Ministry of Economy of the Slovak Republic

New version

Energy Policy of the Slovak Republic

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CONTENTS

I INTRODUCTION

The Energy Policy of the Slovak Republic (Energy Policy) is the strategic document defining the energy sector's primary objectives and priorities to 2035 with a view to 2050.

The Energy Policy is a component of Slovakia's national economic strategy given that ensuring sustainable economic growth is conditioned by the reliable supply of affordable energy.

The Ministry of Economy of the Slovak Republic (Ministry of Economy) is responsible for completing the Energy Policy for a minimum period of 20 years and updating it on a five-year cycle at a minimum pursuant to Section 88 of Act No. 251/2012 Coll. on Energy and on amendment of certain acts as amended by Act No. 391/2012 Coll. (Act No. 251/2012 Coll. on Energy). Economic development, new trends in the liberalisation of energy markets in the European Union (EU), new legislation and new EU energy policy also required an update of the Energy Policy adopted in 2006.

The Energy Policy is intended to ensure the sustainability of the Slovak energy sector to contribute to the sustainable growth of the national economy and its competitiveness. The priority from this perspective is ensuring the reliability and stability of energy supply, efficient energy utilisation at optimum costs and ensuring environmental protection.

A well-functioning energy market with a competitive environment will be strengthened by Energy Policy implementation. The task of the Energy Policy is to create a stable framework for a safely operating energy market that motivates investments into energy. The Energy Policy is focused on the public as well as the private sector. It responds to the interests of consumers and end users in order to maximise the exploitation of the advantages offered by a liberalised and secure energy market.

The Energy Policy complies with the primary objectives of the Treaty of Lisbon and is based on the fundamental European goals for energy outlined in the *Europe 2020* strategy.

Slovakia is among a group of vulnerable countries with respect to energy security, and therefore it supports an energy architecture that creates the conditions for increasing energy self-sufficiency, pro-export capacity in electricity, transparency and optimisation of the energy mix with low-carbon technologies and increasing energy efficiency in the interests of stability, the development of the national economy and the interests of consumers and their protection.

Close cooperation between the countries of Central and Southeastern Europe is the key issue with respect to increasing the energy security of the entire region and is the driving force for Slovakia's active involvement in the creation of trans-European energy infrastructure, in particular in cooperation with Visegrad Four (V4) countries.

The Energy Policy emphasises the optimum use of domestic energy sources and low-carbon technologies such as renewable energy sources (RES) and nuclear energy.

A major milestone in the Slovak energy sector was the implementation of the Third Energy Package of the European Parliament and of the Council and directives concerning common rules for the internal market in electricity and gas upon the adoption of the Energy Act and the Act on Regulation of Network Industries at the end of July 2012.

II EUROPEAN UNION ENERGY POLICY

The European Commission (Commission) published its "***An energy policy for Europe***" communication in January 2007. This communication staked out the development of the energy sector by 2010 and targets for 2020.

The communication, respecting sovereignty and the energy mixes in individual EU countries, integrated energy policy with climate change policy and clearly formulated the three fundamental pillars of EU energy policy: ***energy security;***

competitiveness;

sustainability.

The European Council then adopted the ***Energy Action Plan 2007 – 2010*** in March 2007, which included significant commitments with respect to climate change:

- decrease *greenhouse gas emissions by 20% by 2020* compared to 1990;
- increase the share of *renewable energy sources to 20% by 2020*;
- achieve a *10% share of renewable energy sources in transportation by 2020;*
- achieve *20% energy savings compared to projection up to 2020*.

The approved Action Plan became the basic document used to develop the legislative framework in a subsequent period. Other strategic and legislative documents covering the individual areas of the action plan followed including: ***Strategic Energy Technology Plan (SET Plan)*** (2007), ***Third Energy Package*** (2007), ***Climate and Energy Package*** *(2008)* and ***Energy Efficiency Action Plan*** (2006 to 2011). Another round of strategic energy research and the Energy Security and Solidarity Action Plan in 2008 focused on the least developed pillar of energy policy, i.e. energy security, at a very opportune moment given the gas crisis that began in January 2009. The ***European Economic Recovery Plan*** (2008) included a proposal to support the development of energy infrastructure with support for specific projects in Slovakia involving the development of natural gas infrastructure.

The adoption of the ***Treaty of Lisbon*** in 2009 was a major milestone in the development of energy policy. Treaty on the Functioning of the European Union defined a new legal foundation for EU energy policy measures and Article 194 of the Treaty defines the basic objectives and principles of EU energy policy. The basic objectives of EU energy policy are to ensure the functioning of the energy market; ensure the security of energy supply in the Union; promote energy efficiency and energy savings and the development of new electricity generation technologies and support for electricity generated from RES, and promote the interconnection of energy networks. The basic principles of European energy policy specifically establish the sovereignty of the Member States in determining the composition of their energy mix and energy security.

The principles and objectives for energy to 2020 are based on the ***Europe 2020*** strategy and are described in more detail in the ***"Europe 2020: A strategy for competitive, sustainable and secure energy"*** communication. The priorities for energy include efficient use of energy sources in the EU; building a pan-European integrated energy market until 2015, empowering consumers and achieving higher level of energy security, maintaining EU's leadership in the development of energy technology, and strengthening the external dimension of the EU energy market.

Energy efficiency gradually became a focal point, as evidenced by the revision of EU energy policy in terms of energy efficiency with the adoption of the *Energy Efficiency Directive (2012/27/EU)*. The Directive lays out a common framework for energy efficiency measures in

the EU with the goal of securing the EU's primary energy efficiency target of a 20% reduction in energy consumption by 2020 on the basis of the Europe 2020 strategy. Slovakia will have to shift its primary focus in the near future to implementing this Directive. Member States have the obligation to transpose Directive 2012/27/EU by 5 June 2014 at the latest.

Within the area of energy infrastructure, the basic tasks in terms of developing infrastructure in the oil, gas and electricity sectors by 2020 and the basic long-term and short-term (by 2020) priorities in the area of European energy infrastructure to complete internal market connections were identified in the ***"Energy infrastructure priorities for 2020 and beyond"*** communication released in November 2010. Priorities with an impact on the development of energy infrastructure in Central-Eastern Europe and Southeastern Europe of importance for Slovakia include north-south natural gas pipeline and electricity grid connections, crude oil pipeline connections in Central Europe and the southern natural gas pipeline corridor. These priority European energy infrastructure corridors were incorporated in the ***"Energy Infrastructure Package"*** submitted in 2011 and adopted in 2013, in particular Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure (TEN-E) and Regulation No. 1316/2013 establishing the Connecting Europe Facility (CEF). The decision making body accepted a European list of projects of common interest (PCI) covering the electricity, gas and crude oil supply sectors in July 2013. The Commission should submit objectives for infrastructure connections to 2030 by October 2014.

Projects in the PCI list involving Slovakia include projects to connect the natural gas networks in Slovak and Hungary and Slovakia and Poland designed by eustream, a.s.; cluster connections between the electricity grids in Slovakia and Hungary designed by SEPS, a.s. and two crude oil projects, involving the Bratislava-Schwechat Pipeline (BSP) connection project between Slovakia and Austria to be completed by Transpetrol, a.s. and the project to overhaul and expand the JANAF-Adria pipeline combined with a project to overhaul and expand capacity of the Adria pipeline being implemented by the Hungarian MOL group, and/or Slovnaft a.s.

Representatives of Slovakia, Austria, Bulgaria, Czech Republic, Germany, Hungary, Poland, Romania, Slovenia, and deputies of Croatia and the Commission signed the *Memorandum of Understanding on North-South Interconnections in Central-Eastern Europe* (MoU) on 23 November 2011 in Brussels; the MoU also included an Action Plan, which included projects involving Slovakia.

The objective of these activities was to incorporate those North-South corridor projects relevant for Slovakia into the EU PCI list based on the regulation on guidelines for trans-European energy infrastructure (TEN-E), which replaced the previous mechanism for evaluating trans-European energy infrastructure (TEN-E) projects. Slovakia is a part of the regional groups for Central, Eastern and Southeastern Europe involved in North-South electricity, gas and crude oil connections and the Southern corridor regional group. These projects (if evaluated positively and included in the EU PCI list) will then compete for Commission support for implementation within future EU funding provided through the CEF.

The Commission analysed the consequences of the commitment to decrease greenhouse gas emissions by 80 – 95% compared to their 1990 levels and defined the extent of emissions reductions in key sectors by 2030 and 2050 in its ***Roadmap for moving to a competitive low carbon economy in 2050*** (03/2011). Electricity will play a central role in the low carbon economy. The Commission's analysis showed that it could contribute to a near complete elimination of CO_2 emissions and potentially offer a partial replacement for fossil fuels used in transport and heating by 2050. The Commission called on other European institutions and member states to take this plan into consideration in the subsequent development of European, domestic and regional policies focused on building a low carbon economy by 2050.

The Commission investigated a number of scenarios for the "de-carbonisation" of the energy system and ways to secure energy deliveries and competitiveness to 2050 in its **Energy Roadmap 2050** communication (12/2011). The plan attempts to elaborate a long-term technologically neutral European framework for energy policies in order to achieve the required level of security and stability in investments into the energy system. The roadmap plan does not serve to replace national, regional and local efforts focused on modernising energy supply; rather it seeks to elaborate a long-term technologically neutral European framework in which these policies are more effective.

The European Commission published the **"Renewable Energy: a major player in the European energy market"** communication (06/2012) with the objective of ensuring sustainable growth after 2020. The Communication contains basic priorities, including improved coordination of support schemes, boosting the role of the Southern Mediterranean, increasing the utilisation of support mechanisms and advancements in the area of energy technologies.

The European Commission released the **Green Paper:** ***A 2030 framework for climate and energy policies*** in March 2013 and began the debate on the form of the ***Framework for climate and energy policies after 2020***. The European Commission published the **European Commission's Communication on the 2030 framework for climate and energy policies** on 22 January 2014 building upon the Green Paper from March 2013. The Council adopted a commitment to adopt the 2030 framework for climate and energy policies by October 2014 at its meeting held on 20 – 21 March 2014. Slovakia has not yet firmed up a definitive position in this regard given the coordination of positions between the involved departments (Ministry of Finance, Ministry of Environment and Ministry of Economy). The Ministry of Economy during negotiations on this future framework will emphasise the need to maintain sovereignty in the area of the energy mix, the non-binding nature of the targets after 2020 for RES, energy efficiency, the need to respect national specifics, as well as the need to develop RES in a cost-effective manner; however the Ministry remains open to discussions regarding binding greenhouse gas emissions decrease targets to 2030 so long as specific conditions are met.

The European Commission identified barriers and measures needed to fulfil the objective of building the EU's internal energy market (IEM) by 2014 and eliminating the isolation of member states by 2015 within its ***"Making the internal energy market work"*** communication (11/2012). The communication also contained recommendations for Slovakia regarding the removal of energy supply pricing regulations, resolving loop-flow issues and the development of north-south connections in the gas and power industries. The European Commission's (EC) Communication on the Internal Energy Market from May 2013 and the Communication on the Internal Energy Market including the Commission's Guidance for state intervention from November 2013 are related to these documents. Slovakia will emphasise the critical importance of implementing the priority energy infrastructure projects (PCI), the role of regional initiatives in the integration of markets with electricity and gas, the need to adopt balanced network regulations and in particular considerations for issues related to loop-flows in the discussion for completing the Internal Energy Market.

III ENERGY POLICY OF THE SLOVAK REPUBLIC

1 BASIS OF ENERGY POLICY

1.1 Assessment of the fulfilment of measures and recommendations from the 2006 Energy Policy

The Energy Policy adopted by the government in Resolution No. 29/2006 (2006 Energy Policy) laid out the following commitments:

1. Complete a strategy for increasing the utilisation of renewable forms of energy in Slovakia.

   The Strategy for Higher Utilization of Renewable Energy Sources in the Slovak Republic was completed and approved by the government in Resolution No. 383 of 25 April 2007.

2. Complete analysis of opportunities to diversify the sources and transportation routes for crude oil and natural gas.

   This analysis was completed and incorporated into the ***Energy Security Strategy of the Slovak Republic*** approved by the government in Resolution 732 of 15 October 2008.

3. Complete an energy efficiency plan and submit it to the government for discussion

   The Energy Efficiency Concept of the Slovak Republic was completed and approved by the government in Resolution No. 576 of 4 July 2007.

The government recommended:

1. Implementing the 2006 Energy Policy when conducting state administration activities in the energy sector.
2. Creating the conditions for the construction of connecting infrastructure with neighbouring countries.
3. Considering the 2006 Energy Policy in regulatory policy.
4. Developing the 2006 Energy Policy into regional energy policies.

All recommendations from the 2006 Energy Policy were or are currently being implemented.

1.2 Assessing fulfilment of 2006 Energy Policy objectives

1. Ensuring secure and reliable supply of all forms of energy in the required quantity and quality at optimised costs for the needs of sustainable economic growth.

   Reliable supply of all forms of energy (with the exception of natural gas during the 2009 gas crisis) was ensured throughout the monitored period.

2. Ensuring self-sufficiency of electricity generation.

   The balance of electricity generation to consumption was balanced in 2013.

3. Lowering energy intensity.

   Energy intensity decreased by approximately 19% between 2006 and 2012.

1.3 Assessment of the tasks, of fulfilment of measures and of recommendations from the Energy Security Strategy of the Slovak Republic

1. The priorities and measures of the strategy are considered in strategic and conceptual materials and draft legislation completed by the individual departments.
2. Draft methodology was developed in order to implement expanded monitoring of the section of Danube River affected by the implementation of the overall water management project modifications made upriver in Austria and the issue is being resolved permanently through contact with Austrian authorities.
3. Harmonisation of current legislation in force resolving the issue of the incineration of wastes with the strategy was secured with an amendment to Act No. 343/2012 Coll. on Wastes.
4. The Concept for Use of the Hydropower Potential of Rivers in the Slovak Republic was approved by the government in Resolution No. 178/2011.
5. The criteria for issuing certification for the construction of energy installations were supplemented to include the priorities contained in the strategy and updated on the Ministry of Economy's website.
6. Competent authorities in Slovakia held numerous meetings with the representatives of stakeholder institutions and organisations in order to coordinate activities in promoting the construction of the Wolfsthal – Bratislava waterworks project and finding potential solutions.

The following documents were published in the *Draft of Primary Measures to Safeguard Energy Security*: Act on Promotion of Renewable Energy Sources and Cogeneration of Heat and Electricity, Act on Ecological Design, Act on Energy Efficiency and the new Act on Energy, Act on Regulation in Network Industries and Regulatory Office for Network Industries Decree No. 24/2013 Coll. defining the rules for the operation of the internal electricity market and the rules for the operation of the internal gas market, which replaced government regulations defining the rules of the electricity and gas markets (defined in detail in the Annex).

Geological storage of CO_2 from fossil fuel power plants is stipulated in Act No. 258/2011 Coll. on the Permanent Geological Storage of Carbon Dioxide and on amendment of certain acts as amended.

1.4 Fundamental legislative changes since adoption of the 2006 Energy Policy

A number of new acts and amendments as well as government resolutions and strategic materials have been adopted and published since 2006. The key legislative standards within this period include: the amended Act on Energy and Act on Regulation; and Acts on the National Nuclear Fund, Energy Efficiency, Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and amendments thereof. The new Act on Energy and the Act on Regulation in Network Industries were issued in 2012 within the implementation of the EU's Third Energy Package (defined in detail in the Annex).

1.5 Conceptual documents adopted since 2006

The most important strategic and conceptual materials are: the Concept of Energy Efficiency of the Slovak Republic (2007), the 2008 – 2010 First Energy Efficiency Action Plan (2007), the Strategy for the Final Stage of Nuclear Energy (2008), the Energy Security Strategy of the Slovak Republic (2008), the Concept for Use of the Hydropower Potential of Rivers in the Slovak Republic to 2030 (2010), the National Action Plan for Renewable Energy Sources (2010) and the 2011 – 2013 Energy Efficiency Action Plan (2011), updated analysis of the functioning of state aid for mining (2012), the Strategy for the Final Stage of Peaceful Utilization of the Nuclear Energy in SR (2014), regulatory policy for subsequent regulatory periods including assessment of the efficiency of regulatory methods, justification for regulation in network industries and the proposal for the implementation of future regulation (2007, 2008, 2009, 2011 and 2012) (a detailed list is provided in the Annex).

1.6 Privatisation and liberalisation of the energy market

The process of liberalising the gas and electricity markets has continued since 2006 and since led to the legal separation of generation/supply from transmission/distribution activities.

Slovenské elektrárne a.s. was privatised in April 2006 with Enel, a.s. becoming the majority shareholder by purchasing 66% of all the company's shares.

A specific number of problematic areas remained open within the privatisation of Slovenské elektrárne a.s. First of all, it involved the actual closing of the purchase and sale transaction for a 66% interest in the share capital of Slovenské elektrárne, a.s., where the contracting parties agreed to define the purchase price for the transfer of Slovenské elektrárne, a.s. shares at a later time pursuant to the purchase and sale agreement for a 66% interest in the share capital of Slovenské elektrárne, a.s.; however, no such agreement has been made. There are other open questions involving the operation of the Gabčíkovo hydropower plant, against which several state institutions and state enterprises are involved in unresolved litigation against Slovenské elektrárne, a.s. Last but not least is the question of covering the historical debts for the final phase of nuclear power plant operations (covering the costs of the decommissioning of a nuclear power plant (NPP) A1, decommissioning NPP V1, processing and storing radioactive waste (RAW) including decommissioning and storage of spent nuclear fuel from NPP V1 and the final storage of spent nuclear fuel from NPP V1 and highly radioactive RAW from NPP A1 and NPP V1) where it is critical to resolve this deficit in the form of a specific contribution made to the National Nuclear Fund for decommission of nuclear facilities and for management of spent fuel and RAW.

In the same year, pipeline and distribution activities at Slovenský plynárenský priemysel, a.s. (SPP, a.s.) were legally separated with the creation of two subsidiaries: *eustream, a.s.* and *SPP – distribúcia, a.s.*

The legal separation of distribution from the supply or sales of electricity was accomplished in 2007 in distribution companies in the power industry with the creation of three regional distribution network operators (ZSE Distribúcia, a.s., SSE Distribúcia, a.s., Východoslovenská distribučná, a.s.) and three electricity providers. All consumers also became eligible consumers and gained the ability to select their own electricity and gas provider.

The major events taking place over the last eight years include: the shutdown of two units at the V1 Jaslovské Bohunice Nuclear Power Plant (NPP V1) (2 x 440 MW) at the end of 2006 and 2008, as a result of which Slovakia in 2007 lost its self-sufficiency in electricity generation; the establishment of the National Nuclear Fund for decommissioning of nuclear

facilities; the repurchase of 49% of the shares of Transpetrol, a.s. from Yukos; the establishment of Jadrová energetická spoločnosť Slovenska, a.s. (JESS, a.s.) to secure the preparation, construction and operations of a new nuclear power plant at Jaslovské Bohunice and the creation of the short-term electricity market operator as a 100% subsidiary of the transmission system operator Slovenská elektrizačná prenosová sústava, a.s. (SEPS, a.s.); successful implementation of the 2008 – 2010 Energy Efficiency Action Plan and the declaration of the 2011 – 2013 Energy Efficiency Action Plan and the establishment of a joint Czech and Slovak European Nuclear Forum focused on finding joint solutions to issues related to nuclear energy in a European and national context.

The Slovak government decided within Resolution No. 656/2012 and on the basis of the new Energy Act that it would not apply a model of separate ownership for the transmission network operator within unbundling in the gas industry and as a result eustream, a.s. was not placed under separate ownership from SPP, a.s.; rather it remains a part of a vertically integrated company. SPP, a.s. must fulfil stringent conditions defined in requisite legal regulations to ensure the independent activity of the transmission network operator (applying the ITO model).

1.7 Market regulation

The process of liberalising prices on the energy market is one of the prerequisites for its further expansion, improving the quality of services, increasing energy efficiency, including on the part of consumers, and improving energy security. The creation of an environment that closely mimics that of a competitive environment where its existence otherwise would be impossible for objective reasons i.e. operating utility networks and systems, is the essence of tangible and pricing regulations in network industries based, *inter alia*, on the independence, impartiality and transparency of the national regulator and a stable and predictable legislative and regulatory framework, taking into account the high intensity and the long-term nature of investment into energy infrastructure.

Fluctuations in prices of raw materials, such as crude oil, natural gas and electricity, on international markets have an impact on energy prices in Slovakia. Prices of crude oil, petroleum products and emissions on global commodity exchanges are linked to the prices of electricity and natural gas. This means that increases in oil prices are reflected in increasing electricity (natural gas) prices and vice versa with a certain time delay. The economic crisis drove a surplus of energy on commodity exchanges, which then pushed market prices down. Alternative electricity suppliers began exhibiting greater activity on the Slovak market between 2009 and 2011 for entrepreneurs and households while new gas suppliers for the household segment began offering their services in 2011. The regulatory method for electricity and natural gas prices has changed from a "revenue-cap" to a "price-cap" method, thereby introducing a price limit to enable regulated entities to retain the profit they generate while respecting efficiency and cost reductions. Pricing regulation in the area of supply, regardless of method, allows suppliers to cover all of their costs associated with supplying energy and the required level of service quality and generate adequate profit.

A new regulatory instrument, quality-of-service regulation, was deployed in 2009 and is primarily intended to protect consumers. The Regulatory Office for Network Industries (Regulatory Office) focuses on monitoring and auditing compliance with the standards for quality among regulated entities in the 2012 – 2016 regulatory period. These regulated entities must ensure that consumers receive an acceptable level of quality for the price they pay for electricity, heat or natural gas. If not, the regulated entity is obliged to pay the consumer a compensatory payment. Expansion of the scope of price regulation to include quality

regulation improve the quality of delivered goods and provided services in regulated activities; however, on the other hand, it is also important that price regulation and other regulatory activities enable energy suppliers and other regulated entities to secure their activities in an economically effective way as highlighted above. Conversely, regulated entities may also be penalised under the Act on Regulation if they do not reach the lowest permitted standard of quality as defined by the Regulatory Office and the number of audits of regulated entities is increasing.

2012-2016 Regulatory Policy introduced a system change for accounting deviations for electricity sellers, unified the calculation of prices and introduced compensatory payments for failing to provide deliveries and services at an acceptable level of quality. The regulatory environment is stable, predictable and transparent and the decisions of the regulator are thoroughly justified and supported by relevant economic analyses so as to have a positive impact on the business environment and to improve the operation of the energy market. The Regulatory Office's continued independence, impartiality and transparency in exercising the assigned competencies have been secured thanks to enhancement of its competencies and powers and its ability to investigate the cost structure of regulated entities in order to configure a fair regulation structure.

The EU's Third Energy Package for the internal electricity and natural gas markets from 2009 was implemented with the adoption of Act No. 250/2012 Coll. *on Regulation in Network Industries*. This Act ensures a higher level of independence for the Regulatory Office and strengthened its powers in the area of defining regulated prices as well as audit activities in regulated entities. The Act significantly expanded the powers of the Regulatory Office in surveillance over the regulated entities. Ministry of Economy commenting on price proposals also ended with the adoption of this Act.

The necessary groundwork was laid in Slovakia for opening the market and healthy competition and all relevant EU legal acts were fully transposed to make room in the future for decreasing the regulatory burden in the energy sector while achieving an adequate level of market liberalisation. The preservation of price regulations is required only for those segments of the market where natural monopolies exist. The protection of vulnerable consumers must be ensured before any further reductions or the complete end of price regulation. The need to preserve regulation at the national level going forward is demonstrated by the targeted definition of groups of consumers in line with the Third Liberalisation Package. Act No. 250/2012 Coll. on Regulation in Network Industries defined that the Regulatory Office would complete a concept for protecting consumers qualifying under energy poverty conditions in cooperation with the Ministry of Economy, Ministry of Finance and Ministry of Labour, Social Affairs and Family. The Regulatory Office will submit the concept to the government and will update it going forward for each future regulatory period.

Basic energy commodities, specifically electricity, gas, heat and hot water, are delivered to end users pursuant to the quality standards issued by the Regulatory Office in the form of Decrees No. 275/2012, 276/2012 and 278/2012 from 2012. Providing energy audits and energy services are stipulated in Act No. 476/2008 and its secondary regulations. Further improvements in providing energy services and increasing consumer awareness of their energy consumption have been enabled by transposing of Directive 2012/27/EU on energy efficiency.

The adopted acts ensure a higher level of independence for the Regulatory Office and strengthen its powers in the area of defining regulated prices as well as audit activities in regulated entities. The Regulatory Office's competencies based on requisite directives, competences in the area of surveillance over regulated entities have been expanded with a draft act. Such proposed competencies and powers of the Regulatory Office serve to restrict

any possible non-transparent financial transactions blocking development of competition on the market and discrimination against other parties on the electricity and gas markets.

