined by the Government of the Republic of Lithuania. As long as Lithuania receives natural gas from one monopolistic source and no alternative and competitive system for the supply of gas to national consumers has been created, complete liberalisation of the gas market has to be in line with the provisions of paragraph 8 of Article 25 of the EU Directive 2003/55EC when regulating the activities of monopolistic gas enterprises operating in the country.

Alternative supply of liquefied natural gas is used in these world regions, where construction of natural pipelines gas is not reasonable due to very long distances. The biggest consumers of this fuel (about 65% of world market for liquefied natural gas) are countries of Asia – Pacific Ocean: India, Japan, South Korea, and Taiwan. Consumption of liquefied natural gas in European countries is comparatively high, at present it amounts to 25% in the world market, and the share of USA is about 10%.

Liquefied natural gas is supplied to consumers by sea transport via construction of liquefied natural gas import terminals. These terminals serve as a system of alternative fuel supply seeking to increase security of natural gas supply. This issue is very relevant for Lithuania because natural gas is supplied only by single branch from Jamal – Western Europe pipeline.

Dependence on natural gas supply from Russia can be reduced by construction of planned Nabucco pipeline, whereby gas will be supplied from Kazakhstan, Turkmenistan and Azerbaijan. This gas pipeline should be used for transit of natural gas to Austria across the territories of Turkey, Bulgaria, Rumania and Hungary. It is planned that this pipeline will be constructed until 2010 and about 25–30 billion m^3 of natural gas from the fields of Caspian Sea and Middle East regions will be supplied to the EU gas market. It is reasonable to consider the construction of pipeline branch to the Baltic States. Construction of Nabucco pipeline with this branch could create one of alternatives to Russian Gas Company "Gazprom" which has monopoly of natural gas supply to Lithuania

XVII

DEVELOPMENT OF THE SECTOR OF OIL, PETROLEUM PRODUCTS AND BIOFUELS

38. Petroleum products hold a significant share (30.8%) in the national primary energy balance. In 2005, 2.7 million tons, including the orimulsion, were used. Lithuania possesses the only ***oil refinery*** in the Baltic countries region with the annual capacity amounting to 10–11 million tons, and also the oil terminal for oil import-export via the Baltic Sea with the annual capacity equal, accordingly, to 6.1 and 8 million tons, and the petroleum products transhipment terminal in Klaipėda, one of the region's most modern, the capacity of which reaches 7.1 million tons. At present, Lithuania possesses all the technical capabilities for importing oil and petroleum products from different countries and thus it has achieved diversification in the supply of petroleum products and is technically secured against possible supply disruption from any one country. Lithuania has sufficient transportation, processing, storage and distribution capacities to meet the demand in petroleum products.

In 1991, Mažeikiai oil refinery refined almost 12 million tons of oil, which was supplied by the oil pipeline directly from Russian fields. However, during the period 1992–1996 the Refinery has had many difficulties seeking to maintain the stability of its operation due to the shortage of circulating capital and problems in negations with single oil supplier. Under these conditions company refined only 3.5–5 million tons of crude oil (**Fig. 17.1**). During the period 1999–2002 Russian oil company for several times cut off the oil supply. Capacities of the refinery were exploited rather efficiently during the period 2003–2005 when Russian company *Yukos* had rights of strategic investor. On May 2006 a majority stake in the Refinery was bought by Polish company *PKN Orlen* and in July break/leak of pipeline in Russian territory was a reason for the Russian monopoly Transneft to cut off oil supply to Mažeikiai oil refinery. Since August 2006 crude oil (mostly Russian) is pumped to the Refinery through Būtingė Oil Terminal.

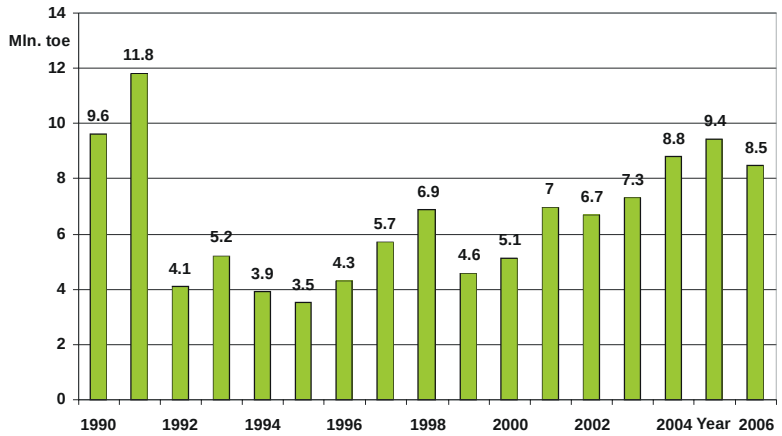

Fig. 17.1. Volumes of crude oil refined at Mazeikiai Oil Refinery

39. In order to ensure reliable supply to the national economy with oil and petroleum products, the state stocks of oil and petroleum products are additionally accumulated each year. It is forecasted that the state ***stocks of oil and petroleum products equalling 90 days' consumption*** will be accumulated in 2009. 50% of these stocks will be accumulated and managed with state funds. The remaining share of

In 1998, the EU adopted a Directive imposing an obligation on the Member Sates to keep 90-day stocks of crude oil and petroleum products. In Lithuania, the accumulation, formation and storage of state stocks is subject to the Law on State Stocks of Petroleum Products and Crud Oil, adopted in 2002. A State of Emergency in energy would be declared in case of the disruption in the normal supply of energy resources to energy companies and consumers, which could result in the failure of energy companies to plan and to manage, in a timely manner, their economy activity. The oil stocks can also be used by the Government in the event of another type of State of Emergency or state of war declared in the manner prescribed by the law.

The forecast for local oil resources is estimated at 278 million tons. However, the exploitable resources amount only to 87 million tons, including 64 million tons on land and 23 million tons in the Baltic Sea shelf. The pilot production of oil started in Lithuania in 1990 and has been continuously expanded until 2001 (**Fig. 17.2**). Later on production of oil started to decline due to depletion of oil resources in existing sites. It is expected that annual production will be maintained at the level of 0.2 million tons, taking into consideration that Lithuanian oil resources are rather small. Lithuanian oil is top-quality, and its major part is exported to Poland.

stocks must be accumulated by enterprises engaged in the supply of oil and petroleum products. With a view to ensuring reliable and safe storage of petroleum products, warehouses, storage facilities and terminals will have to conform to the EU legislation and environmental requirements.

40. ***Indigenous oil resources*** are scarce and oil production from the already explored areas can be continued for several decades maintaining the annual oil extraction level of 0.2 million tons and therefore the oil and petroleum products sector in the near and far future will remain dependent on oil imports. Although the share of petroleum products in the balance of primary energy resources used for generation of heat and electricity will still be decreasing, petroleum products will remain an important reserve fuel in thermal power plants and large district heating systems.

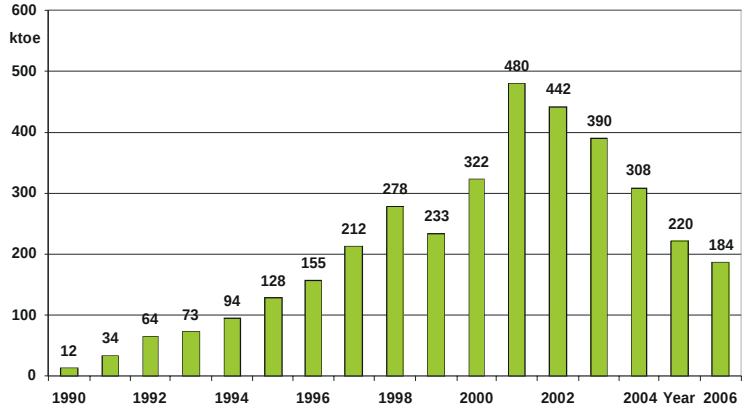

Fig. 17.2. Oil production in Lithuania

41. It is forecasted that the most noticeable increase in the consumption of light petroleum products is envisaged in the transport sector where their consumption will amount to approximately 2.2 million tons per year by 2025. In future, the demand for liquefied gas in households will grow only insignificantly and their consumption for transport needs, considering the present tax system, will continue to increase. The increasing petrol prices result in growing demand for this type of fuel.