The measures adopted in the draft acts supported the expectations of stability and decreasing energy prices The Ministry of Economy placed the highest priority in the draft acts on solutions beneficial to Slovakia's economic interests, the protection of energy consumers, in particular vulnerable consumers, and combating energy poverty. The acts fully implemented the conditions of an open and competitive market for gas and electricity, increased transparency on the market for gas and electricity, significantly enhanced the rights of electricity and gas consumers with emphasis on protection of vulnerable consumers and raised the level of awareness among energy consumers.

The Regulatory Office received competencies with the adoption of two key energy acts that enabled it to exert significant influence in the creation of network fees thanks to secondary legislation. The Regulatory Office issued requisite decrees and decisions that created realistic expectations for a decrease of network fees.

Legislation produced by the Regulatory Office thoroughly applied European legislation on the protection of the most vulnerable groups of consumers and the provisions of the Third Energy Package concerning the right to fair prices for all market participants. Measures were taken to ensure safe and reliable deliveries for consumers.

The Regulatory Office completed the "Concept for protecting consumers qualifying under energy poverty conditions" in 2013 in cooperation with the Ministry of Economy, Ministry of Finance and Ministry of Labour, Social Affairs and Family. The Minister of Economy established a committee upon the basis of a government resolution to resolve minimising the impact of energy prices on vulnerable consumers.

The protection of clearly defined groups of energy consumers within the household segment must be ensured going forward via instruments that will not deform the energy supply market while such instruments of protection should also be non-discriminatory and transparent in relation to energy suppliers. It is also necessary to consider the inherent size and structure of the Slovak gas and electricity market while improvements in the current situation in the form of needed competition and pressure on prices is expected from the completion of the fully functional and integrated EU internal market.

Price regulation for the supply of household heating gas ended after 2013 pursuant to regulatory policy; however, on the other hand, price regulation was restored, in spite of the developed competitive environment, for small enterprises in order to provide higher protection of their rights as the party at a disadvantage in supply contracts.

1.8 Energy poverty

The Regulatory Office completed the "Concept for protecting consumers qualifying under energy poverty conditions" in cooperation with the Ministry of Economy, Ministry of Finance and Ministry of Labour, Social Affairs and Family pursuant to Section 9(3)(f) of Act No. 250/2012 Coll. on Regulation in Network Industries.

The problem of energy poverty was tabled by the European Union in legal regulations contained in the EU's Third Energy Package.

The objective of this concept is to provide an idea as to how other EU member states deal with energy poverty and to highlight a number of processes and solutions that could be applied in Slovakia.

The Regulatory Office's competencies do not include the full scope of the issue of energy poverty (e.g. social policy or increasing residential energy efficiency). The concept therefore

strictly differentiates between potential instruments for resolving this issue at the government level and at the level of the national energy regulator as the party responsible for potential pricing measures in the energy sector directed towards socially vulnerable groups of residents. It clearly states the impossibility of resolving energy poverty from the position of the national energy regulator as an isolated element of public administration and accentuates the need for an integrated approach to resolving this social issue involving all public stakeholders, which could be coordinated from the government level.

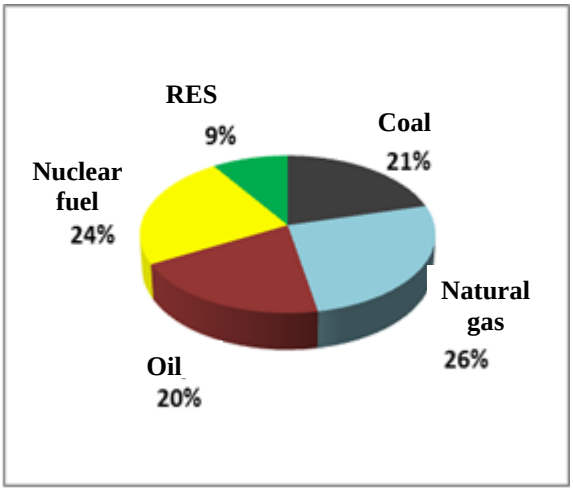
1.9 Energy mix

Slovakia has a balanced share of nuclear fuel and fossil fuels in terms of gross inland energy consumption[1].

The shares of the individual energy sources in gross inland energy consumption in 2012 were as follows: natural gas 26%, nuclear fuel 24%, coal 21%, oil 20% and renewable energy sources, including hydropower, 9%.

The energy development concept is focused on optimising the energy mix in terms of energy security.

Fig. 1 Energy mix 2012 (Source: Ministry of Economy)



1.10 Development of inland energy consumption

1.10.1 Gross inland energy consumption

Slovakia maintains a long-term declining trend with concurrent growth in gross domestic product (GDP).

[1] The term **gross inland energy consumption** was introduced into energy statistics in 2002 to replace the previously used **primary energy sources (PES)**. Gross inland energy consumption includes direct generation (brown coal, lignite, oil, natural gas, heat and electricity) in Slovakia and is modified by recovered products, the export-import balance and utilisation of stocks. This includes the export-import balance and utilisation of stocks from other energy sources including black coal, coke, briquettes, diesel, naphtha, light and heavy fuel oil, kerosene, coke oven and blast furnace gas and other solid, liquid and gaseous fuels.

Fig. 2 Development of GDP and gross inland energy consumption (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

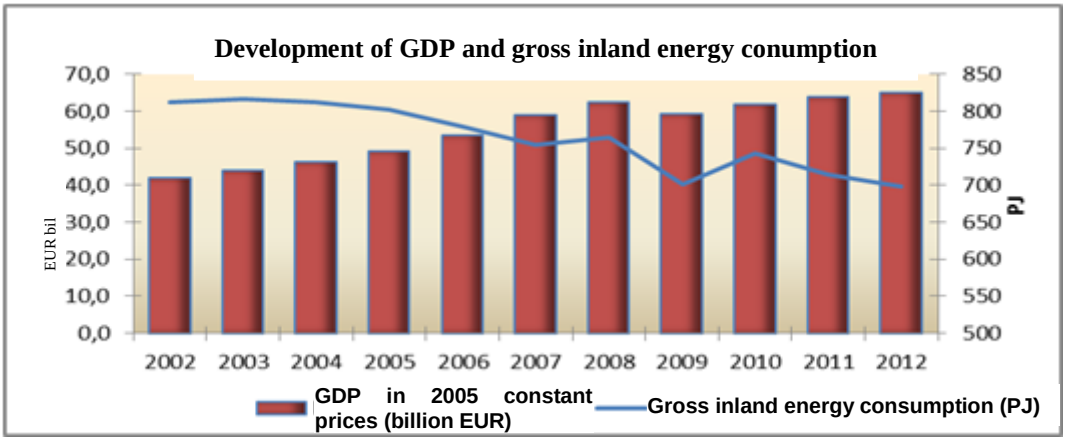


Table 1 Development of GDP and gross inland energy consumption (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GDP in 2005 constant prices (billion EUR)	42.0	44.0	46.2	49.3	53.4	59.0	62.4	59.4	61.9	63.9	65.2
Gross inland energy consumption (PJ)	813	816	812	803	779	754	764	702	743	716	699

The decrease in gross inland energy consumption is largely due to the restructuring of industry in the 1990s, the transition of investors over to sectors with higher added value and broader application of energy efficiency principles through the introduction of modern production technologies with lower energy intensity, insulating buildings, consumers transitioning to more energy saving appliances and savings resulting from the deregulation of prices.

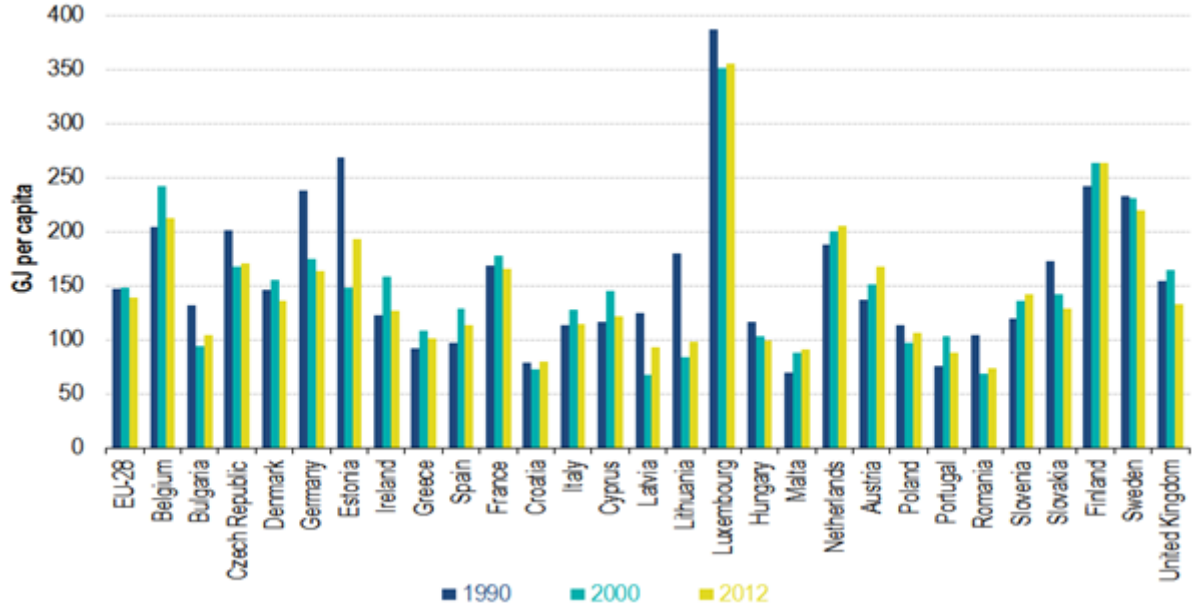
The total reduction in gross inland energy consumption from 2002 to 2012 totalled 14% (114 PJ). The long-term declining trend in gross inland energy consumption was maintained in 2012 and the same year recorded the lowest total value (699 PJ) during the entire monitoring period, even lower than the total of 702 PJ for 2009 driven by the economic crisis.

1.10.2 Per capita gross inland energy consumption

The reduction in gross inland energy consumption is a positive trend in meeting one of the Energy Policy targets, including a decrease in energy intensity, or specifically the ratio of gross inland energy consumption to GDP.

The per capita gross inland energy consumption in Slovakia in 2012 was 129 GJ per capita which is approximately 10% lower than the gross inland energy consumption in the EU 28 of 141 GJ per capita.

Fig. 3 Development of per capita gross inland energy consumption (GJ per capita) in the EU28 in 1990, 2000 and 2012 (Source: Ministry of Economy)



1.10.3 Final energy consumption by individual sectors

Final energy consumption recorded a 14% decrease over the past 10 years (64 PJ). Final energy consumption totalled only 379 PJ in 2012 as compared to 443 PJ in 2002. This development is the result of introducing less energy intensive technologies in industry and energy efficiency measures in households. Only the transport sector recorded an increase in final energy consumption over the past 10 years; decreases were recorded in all other sectors, including households.

Final energy consumption of 69 GJ per capita in Slovakia is approximately 32% below the EU 27 average, which is 91 GJ per capita.

Final energy consumption in households has exhibited a decreasing trend since 2010 and was almost 8% lower in 2012 than the previous year.

Fig. 4 Final energy consumption by individual sectors in PJ (Source: Ministry of Economy)

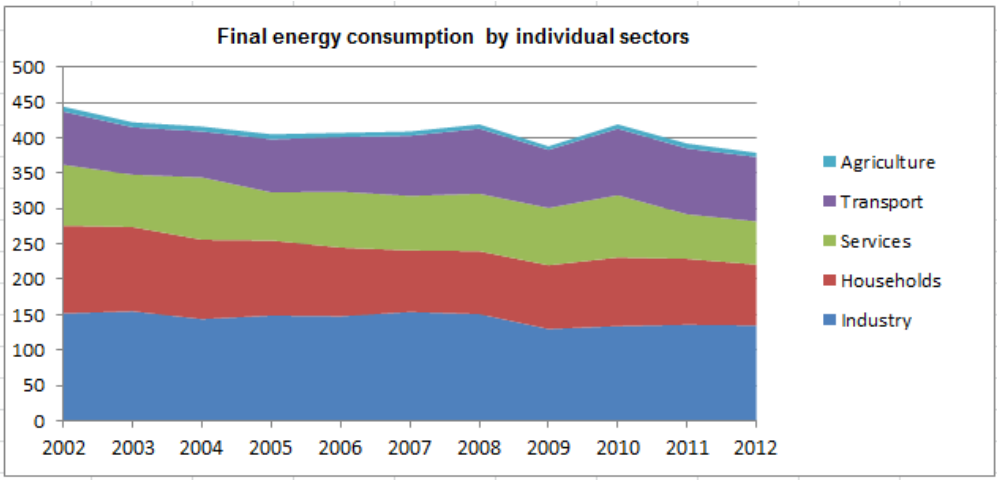


Table 2 Final energy consumption by individual sectors (Source: Statistical Office of the Slovak Republic)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Industry	152	155	144	149	148	154	151	130	134	136	135
Households	124	119	112	106	97	87	89	90	97	93	86
Services	86	74	88	68	79	77	81	81	88	63	61
Transport	75	67	65	75	77	85	92	82	94	93	91
Agriculture	7	7	7	7	6	6	6	5	6	7	6
Total (PJ)	**443**	**421**	**415**	**404**	**406**	**409**	**418**	**389**	**419**	**391**	**379**

Final household energy consumption per capita in Slovakia, which was 17.2 GJ per capita in 2011 and 16 GJ per capita in 2012, is still below the European average of 23 GJ per capita. (2011). Future growth in electricity consumption must be considered given the expansion of air conditioning and electric vehicles. Energy efficiency measures, in particular insulating panel-construction apartment blocks and family homes, will serve as a counterbalance to these increases.

1.11 Expected development of gross inland energy consumption – alternative scenarios

The development of gross inland energy consumption by fuel type is primarily influenced by economic developments, which themselves are difficult to forecast; three scenarios are considered for this reason:

1.11.1 High scenario

This scenario forecasts significant growth in GDP and thereby significant growth in primary energy source consumption or gross inland energy consumption up to a level of approximately 868 PJ. Such development is the least realistic from a current perspective.

The "nuclear fuel" column includes the entire volume of heat generated from nuclear fuel in nuclear reactors used for heating and electricity generation, including electricity for export purposes.

Fig. 5 Gross inland energy consumption development scenarios (PJ) (Source: Ministry of Economy)

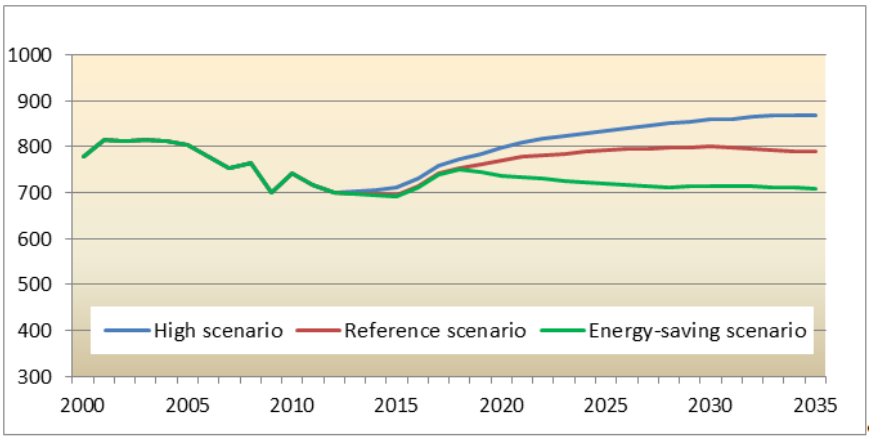


Table 3 Gross inland energy consumption development scenarios (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

Gross inland energy consumption (PJ)	2000	2005	2010	2012	2015	2020	2025	2030	2035
High scenario	778	803	743	699	712	797	835	860	868
Reference scenario					694	769	792	800	790
Energy-saving scenario					686	735	721	714	708

1.11.2 Reference scenario

This forecast for the development of gross inland energy consumption in this scenario anticipates growth to a level of around 800 PJ by 2030, after which it should stagnate at this level. A decrease in coal consumption is expected, balanced out with an increase in the consumption of nuclear fuel (electricity), petroleum products and RES.

A significant increase in gross inland energy consumption will occur as a result of increased nuclear fuel consumption with the start-up of Mochovce 3 and 4 Nuclear Power Plant (NPP Mochovce 3, 4) and the planned New Nuclear Power Plant at Jaslovské Bohunice (New NPP).

Graph 6 shows one of the potential alternatives for the development of gross inland energy consumption which includes the Jaslovské Bohunice V2 Nuclear Power Plant (NPP V2) with installed generation capacity of 1000 MW to be replaced by a new nuclear power plant with installed generation capacity of 1200 MW by 2030.

1.11.3 Energy saving scenario

This scenario involves a decrease in consumption of primary energy sources. A continuation of the trend of decreasing gross inland energy consumption is in line with the current trend of significant decreases in energy intensity. The expectation is for a systematic reduction in the consumption of primary energy sources with expected GDP growth up to 3%. This development in the consumption of primary energy sources involves subsequent increases in the implementation of full-scale energy efficiency and rationalisation measures in every sector of the economy, in particular in housing and in transport. The new Directive 2012/27/EU on energy efficiency will make a major contribution towards such efforts as countries are obliged to contribute to the European target of decreasing primary energy consumption[2] by 20% compared to the PRIMES 2007 reference scenario.

[2] Primary energy consumption is gross inland energy consumption less non-energy consumption.

Fig. 6 Development in gross inland energy consumption (PJ) – reference scenario (Source: Ministry of Economy)

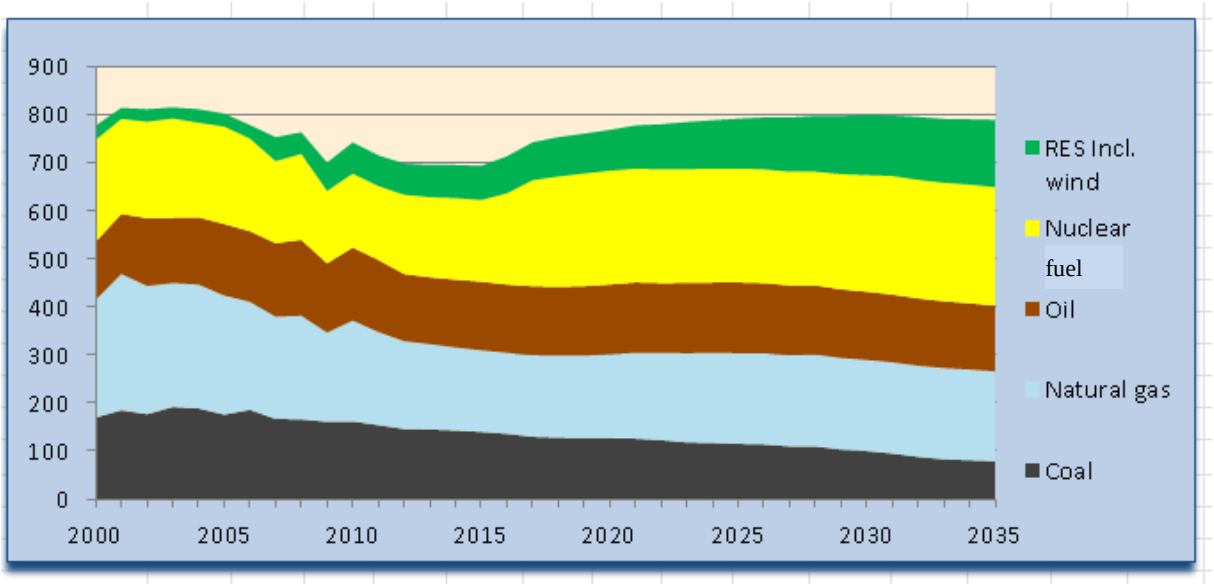


Table 4 Development in gross inland energy consumption – reference scenario (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

(PJ)	2000	2005	2010	2012	2015	2020	2025	2030	2035
Coal	170	176	162	146	140	127	115	100	80
Natural gas	245	248	210	183	170	175	189	185	185
Oil	121	149	152	140	143	145	147	142	137
Nuclear fuel	212	203	154	165	170	237	237	247	247
RES including wind	30	27	65	65	71	85	104	126	141
Total	**778**	**803**	**743**	**699**	**694**	**769**	**792**	**800**	**790**

1.12 Expected development of final energy consumption

The development of final energy consumption behaves differently compared to gross inland energy consumption. Subsequent decreases in energy intensity are expected, with improved efficiencies in the conversion of primary energy sources for all scenarios of final energy consumption development. Three scenarios were considered. Growth in final energy consumption is expected until 2035 under the reference scenario. The energy-saving scenario counts on subsequent decreases in final energy consumption.

A significant decrease in final energy consumption of 10% (40 PJ) was recorded between 2010 and 2012. In the case of the energy-saving scenario and the application of key long-term energy efficiency measures, further decreases in final energy consumption may occur by 2035.

Fig. 7 Final energy consumption development scenarios (PJ) (Source: Ministry of Economy)

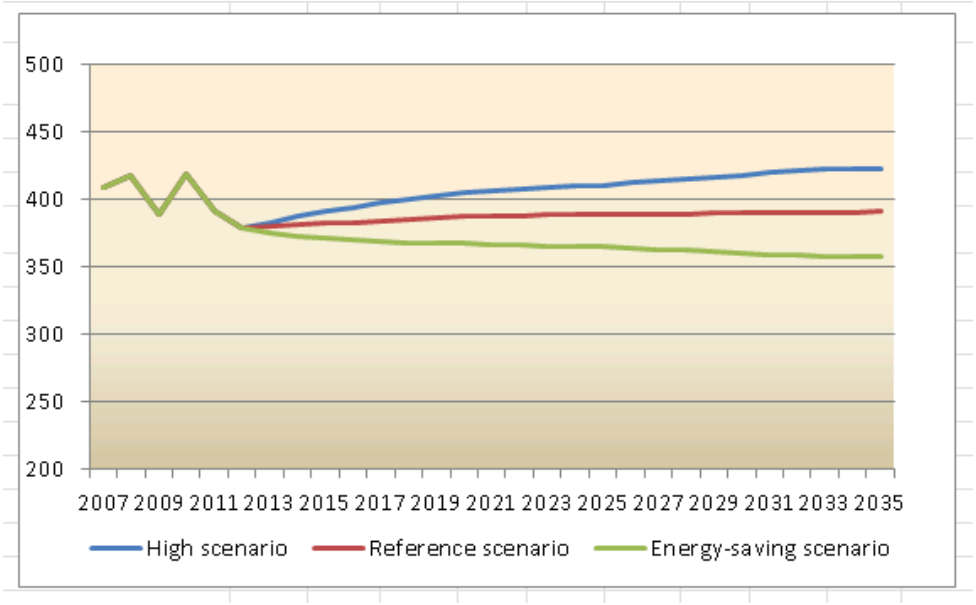


Table 5 Final energy consumption development scenarios (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

Scenarios (PJ)	2007	2010	2012	2015	2020	2025	2030	2035
High scenario	409	419	379	391	405	411	418	424
Reference scenario				382	387	389	390	391
Energy-saving scenario				371	368	365	360	358

2 STRATEGIC OBJECTIVE AND PRIORITIES OF THE ENERGY POLICY OF THE SLOVAK REPUBLIC

Sustainable energy supply is one of the basic prerequisites for sustainable economic growth and concerns secure and reliable energy supply at optimised costs and the effective use of such energy with thorough environmental protection.

The Energy Policy is influenced significantly by EU targets of a 20% reduction of greenhouse gas emissions, a 20% increase in energy efficiency and a 20% utilisation rate of RES by 2020. Energy Policy targets and priorities are defined so as to fulfil the targets defined at the EU level.

The *Roadmap for moving to a low carbon economy in 2050* and the *Energy roadmap 2050* create the framework for long-term energy measures and in other related sectors. The EU has set the target of decreasing greenhouse gas emissions by 80 – 95% by 2050 compared to levels in 1990. Basic objectives must be proposed within this context and long-term development trends in the energy sector must be defined for the 2030 horizon until 2050, whereby the basic direction is defined already in the Energy Policy.

The strategic target and pillars of the Energy Policy based on the three pillars of European Union Energy Policy are:

- **energy security;**
- **competitiveness;**
- **sustainability.**

Strategic target of the Energy Policy:

Achieving a competitive, low-carbon energy sector safeguarding the safe, reliable and efficient supply of all forms of energy at acceptable prices with considerations given to consumer protection and sustainable development.

Pillars of the Slovak Energy Policy:

- energy security;
- energy efficiency;
- competitiveness;
- sustainable energy.