A significant growth of the transport sector activities, and especially the fact that the international carriage of goods is becoming more active, has a considerable influence on the increasing demand for diesel. The consumption of diesel for agricultural purposes has been also increasing.

42. High prices for oil and petroleum products and EU policy, which aims at promoting the member states to reduce their dependence on oil imports, create favourable conditions for the increase in the production of biofuel. Currently, the EU biofuel production price is very close to that of the petroleum products (petrol and diesel) (considering

the excise duty). With the increase in the production volume and introduction of modern technologies, biofuel can occupy a significant place in the transport fuel market. The development of biofuel production would enable to improve the energy security of Lithuania, to reduce the negative impact of the transport sector on the environment and would provide for an opportunity to create new jobs.

Favourable conditions for business entities to invest in the production of biofuel and the required equipment, to increase the production volume and consequently reduce the biofuel production price will be created in Lithuania. Tax reliefs and other economic measures will be employed to promote the use of pure biofuel (for example, pure ethanol, petrol containing 70% of ethanol or, respectively, a fatty acid methyl ester) in vehicles and engines of agricultural machinery.

Implementation of the requirements laid down in EU directives will result in significant increase in the share of biofuel in the total balance of the transport fuel and will account for at least 5.75% in 2010 and to 15% in 2020.

43. Seeking to meet the requirements of the European standards, more stringent quality requirements for petroleum products will be further gradually imposed in Lithuania.

Acting in compliance with the conditions stipulated in Council Directive 2004/74/EC of 29 April 2004 amending Directive 2003/96/EC as regards the possibility for certain Member States to apply, in respect of energy products and electricity, temporary exemptions or reductions in the levels of taxation, it is planned to gradually increase the excise duties for petrol and gas oils.

44. With a view to attaining the development objectives of the sector of oil, petroleum products and biofuel, namely, ensuring reliable building, accumulation, maintenance and use of the state stocks of oil and petroleum products, promoting the use of biofuel in the transport sector, the following measures are necessary:

1) each year, to additionally accumulate the state stocks of oil and petroleum products. To strive to achieve that the state stocks of oil and petroleum products equalling 90 days' consumption would be accumulated in 2009.

2) to encourage enterprises engaged in the supply of oil and petroleum products to accumulate the remaining share of stocks.

3) to conform to the EU legislation and environmental requirements for warehouses, storage facilities and terminals seeking to ensure reliable and safe storage of petroleum products therein;

4) strive to achieve that the share of biofuel in the total balance of the transport fuel would account for at least 5.75% in 2010 and to 15% in 2020.

XVIII

INCREASE OF STRATEGIC RELIABILITY OF ENERGY SUPPLY

45. In the energy sector of Lithuania, it is necessary to create opportunities and provide for measures enabling to efficiently neutralise, or compensate for, threats arising due to the dependence on energy supply from Russia or to minimize damage caused by them by employing all the acceptable ways for reducing the dependence. When undertaking privatisation of enterprises and infrastructure facilities of the energy sector in Lithuania, priority has to be given to the foreign investments meeting the criteria of the European and trans-Atlantic integration.

46. With a view to increasing Lithuania's energy security by 2025, it is intended:

1) to interconnect Lithuania's high tension electricity transmission network with the networks of Poland (Lithuania-Poland, 1 000 MW interconnection) and Sweden (Lithuania-Sweden, up to 1 000 MW interconnection);

2) to put into operation a new nuclear power plant and to prepare for joining the UCTE in 2015 at the latest;

3) within the integrated gas supply system of the Baltic countries, to construct an underground gas storage facility, whose total useful capacity for Lithuanian consumers would be at least 1.0 billion m^3 (investments amount to approximately LTL 1.0 billion);

4) together with Latvia, Estonia and Poland, to prepare feasibility studies on the construction of regional liquefied natural gas import terminals in the Baltic region in 2007;

5) to expand geological exploration for indigenous oil in the territory of Lithuania and in the shelf; to prepare a new programme on a faster use of indigenous and renewable energy resources;

6) to prepare and implement a biofuel production programme and to increase the share of biofuel in the total balance of the transport fuel to 20% by 2025;

7) to develop distributed electricity generation;

8) to draft a nuclear energy development programme;

9) to adapt modern analytical methodologies to achieve that future strategic decisions in the field of reliability of energy supply

would be optimal and consider the risk level of different potential factors and their economic, social and political consequences.

XIX

DEVELOPMENT OF THE SECTOR OF INDIGENOUS AND RENEWABLE ENERGY RESOURCES

Local fuel resources include peat, firewood, lumbering and wood processing waste (bark, branches, sawdust, sawdust briquettes, etc.), agricultural production waste (straw, reeds, boon, etc.), hydro, wind, geothermal and solar energy. Biogas and biofuels produced from ethanol and rape oil have started recently to gain a definite position in the balance of local energy resources. Municipal and industrial waste can also be used as local fuel in the country. The wider concept of local resources covers all renewable including waste energy sources, i.e. the energy derived in any technological process and available as a waste product.

47. In 2005, the share of indigenous and renewable energy resources, including the energy produced during chemical processes (hereinafter referred to as "indigenous energy resources"), (indigenous oil excluded), in the total primary energy balance amounted to approximately 10.8% (0.94 million toe). A target should be that approximately 2 million tons of oil equivalent of indigenous energy resources (out of this number, approximately 450 000 toe of biofuel) are used by 2025 and this would account for nearly 20% in the primary energy balance.

48. Seeking to use indigenous energy resources to the maximum and thus reduce the import of fuel and the use of gas in generation of electricity and district heating, to create new jobs and reduce CO_2 emission, a programme aimed at a more speedy use of biofuel for heat and electricity generation will be drafted and implemented envisaging:

1) the application of modern technologies when using all the economically justified potential of the logging waste, which, by 2025, will amount to approximately 180 000 toe (investments amount to nearly LTL 120 million);

2) the creation and implementation of the logistics system for gathering, storage, transportation and use of straw in enterprises providing district heating. According to experts, straw remains unused in the agricultural sector of Lithuania and their energy value may amount to approximately 120 000 toe by 2025 (investments amount to nearly LTL 120 million);

3) planting of the energy crop plantations and constantly expanding their area to achieve the supply volume of approximately 45 000 toe by 2015 and by 2025 – nearly 70 000 toe for energy purposes;

4) arranging sorting of municipal waste and constructing incineration facilities for such waste by 2010 in Vilnius, and later – in Kaunas, Klaipėda, Šiauliai and Panevėžys to replace approximately 120 000 of fossil fuel (investments amount to approximately LTL 1 billion);

5) to replace approximately 450 000 toe of petroleum products with biofuel by 2025, by respectively expanding rape and other oil-bearing plants growing areas and the production of biodiesel, as well as comprehensively supporting the production of bioethanol using the latest technologies and versatile raw materials (investments amount to approximately LTL 300 million).

49. With a view to increasing the use of biofuel and other indigenous energy resources by reducing the demand in the imported fuel, the following measures will be undertaken:

1) drafting of the required legal acts regulating the use of renewable energy resources of all types in the energy and transport sectors. The State will support the implementation of projects aimed at achieving this goal and will create the conditions for the EU structural and other support funds to be used for this purpose;

2) encouraging the extensive use of indigenous energy resources by employing legal and economic measures, supporting enterprises growing energy plants and crops and producing biofuel;

3) implementing the programme for the construction of wind power plants with the total capacity of 200 MW and drafting a new long-term programme for using wind energy in Lithuania;

4) efforts will be made to increase the share of renewable energy resources in the primary energy balance by 1.5% each year until 2012 and by 2025 to reach 20% (***Table 19.1***).