2.1 Priorities defined to support the pillars of the Energy Policy

Priorities of the Slovak Energy Policy:

- optimise the energy mix;
- increase the security of energy supply;
- develop energy infrastructure;
- diversify energy sources and transport routes;
- maximise the utilisation of transmission networks and transit systems passing through Slovakia;
- improve energy efficiency and lower energy intensity;

- ensure a functioning energy market with a competitive environment;
- ensure quality energy supply at an acceptable price;
- protect vulnerable consumers;
- resolve energy poverty;
- ensure an appropriate pro-export balance in the power industry;
- utilise nuclear energy as a zero-carbon source of electricity;
- increase the safety and reliability of nuclear power plants;
- support high-efficiency cogeneration of heat and electricity.

2.2 Measures to support the pillars of the Energy Policy of the Slovak republic

Measures that must be fulfilled are primarily of a legislative, financial and regulatory nature at the national level.

- In terms of legislation, the amendments of the Energy Efficiency Act, the Construction Act, the Act on Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and Health and other acts are involved in ensuring Energy Policy priorities become an integral component of current and future legislation.
- The primary effort in terms of financing is on reaching those objectives using EU funds and state aid schemes.
- An increased level of independence for the Regulatory Office and its powers in the area of defining regulated prices as well as conducting audits of regulated entities shall ensure a regulatory framework that is predictable and stable over the long-term enabling effective restriction of any potential unfair business practices preventing the development of competition on the market or the discrimination of other market participants.
- Support for the prerequisites of stability and decreased energy prices places priority on solutions beneficial to Slovakia's economic interests, the protection of energy consumers, in particular vulnerable consumers, and combating energy poverty.

2.3 Energy security

The following priorities are defined for increasing energy security:

- diversify energy sources and transport routes;
- utilise nuclear power plants and increase the level of nuclear safety and reliability;
- optimise the share of domestic renewable energy sources for generating heat with respect to cost effectiveness;
- utilise secondary energy sources;
- support effective development of natural gas and oil storage capacities;
- lower dependency on imported fossil fuels;
- increase energy efficiency and decrease final energy consumption;
- maximise the utilisation of transport and transmission routes passing through Slovakia.

2.3.1 Diversification of energy sources and transport routes

Slovakia is nearly 90% dependent upon imported primary energy sources: nuclear fuel (100%), natural gas (98%), oil (99%) and coal (68%). Diversification of transport routes, in particular for natural gas and crude oil, is critical for stability of ensuring the primary energy sources. The risk of an interruption of supply is currently higher for natural gas and crude oil than it is for black coal and nuclear fuel.

The interruption in natural gas supply in 2009 with its significant negative impact on the Slovak economy confirmed the need for greater energy security in Slovakia and increased focus on the diversification of primary energy sources and transport routes as well as domestic energy sources and RES in particular. The primary instruments to secure a sufficient level of natural gas supply and the availability of this commodity in the event of an interruption of cross-border supply are the use of underground storage facilities and the diversification of transport routes. The gas pipeline connection between Hungary and Slovakia with test operations commencing on 27 March 2014 makes an important contribution to safeguarding Slovakia's energy security.

The implementation of measures contained in the *Energy Security Strategy of the Slovak Republic* adopted by the government in October 2008 and measures adopted as a reaction to the gas crisis in 2009 led to significant improvements in Slovakia's energy security during 2009/2010, in particular in terms of natural gas supply. Storage capacities in the Slovak gas system safeguard gas supply for households and other protected consumers and are one of the most important instruments for safeguarding gas supply in crises and emergency situations.

Since November 2011, the operator of the transmission network, *eustream, a.s.*, has fully automatic reverse flow capabilities for gas with total capacities of 67 million m^3 per day from the Czech Republic and 23.8 million m^3 per day from Austria, which combined are in excess of Slovakia's daily gas demand. As a result of the crisis in Ukraine, a new connection was constructed in the direction of Ukraine and therefore the connection of Slovakia and Poland is critical for supplying the region with gas if flow through Ukraine is halted as this connection will significantly increase the security of supply within the EU.

Utilising reverse flow capacities for standard commercial purposes has grown significantly in importance since 2012. Over the long-term it is in Slovakia's interests to use suitable means to support traditional east-west flow of natural gas so that Slovakia is not supplied exclusively by reverse flow gas.

Regulation (EU) No 994/2010 of the European Parliament and of the Council concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC defines new standards for gas supply security. This involves a technical standard known as infrastructure standard that should safeguard the ability of member states to supply gas in the event of an interruption using their single largest gas infrastructure. A supply standard is also defined and stipulates the situations in which gas supply must be secured for protected consumers. Measures to safeguard both standards are met by natural gas undertakings defined by the member states.

Slovakia currently maintains emergency stocks of crude oil and petroleum products to cover 95 days of average net daily imports. Slovakia's total emergency stocks of crude oil and petroleum products in 2013 were approximately 715,000 tonnes.

Slovakia's oil security will be significantly enhanced with the planned overhaul and capacity expansion of the Adria pipeline and the construction of the Bratislava – Schwechat (BSP Project) pipeline. The Commission has classified the BSP Project as a strategic energy connection in the community.

Electricity generated from nuclear fuel appears the least dependent on outages in the supplies of primary energy sources with regards to energy security as there is ample opportunity to secure sufficient stocks in advance and even change suppliers. Uranium fuel supplies are diversified from stable regions and the price of uranium itself has a limited impact on the price of electricity.

The use of domestic RES, in particular biomass, hydropower potential and secondary energy sources, helps to increase energy security by decreasing dependency on imports.

Utilising energy efficiency measures to decrease energy demand also helps decrease demand for the supply and imports of energy sources.

The mechanism of issuing "*Energy Installation Construction Certificates*", which are issued by the Ministry of Economy pursuant to Act No. 251/2012 Coll. on Energy and Act No. 657/2004 Coll. on Thermal Energy, serves to ensure regulated construction of energy installations in line with Slovakia's national interests.

The commissioning of the 2 x 400 kV Lemešany – Moldava nad Bodvou transmission lines (2012) significantly increased the reliability of electricity supply in the region of Eastern Slovakia.

The operators of the Slovak and Czech transmission systems began the testing phase of a cross-border regulation electricity exchange project known as the "e-GCC Project" in January 2012. The goal of the cooperation between the transmission system operators is to limit supply of regulation electricity in the opposite directions. Cooperation in electricity grid regulation leads to a subsequent decrease in the activation of regulation electricity within support services, specifically secondary power regulation. The e-GCC Project contributes to safeguard security and reliability in the connected systems at optimum prices.

2.3.2 Increasing the level of nuclear safety and the reliability of nuclear power plants

Slovakia currently utilises and plans to continue utilising nuclear power within its energy mix while the question of nuclear safety remains the absolute priority. The safety of nuclear installations in Slovakia in terms of external forces, such as seismic resistance, and in terms of other safety aspects remains at the required level and is monitored continuously. The level of nuclear safety is regularly, comprehensively and systematically assessed within the context of operating experience and the latest scientific advancements and research; likewise, measures to increase safety are adopted on a continuous basis.

The Commission adopted a decision to perform comprehensive risk and resistance assessments for all EU nuclear power plants in extreme conditions following the Fukushima nuclear accident in March 2011.

The stress tests were intended to determine the level of external hazard nuclear power plants were capable of resisting without serious damage to the nuclear fuel in their reactor cores or without a significant release of radioactive material into the environment. The testing of Slovak nuclear power plants, specifically NPP V2, NPP Mochovce 1, 2 and NPP Mochovce 3, 4 was completed primarily in the form of engineering analyses, calculations and evaluations. Extraordinary external events such as earthquakes, flooding and other initiating events potentially leading to the loss of multiple safety functions at such plants were analysed during the stress tests. The Nuclear Regulatory Authority of the Slovak Republic (Nuclear Regulatory Authority) submitted the final national report on 31 December 2011 and its assessment by the European Nuclear Safety Regulators Group (ENSREG) was completed on 26 April 2012. Slovenské elektrárne, a.s. then completed the Action Plan for implementing measures to use the lessons learned from the Fukushima nuclear accident. The fact that no immediate intervention was required to safeguard nuclear safety at nuclear power plants in

Slovakia was confirmed by an independent international expert team and in the final ENSREG report.

Measures focused on increasing energy security:

- support infrastructure projects facilitating the diversification of energy sources and routing and strengthen the technical safety of operations of energy systems and networks;
- strengthen regional cooperation, integrating regional energy markets and promote the improvement of inter-state connections with emphasis on the gas connection between Slovakia and Poland;
- complete NPP Mochovce 3, 4 and build the New NPP at Jaslovské Bohunice;
- increase the security and reliability of gas, crude oil and nuclear fuel supply;
- comply with the highest level of nuclear safety pursuant to EU and IAEA standards;
- support the effective development of gas storage capacity in specific areas to safeguard the security of gas supply in the event of an interruption in cross-border supply as one of the most important gas supply security instruments;
- maintain the general economic interest in utilising optimum and cost-effective electricity generation using domestic coal from 2011 to 2020 with a view to 2035 pursuant to Slovak government Decree No. 47/2010;
- preserve the operation of at least two units (2 x 110 MW) at the Nováky Power Plant to safeguard the security of electricity supply and the technical safety of the Slovak electricity system, to supply electricity to large regional industrial concerns and as a backup source with respect to other power plants and increasing their output;
- build intelligent networks;
- create a stable legislative framework in the area of energy security;
- maintain emergency stocks of crude oil pursuant to EU directives;
- support the optimum development of RES and increasing energy efficiency.

2.4 Energy efficiency

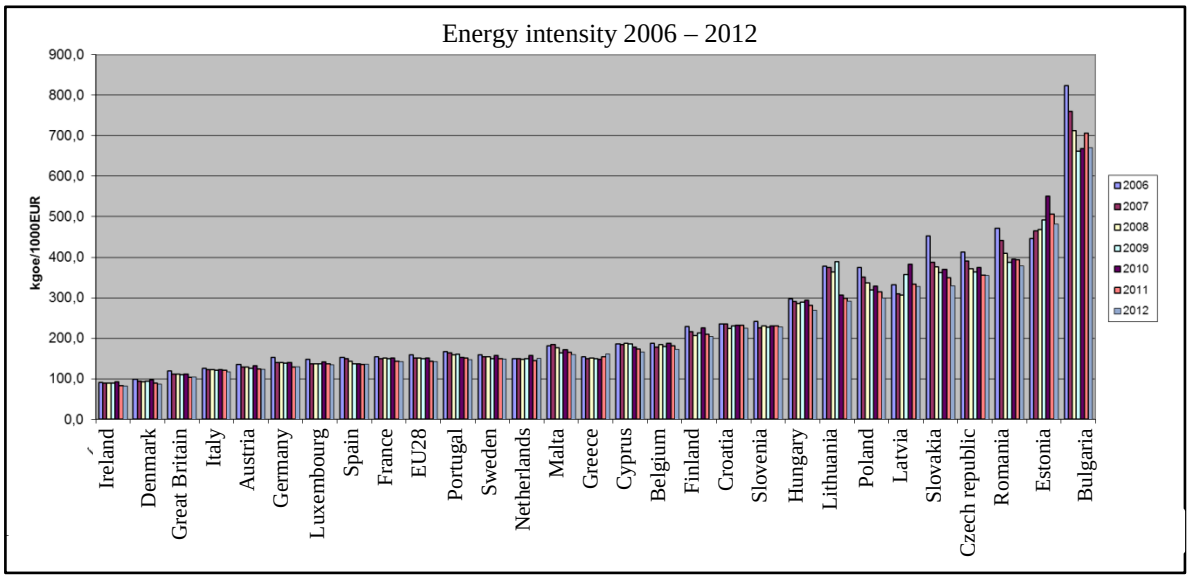
The following priorities are defined for increasing energy efficiency:

- achieve additional decreases in energy intensity at the level of the EU average;
- define a national target and securing financing for individual measures;
- fully transpose the Energy Efficiency Directive;
- establish a scheme for financing energy efficiency;
- secure high quality and thorough measurements, monitoring and evaluation in the area of energy efficiency;
- provide high quality energy efficiency information and education;
- introduce intelligent metering systems and creating intelligent networks to provide consumers with more information and the ability to make informed decisions;
- effective demand-side management.

2.4.1 Development of energy intensity in Slovakia

Energy intensity, the share of gross inland energy consumption to GDP, is an important economic indicator in a national economy. Energy intensity has exhibited a declining trend over the past 10 years; however, Slovakia remains fifth in terms of the highest energy intensity based on constant prices in the EU 27.

Fig. 8 Comparison of energy intensity in Slovakia and EU countries (Source: Eurostat)



Significant progress in decreasing energy intensity occurred from 2002 to 2009 when Slovakia's energy intensity decreased by 38%, the largest percentage decrease among all OECD countries and EU member states. This trend continued from 2005 to 2010, where the decrease of more than 21% represented the largest decrease in the EU in the same period. Energy intensity decreased by almost 45% in the period from 2002 to 2012.

Fig. 9 Development of GDP and energy intensity (Source: Ministry of Economy)

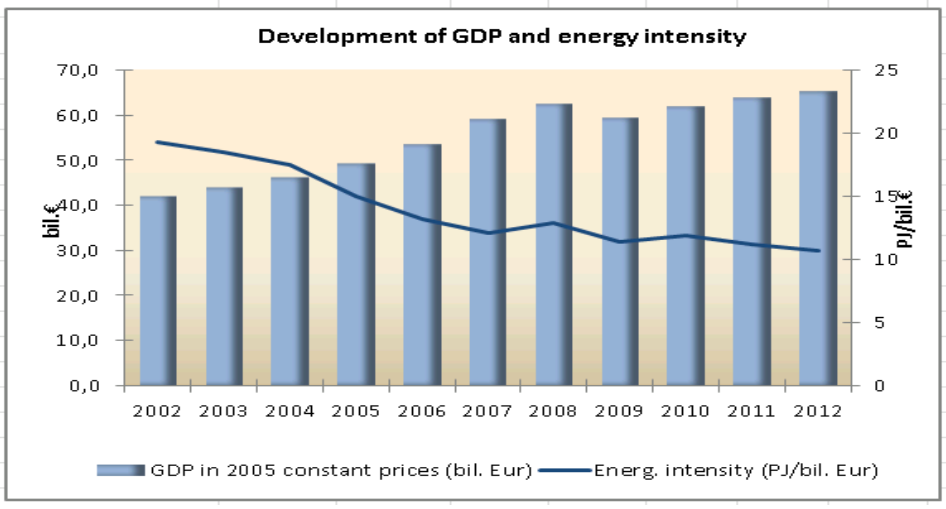


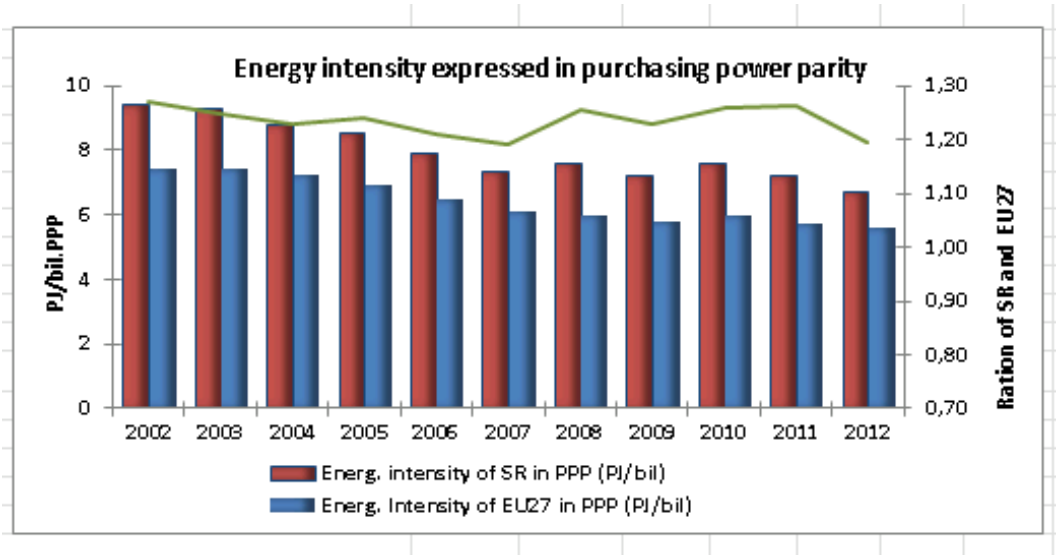
Table 6 Development of GDP and energy intensity (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GDP in 2005 constant prices (billion EUR)	42.0	44.0	46.2	49.3	53.4	59.0	62.4	59.3	61.9	63.9	65.2
Energy intensity (PJ per billion EUR)	19.3	18.5	17.5	15.0	13.2	12.1	12.9	11.3	12.0	11.2	10.7

The positive trend can be attributed, *inter alia*, to the successful restructuring of industry, the introduction of low-energy production processes in industry and effective efficiency measures in the household sector involving the replacement of appliances with modern, energy efficient models.

Energy intensity expressed in purchasing power parity can be used to compare energy intensity with other countries where GDP is modified into a form taking into consideration the differences in price levels between the compared countries. The graph clearly shows that energy intensity expressed in purchasing power parity was 20% higher than the EU 27 average in 2011. Slovakia's energy intensity can be expected to approach the EU 27 average by 2020 given the curve of the ratio of Slovakia's energy intensity to the EU 27 expressed in purchasing power parity if the current trend continues.

Fig. 10 Energy intensity of Slovakia and the EU expressed in purchasing power parity (Source: Statistical Office of the Slovak Republic, Ministry of Economy)



Energy efficiency targets

Energy efficiency is the only "fuel" that concurrently fulfils economic, energy and environmental targets.

The EU Energy Efficiency Action Plan of 8 March 2011 and Directive 2012/27/EU on energy efficiency propose significant energy efficiency changes in the EU that require a response at the national level.

The target for all EU member states defined in Directive 2012/27/EU on energy efficiency in compliance with the Europe 2020 strategy is to decrease the consumption of primary energy sources by 20% at the EU level compared to the PRIMES 2007 reference scenario. The EU's target is expressed in specific values of 62,090 PJ (1,483 Mtoe) in primary energy consumption, 45,469 PJ (1,086 Mtoe) in final energy consumption and 15,491 PJ (370 Mtoe) in primary energy savings.

The transposition of Directive 2012/27/EU includes the definition of an indicative national energy efficiency target to help the EU meet this 20% target. The indicative national energy efficiency target must be expressed in the form of an absolute value for primary energy and an absolute value of final energy consumption in 2020. Another two partial targets defined in the Energy Efficiency Directive are: the energy saving target, which corresponds to the annual

energy efficient renovation of 3% of total floor area of buildings owned and used by central government bodies at a minimum requirements and an energy savings target of 1.5% of annual sales of energy to end users from every energy supplier.

Slovakia's energy efficiency concept approved by the government in Resolution No. 576/2007 defined a target of 9% savings in final energy consumption compared to the average from 2001 – 2005 and a framework for measures until 2016, developed into three national energy efficiency action plans for 2008 – 2010, 2011 –2013 and 2014 – 2016. Slovakia adopted an energy saving target of 11% from the average final energy consumption in 2001 – 2005 based on the energy efficiency concept defined above.

The assessment of the first energy efficiency action plan noted that Slovakia exceeded the mid-term target set in the 2008 – 2010 Energy Efficiency Action Plan as savings reached nearly 9% compared to average final energy consumption 2001 – 2005 (27.8 PJ). The prerequisite for the proper definition of the indicative national target is the full transposition of the Energy Efficiency Directive, the completion of comprehensive analysis of potential energy savings in individual sectors of the national economy and a proposal of scenarios for implementation of measures for achieving the energy savings targets by 2030.

Indicative national energy efficiency target for 2020

As a first step, Slovakia proposed a preliminary 2020 target for 2013 that was proposed without using the data from 2012. This target was modified after including the assumptions made in the Energy Policy and after new energy statistics for 2012 were published. Final energy consumption in 2020 is expected at a level of 378 PJ. Primary energy consumption in 2020 should decrease by 19.5% compared to the PRIMES 2007 reference scenario to a level of 686 PJ.

Table 7 Indicative national energy efficiency targets (Source: Ministry of Economy)

Slovakia's indicative national energy efficiency targets	
Energy efficiency target expressed in terms of the absolute value of final energy consumption in 2020	**378 PJ (9.02 Mtoe)**
Energy efficiency target expressed in terms of the absolute value of primary energy consumption in 2020	**686 PJ (16.38 Mtoe)**

Thorough monitoring and assessment of energy savings

Monitoring of energy savings is the primary role of the energy efficiency monitoring system rolled out in 2011. A lack of information on achieved energy savings prevents an accurate assessment of the energy efficiency target. Data acquisition must be improved for this very reason at the level of the individual sectors, programmes, projects and among end users so as to be able to assess the fulfilment of the indicative national energy efficiency target. The cost efficiency of energy efficiency measures must also be assessed.

The requirement of monitoring energy savings in projects funded by structural funds as well as the need to monitor energy savings within individual projects in the fulfilment of the indicative national energy efficiency target is a tremendous challenge for the Slovak Innovation and Energy Agency. However, the timely implementation of policies and energy efficiency measures and increased public awareness of energy efficiency are fundamental for future development and to meet the national energy efficiency target as well as the partial targets.

The assessment of energy savings in individual projects facilitates the determination of the impacts of individual measures on individual sectors of energy consumption, thereby providing a more complete picture of achieved energy savings. The completion of

methodologies and methods for calculating energies for individual types of energy savings as well as expected savings, measured savings, relative savings and savings achieved on the basis of research are critical for fulfilment of this demanding target.

Financing energy efficiency

A permanent source of financing for energy efficiency projects at the national level is critical at a time of increasing requirements to decrease energy consumption in the EU and due to the high initial investments energy efficiency projects require. The primary financing instruments are EU funds at the present time, specifically structural funds and the Cohesion Fund, which provided more than 50% of all total funding used for energy efficiency measures from 2007 to 2013. Monitoring of energy savings in projects financed by these funds and introduced in Slovakia as the first in the EU confirmed the significant benefits delivered by these funds in terms of energy efficiency. The allocation of funding from EU funds for energy efficiency projects alone is simply not enough, as has been shown by the rapid use of funds from Operational Programme Competitiveness and Economic Growth. In the future it would be advantageous to secure as much funding from EU funds as possible to cover energy efficiency projects during the entire financing period and in order to support the achievement of the required savings targets.

Projects financed from the State Housing Development Fund, the Housing Development Programme, specifically subsidies to remove systematic failures, the Government Insulation Programme, the Slovak Energy Efficiency and Renewable Energy Finance Facility, the Norwegian Financial Mechanism and other international support programs all played a major role in decreasing energy consumption in households, buildings and the public sector. Sources of private funding include private investments, financial mechanisms provided by commercial financial institutions and the SPP-EkoFond, n.f. non-investment fund.

Joining the Covenant of Mayors may help cities and towns to bind themselves to decrease CO_2 emissions by 2020 compared to 1990 levels. They declare the target by preparing a Sustainable Energy Action Plan financed by the Covenant. Involved cities and towns (a total of 8 cities and towns in Slovakia) may take advantage of grants for non-investment projects using the ELENA and MLEI (mobilisation of local energy investments) mechanisms as well as loans for investment projects from the European Energy Efficiency Fund. Cities may also join the Smart Cities program.

Support for non-investment projects using the Intelligent Energy – Europe programme can be considered one of the Commission's successful projects and the success rate of Slovak applicants in this programme was significantly higher than the EU average. Non-investment projects will be supported using the Horizon 2020 programme between 2014 and 2020.

The total amount of funding committed to the 2011 – 2013 period was insufficient. This was the primary reason for the definition of a low 2.7% energy savings target in terms of average final energy consumption from 2001 to 2005 in the 2011 – 2013 Energy Efficiency Action Plan. The establishment of an effective and functional model for financing energy efficiency is expected in the implementation of the Energy Efficiency Directive to facilitate annual energy savings at a rate of 1.5% of the energy sold to end users every year in the 2014 – 2020 period. All available financing mechanisms, including existing and planned national, European and private sources, must be involved in order to meet this requirement and other energy efficiency targets. The cornerstone of these efforts should once again be European funds that should support those areas with the greatest potential for energy savings.

Industrial energy efficiency efforts may be financed from the proceeds from the sale of emission allowances through auctions. European legislation stipulates that at least 50% of these revenues should be used to decrease greenhouse gas emissions.

Energy service

One of the key horizontal measures to support the development of energy efficiency and to increase energy savings is the introduction of energy service institute. A qualified energy service provider enables their consumers, i.e. in particular end users, to fully exploit potential energy savings within energy efficiency projects.

An Energy Performance Contract (EPC) has special standing within energy service and in such contract the energy service provider guarantees energy savings, while such contract may also involve securing financing for investment costs.