Table 19.1. Consumption and forecast of indigenous and renewable energy resources, ktoe

	Year		
Type of resources	**2006**	**2010**	**2025**
Wood and wood waste	728.2	795	1015
Agricultural waste	1.7	25	120
Biogas	2	10	20
Energy crops		20	70
Wind energy	1.2	35	90
Hydro energy	34.2	40	45
Biofuel	20.9	115	450
Municipal waste		25	120
Geothermal and solar energy	1.7	10	45
Other resourses	0.1	15	80
Total,	790	1090	2045
% in primary energy balance	9.2	12.6	19.6

XX

ENHANCING ENERGY EFFICIENCY

50. As a result of structural changes and technological modernisation that occurred in the Lithuanian economy during the period between 1990 and 2004, primary energy intensity, i.e. energy consumption for the production of GDP unit, decreased 1.7 times, and final energy intensity decreased as much as 2.1 times. The economically feasible energy saving potential set in the National Energy Efficiency Programme for 2006–2010 is targeted at approximately 1.0 million toe.

Fig. 20.1 shows present energy efficiency indicator in various countries. In 2005, one tone of final energy consumed in branches of the Lithuanian economy (all resources are estimated in oil equivalent) allowed to produce the amount of GDP equal to 8386 USA dollars (at 2000 prices, using Purchasing Power Parities). This indicator is close to average in the EU-27 countries. However, one can interpret such high energy efficiency by comparatively low final energy consumption per capita. In 2005, final energy consumption per capita in Lithuania was 1.7 times less than average in the EU-27 countries. Therefore, the potential to increase energy efficiency is still large. One of possibilities to reduce energy demand is linked with renovation of the multifamily houses (constructed until 1992) apartment and public buildings.

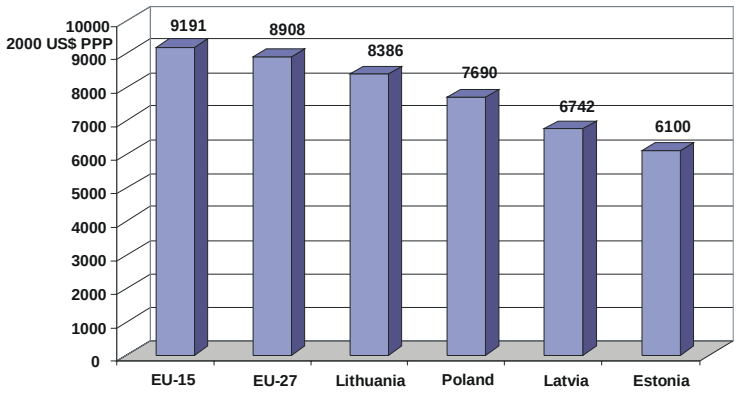

Fig. 20.1. Final energy efficiency indicators in 2005

51. Pursuant to the National Energy Efficiency Programme for 2006–2010, with the view of increasing the efficiency of consumption of energy resources and energy, the use of renewable energy resources in all economic sectors, including in particular buildings and their engineering systems, technological processes in enterprises, equipment in enterprises, establishments and households, the district heating sector and transport, the following measures are envisaged:

1) to carry out the energy policy brought in line with sustainable development objectives, as well as to incorporate energy efficiency into the common national policy by co-ordinating sectorial actions, working out and applying relevant regulation;

2) to undertake applied scientific research, information and educational activities relating to energy efficiency, the use of renewable energy resources, as well as to broaden syllabuses of related subjects at general education schools;

3) to ensure the effective use, renovation and modernisation of existing buildings;

4) to strengthen the capacity of owners and managers of buildings and other participants of the market to maintain, renovate and modernise buildings, as well as to improve their energy characteristics;

5) to adopt the common system for building energy efficiency assessment which is jointly developed by EU Member States;

6) to use resources of the EU structural funds to renovate multi-apartment houses in problem territories and public buildings by enhancing their energy efficiency;

7) to orientate the development of the industry sector towards up-to-date and environment-friendly technologies;

8) to improve the energy efficiency of equipment in enterprises, establishments and households;

9) to co-ordinate the development of all types of transport, giving priority to transport having less adverse impact on the environment;

10) to increase the efficiency of district heating systems.