Support must be directed in particular to the development of energy service companies (ESCO), the creation of supporting forms of legislation, the drafting of methodology and facilitating and supporting cooperation with financial institutions that could enter into contractual matters as third parties or securing suitable loan financing or other instruments to enable ESCO to conduct activities and interventions with a longer than usual return on investment for example in the interests of completing more comprehensive building renovation and overhaul activities to support the development of the energy service market.

The EPC and ESCO models will be supported with the objective of creating a direct connection between energy efficiency and the private sector. This support also contributes to the development of the energy service market.

We therefore expect that the range of energy services that can also be provided by energy suppliers will expand along with the development of intelligent metering systems.

Energy efficiency improvements in individual sectors

The household and industry sectors made the bulk of contributions to decreasing final energy consumption in Slovakia from 2008 to 2010. Transport is the only sector showing continued increases in energy consumption, caused primarily by an increase in car traffic. Lower household consumption is the result of replacing appliances with more energy-efficient models and more intensive efforts to insulate buildings.

Buildings

The buildings sector includes residential (apartment buildings and family houses) and non-residential (public and commercial) buildings. Heating consumes most of the energy in these buildings (approximately 75% for residential and 60% for office buildings). Around half of existing buildings will be insulated by 2020 if current trends of renovations continue with a majority of buildings insulated by 2030; all apartment buildings constructed before 1992 should be insulated by 2030. It is likely that a specific portion of buildings insulated before 2010 will have to be re-insulated as well. These trends will contribute to lower heat consumption, which will significantly impact the heating industry.

Every new, rented or renovated building, including single-family houses, must have an energy certificate defining the energy class of the building as of 2013. The potential uses of these energy certificates in practice should be ensured by the introduction of subsequent efficient instruments to support their use and by rigorous inspection of energy certificates. All new buildings, and renovated buildings if technically, functionally and economically feasible,

should meet the defined minimum requirements which themselves should be updated in annual 5-year cycles towards cost-optimal levels.

The replacement of appliances with more efficient models should partially compensate for the expected increase in the standard of living and the accompanying increase in home furnishings driving an increase in electricity consumption. The share of new low-energy and passive buildings will increase. Given the requirements of Directive 2010/31/EU on the energy performance of buildings, all new public buildings constructed after 2019 and all other new buildings constructed after 2021 must meet the requirements for buildings with near zero energy consumption in line with technical standards. Energy consumption in buildings will shift towards an increase in RES utilisation. A list of buildings of central government bodies must be completed and published in accordance with the Energy Efficiency Directive. The renovations of 3% of central government body buildings in excess of 500m^2 as determined by floor area must be secured beginning in 2014; this threshold will later drop to those above 250 m^2. In addition, the directive includes the obligation to complete a long-term investment strategy for the renovation of national building stock. This strategy must among other things include an overview of national building stock, identify cost-effective approaches to building renovations, propose supporting measures for cost-effective and comprehensive building renovations, present a scenario for the development of building renovations and provide an estimate of cost-optimal energy savings in buildings in Slovakia.

Households

The current tempo of apartment building renovations is curbing heat consumption in households, and a majority of apartment buildings are expected to be insulated by 2030 if the current trend of renovations continues. Higher energy savings and/or significant decreases in heat consumption are expected with the progressive shift in minimum requirements towards cost-optimum levels under consideration. Lower household consumption is based also on the replacement of high energy consuming appliances and products with new models that are subject to legislation on ecodesign and energy labelling. Ecodesign and energy labelling rules are to be expanded to 50 product groups, contributing further to more energy savings; however, the number of appliances in our households is expected to increase. The replacement of refrigerators and freezers for new, more energy efficient models has produced savings of up to 70% with respect to the consumption of these appliances. Additional significant savings have been delivered by the replacement of standard light bulbs with energy efficient fluorescent bulbs and LEDs. The installation of individual temperature gauges and thermostatic valves provides the ability to monitor and regulate heat consumption, the addition of thermal insulation on heating and hot water lines during renovations and subsequent hydraulic balancing in building systems have all contributed to lower heat consumption in buildings. Every household must have its own individual meters for all types of energy beginning in 2017. Programmes supporting voluntary energy audits for apartments and houses will be made available.

The introduction of intelligent metering systems (IMS) and intelligent networks facilitating the remote calculation of energy consumption, regular meter reading for monitoring energy consumption over time and on higher IMS functionality also control over energy consumption, will make a significant contribution to decreased energy consumption in households. This constant overview of electricity, gas, heat and hot and cold water consumption, a greater quantity of information, simplified breakdowns and billing and new tariff products afforded by the introduction of IMS will have a positive impact on the behaviour of consumers, who will save more energy. The system or network is precisely monitored via the IMS and can provide the network operator with information that can be

exploited for energy efficiency purposes. Economic efficiency is the prerequisite for deploying IMS.

In locations without centralised heat supply systems, one of the options for increasing energy efficiency and decreasing emissions is the installation of condensing boilers if the heating systems are adapted to such condensing boilers.

Energy

Specific measures to increase the efficiency of energy conversion and decreasing losses in transmission and distribution will be adopted on the basis of analysis into potential energy savings in the energy sector in 2015, with respect to the provision of Directive 2012/27/EU on energy efficiency, which supports the development of individual efficient heating systems (including condensing boilers), efficient centralised heat supply systems and efficient cooling systems. Energy suppliers must be integrated into energy saving scheme with the objective of decreasing energy consumption in the entire energy chain.

Industry

The utilisation and further expansion of the energy audit system and the implementation of measures identified in these audits will have a significant impact on decreasing energy consumption in industry. Tightening requirements for environmental protection, on the other hand, can be expected to increase energy consumption in industry. It is expected that a significant portion of investments will be directed into measures that are dedicated exclusively to environmental protection, including the introduction of new, energy intensive technological installations. This, in turn, conditions an increase in the share of environmental fees used directly for energy efficiency measures. Increased diversification in energy supplied to industrial enterprises will influence the distribution systems supplying such energy. Mandatory energy audits must be applied in the energy industry in connection with planned savings in primary energy sources; likewise a financial mechanism for voluntary energy audits for small and medium enterprises must also be secured along with support for the introduction of energy management systems (STN ISO 50001). The development of the energy service market, itself facilitating the development of projects using the EPC format or via companies providing energy services in which energy audits are a critical prerequisite for achieving guaranteed and contracted energy savings, is expected to make a major contribution.

Transport

The share of public transport to transport as a whole has decreased significantly recently. This trend has negative consequences for the environment, increases energy intensity and traffic density, requires the construction of new infrastructure and increases the risk of traffic accidents. In connection with decreasing subsidies for public mass transport and the construction of basic transport infrastructure, growth in individual transport is expected to continue in the future at the expense of mass transport, which is why specific measures must be taken to change this negative development trend, focused for instance on restricting the need for individual transport and vehicle freight transport at the level of spatial and strategic planning. Transport remains the only sector of consumption in which growth in energy consumption will continue. Measures should be supported and financial mechanisms should be established to decrease the energy intensity of transport, in particular by supporting the development of public mass transport through faster renewal of obsolete bus fleets and railway rolling stock, while at the same time decreasing exhaust gas emissions and noise

levels and increasing the patronage of these services. The programme to support public passenger transport facilitates planning and the implementation of integrated systems in urban agglomerations and in selected larger cities.

The introduction of progressive transport systems, creating logistics centres, increasing terminal capacities of combined transport, improving technical and technological equipment at terminals and improving cooperation between the individual elements of combined transport all serve to increase share of intermodal transport in transport.

The construction and development of transport infrastructure, completion of a compact network of superior road infrastructure, the modernisation of primary rail lines and the elimination of transport bottlenecks and critical accident-prone areas will facilitate decreases in fuel consumption and hence significant energy savings.

Improved utilisation of alternative fuels (CNG and LPG) in road transport, non-motor transport and electric vehicles can be expected in the future. The number of CNG powered buses in public transport will increase and new electric buses will be introduced. The renewal of vehicle fleets will be focused on environmental and energy efficient vehicles. The number of electric vehicles will be increased and the network of charging stations will be expanded, to enable the use of electric vehicles across Slovakia, on the basis of supporting European legislation. Support for the construction of bicycling infrastructure and the introduction of a navigation and information system for cyclists, cycling paths and parking facilities for cyclists will continue.

Agriculture

A slight decrease in energy consumption can be expected in agriculture with the introduction of new technologies and increasing the share of "self-sufficient" energy provided in particular by biomass.

Public sector

Special focus must be given to energy efficiency measures in the public sector, in particular with respect to its role in setting an example. The principles of energy efficiency must be incorporated into relevant conceptual, strategic and legislative documents in all central government bodies. The use of supporting financial mechanisms in the field of energy efficiency and energy services should continue with emphasis on the efficient use of public funding. The opportunity to apply criteria for energy efficiency within green public procurement pursuant to the 2011 – 2015 National Green Procurement Action Plan must be used, the criteria for energy efficiency must be incorporated into public procurement and subsequent consistent monitoring must also be ensured, while central government bodies will only be permitted to procure products in the highest energy efficiency class. It is necessary to ensure the completion and approval of a detailed methodology guide for applying the principles of energy efficiency in public procurement.

A significant role will be attributed to the public sector's role of setting an example in applying the principles of energy efficiency within public procurement. The EPC and ESCO models help create a direct connection between sustainable energy efficiency and financial compensation for entrepreneurs.

Energy efficiency measures:

- fully implement Directive 2012/27/EU on energy efficiency and the completion of specific measures from the three-year energy efficiency action plans to lead to the fulfilment of the indicative national target in 2020;
- provide a permanent, effective and functional model for financing energy efficiency measures at the national level;
- utilise existing financial mechanisms and securing new funds from EU funds for energy efficiency projects including building renovations, overhaul and modernisation of heat distribution systems, support for the introduction of innovative technologies and modernisation of public lighting systems in addition to support for EPC and ESCO models;
- incorporate energy efficiency principles into relevant conceptual, strategic and legislative documents. Introduce and thoroughly apply energy efficiency principles within public procurement;
- ensure the achievement of energy savings when renovating buildings of central government bodies, to secure the state's role in setting an example in terms of energy efficiency and energy performance; create and make public a list of public administration buildings; introducing efficient quality controls for energy certificates and measures to support their active use;
- provide systematic support and secure financing for the construction of low energy and passive buildings;
- modify and expand the system of energy audits, qualification, accreditation and certification schemes and ensure availability of experts through education and training programmes;
- support a reduction in the energy intensity of transport by supporting public mass transport, intermodal transport, the development of alternative fuels, non-motor transport and electric vehicles;
- increase awareness among consumers and access to information on their energy consumption at all levels as well as opportunities and forms of saving energy, develop the professional skills of key implementers in the public and private sectors;
- permanently assure the monitoring of energy savings and improvements in the quality of data collection on implemented energy-saving measures and their cost effectiveness; secure cross-cutting monitoring of energy savings for all measures contributing to energy savings financed using public funds;
- support the construction of new and more efficient centralised heat supply and the modernisation and expansion of existing centralised heat supply systems;
- implement energy efficiency principles and measures to contribute to the achievement of the targets of the Efficient World Scenario defined by the International Energy Agency;
- support the development and use of intelligent metering systems on the basis of their economic efficiency and the application of the latest technologies in achieving energy savings while increasing end user awareness of their energy consumption in all sectors.

2.5 Competitiveness

The following priorities are defined for ensuring competitiveness:

- achieve competitive final energy prices;
- a well-functioning energy market;
- a stable and predictable legislative and regulatory framework;
- greater independence and powers for the regulator in determining prices as well as in audit activities in order to restrict any possible unfair business practices preventing the development of competition and facilitating the discrimination of some parties on the market; consistent application of the regulator's competencies through its independence and support when developing its material and human resources; .

The achievement of fully integrated energy systems and networks in Europe and additional liberalisation of the energy markets represent critical steps for ensuring the competitiveness of the energy sector in the future, in efforts to transition over to a low carbon economy while safeguarding the security of supply at the lowest possible costs. The fulfilment of the target laid out by the European Council in 2012 to construct the internal EU energy market is the key measure in these efforts. This target can be achieved not only by developing connections between the member states but also by using legislative measures (implementation of the Third Energy Package and its rigorous application). A major role will also be attributed to the development of network regulations to ensure future development of well-functioning cross-border wholesale markets and the common rules they define to allow system or network operators, producers, suppliers and consumers to operate more efficiently on the market.

The Slovak electricity and gas markets are fully liberalised, open to all parties on the market and have sufficient transmission and transport capacities. The rights of electricity and gas consumers were significantly reinforced with emphasis placed on protecting vulnerable consumers with the publication of Act No. 250/2012 Coll. on Regulation in Network Industries and Act No. 251/2012 Coll. on Energy. The Regulatory Office drafted quality standards, which themselves are a set of rules and procedures regulated entities must comply with, in order to increase the level of consumer protection so that consumers receive an appropriate level of quality for the price they pay for electricity, gas, heat and water. Other legislative measures stipulate the ability to change electricity and gas suppliers within a period of three weeks without any fees, the rights of consumers to receive final billing within four weeks following a change of supplier and the rights of consumers to receive relevant data on their electricity consumption.

The efficient introduction of metering systems and providing new services requires the development of communication technologies and more intensive connections to the equipment of energy system operators which will also require the assistance of science and research programmes. An important element will remain the search for cost-effective solutions that enable consumers to reap the full benefits of all the tools made available by the latest technologies. The results of a representative pilot project involving a relevant sample size of points of supply will play an important role in this context.

Competitiveness measures:

- ensure cost-effectiveness while supporting energy from RES and minimising effects on final energy prices;
- minimise the effects of support measures on final energy prices;

- provide consumers with more choice and flexibility and improving the information provided to consumers;
- provide critical support to vulnerable consumers through measures that do not deform the market nor prevent its further development;
- prepare a strategy and develop intelligent metering systems and intelligent networks;
- create conditions so that financing the introduction of intelligent metering systems considers the benefits delivered to society as a whole.

2.6 Sustainable energy

The following priorities have been identified for securing energy that complies with the principles of sustainable development:

- increase the share of low carbon and zero carbon electricity generation;
- utilise nuclear energy as the primary source of zero-carbon electricity;
- optimise the share of RES especially in heat generation;
- utilise natural gas as a "transitional fuel" in the transition to a low carbon economy;
- support efficient centralised heat supply systems.

Sustainable development must secure the current needs of residents without restricting the means available to future generations to satisfy their own needs. The world is facing numerous crises and challenges related to the increase in consumption currently being observed and the manner in which limited natural and energy sources are utilised. Technology, processes and habits on both the supply and demand sides must be changed in order to achieve sustainable development.

Energy sector is among the sectors that contribute significantly to environmental pollution. Global carbon dioxide emissions from energy sector in 2011 rose by 3.2% and reached 31.2 Gt. Energy must be a part of the solution to environmental problems. The future prosperity of humanity depends on finding ways to meet growing energy demand in a way that does not harm the environment. Preserving nature and keeping natural systems intact are the fundamental prerequisites for quality of life, a well-functioning society and its sustainable development.

Climate change policy is a cross-cutting and wide-ranging theme. It demands effective coordination at the level of the Slovak government and specific institutional arrangements at lower levels of the management process. In December 2011, the Slovak government approved a proposal for the institutional fulfilment of the targets laid out in the Climate and Energy Package in Slovakia and established the Committee on Coordination of Climate Change Policy, which created an effective structure for coordinating the activities of the involved departments and for securing professional analysis to be used in the decision making process.

Progress in implementation can only be achieved through improved coordination of sector policies. Focus must primarily be directed at technical measures to lower emissions with the potential to create new jobs, increase national energy security, lower energy bills and improve air quality and public health. Selection of economic and fiscal instruments should stimulate investments into new, cleaner technologies and effective energy consumption.

2.6.1 Current global energy trends with environmental impacts

- current global energy supply and consumption trends are not environmentally, economically or socially sustainable over the long-term;
- balance must be achieved between energy security, economic development and environmental protection at a global level;
- greenhouse gas emissions caused by human activity responsible for global warning have increased dramatically recently, even as global economic growth has slowed, which may result in an increase in global temperatures over 3.6 °C;

- EU in order to avoid this dangerous trend adopted a target of restricting this rise of global temperatures to below 2°C as compared to the pre-industrial age and has defined a framework through its climate change and energy policies to 2020;
- the international community opened negotiations on a new international agreement on joint action to protect the Earth's climate system in 2011; this agreement, to be signed by the end of 2015 and to be applied beginning in 2020, should reinforce the ambitions needed to lower global emissions.

2.6.2 Overview of EU policies and measures that should contribute to mitigating energy's environmental impacts over the long-term

Transition to the "green economy"

According to the OECD's Green Growth Strategy, green growth represents a means of supporting economic growth and development and is to ensure that natural wealth can continue to provide the resources and environmental services on which human well-being depends. Green growth combines economic and environmental contexts and has the potential to resolve economic and environmental problems and should open up access to new drivers of growth through productivity and innovations. Green growth is a component of sustainable development. The objective of green growth is to contribute to an increase in human prosperity by supporting the efficient use of natural resources and economic activities suitable for society from a long-term perspective. Innovations must be transposed into practice in order to meet these objectives and greater understanding and awareness of the value of natural capital (the environment) is also critical. Green growth should be implemented on the basis of adopting a political framework focused on mutually supporting aspects of economic, environmental and energy policy. The primary objective of green growth is to mutually strengthen economic and environmental political strategy, which should ensure economic growth without depreciating natural capital (the environment). Given the cross-cutting nature of the issue of green growth, the completion of a comprehensive framework for the implementation of the green growth strategy in Slovakia is being completed through inter-institutional cooperation. An inter-institutional working group was created in order to monitor progress leading to green growth and the working group approved a national system of green growth indicators for local conditions in Slovakia based on OECD methodology. The group of environmental and resource productivity indicators includes energy intensity in economic sectors, energy productivity, the share of RES in gross inland energy consumption and the share of electricity generated from RES.

The United Nations Environment Program (UNEP) defines a green economy in this context as an economy supporting human prosperity and social equality with a concurrent, significant reduction in environmental risks and ecological damage. In simplified terms, this is a low carbon economy, efficiently utilising resources and supporting social inclusion. The keys to the transition to a green economy in Slovakia in particular are the efficient use of market instruments, including the implementation of an emissions trading act, improving the competitiveness of the economy through environmentally-friendly innovations and more intensive use of voluntary environmental policy instruments (schemes for environmental management and audit, environmental labelling of products and green public procurement). The transition to a green economy will require increased attention be paid to sustainable generation and consumption, which considers the entire product life cycle.

2.6.3 Competitive low carbon economy

Developing a competitive low carbon economy is a long-term priority of the Energy Policy of the Slovak Republic. Key to achieving this transition to a low carbon economy is building a competitive green economy in Slovakia based on the EU's Roadmap to a resource-efficient Europe strategy whereby the action policy framework for green growth contributing to the achievement of the long-term low carbon economy target in each country should take into consideration national conditions and circumstances.

The Commission analysed the consequences of the commitment to decrease greenhouse gas emissions by 80 – 95% compared to their 1990 levels and defined the extent of emissions reductions in key sectors by 2030 and 2050 in its ***Roadmap for moving to a competitive low carbon economy in 2050*** (03/2011). Electricity will play a central role in the low carbon economy while natural gas will have an important role in its generation until at least 2030 or 2035. Commission analysis has showed that this step could contribute to a near complete elimination of CO_2 emissions by 2050.

The Commission (12/2011) investigated a number of scenarios for the "de-carbonisation" of the energy system by 2050 in its ***Energy Roadmap 2050*** including influencing energy efficiency on the demand side, RES, nuclear energy and capturing and storing CO_2. The plan attempts to elaborate a long-term and technologically neutral European framework for energy policies in order to achieve the required level of certainty and stability in investments into the energy system.

From a long-term perspective, the creation and preservation of jobs depends on Slovakia's ability to assume a more significant position in the development of new low carbon technologies by improving education, professional training, programmes to support a friendlier stance towards new technologies, research and development and enterprise as well as a favourable economic framework of conditions for investments.

2.6.4 Emissions trading scheme

The emissions trading scheme is a major point of EU policy for combating climate change and a key instrument for reducing greenhouse gas emissions. The EU adopted a change in the rules for emissions trading beginning in 2012 within the Climate and Energy Package. *Directive 2009/29/EC* introduced an improved and expanded system for the third trading period, for the years 2013 – 2020 effective on 1 January 2013. The purpose of Act No. 414/2012 Coll. on Trading Emission Allowances and on amendment of certain acts is to ensure the efficient operation of the trading scheme in Slovakia so that the operators with a significant impact on overall greenhouse gas emissions in Slovakia are integrated from an environmental perspective into the trading scheme.

The primary changes in the area of emissions trading after 2012 involve the integration of new sectors and gases into the scheme. The individual sectors are also divided into those with a risk of carbon leakage, other sectors and electricity producers with defined reference levels and rules for the free-of-charge allocation of emission allowances and the introduction of auctions.

The free-of-charge allocation of emission allowances is expected to continue in the sectors with a risk of “carbon leakage” after 2012 based on the reference levels of emissions, i.e. standard CO_2 emissions determined by the type of product.

A progressive reduction in the free-of-charge allocation of emission allowances is expected in *other sectors without a risk of carbon leakage* after 2012 from a level of 80% of real needs in 2013 to 30% in 2020. The power generation sector is obliged to purchase all emission allowances needed to generate electricity at auction and at market prices beginning on 1

January 2013. The new Act No. 414/2012 Coll. on Trading Emission Allowances and on amendment of certain acts is valid from 1 January 2013.

2.6.5 Implementation of the Industrial Emissions Directive

Emission limits that are significantly stricter than their current values go into force on 1 January 2016 and from then on full compliance with stricter emission limits for the individual solid and gas pollutants must be met.

In order for thermal power plants to continue operating after this day, most of the power plants, in particular coal-fired plants, will have to take measures to ensure compliance with stricter ecological requirements defined by the new emission limits.

2.6.6 Transitional national plan

Directive 2010/75/EU on Industrial Emissions defines the opportunity for member states to complete a *transitional national plan* for older combustion plants unable to technically achieve the new minimum requirements in order to delay the deadline for bringing such installations into compliance with new limits for combustion plants with total installed capacity of 50 MW and higher until 30 June 2020 due to the fact that large combustion plants are strategic energy sources. Emissions from combustion plants included in the transitional national plan are limited by a sliding scale limit on emissions in the period from 1 January 2016 to 30 June 2020. A total of 9 combustion plants are included in Slovakia's plan with the following producers: Bratislavská teplárenská, a.s., Continental Matador Rubber, s.r.o., Priemyselný park Štúrovo, a.s., Slovnaft a.s., U.S. Steel Košice, s.r.o., Zvolenská teplárenská, a.s. and Žilinská teplárenská, a.s.

2.6.7 Increasing the share of low carbon electricity generation

Climate change and adaptation to its negative consequences are not simply political and environment issues; rather they represent economic and technological challenges that can largely be resolved through sustainable energy policy, the use of RES and improved energy efficiency. In addition to reductions in greenhouse gas emissions that are a major contributor in the transition to a low carbon economy, this transition will also deliver additional fundamental benefits, in particular reductions in energy costs and a decrease in dependency on imported fossil fuels. Climate change policy targets are largely achieved through sustainable energy policy. Increasing energy efficiency and rational support for the use of RES as well as fiscal policy, through which the pricing and tax system serves as a means of motivating and initiating action among the market participants, are critical to these efforts.

Slovakia has made significant progress in separating increases in greenhouse gas emissions from economic growth since 1990. Emissions have decreased by 41%, ranking Slovakia among the best in Europe.

Major technological changes, a progressive change in the fuel mix with an increasing share going to natural gas and a dramatic decrease in coal and mineral oil consumption between 1990 and 2005 are the primary factors driving the positive trend of continuous reductions in the carbon intensity of GDP. The preservation of nuclear energy in the energy mix has also played an important role.

2.6.8 Utilisation of nuclear energy

Nuclear energy is the driving force of low carbon growth in Slovakia. In addition to safe operations, one of the most important factors in using nuclear energy is managing the final stage of utilization of the nuclear energy. The *"Strategy for the Final Stage of Peaceful Utilization of the Nuclear Energy in SR"* was adopted by the government in Resolution No. 26/2014 of 15 January 2014.

The primary objective of the strategy is to protect the environment from the long-term consequences of the use of nuclear energy to generate electricity and the consequences of other aspects of the peaceful use of nuclear energy. The strategy assesses the financial assurance of the strategy, including its impacts on the competitiveness of electricity producers and the reliability of the electricity grid. The strategy follows the polluter pays principle. It also reflects European legislation regarding the management of radioactive waste and spent nuclear fuel as adopted in Council Directive 2011/70/Euratom establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste.

The strategy includes the decommissioning of NPP A1 at Jaslovské Bohunice and NPP V1, for which it primary resolves Stage I of the decommissioning process, the completion of periodic nuclear safety assessments and preparations for the transition to Stage II, including managing the radioactive waste generated by these activities. The strategy also includes the planned decommissioning of other operated nuclear installations and nuclear installations in various pre-operational phases, managing the nuclear waste from operations and from the decommissioning of nuclear installations, managing spent nuclear fuel and activities leading to a decision on the final phase of such management.

A systematic approach to resolving the issue of historical debt (a deficit in funding which forms the shortfall of resources during the operation of nuclear power plants as of 31 December 1994) was defined by Act No. 391/2012 Coll. on the National Nuclear Fund amending Act No. 238/2006 Coll. on the National Nuclear Fund for decommissioning of nuclear facilities and for management of spent fuel and radioactive waste (Nuclear Fund Act) and on amendment of certain acts as amended and which amends Act No. 251/2012 Coll. on Energy and on amendment of certain acts.

2.6.9 Decommissioning nuclear power plants

The continual decommissioning variant was selected for the decommissioning of the NPP A1 and NPP V1. It is expected that this variant will also receive priority in the conceptual plans for decommissioning other power plants. This method is considered brown field decommissioning. Green field decommissioning will come under consideration once all nuclear activities at the given site have been terminated. Sufficient technical and capacity conditions have been created in order to decommission nuclear power plants in Slovakia.

The management of radioactive wastes from operation and the decommissioning of nuclear installations, managing spent fuel as well as targets and measures for the final stage of nuclear energy utilization are the subject of the "Strategy for the Final Stage of Peaceful Utilization of the Nuclear Energy in SR".

2.6.10 Side benefits in terms of air quality and public health improvements

Energy generation and consumption is accompanied by the production of emissions containing fundamental pollutants. Reductions in energy generation and demand and the transition to more refined fuels have led to a significant decrease in sulphur oxide and nitrogen emissions in Slovakia in recent years. Measures adopted to further reduce

greenhouse gas emissions should provide a significant complement to existing and planned air quality measures, thereby driving further significant reductions in the level of air pollution.

The policy for reducing greenhouse gas emissions is defined in Directive 2003/87/EC on the Community scheme for the trading of greenhouse gas emission allowances, amended by Directive 2009/29/EC, which is part of the EU Climate and Energy Package. This directive was implemented in Slovakia by Act No. 414/2012 Coll. on Trading Emission Allowances and on amendment of certain acts.

The National Council of the Slovak Republic approved Act No. 258/2011 Coll. on the Permanent Geological Storage of Carbon Dioxide and on amendment of certain acts on 12 June 2011. This act, in compliance with the directive, stipulates the rights, commitments, measures and procedures related to the process of capturing and storing industrial carbon dioxide emissions in the geological environment. The primary objective of the act is to create a legislative framework for the process to minimise the impacts of climate change on the environment.

The act fully respects the principles of sustainable development and makes a major contribution to the fulfilment of the principles of environmental creation and protection. Technology for capturing and storing CO_2 offers a host of new opportunities to reduce its production and will become a completely new business segment. The act has an impact on the conditions for doing business in geological research, energy, metallurgy and other industrial sectors dependent upon combustion plants.

The activities of the cross-cutting Committee on Coordination of Climate Change Policy established by the government in Resolution No. 821/2011 contribute to the coordination of meeting reduction targets adopted to decrease emissions and lessen the negative consequences of climate change and the implementation of new rules for the EU trading scheme for emission allowances. Key activities of the committee include the preparation of the Low Carbon Strategy of the Slovak Republic to 2030 and the Adaptation Strategy of the Slovak Republic to the Negative Consequences of Climate Change.

All permits for electricity generation in the EU have been subject to auction trading since 2013. All Slovak electricity producers must purchase emission allowances.

Targets for sustainable energy development

Slovakia adopted targets for reducing greenhouse gas emissions that can be classified as follows over time:

- The *short-term target* set in the Kyoto Protocol was a commitment to reduce aggregate greenhouse gas emissions from 2008 to 2012 by 8% compared to 1990.
- The *mid-term target* adopted in the Climate and Energy Package was an EU-wide commitment to decrease greenhouse gas emissions by 20% compared to 1990 by 2020.
- *Over the long-term*, Slovakia must identify the comparative advantages of low carbon development and prepare a corresponding strategy.

Measures to ensure environmental sustainability

- improve the utilisation of proceeds from the mechanisms of the Kyoto Protocol through a green investment scheme to speed up the implementation of measures reducing greenhouse gas emissions in a cost-effective manner;

- intensify activities to reduce CO_2, emissions, in particular in the transport sector, to achieve the national target regarding emissions in sectors outside of the European trading scheme for emission allowances for greenhouse gases;
- thoroughly evaluate the construction of new energy conversion sources with respect to potential negative impacts on decreasing the efficiency of existing installations to generate and distribute heat including centralised heat supply systems as well as negative impacts on the environment in the given location and eliminate these negative impacts;
- draft measures to facilitate economic growth based on low carbon and a less energy-intensive economy;
- ensure the timely implementation of energy efficiency policy and measures and increase the level of public discussion on energy efficiency given its decisive significance for energy security, decreasing the negative consequences of climate change and the competitiveness of the economy;
- contribute to the achievement of environmental sustainability with the defined targets using adequate and targeted regulatory measures.

3 STATE OF SLOVAKIA'S ENERGY AND FUEL SUPPLY. DEVELOPMENT IN INDIVIDUAL ENERGY SECTORS

3.1 Coal supply

3.1.1 Current state of coal supply

Total coal consumption in Slovakia is locked in a long-term declining trend. The total in 2012 was 7,150 kilotons (kt). The reduction in consumption over the past 5 years is nearly 19%. The volume of black coal imports has declined significantly, though it has stagnated at a level of 3,900 kilotons over the past two years.

Fig. 11 Total coal consumption (production and imports) in the Slovakia by year (Source: Ministry of Economy)

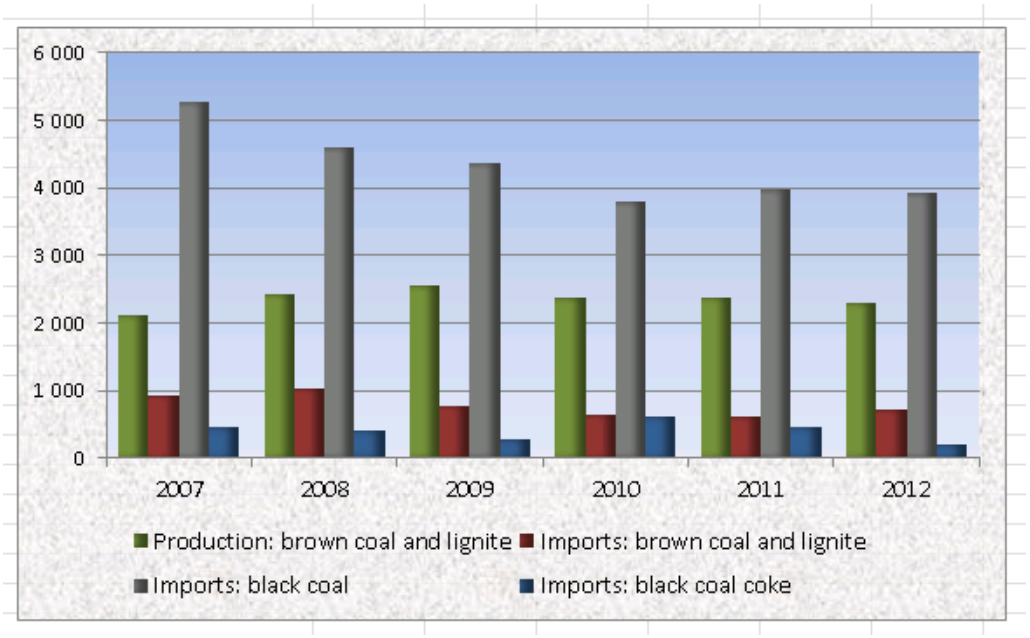


Table 8 Total coal consumption in Slovakia (Source: Statistical Office of the Slovak Republic, Ministry of Economy)

	2007	2008	2009	2010	2011	2012
Production: brown coal and lignite	2,113	2,423	2,573	2,378	2,376	2,292
Imports: brown coal and lignite	936	1,039	781	647	611	715
Imports: black coal	5,286	4,610	4,368	3,807	3,984	3,928
Imports: black coal coke	480	415	275	610	468	218
Total (kt)	**8,815**	**8,487**	**7,997**	**7,442**	**7,439**	**7,153**

Black coal

Black coal is primarily imported from Russia and Ukraine and is primarily used in the steel industry (US Steel Košice) and the Vojany I Power Plant (Vojany I). Black coal consumption also has exhibited a declining trend. The decline in black coal imports in the recent past is related to the economic crisis, gasification and the reduction in power generation at Vojany I.

Brown coal and lignite

Domestic brown coal and lignite production fluctuates in a range of 2,300 kt/year with consumption at a level of 3,000 kt/year. The deficit is covered by imports, primarily from the Czech Republic. Total extraction in 2012 totalled 2,292 kt, a 32% decline over the past 10 years.

Three mining companies are involved in extraction work: Hornonitrianske bane Prievidza, a.s., (HBP, a.s.), Baňa Čáry, a.s. (BČ, a.s.) and Baňa Dolina, a.s. (BD, a.s.)

Fig. 12 Forecast development of brown coal and lignite extraction in Slovakia (Source: Ministry of Economy)

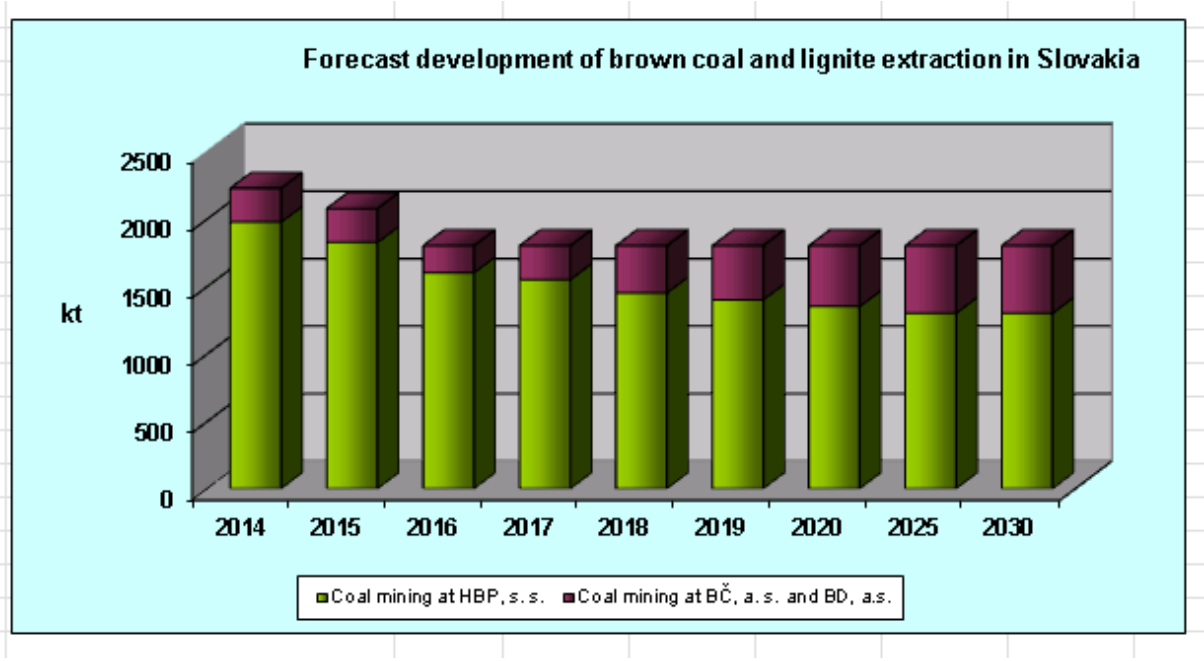


Table 9 Forecast development of brown coal and lignite extraction in Slovakia (Source: Hornonitrianske bane, Ministry of Economy)

Location	2014	2015	2016	2017	2018	2019	2020	2025	2030
Coal mining at HBP, a. s.	1,975	1,825	1,600	1,550	1,450	1,400	1,350	1,300	1,300
Coal mining at BČ, a. s. and BD, a.s.	250	250	200	250	350	400	450	500	500
Total coal mining in Slovakia (kt)	**2,225**	**2,075**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**

This scenario for the development of coal mining anticipates a decrease in coal mining at HBP, a.s. given the exhaustion of extractable reserves at the Cígeľ site and the reconstruction of the Nováky Power Plant as the 2 units at the power plant will be shut down after 2015 as a result of stricter EU air quality and climate protection standards.

The alternative to shutting down operations of 2 units at Nováky Power Plant B and two boilers at Nováky Power Plant A considered in 2013 involved the complete exhaustion of existing reserves in what is known as the East Shaft (300 kt/year). Accessible reserves are expected to be extracted at the Baňa Cígeľ mine in 2015. A decrease in extraction of approximately 500 kt/year to approximately 1,600 kt in 2016 is expected with a further decrease to approximately 1,300 kt in 2030. Supply levels for electricity generation are expected to be maintained in Slovakia in light of the general economic interest of such action and in order to produce heat in combination with biomass for the surrounding communities and industry.

The Slovak government confirmed the volume of electricity and heat generation and supply from domestic coal as in the general economic interest in Resolution No. 47/2010. This measure ensures the optimum level of coal extraction increases the security of electricity supply and lowers Slovakia's energy dependence in the period until 2020 and with perspective to 2035. This support has an important social aspect as it maintains employment in the regions of Horná Nitra, Veľký Krtíš and Záhorie.

Table 10 Optimisation of electricity generated using domestic coal 2014 – 2030 (Source: Ministry of Economy)

SE, a.s. – Nováky Power Plant	units	2014	2015	2016	2017	2018	2019	2020	2025	2030
Electricity generation	**GWh**	1,702	1,684	1,584	1,584	1,584	1,584	1,584	1,584	1,584
Delivered electricity	**GWh**	1,466	1,450	1,350	1,350	1,350	1,350	1,350	1,350	1,350
Coal consumption for electricity	**kt**	**1,820**	**1,800**	**1,700**	**1,700**	**1,700**	**1,700**	**1,700**	**1,700**	**1,700**
Coal consumption for heat	**kt**	200	200	100	100	100	100	100	100	100
Biomass consumption for heat	**kt**	0	0	70	70	70	70	70	70	70
Total coal consumption	**kt**	**2,020**	**2,000**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**	**1,800**

The optimisation of electricity generation using domestic coal by 2030 was completed after evaluating mining capacities of local mines within Slovak government Resolution No. 381 of 10 July 2013: "Proposed programmes for creating new jobs in the Horná Nitra region in cooperation with HBP, a.s."

Other coal deliveries must continue to be imported given the expected needs of consumers.

3.1.2 Securing sufficient coal supply for the Slovak market until 2030

According to the *Balance of Stocks of Specific Reserves*, Slovakia has a total of 21 coal reserves with a total volume of geological reserves of approximately 1 billion tonnes. According to a material published by the State Geological Institute of Dionýz Štúr, 100 to 130 million tonnes of extractable reserves are located in a total of 7 reserves. This balance clearly illustrates that even if the extraction and consumption of domestic coal is restricted to supplying coal to Nováky Power Plant for generation purposes, the amount of coal would only be sufficient for a 20 – 25 year period with annual coal consumption at Nováky Power Plant of approximately 2 million tonnes per year.

Since 2015, the Slovak government is no longer counting on the extraction of brown coal from **Baňa Dolina, a.s.** Veľký Krtíš as confirmed by Resolution No. 449/2012. Baňa Dolina will exhaust its brown coal reserves by the end of 2015 and terminate its mining activities. Remediation work, both on the surface and underground, is currently under way.

Baňa Čáry, a.s. with its reserves of lignite is a potential source of this raw material for power generation uses. There is 26 million tonnes of extractable reserves, which represents a potential reserve lifespan of more than 50 years. The lignite from this reserve has low sulphur content and a stable heat value. It is particularly suitable for combustion in fluidized bed boilers. Preparations may intensify and extraction may be increased up to a total of 500 kt per year if economic conditions are favourable.

The extraction volumes contained in Table 9 are based on the actual extraction capabilities of BČ, a.s. and are in full compliance with Slovak government Resolution No. 47/2010 on the extension of the general economic interest in the use of domestic coal for electricity generation for the period from 2011 to 2020 with perspective to 2035. The largest consumer of this coal is SE, a.s. – Nováky Power Plant.

Coal mining objectives:

- ensure sufficient domestic coal stocks for generating electricity for residential and industrial usage to 2035;
- gradually replace classic extraction methods with underground coal gasification methods and secure gas synthesis for electricity and thermal generation purposes or for chemical uses after 2020.

Measures to achieve these objectives:

- complete analysis of in situ underground gasification of coal (2015);
- regularly assess the costs and benefits of support for electricity generation, optimise costs and increase production efficiency in cooperation with the regulatory authority;
- preserve the general economic interest for the generation and supply of electricity generated using domestic goal while optimising electricity generation and providing a suitable regulatory framework for ensuring the return on investment needed to secure fulfilment of the commitments arising from Directive 2010/75/EU on Industrial Emissions.

3.2 Crude oil supply

3.2.1 Crude oil sources and transport

Domestic crude oil extraction is almost negligible compared to consumption. The expected trend is a gradual decrease until the exhaustion of reserves around 2020.

Table 11 Development of domestic crude oil extraction (Source: Ministry of Economy)

Crude oil extraction in Slovakia	2009	2010	2011	2012
Extraction (tonnes)	14,644	13,083	15,431	11,448

The main source of crude oil for the petroleum industry is imports from Russia and Azerbaijan via the Druzhba oil pipeline. Slovnaft a.s. (Slovnaft) annually refines 5.3 – 6.0 million tonnes of crude oil. The company imported 5.5 million tonnes in 2010, 6 million tonnes in 2011, 5.36 million tonnes in 2012, and 5.79 million tonnes of crude oil in 2013.

Crude oil is currently transported in compliance with the "Agreement between the Governments of the Slovak Republic and the Russian Federation on Cooperation in the Area of Long-Term Crude Oil Deliveries", which expires at the end of 2014 with an agreed quantity up to 6 million tonnes per year.

The Druzhba oil pipeline has a design capacity in its Slovak leg of 20 million tonnes per year. The current amount of crude oil transported by the pipeline operator, Transpetrol, a.s., is 10 million tonnes per year. 6 million tonnes of this oil represent supplies for the Slovnaft refinery with the remainder transported to a refinery in the Czech Republic and small amounts for other consumers. A decrease in the utilisation of the oil pipeline was caused by a decrease of transport to Czech Republic, where a significant portion of supplies now uses the IKL pipeline (Ingolstadt – Kralupy nad Vltavou – Litvínov).

The crude oil pipeline system in Slovakia is owned and operated by Transpetrol, a.s., which secures crude oil transports for consumers in Slovakia, Czech Republic and transit oil transport to Hungary. Russian REBCO oil for the Slovnaft refinery is carried through the Druzhba oil pipeline and sporadically through the Adria oil pipeline from Hungary.

3.2.2 Diversification of crude oil sources

The **Adria oil pipeline** (Adria project) represents a usable, existing oil pipeline connected to the seaport in Omišalj, Croatia as a diversification option. Slovnaft and the MOL group are preparing a project to overhaul and expand transport capacity of the Adria oil pipeline on the Šahy – Százhalombatta (Hungary) line in order to increase use and transport capacity from 3.5 million to 6 million tonnes per year, thereby securing the diversification of crude oil transports for Slovakia. The overhaul of the oil pipeline should be completed by the end of 2014.

The **Bratislava – Schwechat Pipeline (BSP) oil pipeline connection project** is to connect the Druzhba oil pipeline with the Schwechat refinery near Vienna and the TAL and AWP oil pipeline systems. This will allow the Schwechat refinery to be supplied with oil from the Druzhba pipeline. A benefit of this project will be to amplify the importance of the Slovak section of the Druzhba oil pipeline within pan-European oil pipeline networks and at the same time significantly improve the economic balance of Transpetrol a.s. Likewise, the BSP

pipeline connection will allow the Slovnaft refinery to be supplied with reverse flow oil from the oil terminal in Trieste if supply through the Druzhba oil pipeline is interrupted.

The Slovak government approved the *Information on the Bratislava-Schwechat oil pipeline connection – assessment of the feasibility and strategic nature of connecting the Druzhba oil pipeline with the Schwechat refinery* material in January 2013. This material includes the actual progression of work activities, including assuring commitments from Austrian counterparts, resulting in the submission of a comprehensive and detailed material with exact specification of the BSP oil pipeline routing, including all related documents to secure its construction, operation, economic returns and environmental safety, to the government for discussion by the end of 2014.

Transpetrol, a.s. and OMV will fully cover the financing of the above mentioned project. Project costs are estimated in a range of EUR 75 – 125 million depending on the type of the selected final routing of the pipeline. The pipeline's total length ranges from 81 to 152 km depending on its final routing with total capacity of 2.5 – 5 million tonnes of crude oil per year. The operational phase of the oil pipeline connection should begin at the end of 2017 but this depends on a decision on the final routing of the pipeline on the Slovak side.

Both the Adria project and the BSP project are of strategic importance in terms of energy security and crude oil diversification and such strategic importance is a part of evaluation by the Commission. Both projects have been classified into the list of *EU Projects of Common Interest* (PCI) in the oil sector.

Other sources of crude oil for Slovakia include supply from the Czech Republic, which is connected to the IKL and TAL oil pipelines and which is also considering the construction of a new oil pipeline to Germany along a route from the Litvinov refinery to Leuna (Schwedt), which is connected to the northern leg of the Druzhba pipeline passing through Poland. Reverse flow from the Czech Republic to Slovakia is not currently possible and the implementation of reverse flow capacity requires technical modifications to pumping stations in the Czech Republic.

3.2.3 Emergency crude oil stocks in Slovakia

Safeguarding Slovakia's crude oil supply and building up emergency crude oil and petroleum product stocks in accordance with EU regulations created and maintained to mitigate and resolve the negative consequences of a serious interruption of oil and petroleum product supply in Slovakia or in the EU are critical tasks in terms of the national security in the oil market in connection with the international environment and concurrently for ensuring economic efficiency.

The Member States are obliged to maintain minimum stock levels of crude oil and/or petroleum products equal to 90 days of average daily net imports or 61 days of average daily inland consumption, depending on which is higher, based on the provisions of Council Directive 2009/119/EC dated 14 September 2009. Slovakia implemented this directive in Act No. 218/2013 Coll. on Emergency Stocks of Oil and Petroleum Products and on Resolving Oil Crises and on amendment of certain acts.

Slovakia currently maintains emergency stocks of crude oil and petroleum products at a level of 97 days of average daily net imports for the period until March 2015. Total emergency stocks represent approximately 770,000 tonnes (60% as crude oil and 40% as petroleum products in individual categories).

Act No. 373/2012 Coll. *on Emergency Stocks of Oil and Petroleum Products on Resolving Oil Crises and amending Act No. 309/2009 Coll. on Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and on amendment of certain acts as amended* was adopted

with the transposing of Council Directive 2009/119/EC and entered into force on 1 January 2013.

The administration of these emergency stocks was a major burden on the state budget, which is why a new model for administration was proposed and the ***Emergency Oil Stocks Agency*** (Agency) was established on 13 September 2013 on the basis of Act No. 218/2013 Coll. *on Emergency Stocks of Oil and Petroleum Products and on Resolving Oil Crises and on amendment of certain acts*, which entered into force on 1 August 2013. The Agency owns the emergency stocks of oil and petroleum products, ensures their procurement, maintenance and exchange and is responsible for national security in this specific sector pursuant to the requirements laid down in Council Directive 2009/119/EC.

Emergency stocks of oil and petroleum products were handed over to the Agency pursuant to Act No. 218/2013 Coll. on Emergency Stocks of Oil and Petroleum Products and on Resolving Oil Crises and on amendment of certain acts on 1 December 2013. Selected undertakers are obliged to pay a specific fee to the Agency according to the same act on the basis of a Contract to Secure Maintenance of Emergency Stocks beginning on 1 December 2013.

The level of emergency stocks should reach circa 1.5 million tonnes, approximately double their current level, by 2030. Available storage capacity for storing emergency stocks is approximately 65% of Slovakia's total current storage capacities for oil and petroleum products totalling approximately 1,400 thousand m^3. The conditions for securing and building additional storage capacities for oil and petroleum products must be secured given current restrictions.

3.2.4 The petroleum products market in Slovakia

The petroleum products market has changed over the past 15 years in terms of quality and quantity. Slovakia's closed market with a single producer and seller of petroleum products has become a market integrated into the liberal European oil market where multiple regional producers compete for consumers and whose products are sold in dozens of retail outlets both domestically and internationally.