52. As a result of the achievement of goals:

1) heat consumption in existing buildings will decrease by 7%;

2) buildings and their energy systems will be renovated, as well as properly used and maintained;

3) the monitoring of energy efficiency and energy demand good management projects will be conducted and summarised;

4) legal and methodical documents will be drawn up for positive regulation of energy efficiency and environmental pollution in the transport and industry sectors;

5) legal and regulatory documents concerning Lithuania's international obligations and commitments to the EU related to energy efficiency and the use of renewable energy resources will be improved and developed;

6) scientific research will be carried out, the public will be informed and educated about energy efficiency and the use of renewable energy resources.

53. The State will promote economically feasible measures and projects relating to building insulation and the modernisation of energy systems, the increase of energy efficiency in the industry, transport and other branches of the economy by using more financial resources from the EU structural and other support funds.

The renovation of public buildings and the modernisation of their energy systems will be further financed by their owners, using soft loans and drawing on other possible sources of financing.

With the view of accelerating the insulation of multi-apartment houses and the modernisation of their energy systems, the Programme for the Modernisation of Multi-apartment Houses approved by Resolution No 1213 of the Government of the Republic of Lithuania of 23 September 2004 (*Valstybės žinios*, 2004, No 143-5232) will be revised, envisaging additional financial and other measures aimed at encouraging apartment owners to renovate multi-apartment houses and involving low-income population in the implementation of such projects.

XXI

ENVIRONMENTAL PROTECTION

54. Lithuania shall meet the obligations assumed under international environmental conventions and implement the requirements set in the EU environmental directives that have impact on the development of the energy sector. The main environmental directions for the energy sector are as follows:

1) implementation of the requirements laid down in the Kyoto Protocol to the United Nations Framework Convention on Climate Change of 11 December 1997 (*Valstybės žinios*, No 126-5735, 2002) ratified by the Republic of Lithuania Law No IX-1203 of 19 November 2002 "On the Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change" (*Valstybės žinios*, No 126-5728, 2002) seeking to properly use the potential of increasing the efficiency of the energy consumption and the use of the renewable energy resources;

One of the most important priorities of the EU policy is stabilization of climate change by significant reduction of greenhouse gas emissions. Increasing amount of anthropogenic greenhouse gas emissions in the atmosphere causes increasing temperature of planet's surface and stimulates global worming. The main greenhouse gas emissions in Lithuania are the following: carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). In 2005, carbon dioxide in total structure of greenhouse gas emissions amounted to 62.7%, nitrous oxide – 22.3% and methane – 14.9%, hydrofluorocarbons (HFC) and sulfur hexafluoride (SF_6) – 0.1%. The combustion of fossil fuel generates the biggest part of country's greenhouse gases – in 2005 this part amounted to 58.5%. Agriculture is the second largest source of greenhouse gases – 18%. Greenhouse gases in agriculture are derived from fermentation processes, manure management, use of fertilizers, etc. The main source of CO_2 in the industry sector is production of cement, lime and bricks. Industrial processes generate 16.7% of greenhouse gases and the waste sector – 6.8%. At present the level of emissions of greenhouse gases in Lithuania is about 50% lower than Kyoto protocol requirements. However, since 2000 emissions of greenhouse gases are increasing (**Fig. 21.1**) due to very rapid growth of the country's economy.

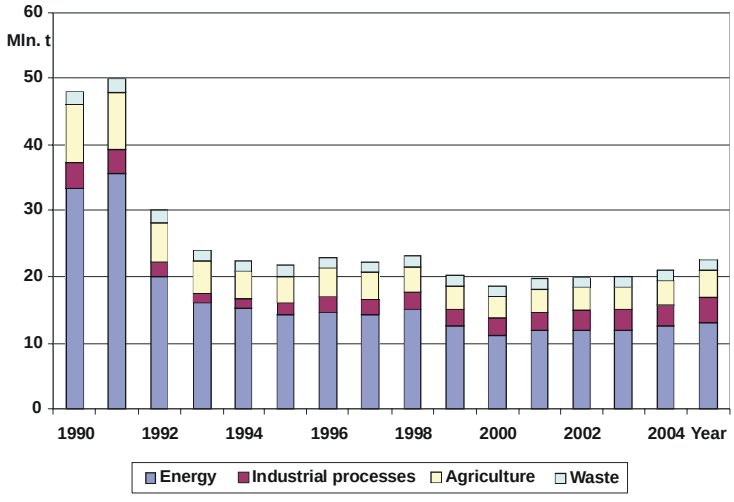

Fig. 21.1. Dynamics of greenhouse gas emissions

2) regulation of environmental protection including the implementation of measures mitigating the climate change in the energy sector by giving priority to flexible economic levers;

3) strengthening of institutional capacities, training of the participants in the energy sector, dissemination of information and

Greenhouse Gas Emission Trading Scheme (ETS) has been implemented by the EU Directive 2003/87/EC, which is considered as one of economical instruments for greenhouse gas emission regulation. European Commission (EC) is responsible for validation of the National Allocation Plans (NAP) elaborated by the Member States. The first phase 2005–2007 of ETS disclosed a fair amount of gaps. For the second phase 2008–2012, EC assigned to Lithuania cap of 8.85 million tons of CO_2 equivalent. This decision was based on analysis carried out using PRIMES mathematical model and didn't take into account Lithuanian NAP and provided explanations. In the future it is necessary to determine explicit and transparent methods and rules for cap allocation in each Member State, based on unanimous methodology and certified criteria's taking into account specific features of the national economies and energy sectors of the Member States.

education with a view to encouraging enterprises to actively participate in the ***emissions trading*** both in the EU trading system and in the global CO_2 markets: to introduce clean development mechanisms or joint implementation projects;

4) application of flexible measures for reducing the greenhouse gas emission into the atmosphere taking into consideration their interaction with other planned measures aimed at ensuring supply reliability (additional capacities market, auctions of reliability contracts, etc.), encouraging the use of the renewable energy resources (trade in green certificates) and increasing the efficiency of energy consumption (trade in white certificates, etc.) and avoiding double accounting;

5) application of financial innovations (the options, the futures, etc.) and their development in Lithuania seeking to minimize the risk of enterprises engaged in the emissions trading, trading in CO_2, green and white certificates and of participants in additional capacities markets;

6) encouragement of new type (third generation) informative, voluntary and educational measures aimed at reducing the negative impact of the environment (the development of demonstrational projects, ecological marking, contracts between voluntary enterprises and state environmental institutions, international environmental management systems and standards), which will replace, in the future, the flexible measures having economic effect on the energy sector;

7) development of measures aimed at reducing the amount of SO_2 and NO_x emitted into the atmosphere by implementing the national gas emission reduction and ambient air quality improvement programmes;

8) the amount of the greenhouse gas emission will be reduced by 8%, if compared with the base year of 1990;

9) properly using the potential for energy saving, efficient transformation and the use of indigenous and renewable energy resources, the emissions of the following gases will be reduced by the following amounts by 2010, if compared with the year 2004: CO_2 – by approximately 32% (3.9 million tons) per year, SO_2 – by 3% (1 thousand tons) per year, and NO_x – by nearly 21% (10 thousand tons) per year;

10) improvement and development of the monitoring of the emissions into the atmosphere and the pollution control systems applying the already effective requirements for monitoring of the greenhouse gas and drafting of the reports;

11) promotion of the research and development and the state subsidies, using the funds from the EU structural funds in the fields of

introduction of new, clean technologies that increase the efficiency of energy consumption and use renewable resources of energy, and innovations;

12) safe exploitation of the Ignalina NPP after constructing modern nuclear reactors of new generation in the future;

13) safe decommissioning of the second Ignalina NPP Unit and management of all types of nuclear waste using the latest technologies in compliance with international requirements;

14) introduction of the best available ways of production and technologies in the energy sector;

15) raising of any environmental taxes or the introduction of new ones in the energy sector will be carried out by respectively decreasing other taxes (profit, income, etc.) with a view to keeping the budget revenue at the same level and not increasing the tax burden.