Slovnaft's refinery production capacity (6 million tonnes) is more than twice the current national demand for petroleum products (approximately 2.5 million tonnes) and therefore Slovakia exports most refinery and petrochemical products. Domestic fuel production totalled 4.67 million tonnes in 2011.

Approximately 6 thousand tonnes of oil products are consumed in Slovakia on a daily basis, of which 4 thousand tonnes are diesel fuel and 1.6 thousand tonnes are petrol. Nowadays, 35% of these products are imported to Slovakia, primarily from the Czech Republic and Austria and partially from Belarus and Romania. This is the result of competition between refineries, as Slovnaft has sufficient capacity to supply 100% of the Slovak market. Slovnaft currently exports approximately 75% of its production, which it naturally would not do during a crisis, as there is also a high probability of an interruption of petroleum product imports to Slovakia as Austria and the Czech Republic would also be affected by a shortage of oil or a shortage of petroleum products from Slovakia.

3.2.5 Inland fuel and heating oil consumption

Inland fuel consumption in 2012 was 2,064 thousand tonnes (petrol totalled 542 thousand tonnes, diesel totalled 1,494 thousand tonnes and LPG totalled 31 thousand tonnes). Petrol consumption has recently been exhibiting a declining trend. A 7% drop was recorded in 2012

compared to 2011. Diesel consumption continues to increase over the long-term. LPG consumption has stagnated at a level of around 30 thousand tonnes and heating oil consumption has dropped dramatically.

35% of inland fuel consumption is covered by imports, despite the fact that the domestic producer Slovnaft is able to supply more than double the entire domestic market over the long term.

3.2.6 Fuel consumption forecasts in Slovakia

A number of variants of future fuel consumption developments have been analysed using a number of potential trends. All of the variants included the planned introduction of biofuel blends pursuant to the approved National Action Plan for Renewable Energy Sources by 2020.

Fig. 13 Fuel and heating oil consumption forecast (Source: Ministry of Economy)

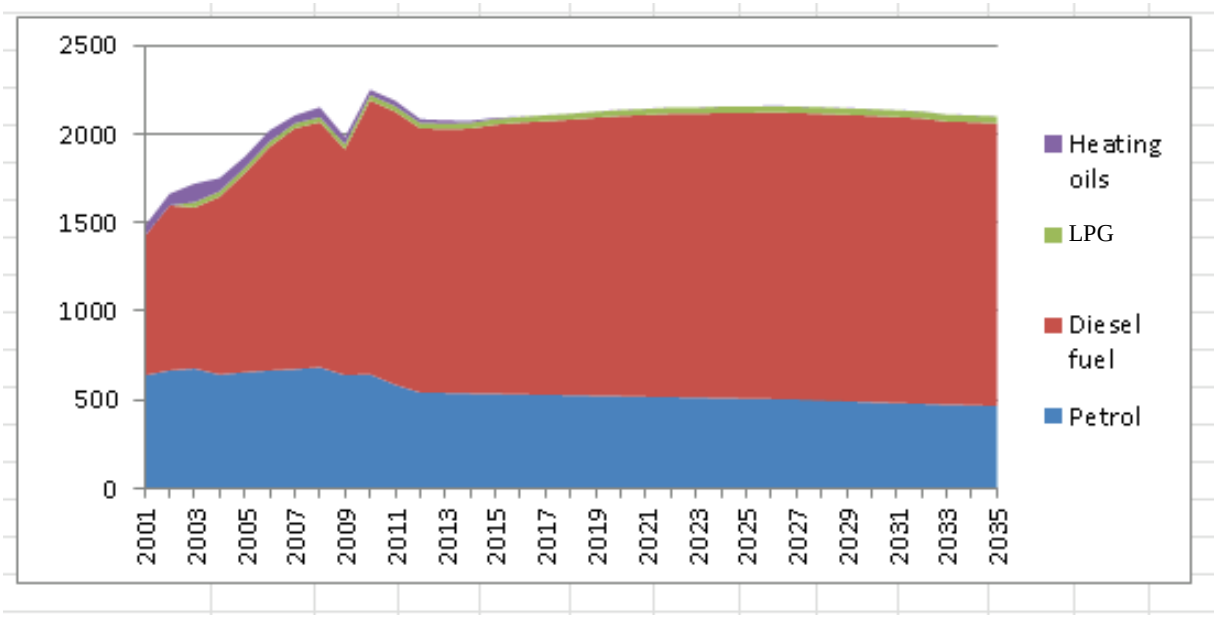


Table 12 Fuel and heating oil consumption forecast (Source: Slovak Association of Petroleum Industry and Trade Annual Report 2012, Ministry of Economy)

Thousand tonnes	2001	2005	2010	2015	2020	2025	2030	2035
Petrol	638	656	644	534	521	508	487	465
Diesel fuel	783	1124	1520	1559	1582	1612	1617	1596
LPG	-	31	30	32	34	36	37	39
Heating oils	57	61	30	7	1	1	1	1
Total	**1478**	**1872**	**2251**	**2093**	**2138**	**2156**	**2142**	**2101**

The reference scenario for development of fuel and heating oil consumption is derived from the developments in recent years and economic growth forecasts. Decrease is expected in the growth rate of motor fuel consumption compared to the average for 2001 – 2012.

Petrol consumption should continue on a slightly declining trend with a year on year coefficient of -0.5% or stagnate at its current level depending on the development of the purchasing power of the population, the rate of introduction of alternative fuels as well as increasing the share of passenger cars with diesel engines.

Diesel fuel consumption in the reference scenario should continue with more dynamic growth depending on economic developments and the extent to which alternative fuels are utilised. Long-term average year on year growth in consumption is expected at a level of 5%.

The scenario with lower growth in fuel consumption can be expected in the event of a more dramatic slowdown in the Slovak economy.

The importance of alternative fuels such as LPG, CNG and electric vehicles, as well as hydrogen-based drive systems, is expected to increase in transport.

The country's ability to supply the market is high in terms of the absolute volume of fuels consumed in Slovakia going forward given that maximum production capacity in the refinery industry is sufficient in all scenarios.

The same can be said if domestic demand was supplied exclusively from the domestic refinery even if such situation is actually extremely unlikely as long as Slovakia remains a fully integrated part of the EU and the unified liberal European oil market.

Oil industry objectives:

- reliably meet domestic market demand for fuels and other petroleum products;
- secure the introduction of biofuel blends pursuant to the *National Action Plan for Renewable Energy Sources by 2020*.

Measures to achieve these objectives:

- resolve the routing of the Bratislava – Schwechat oil pipeline in a manner that poses no threat to ground water reservoirs on Rye Island and mitigates negative environmental impacts;
- continue efforts to lay the groundwork for diversifying oil supply (transport routes and sources);
- implement the project to overhaul and increase the capacity of the Adria oil pipeline;
- intensify the use of alternative, less carbon intensive fuels in transport, in particular CNG;
- increase efforts to restrict increases in demand for oil by management of the demand side, in particular in the transport sector;
- monitor the mid-term increase in demand and assess overall requirements for storage capacity in order to secure a sufficient expansion of storage capacity for strategic stocks.

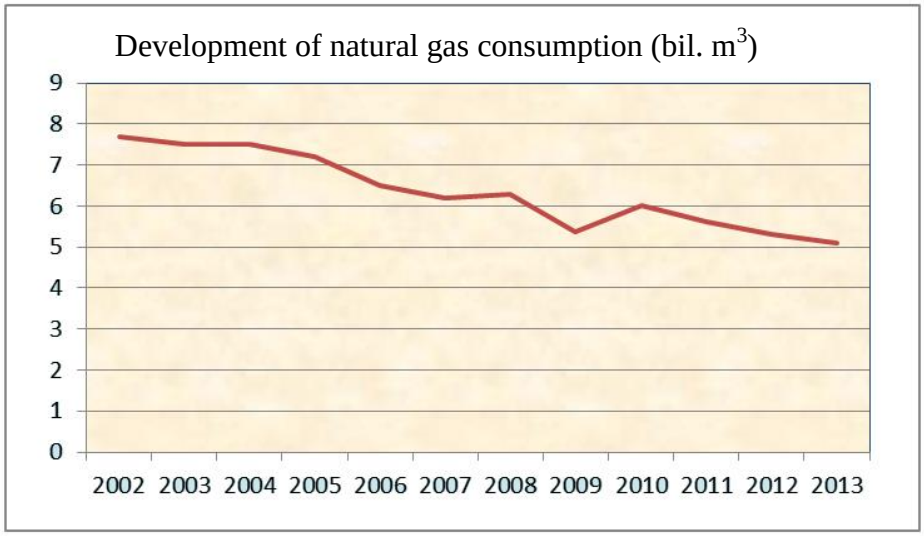
3.3 Natural gas supply

3.3.1 Current situation of natural gas supply

Market liberalisation and development

Inland natural gas consumption has continued to decline in recent years and fluctuates at a level of 5 – 6 billion m^3. Consumption decreased by 34% over the recent 11 years (2002: 7.7 billion m^3, 2013: 5.1 billion m^3).

Fig. 14 Development of natural gas consumption to 2013 (Source: Statistical Office of the Slovak Republic)



Gas consumption has declined sharply over recent years across Europe. A 10% decline was recorded between 2010 and 2011 with a further circa 3% reduction from 2011 to 2012.

The Slovak gas market is liberalised as multiple sellers are active on the market. In addition to Slovenský plynárenský priemysel, a.s. (SPP, a.s.), other major sellers include: RWE Gas Slovensko, SHELL Slovakia, VNG Slovakia, ČEZ Slovensko, Lumius Slovakia, ELGAS and A.En. Gas. Other smaller suppliers are also active on the market but collectively they account for less than 1% of market share.

New players entered the market in the small and medium enterprise segment in addition to the segment of medium and large consumers in 2010. Households have been able to take advantage and profit from offers from multiple suppliers since 2011 even though legislative conditions for competition were created in 2007. Large consumers account for 60% of natural gas consumption while small enterprises and organisations consume 10% and households account for the remaining 30%.

The arrival of new players on the gas supply market and its dynamic development in the last two years, which continued also in 2012, is evidence of the fact that there are no real barriers, either legislative or factual, preventing the entrance of new players and the development of the gas market in Slovakia. Further rigorous application of the rules in valid EU and Slovak legislation must continue to create the conditions needed to develop competition and transparency on the Slovak gas market. The entry of new players on the market was also caused by the situation on the international market and the deviation of spot market prices from prices based on long-term contracts tied to the price of oil.

Pricing policy in energy is based on regulatory policy, which is developed by the regulatory council of the Regulatory Office for Network Industries with Ministry of Economy and Ministry of Environment commenting.

The essence of price creation in energy is the creation of a stable regulatory framework, compliance with the principles of equal conditions for all entities on the energy market and transparency of the Regulatory Office's secondary legislation as the state's regulatory authority. Tariffs and prices are created using objective data provided by regulated data on the basis of requests from the Regulatory Office. The data and information undergo thorough analysis and are inspected if necessary directly on site at the providing entity. Draft regulations and decisions are published and are consulted personally with all stakeholders within the commenting procedure to ensure the transparency of state regulatory procedures.

Energy prices ensure undertakers a return on their investments with adequate profit while they also meet consumer protection requirements based on European legislation. The prices are developed so as to prevent cross subsidies between the individual products of producers and between different groups of consumers. The Regulatory Office completes economic models using the data provided by regulated entities in order to determine the consequences of regulatory measures and the effectiveness of the activities of regulated entities.

3.3.2 Security of supply

The Slovak gas market is at a high level with respect to the security of supply and gas stocks in underground storage facilities and long-term gas purchasing contracts play the most important role in terms of safeguarding the security of gas supply and ensuring its stability while subsequent planned investments into gas infrastructure and support for the liberalisation of the gas supply market will increase this level. As shown above, SPP a.s., as the dominant supplier, has increased the security of gas supply thanks to its stock portfolio as well as its gas supply contracts from other sources in the event of an restriction or interruption of gas deliveries from Eastern Europe.

Long-term gas purchasing contracts are one of the most important instruments for safeguarding the security of gas supply. Individual suppliers active in Slovakia use their own approaches for purchasing gas while employing long-term contracts as well as more flexible types of gas purchasing on spot markets. The Russian company Gazprom export is the largest supplier of gas to Slovakia.

Reverse flow capacities at the western borders of Slovakia are 67 million m^3 per day from the Czech Republic and 23.8 million m^3 per day from Austria. The construction of reverse flow capacity involves modification of the pipeline network to enable the physical transport of gas from the west along the full length of the transit pipeline and the construction of a new connection to Ukraine. The interconnection of the pipeline networks in Slovakia and in Poland is extraordinarily important for a significant increase of reverse flow capacities and increase of the security of supply. Likewise the eustream, a.s. transmission network is able to transport natural gas from storage facilities located in the western part of the country and secure uninterrupted supply to the entire distribution network in Slovakia.

3.3.3 Routing diversification

Slovakia supports the diversification of gas transport routes. It is important to emphasise that new pipelines should not duplicate existing excess capacities as these must be fully utilised.

Slovakia – Hungary gas pipeline connection project

The connection of the gas pipeline network between Slovakia and Hungary and specifically the towns of Veľké Zlievce (Slovakia) and Vecsés (Hungary) was placed into test operations

on 27 March 2014. January 2015 is the planned date for the start of commercial operations of the pipeline.

Pipeline costs totalled EUR 170 million with the Slovak side contributing EUR 21 million. The project was supported with a total of EUR 30 million from the European Energy Programme for Recovery.

The transport capacity of the 111 km long (19 km of which are in Slovakia) pipeline will be 5 billion m^3/year. The total expected costs are EUR 160 million. The project represents a major component of the north-south gas corridor connecting LNG terminals in Poland and Croatia and contributes in a significant way to European energy security.

Slovakia – Poland gas pipeline connection project

An agreement was signed between the governments of Slovakia and Poland in November 2013 on cooperation in completing a gas pipeline connection between the Slovak and Polish transmission networks. This project received PCI status from the EU.

The gas pipeline connection between Slovakia and Poland is a component of the planned north-south corridor as it should increase the liquidity of the gas market, safeguard the security of supply at competitive prices and provide a major contribution to safeguarding the energy security of the entire EU. The importance of the project is amplified by its connection with the newly constructed connection to Ukraine and potential interruptions of supply via Ukraine in the primary transit corridor.

Expected costs for the Slovak portion of the Poland – Slovakia gas pipeline connection are EUR 142.2 million.

3.3.4 Underground storage facilities

Underground storage facilities have generally been viewed over the long term as the most important instrument in terms of safeguarding gas supply, which was also confirmed during the crisis in January 2009 when gas deliveries from Russia to Slovakia were interrupted. Underground storage facilities will continue to be of strategic importance given the importance of gas as a source of energy and the standing of underground storage facilities as the most important instrument for safeguarding the security of gas supply going forward.

Current storage capacity at underground storage facilities in Slovakia is 2.9 billion m^3, which is expected to increase to approximately 3.12 billion m^3 following the completion of the Gajary – báden storage facility (2015). A slight increase in storage capacity is also expected given the geological structures in which current underground storage facilities are installed. Slovakia will strengthen its position among countries with the highest ratio of storage capacity to national natural gas consumption.

Table 13 Development of natural gas storage capacity, extraction and transport (Source: Ministry of Economy, operators of storage facilities, eustream, a.s.)

Volumes in billion m^3	**2008**	**2009**	**2010**	**2011**	**2012**	**2015**
Storage capacity	2.60	2.77	2.86	2.94	2.94	3.12
Domestic extraction	0.102	0.103	0.103	0.092	0.093	0.045
Transport	76.2	66.4	71.4	74.0	56.5	

3.3.5 Domestic extraction

Domestic extraction accounts for approximately 2% of natural gas consumption. Existing gas reserves are in the final stages of exhaustion and the yields from these reserves continue to decline. Thanks to major investments made by private companies into geological research, new gas reserves have been discovered and opened, which has helped to stabilise overall gas extraction in recent years. Domestic gas extraction totalled 92 million m^3 in 2011 and it is expected to remain below the 100 million m^3 threshold in the coming years.

The future of gas extraction efforts in Slovakia depends on the verification of new exploration concepts (deep exploration) that are financially intensive and associated with significant geological and technical risks. The feasibility of such projects fully depends on the clarity provided in geological and mining legislation and on the enforcement of exploration rights on the basis of this legislation.

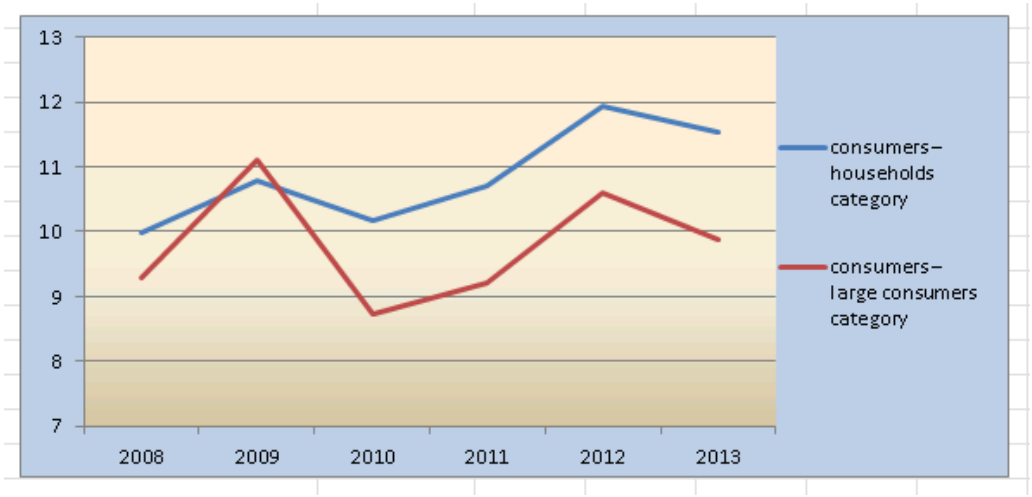
Shale gas may be considered one of the potential options for diversification and decreasing dependence on gas imports at the EU level. Its actual potential in Slovakia must be comprehensively evaluated, including estimation of the country's potential reserves.

Based on initial estimates, the extraction of shale gas in Slovakia is expected to be problematic, in particular economically and in terms of extraction methods with potential environmental risks being one of the decisive factors.

3.3.6 Development of natural gas prices

The graph compares prices in the category of large consumers with consumption of up to 100,000 GJ/year and the category of household consumers with consumption of up to 200 GJ/year.

Fig. 15 Development of natural gas prices from 2008 to 2013 in EUR/GJ (Source: Ministry of Economy)



The liberalisation process on the Slovak gas market was strengthened in 2010 with an increase in the growth of competition in the area of gas supply to industrial consumers manifested in the form of lower prices available to consumers and an increase in the number of gas supplier changes in all groups of gas consumers except for households. The events of 2010 were after all only accompanied by increasing energy prices. Slovakia's gas market recorded dynamic growth in competition in the area of gas supply in 2012. Gas prices influence the competitiveness of Slovak industry even within Europe.

Decisions issued by the Regulatory Office regarding regulated fees for gas prices, including fees for transport and distribution, are published on its website and/or the Regulatory Office publishes a development of prices assessment in its annual report.

3.3.7 Future development

The gas sector is investment intensive, which is why a predictable business environment over the long term and generating appropriate returns on investments is absolutely critical when making the right investment decisions.

Intensive construction of connections with gas networks, including the use of LNG gas and with the electricity grids in neighbouring countries, will improve the security of supply, independence from a single supplier and therefore the competitive environment will also be improved.

The north-south gas pipeline connection is currently one of the most important steps in energy security for Slovakia. In addition to increasing the level of security, this will improve competitiveness and the development of our energy market. This corridor represents a set of pipelines connecting liquefied natural gas terminals in Poland and Croatia, which will place Slovakia in an important position for safeguarding energy stability and security in the central and eastern parts of the EU.

3.3.8 Preserving its position in transporting gas to Europe

Slovakia's pipeline network has played a key role in the security of gas supply to Europe over the past decades. This is why it is important to preserve this position even at a time when the transport of gas from Russia is secured through alternative routes, for instance Nord Stream.

The volume of transmitted gas decreased in connection with the Nord Stream pipeline start-up and the redirection of a portion of transit gas, in particular to Germany and the Czech Republic. This demonstrates the importance of raising Slovakia's profile as a cross-road of gas pipeline connections and therefore improving its ability to secure gas transport for the entire region, to which the construction of the connection between Slovakia and Poland will contribute greatly.

3.3.9 More efficient use of natural gas

Natural gas is the cleanest of all the hydrocarbon fuels in terms of greenhouse gas emissions and this is the reason for its important position in Slovakia's energy mix going forward; additionally natural gas will play one of the key roles in the transition to low carbon energy in the future. CO_2 emissions may be reduced by up to 50% when using natural gas for heating compared to coal and savings may be up to 60% for cogeneration of electricity and heat.

3.3.10 Forecast of future natural gas consumption

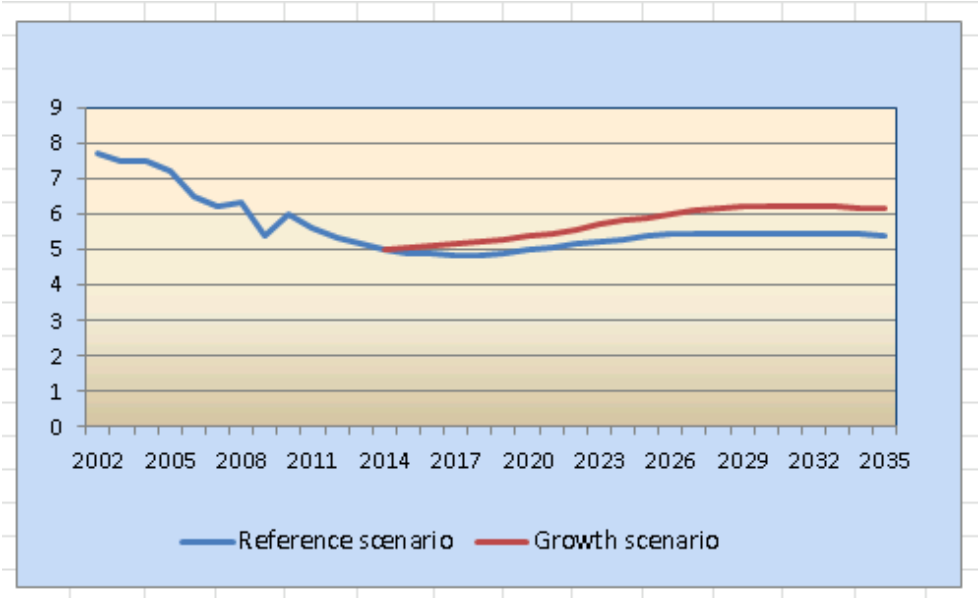
Two counter-acting trends will have an impact on future natural gas consumption. The construction of buildings with lower heating demands, the insulation of existing buildings, measures focused on gas savings and the increased use of biomass, solar collectors and geothermal energy to generate heat and hot water are causing a decrease in natural gas consumption.

The trend of replacing coal with natural gas, on the other hand, is driving increased usage of natural gas, in particular in the heat industry. The development of the use of compressed

natural gas (CNG) in transport can also be considered another factor increasing the utilisation of natural gas. Natural gas may also play an important role in the case of future development of technologies to store CO_2.

Based on these tendencies there is an expectation that natural gas consumption will fluctuate around its current levels over the mid-term and may rise slightly depending on the extent to which natural gas is used as a replacement for coal (combined cycle power plants). Two scenarios for natural gas consumption are considered. The reference scenario does not consider restarting the currently mothballed large combined cycle power plants. The growth scenario includes the restarting of these large power plants as economic conditions for electricity generation improve.

Fig. 16 Expected development of natural gas consumption to 2035 (Source: Statistical Office of the Slovak Republic, Ministry of Economy)



Gas industry objectives:

- connect gas infrastructure in Slovakia with neighbouring states;
- construct sufficient natural gas storage capacity;
- improve the ecology of transport by speeding up development and providing additional support for the use of CNG;
- achieve technical harmonisation with the standards introduced in neighbouring countries;
- safeguard secure, reliable and effective transport and distribution of natural gas;
- maximise the utilisation of the pipeline network through Slovakia.