XXII

MARKET LIBERALISATION AND IMPROVEMENT OF THE ENERGY SECTOR MANAGEMENT

55. Liberalisation of energy market relations will be continued and competition between energy companies will be encouraged seeking to accomplish the main objectives of the National Energy Strategy. Seeking to create favourable conditions for the integration of the energy sector into the EU energy markets, legal acts regulating the energy sector in compliance with the EU directives will be drafted and improved. When revising legal acts and developing market relations, it is intended to achieve the following goals:

1) to complete the liberalisation of the energy sector by opening the market in accordance with the requirements laid down in the Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC, to continue the liberalisation of the gas sector in accordance with the requirements laid down in the Directive 2003/55/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30/EC taking into consideration the expediency of using the exemptions stipulated in the directives;

2) development of cooperation with the Baltic countries by creating a common electricity market and later, having connected the Lithuanian, Polish and Swedish power systems, integration into the electricity market of the Western Europe and the Nordic countries;

3) encouraging foreign investors, which meet the national criteria, as well as those of the European and trans-Atlantic integration, to participate in the construction, modernisation and reorganisation of energy enterprises, and continue the privatisation of natural gas enterprises and a number of power plants;

4) retention of the state control in the electricity transmission company AB *Lietuvos energija*;

5) improving pricing in the energy sector by implementing, where possible, competition and competitive prices, and in monopolistic areas – the price cap principle prohibiting cross-subsidisation and

Green certificate systems are used for promoting the use of renewable energy sources. Under such schemes, the renewable electricity is sold at market prices. With a view to accumulating the financial resources for production of such electricity, all customers are obliged to buy a certain number of green certificates from power plants using the renewable energy resources according to a quota or fixed percentage of the total electricity consumption. As the users are willing to acquire such certificates only at the lowest possible price, the renewable electricity generators compete with each other in selling green certificates.

gradually introducing multi-component energy prices to be charged to all consumers;

6) improving the procedure for promoting energy generation from renewable energy resources and purchasing this energy, implementing competition between the producers, and, after 2020, introducing Green Certificate schemes or other systems;

7) to improve energy networks and adapt them to the development of the distributed energy generation and the use of renewable energy resources.

56. With a view to implementing the established strategic objectives of the energy sector, it is necessary to draft respective legal acts, to strengthen institutions of energy management, supervision and regulation, to increase responsibility for the decisions taken, and to define measures for their implementation that are based on a comprehensive analysis of the scenarios of sustainable development of the national economy and the energy sector, optimized calculations and the accumulated and systematised statistic information.

XXIII

TRAINING OF SPECIALISTS AND SCIENTIFIC RESEARCH

57. It is necessary to draft a national programme for training of energy specialists and specify therein the tasks for organising the studies, the quality of the study programmes, maintenance of the material base of institutions organising studies by taking into consideration the new needs and the sources of financing. When drafting and implementing this programme, national priority has to be given to it to ensure timely preparation of specialists for work in the new nuclear power plant as of the phase of mounting its technological equipment.

58. The Government, taking into consideration the new needs and the sources of financing, has to set the state-supported measures of assistance and commitments in the following priority areas of scientific research in the energy sector:

1) thermonuclear and new generation nuclear reactors (by participating in respective international programmes);

2) ensuring of reliability and quality of electricity supply, vulnerability of power systems and optimisation of operating regimes;

3) nuclear energy safety, reliability and durability of energy equipment and systems, and ageing of construction materials;

4) management, storage and disposal of spent nuclear fuel and other radioactive materials;

5) hydrogen energy;

6) technologies for the use of indigenous and renewable energy resources;

7) distributed energy generation technologies.

XXIV

FINAL PROVISIONS

59. For the implementation of the provisions of the strategy, the Government shall approve a five-year strategy implementation plan and programmes of action as laid down in paragraph 5 of Article 9 of the Law on Energy (*Valstybės žinios*, No 56-2224, 2002).

60. The Government shall annually inform the Seimas about the implementation of the provisions of the strategy in its annual report (the report on the status of the national security and development is a constituent part thereof).