Measures to achieve these objectives:

- eliminate barriers on the market, continue the development of the gas market and ensure a stable and predictable business environment;
- support investments into the connection of Slovakia's gas infrastructure with neighbouring states and create suitable conditions for these investments;

- create conditions for maximising the use of gas pipeline transport capacity through Slovakia;
- support the amplification of the regional dimension of the security of natural gas supply, increase reverse flow capacity by building a gas pipeline connection between Slovakia and Poland;
- create conditions for the involvement of Slovak energy undertakings in projects of Central European or pan-European importance;
- support the utilisation of storage capacities by creating a suitable legislative and regulatory environment;
- safeguard reliable gas supply by utilising gas storage in underground gas storage facilities;
- support the effective construction of storage capacities in connection with regional infrastructure;
- support re-investments into the distribution network with adequate returns on investment;
- create conditions for increasing the competitiveness of the functioning gas market through a transparent and stable legislative and regulatory framework;
- create a more flexible and less formal environment for storage facility operators. These conditions contribute to maximum exploitation of the advantages offered by Slovakia's underground gas storage facilities.
- conduct analysis of the potential of energy savings in the gas transport and distribution networks;
- ensure sufficient information on gas consumption and billing methods provided to end users;
- increase metering transparency.

3.4 Renewable energy sources

3.4.1 Current situation

The use of RES, and in particular those with predictable generation, increases self-sufficiency and therefore energy security in addition to environmental benefits. Increasing the share of RES in energy consumption is therefore one of the priorities.

Biomass has the largest energy potential among RES in Slovakia with theoretical potential of 120 PJ. Biomass represents also an important potential for the development of regional and local economies.

Slovakia is obliged to increase the use of RES compared to gross final energy consumption from 6.7% in 2005 to 14% in 2020. Expected total RES consumption should reach around 80 PJ in 2020. RES consumption was at a level of 50 PJ in 2012, representing 11% of gross final energy consumption.

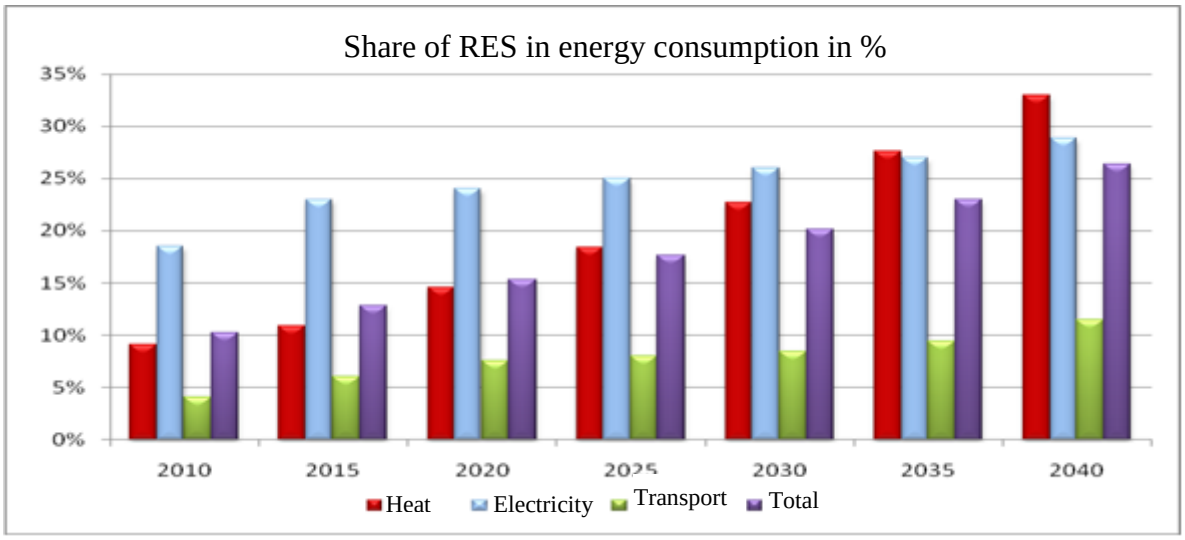
The basic document related to achievement of the 14% target is the *National Action Plan for Renewable Energy Sources* approved by the Slovak government on 6 October 2010 in Resolution No. 677/2010. This document forecasts the achievement of a 15.3% share of RES in terms of gross final energy consumption in 2020.

3.4.2 RES use tendency

Forecasting the use of RES considered the principle of minimising costs while applying an integrated approach to utilising RES and decreasing greenhouse gas emissions. This means that a suitable combination of RES and low carbon technologies will decrease the consumption of fossil fuels and therefore greenhouse gas emissions.

The priority will be technologies which use delivers energy prices that are close to market prices with consideration for a tolerable final energy price. The share of RES in energy consumption should increase in the EU from 10% in 2010 to 26% by 2040 (according to methodology applied to the binding 14% target for 2020). This share is expected to reach 20% in 2030.

Fig. 17 Share of RES in energy consumption to 2040 (Source: Ministry of Economy)



The priority in the near term will be the use of RES for heat generation while support for electricity will be gradually restricted. The increase in the use of RES for heat production will

rise from almost 10% to more than 30% from 2010 to 2040, while the share of RES in electricity generation in electricity consumption will rise from 19% to 29%.

Data up to 2020 take into account the *National Action Plan for Renewable Energy Sources*, which places heavy emphasis on the use of RES in the heating sector. Focus on the heating sector is driven by the need to decrease the dependency of the energy sector on fossil fuels.

3.4.3 Electricity generation

Act No. 309/2009 Coll. on Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and on amendment of certain acts as amended (Act No. 309/2009 Coll. on the promotion of renewable energy) improved the functionality of the electricity market in the area of RES and created a stable business environment. This act provided a guaranteed purchase price for 15 years and also provided guidelines for generating electricity using RES, which favoured the construction of small and decentralised installations. The Action Plan for RES expects that its share in electricity will rise from 19% in 2010 to 24% in 2020.

With respect to priorities, the amendment of this act must take into account the advantages and disadvantages of implementing projects based on the current support scheme. Changes in legislation in terms of support for electricity should create pressure to decrease the costs of support and make more efficient use of biomass. Projects to burn biomass without using heat must be restricted and support must primarily be focused on high-efficiency cogeneration of electricity and heat with installed capacity of up to 5 MW. Support for capacities in excess of 5 MW must assess heat deliveries so that electricity output corresponds to demand for heat, whereby support for heat would be limited to 40 GWh of electricity from biomass per year. Decisions to construct such installations must be made when evaluating combined generation projects using RES in the context of achieving and maintaining maximum energy efficiency through centralised heat supply.

Hydropower plants play a major role in supplying Slovakia's energy as they cover 17 to 19% of electricity consumption. The Slovak government adopted Resolution No. 178/2011 and the *"Concept of Utilizing the Hydropower Potential of Water Courses of the Slovak Republic"* in order to support the development of small hydropower plants with installed capacity of up to 10 MW.

The magnitude of exploitable hydropower potential will be specified after this concept is updated and complex assessment of the impacts such hydropower plants have on water courses will be completed pursuant to *Article 4.7 of the EU Water Framework Directive 2000/60/EU* (Framework Water Directive).

Waterworks that result in changes in the physical properties of surface bodies of water or that change the level of surface of ground water require demonstration of the following in strategic planning documents and during the implementation of the actual project pursuant to the Framework Water Directive defining the framework of EU water or water protection policy:

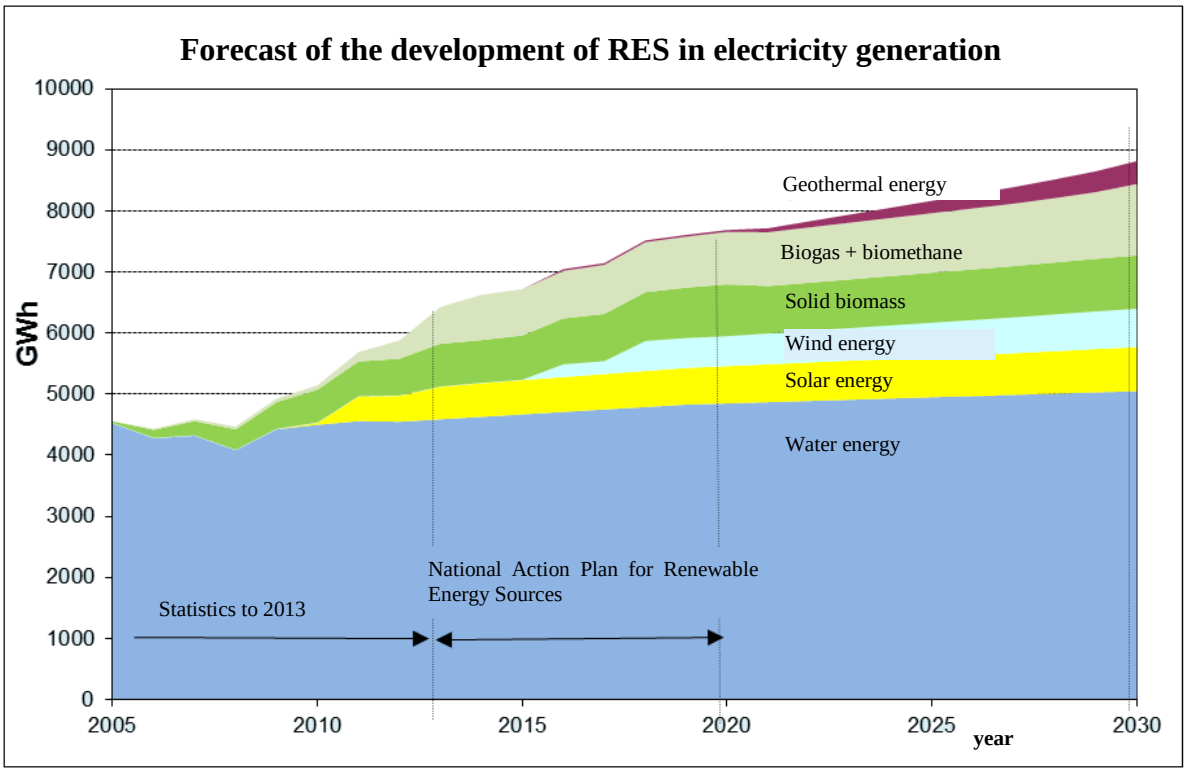
- all feasible steps will be taken to limit negative impacts on the condition of such body of water in the case of a hydropower plant;
- these waterworks or hydropower plants are proposed in the public interest and their benefits for the environment and society outweigh the impacts caused by such construction;
- the benefits of such structures cannot be achieved by any other means that represent a significantly better environmental option taking into consideration the technical feasibility and appropriateness of costs.

The construction of wind turbines will involve the application of a reverse auction in which required installed capacity for the specific period will be defined and investors will compete for their construction by offering purchase prices. A condition for introducing the auctions is a positive assessment regarding the feasibility of constructing wind turbines on the basis of a study completed for SEPS, a.s.

A large increase in the number of photovoltaic power plants was recorded in 2010 and 2011. The installed capacity at all these power plants combined was 537 MW at the end of 2013. Support for additional construction was regulated through a legislative amendment to avoid problems in managing the electricity grid and escalating the price for electricity. Solar generation of electricity will be completely decentralised by 2020 and will only be used to cover the energy needs of specific buildings. The best option is to withdraw from the purchase price scheme and legislative support for installations above 10 kW is no longer needed given the current installed capacity of solar power plants and the price development of technologies at grid parity.

The development and integration of local and distributed RES into energy networks are supported and facilitated by intelligent metering systems and intelligent networks, the implementation of which supports sustainable increases of the share of RES in electricity generation.

Fig. 18 Forecast of the development of RES generation (Source: Ministry of Economy, SEPS, a.s.)



3.4.4 Development of generated electricity purchase prices

The target in the area of support for RES electricity is the optimisation of purchase prices so that no support scheme involving purchase prices is needed after 2020. In the near future those types of RES that do not exhibit any fluctuation in generation would not be relieved from the responsibility for any deviation within the system of support above a specific installed capacity. Those types of RES that do not exhibit any fluctuations in generation and

for which purchase prices come as close as possible to market prices will be given preferential treatment. The new RES support scheme will ensure the achievement of the defined targets in a cost effective manner and prevent negative impacts on electricity prices.

The Ministry of Economy will apply these principles in issuing "Energy Policy Compliance Certificates" and these "Certificates" will be issued after an assessment of the impacts to the final consumer and only for efficient RES plans which are in compliance with the public interest.

3.4.5 Heat generation

The Action Plan for RES places emphasis on the generation of heat from RES with its share projected to rise from 10% in 2010 to approximately 15% in 2020. Biomass is dominant in the RES heat generation sector and is already competitive with natural gas in some cases. The technical potential of biomass predestines it to provide the largest contribution towards meeting the 14% target.

Slovakia has a well-developed centralised heating supply system. This high level of centralisation of heating supply creates favourable technical prerequisites for the use of RES. The construction of heat sources using RES will be supported as a comprehensive replacement of an old heating source when an existing system has sufficient capacity to cover demand for heat.

Biomass, biomethane and geothermal energy will be employed in centralised heating supply system. This will lead to a significant reduction in the consumption of natural gas for heating purposes. The share of heat produced from biomass increased by more than 17% in 2010 and 2011 alone with corresponding reductions in natural gas and coal consumption.

A unified metric incorporating the energy efficiency of combustion, reductions in CO_2 emissions and reductions in emissions of other pollutants must be defined for the purposes of assessing the suitability of the co-combustion of wood chips with coal in classic power plants. Definition of such metric will facilitate the determination of the scope of support for the co-combustion of dendromass with fossil fuels.

Geothermal energy is currently only used for heating specific buildings and no significant development of geothermal power plants is expected by 2020. Support is directed towards using geothermal energy for heat generation in addition to electricity production given the temperature of such water. It is undesirable to support the exclusive generation of electricity through high purchase prices. The largest potential is exhibited by the Ďurkov geothermal spring near Košice, where the geothermal water has a temperature of 130^{o}C, providing the prerequisites for electricity generation. Slovakia also has the potential to use geothermal heat as an energy system and so called dry rocks.

Further development of the use of geothermal energy is conditioned by the creation of a stable legislative framework to protect the quantity and the quality of the sources of geothermal energy.

3.4.6 Support for biomethane

Biomethane is the most universal renewable energy source. It can be used in the power industry, heat industry and transport. It can also be distributed through existing infrastructure and stored in existing storage facilities thanks to its interchangeability with natural gas. Likewise no new sources must be constructed to convert this gas into electricity or heat as it can be combusted in those that currently use natural gas. Biomethane can also be combusted in high efficiency installations thanks to its quality. Preference for biomethane is a given

thanks to the appropriateness of the gas distribution network, however, the connection of biomethane generators to the distribution network requires significant investments so that the biomethane meets all of the parameters for its distribution in the distribution network.

Priority access for biomethane to the distribution network and its subsequent distribution is facilitated once technical conditions are met. Support is provided to electricity producers using biomethane that generate electricity using cogeneration technologies. Increased support for electricity producers is defined for the use of biomethane in high-efficiency cogeneration installations. The share of biomethane in the Slovak energy mix is expected to increase in the coming years.

The promotion of this ecological fuel in transport through suitable means of support as an alternative or to complement the potential of 1st generation biofuel for the fulfilment of commitments in transport should follow after the full development of a network of vehicles powered by biomethane and biomethane filling stations.

The expected quantity of energy generated from biomethane by 2020 pursuant to the National Action Plan for Energy from Renewable Energy Sources is 60 ktoe, corresponding to approximately 70 million m^3 of natural gas. Only the most cost effective biomethane support needs to be considered given the better than expected fulfilment of RES goals at the present time.

3.4.7 Utilising wastes

Biodegradable wastes are considered biomass. Waste recovery for energy utilisation after separation and recycling processes has priority over waste disposal in landfills. Approximately 6.8% of municipal waste was recovered for energy utilisation in 2009, which is a low percentage of the overall quantity of waste. If the requirements to divert waste streams away from landfills are to be met, the level of waste recovery for energy utilisation must be increased significantly along with the production of fuels from wastes (increasing the share of combusted waste overall, improving the technical level of combustion installations and increasing the number of types of waste used to produce alternative fuels). Regulations giving preference to heat produced using renewable components of waste over fossil fuels are seen as an appropriate form of support.

RES objectives:

- increase the use of RES in proportion to gross final energy consumption from 6.7% in 2005 to 14% in 2020;
- achieve a utilisation of RES at a level of 80 PJ in 2020 and 120 PJ with a view to 2030;
- achieve at least a 10% share of RES in transport fuels consumption.

Measures for the rational use of RES:

- implement the National Action Plan for Energy from Renewable Energy Sources with the goal of meeting relevant binding EU targets;
- focus structural funds for the 2014 – 2020 period in the area of RES and in particular on the generation of heat from RES and on support for small sources in households;
- monitor the cost effectiveness of mechanisms to support RES including the system of purchase prices with consideration given to the impact of such support on final prices for consumers;

- consider the impact on the final price of electricity when devising support for energy from RES;
- simplify administrative measures to shorten the time needed to award specific permits to install RES installations, in particular in the case of smaller projects;
- support mechanisms that facilitate local and distributed RES installation which will change from support using additional fees to other mechanisms that do not burden end users;
- amend Act No. 309/2009 Coll. on Promotion of Renewable Energy Sources and High-Efficiency Cogeneration to consider the measures and objectives outlined above.

3.5 Electricity supply

3.5.1 Current state of electricity supply

Electricity supply in Slovakia is reliable with a minimum of outages that could threaten the security of energy supply with respect to long-term efforts to construct an optimum structure of generation capacity and a well-developed distribution system. Slovakia became self-sufficient for electricity supply with the completion of two units at Mochovce Nuclear Power Plant in 1998 and 2000 and was an electricity exporter until 2006. Slovakia once again became dependent upon imports at the end of 2006 following the shutdown of NPP V1 at Jaslovské Bohunice in 2006 and 2008 and other units in thermal power plants. Electricity imports were partially reduced as a result of the economic and financial crisis after 2008, which resulted in a decrease in consumer demand for electricity.

Fig. 19 Balance of total electricity consumption and generation in Slovakia from 2005 to 2013 (Source: Ministry of Economy)

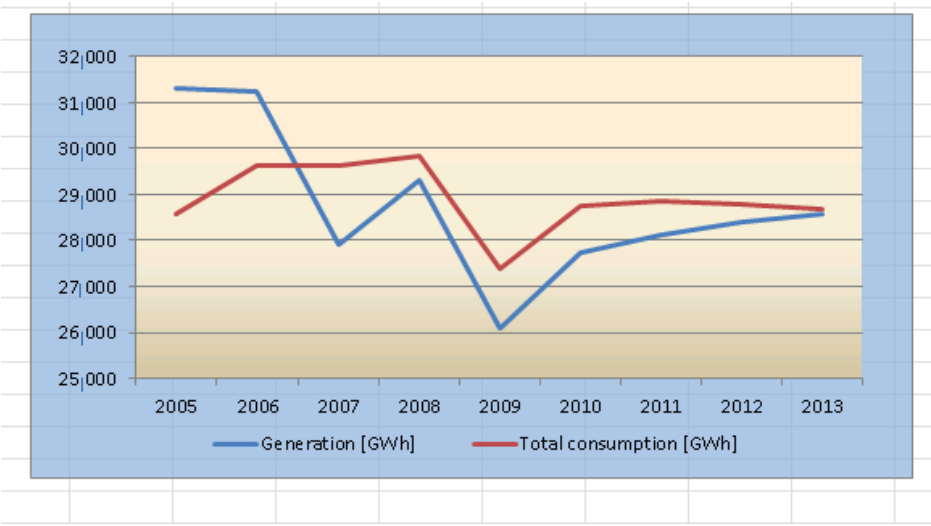


Table 14 Balance of total electricity consumption and generation in Slovakia from 2005 to 2013 (Source: SEPS, a.s.)

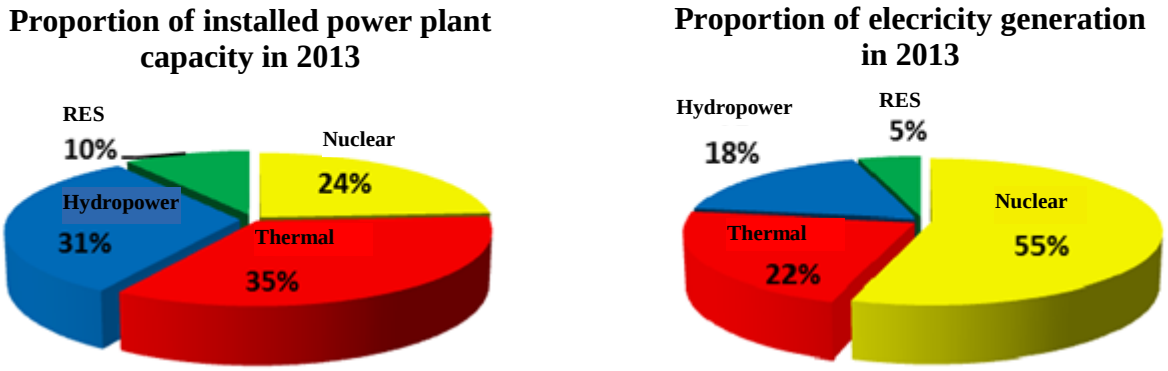
Year	Generation [GWh]	Total consumption [GWh]	Balance [GWh]	Average load [MW]	Peak load [MW]
2005	31,294	28,572	2,722	3,262	4,346
2006	31,227	29,624	1,603	3,382	4,423
2007	27,907	29,632	-1,725	3,383	4,418

2008	29,309	29,830	-521	3,396	4,342
2009	26,074	27,386	-1,312	3,126	4,101
2010	27,720	28,761	-1,041	3,283	4,342
2011	28,135	28,862	-727	3,295	4,279
2012	28,393	28,786	-393	3,277	4,395
2013	28,590	28,681	-91	3,260	4,175

Annual generation gradually increased with the start-up of a number of power plants and in particular by increasing the installed capacity at NPP V2 and NPP Mochovce 1, 2 in subsequent years with electricity imports decreasing every year thereafter.

Total consumption in 2013 reached 28,681 GWh with generation of 28,590 GWh while imports of 91 GWh represented only 0.3% of national consumption; as a result Slovakia was practically balanced in 2013 and had secured self-sufficiency in electricity generation. The difference between consumption and generation could have been covered by domestic sources but electricity imports were more market-efficient than generating this electricity in Slovakia.

Fig. 20 Capacity and generation structure of the generation base in 2013 (Source: SEPS, a.s.)



Totalled installed capacity of power plants in Slovakia in 2013 was **8,074.3 MW.** This represented a reduction compared to 2012 as a result of the removal of the installed capacity of the Vojany II gas power plant (440 MW) from the balance of sources.

3.5.2 Forecast development of electricity consumption in Slovakia by 2035

Future development in electricity supply in Slovakia will primarily be influenced by: development in electricity consumption, phasing out of power plants at the end of their lifespan and the start-up of new power plants, the accessibility and development of the prices of raw materials used to generate electricity, the market price of electricity, higher costs associated with greenhouse gas emissions and pollutants, the price of new production technologies, developments involving RES and means of generating electricity as well as legislative developments.

The forecast development of electricity consumption in Slovakia by 2035 is one of the input parameters used to safeguard Slovakia's energy security over the long-term along with the overall strategy for directing the future development of the power industry in Slovakia. Any forecasts of electricity consumption contain a specific level of uncertainty given uncertain economic developments and/or electricity prices. Three development scenarios are forecast

for electricity consumption for this very reason and are based on a specialised estimate of the year on year growth in consumption given Europe-wide trends.

All scenarios count on a decrease in energy intensity and natural energy savings given the competitive market environment. No significant decreases in consumption are considered as a result of the shutdown or closure of any major electricity consumers in Slovakia.

Fig. 21 Forecast of the development of total electricity consumption in Slovakia by individual scenarios (Source: Ministry of Economy)

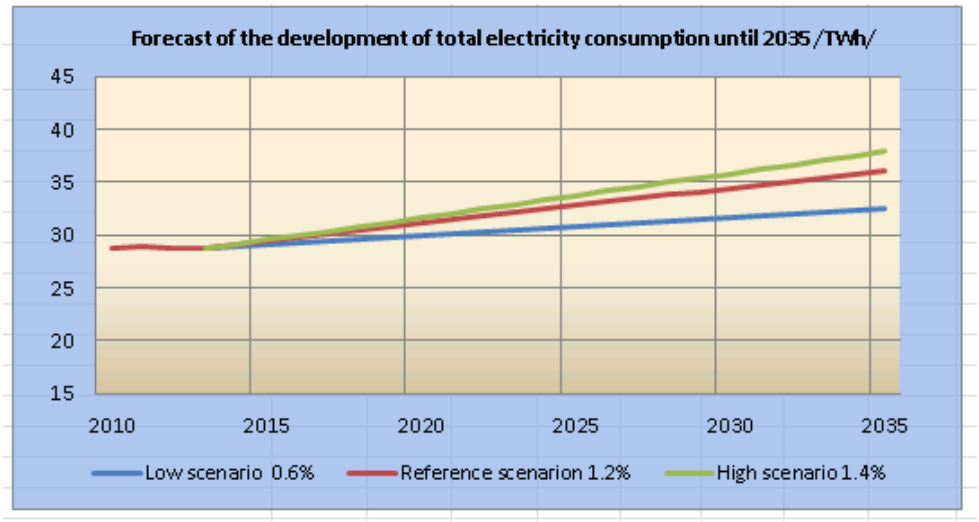


Table 15 Development forecast (Source: SEPS, a.s. Ministry of Economy)

Consumption in TWh	2010	2011	2012	2013	2014	2015	2020	2025	2030	2035
Low scenario 0.6%	28.76	28.86	28.78	28.68	28.8	29.0	29.9	30.7	31.6	32.4
Reference scenario 1.2%					29.0	29.1	31.0	32.7	34.5	36.2
High scenario 1.4%					29.1	29.5	31.6	33.7	35.8	37.9

Low scenario – anticipates a significant slowdown in economic development and GDP growth and low year on year growth in electricity consumption of 0.6%.

Reference scenario – anticipates a slight increase in economic performance and year on year growth in electricity consumption of 1.2%.

High scenario – anticipates accelerated economic development and GDP growth and year on year growth in electricity consumption of 1.4 %.

3.5.3 Forecast development of available electricity generation capacity in Slovakia by 2035

The decisive capacity increase by 2020 is currently under construction. Specifically this involves the construction of Unit 3 and Unit 4 at NPP Mochovce with installed capacity of 2 x 471 MW. The Slovak electrical grid will have a significant surplus, i.e. a pro-export balance of electricity after an extended period of time, once these power plants start up.

The construction of a new nuclear power plant at Jaslovské Bohunice (New NPP) is also under consideration with expected installed capacity of 1200 MW (or 1700 MW or 2400 MW) within a commissioning horizon after 2025.

Slovenské elektrárne, a.s. (SE, a.s.) is working on an extension of the lifespan of the units at NPP V2 of up to 60 years, i.e. until 2045, and is implementing a comprehensive investment programme applying the latest technologies for this very reason.

If the operation of NPP V2 is extended beyond its design lifespan, it will be necessary to consider the concurrent operation of both nuclear power plants (NPP V2 and the New NPP) and therefore it will be necessary to analyse and create conditions in the Slovak electricity grid to increase transmission capacity for the duration of such parallel operations.

The start-up of the new nuclear power plants, the need to secure regulation and transit capacity of the electricity grid as well as the assurance of the N-1 criteria will all require relevant expansions of the Slovak electricity grid as well as its cross-border interconnections.

Developments in the construction of new power plants and transmission lines in neighbouring countries will have an influence on possibilities of export. All of these matters will have to be verified within a feasibility study completed during the preparations for the given power plant.

Preparation and the actual construction of a new nuclear power plant is very demanding in terms of time, finances and the approval process; as such, the decision to implement such a project must be adopted well in advance.

Table 16 Forecast development of electricity generation by individual types of power plants (Source: SEPS, a.s., Ministry of Economy)

Generation in TWh	**2012**	**2015**	**2020**	**2025**	**2030**		**2035**	
Current NPP: NPP V2 + NPP Mochovce 1, 2 (1940 MW)	15.5	15.5	15.8	15.8	15.8	7.9	15.8	7.9
NPP Mochovce 3, 4 (942 MW)	0	0	7.9	7.9	7.9	7.9	7.9	7.9
New NPP (1 x 1200 MW)	0	0	0	0	9.1	9.1	9.1	9.1
Nuclear power, total	**15.5**	**15.5**	**23.7**	**23.7**	**32.8**	**24.9**	**32.8**	**24.9**
Renewable energy sources including wind	5.8	6.7	7.7	8.0	8.5	8.5	8.9	8.9
Current power plants using fossil fuels	7.1	6.3	6.3	6	5.7	5.7	5	5
Planned power plants using fossil fuels	0	0.3	0.7	1.0	1.3	1.3	1.7	1.7
Generation with parallel ops. of NPP V2 and New NPP	**28.4**	**28.8**	**38.4**	**38.7**	**48.3**		**48.4**	
Generation if no extension for NPP V2						**39.2**		**40.5**

This balance provides an overview of the expected development of available electricity generation capacity in the case of parallel operations of NPP V2 and NPP Mochovce 1 – 4 (1200 MW) as well as if operation of NPP V2 is not extended beyond 2028.

Table 17 Forecast balance of electricity consumption and generation in Slovakia by 2035 (Source: SEPS, a.s., Ministry of Economy)

Data are presented in TWh	**2013**	**2015**	**2020**	**2025**	**2030**	**2035**
Total consumption – reference scenario	28.7	29.1	31	32.7	34.5	36.2
Total generation (NPP V2 + NPP Mochovce + New NPP)	28.6	28.8	38.4	38.7	48.3	48.4
Balance (*generation – consumption*)*	**-0.1**	**-0.3**	**7.4**	**7.2**	**13.8**	**12.2**
Total generation (w/out NPP V2)**	28.6	28.8	38.4	38.7	39.2	40.5
Balance (*generation – consumption*)*	**-0.1**	**-0.3**	**7.4**	**6.0**	**4.7**	**4.3**

** A positive balance means exports, negative means imports*

*** If the operation of NPP V2 is not extended*

The magnitude of the balance will depend on the extent of construction of other power plants in Slovakia and the scope of the decommissioning of existing power plants.

Restrictions on the construction of fossil fuel power plants are being considered, which is why the balance only includes smaller natural gas-based cogeneration power plants resulting in particular from reconstruction works as replacements for obsolete units that do not comply with new emissions regulations.

The construction of large combined cycle power plants is not anticipated as a result of air protection measures, with preference being given to zero carbon generation in nuclear power plants and RES and given the inefficient operation of these plants at current natural gas and/or electricity prices.

These principles for resources development will be secured by having the Ministry of Economy control the process of issuing energy installation construction certificates.

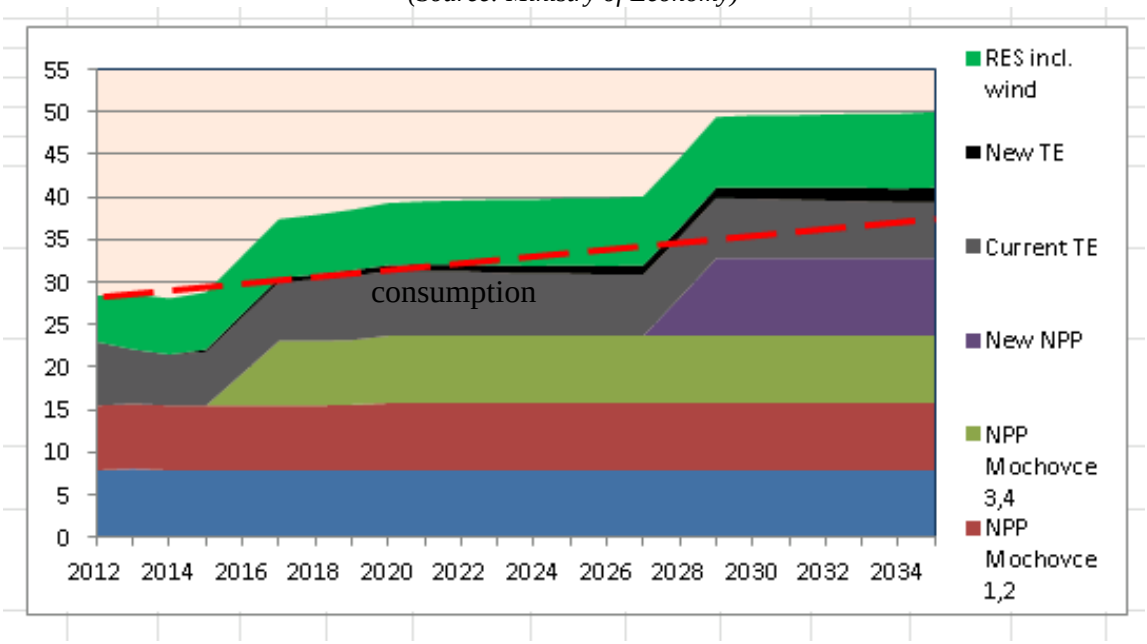
The balance does include the generation from the Malženice combined cycle power plant, which is off-line as a result of cost inefficiencies, or generation from the Bratislava combined cycle power plant, the operation of which is highly restricted for an indefinite period of time. If these two power plants are not placed into continuous operation then total electricity generation will be 2 TWh lower and the expected surplus would be smaller by the same amount.

One variant in the forecast for covering energy consumption also counts on an extension to the operation of NPP V2 after 2028 and the operation of the New NPP as well. Given the expected development in consumption based on the reference scenario, surplus balance will be resolved primarily through exports.

A high share of nuclear power plants may have a limiting effect on load regulation ability of the grid, in particular during times when opportunities to export electricity from Slovakia are limited. The issue of restricting the construction of RES and cogeneration power plants must also be resolved, within which compulsory purchasing of electricity must be respected. The operation of a number of fossil-fuel based power plants will remain crucial in order to provide support services.

Currently it is impossible to predict Slovakia's opportunities for exporting electricity over the long term as neighbouring countries are undertaking their own development programmes focused on ensuring self-sufficiency in electricity supply.

Fig. 22 Forecast development of electricity consumption and its coverage by generation to 2035 in TWh (Source: Ministry of Economy)



3.5.4 Main sources of electricity

3.5.4.1 Nuclear power plants

Slovakia will have six nuclear units with installed capacity of 500 MW after the completion and modernisation of NPP Mochovce 3, 4 and will have total installed generation capacity at three nuclear power plants of approximately 3,000 MW in 2020 with annual generation of 23,400 GWh.

3.5.4.2 Thermal power plants

Nováky power plant provides consumption of domestic coal used to generate electricity and heat in the general economic interest pursuant to valid legislation. Two of its 2 x 110 MW units will have to be modernised in order to comply with new legislation dealing with air protection and emission limits after 2015. SE, a.s. is considering the construction of a biomass-fired boiler.

Two fluidized bed 110 MW units (Units 5 and 6) which comply with emission limits even after 2015 will be operational at Vojany I power plant. Biomass will account for up to 20% of the fuel used on the reconstructed Unit 5 and up to 6% in Unit 6. Units 1 and 2 at Vojany I power plant will be capable of running for 17,500 operating hours until 31 December 2023 making use of certain exemptions. Electricity balances do not consider the operation of Vojany II power plant.

3.5.4.3 Hydropower plants

Total installed capacity at hydropower plants is more than 2,500 GW. Their annual generation fluctuates between 4,000 and 5,500 GWh per year, covering 14 – 19% of total consumption or generation of electricity.

Gabčíkovo hydropower plant is the most important of these power plants (720 MW) with average annual generation of around 2,200 GWh and the Čierny Váh pumped storage

hydropower plant (735 MW) which is used to provide grid support services. The operation of these power plants is expected to continue beyond 2035.

3.5.4.4 Major new power plant construction projects

The Sereď hydropower plant project is focused on utilising the as yet unused energy potential of the Váh River in the section Sereď – Hlohovec to generate around 180 GWh per year. This dam structure with navigation lock is a part of the Vážska waterway project and its construction will help create a navigation channel from Komárno to Hlohovec. The primary barrier to implementing this power plant is long-term return on investment given current electricity prices.

The New Nuclear Power Plant is the most important project in the Slovak energy sector over the long term given its impact on the entire electricity grid and Slovakia's energy security. The Slovak government laid out plans to speed up preparations for its construction in its Manifesto of the Government of the Slovak Republic in 2012. A nuclear power plant with total installed capacity of up to 2,400 MW may be constructed at Jaslovské Bohunice with generation capacity variants of 1 x 1,200 MW, 2 x 1,200 MW or 1 x 1,700 MW while following the conditions and recommendations made in the feasibility study and the reference studies for the new nuclear power plant project.

The Ipeľ pumped storage hydropower plant project with design installed capacity of 600 MW represents an important source of potential for providing a broad range of grid support services. This power plant intends to use a weekly pumping cycle to shift weekend "surplus" energy from nuclear power plants to periods of peak loads on work days. This is also an optimal balancing element for power supplied from wind and photovoltaic power plants. The implementation of this project will depend on the development of the international electricity market and the interest of a strategic investor.

The comprehensive use of the Danube upstream of Bratislava could also be considered to harness its hydroelectric potential.

The construction of relatively small and locally widely distributed, electricity generation stations with relatively small installed capacity can be expected to add a couple of dozen MW to total installed capacity. This generation is highly efficient since it uses the latest technologies, including cogeneration of heat and electricity, without increasing demands on transmission capacity given their proximity to the consumer.

3.5.5 Power plant decommissioning

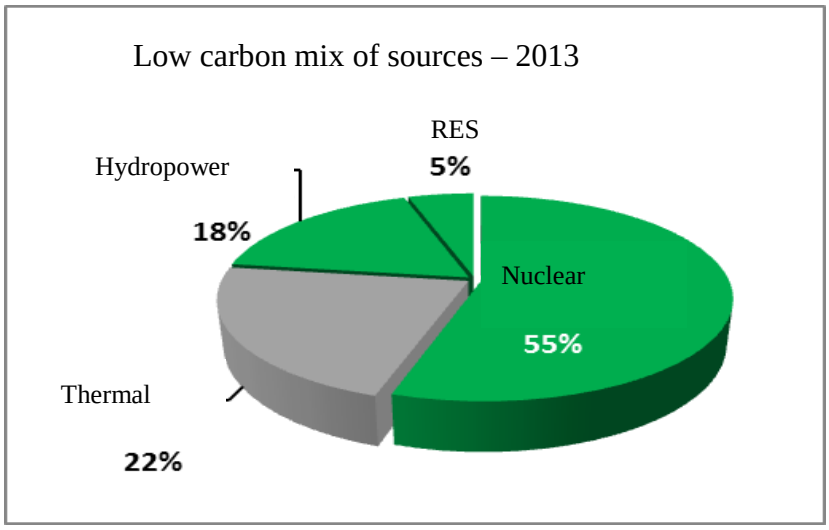
Various units in thermal power plants and heat plants will be decommissioned by the end of 2015 primarily due to their inability to meet stricter emissions limits in place beginning in 2016.

The loss of capacity will primarily be compensated for by reconstructing existing installations with smaller but modern and high efficiency equipment compliant with ecological parameters, primarily utilising natural gas.

3.5.6 Low carbon mix of energy sources

Slovakia has currently a low carbon mix of energy sources as the share of zero carbon generation fluctuates at a level of 78% of total electricity generation. This share will increase to around 80% once NPP Mochovce 3, 4 starts up.

Fig. 23 Low carbon mix of electricity sources in 2013 (Source: Ministry of Economy)

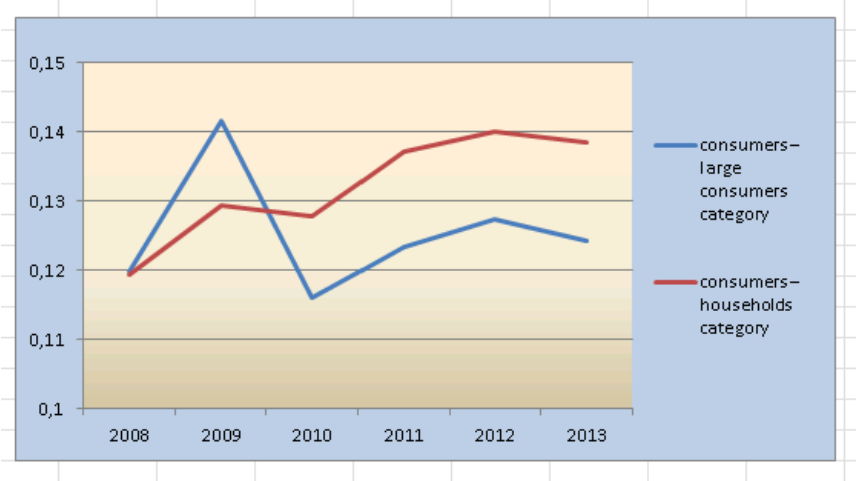


3.5.7 Development of electricity prices

Market electricity price has been declining since 2011 and reached its lowest levels in the previous eight years in 2013. Electricity supply prices have dropped as well. On the other hand, the distribution and grid components of prices have increased for regulated entities, i.e. natural monopolies. Network tariffs continued to wield significant influence on the final price of electricity in Slovakia in 2014.

High final electricity prices have a negative impact on the competitiveness of Slovak and European industrial companies.

Fig. 24 Development of electricity prices in Slovakia, 2008 – 2013 in EUR/kWh (Source: Ministry of Economy)



The graph illustrates the development of electricity prices from 2008 to 2013 for large consumers using up to 2,000 MWh and households using up to 6,000 kWh. Price increases stopped in 2012 and began to decrease again in 2013.

The Regulatory Office decreased the system services tariff in 2014 as well as the price for network access and electricity distribution. The tariff for electricity distribution losses was decreased as a result of the application of pricing regulation method based on the currently valid Decree No. 221/2013 Coll. issued by the Regulatory Office and as a result of the

decrease in commodity electricity prices to cover electricity transmission and distribution losses. On the other hand, the system operation tariff was increased back up to its January 2013 level following a year on year reduction in 2013.

3.5.8 Transmission system

New aspects for coordinating transmission systems have been introduced in the region of Central and Eastern Europe for the purposes of meeting the internal electricity market targets. The EU's Third Energy Package was adopted to meet this target and the individual transmission system operators began to work on meeting their obligations defined on its basis after its adoption in terms of mutual cooperation and the completion of shared trading and technical rules and safety standards and in terms of planning and coordinating investments into new connections.

Securing the fulfilment of the internal electricity market target is inextricably linked with increasing cross-border transmission capacities, which are significantly influenced by the interests and approaches applied by transmission system operators in neighbouring countries. The most pressing question at present is associated with attempts to improve the cross-border profile between Slovakia and Hungary with the construction of new double 400 kV cross-border transmission lines between Slovakia and Hungary.

Increasing the capacity of the connection with Hungary was included among the priorities of the Manifesto of the Government of the Slovak Republic in 2012. The improvement, replacement and new construction of key internal transmission lines connected to the cross-border profiles needed, *inter alia*, to facilitate electricity trading while preserving the security of the entire electricity grid are required in order to ensure synchronous operation within the EU. Domestic transmission system installations are systematically expanded to ensure reliable supply to consumers in Slovakia.

3.5.8.1 Development of the transmission system in Slovakia

The development of the transmission system in Slovakia is moving towards reinforcement of existing domestic transmission capacities, related modifications and overhaul of transmission system substations, their transitioning over to remote control and unmanned operation as well as the construction of new transmission system substations, improvements in the security and reliability of 400/110 kV substations and the resolution of issues related to the issue of the 220 kV network approaching to the end of its lifetime.

The 220 kV system has the highest requirements on repairs and maintenance given its age. Moreover, the power plants connected to the 220 kV system and that supported the existence of the 220 kV system themselves have been gradually decommissioned (in particular NPP V1). The remaining sources are unable to compensate for the lack of 220 kV power in the transmission system which is why the 220 kV system loses its purpose and is being gradually either replaced by the 400 kV system as needed in order to comply with the N-1 safety criteria or is being shut down without any replacement. The definitive shut down of the 220 kV transmission system is expected sometime around 2025.

3.5.8.2 Cross-border transmission capacity

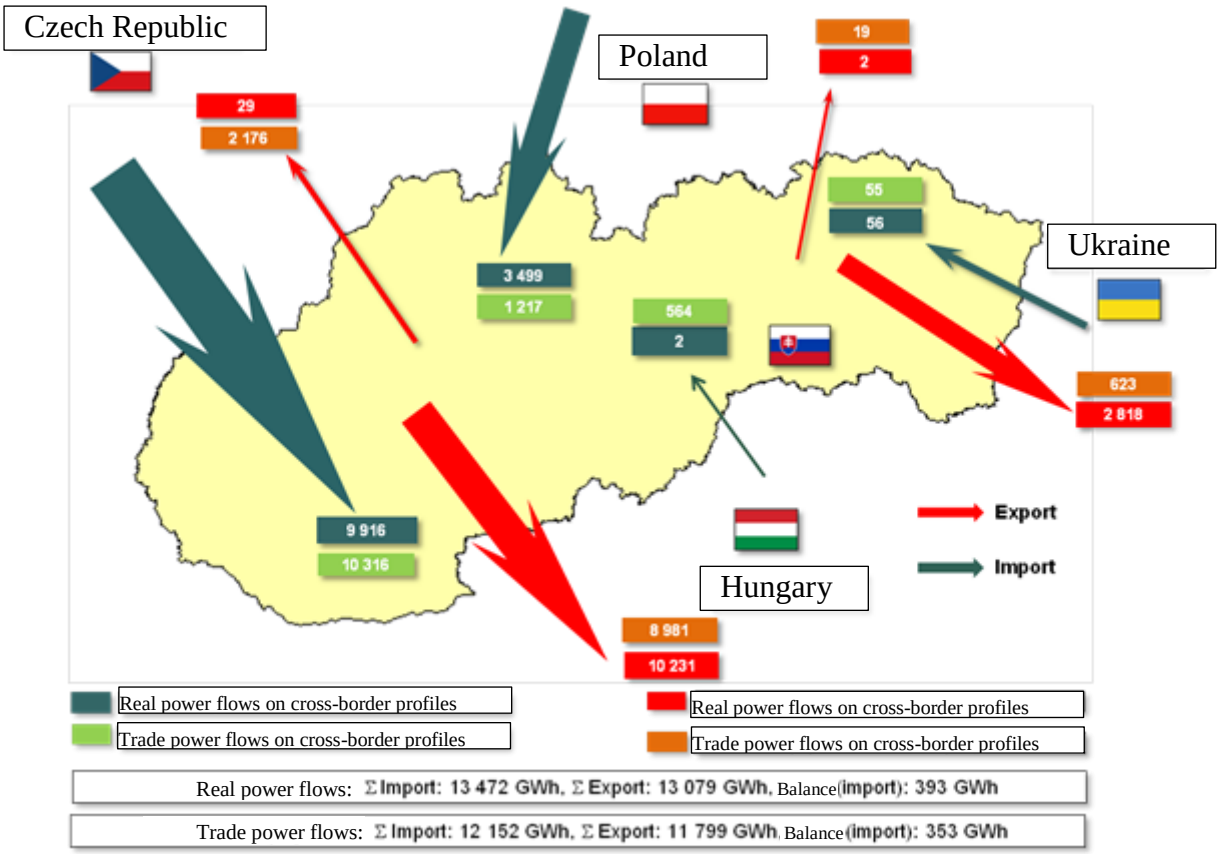
Slovakia's transmission system is connected to all neighbouring countries, with the exception of Austria. Significant problems with the fulfilment of conditions of operation pursuant to ENTSO-E criteria and recommendations have been identified over several years under specific operating conditions. This involves the Slovakia-Hungary profile, which experiences

the heaviest loading. It is loaded with a portion of exports from Slovakia as well as third parties transit and so-called loop-flows.

The completion of new international connections from Slovakia is largely influenced by the state and development of transmission systems in neighbouring countries, the strategies and interests of the individual transmission system operators, the development of international electricity exchange and trade, the construction of power plants and the related development of transmission systems.

The development of the generation base in Slovakia and in EU member states with transmission or electricity grids in the synchronously connected ENTSO-E power system has, *inter alia*, a significant impact on the Slovak – Hungarian cross-border profile. Given this, it is necessary to consider such fact at the present and the near future until the improvement of the mentioned problematic Slovak – Hungarian profile and to approach the development of the generation source base in Slovakia with care, in particular in relation to the safe operation of the Slovak transmission network and the overall connected ENTSO-E system. The improvement of the Slovak – Hungarian transmission profile is the most critical in order to safeguard the security of operations of Slovakia's transmission system with respect to the development of the generation base in Slovakia, which is associated with the cumulation of capacity (in particular in the area of Western Slovakia) and in the EU member states where the development of their generation base results in high transit and loop-flows, and not just through the territory of Slovakia.

Fig. 25 Power flows through Slovakia (Source: SEPS, a.s.)



The following investments were included in the EU PCI list on the basis of Commission Delegated Regulation (EU) No 1391/2013:

- 2 x 400 kV transmission lines, Gabčíkovo – Gönyű (Hungary), commissioning expected in 2018;
- 2 x 400 kV transmission lines, Gabčíkovo – Veľký Ďur, commissioning expected in 2016;
- 2 x 400 kV transmission lines, Rimavská Sobota – Sajóivánka (Hungary), commissioning expected in 2018;
- 2 x 400 kV transmission lines, Lemešany – Voľa – Veľké Kapušany, commissioning expected after 2025;
- 2 x 400 kV transmission lines, Veľké Kapušany – Kisvárda substation (Hungary), commissioning expected after 2025;

wherein the first three projects are related to improving the Slovakia – Hungary transmission profile in the western and central portions of Slovakia's transmission network and the last two are to improve the Slovakia – Hungary transmission profile in the eastern portion of Slovakia's transmission network.

Upon agreement with the Hungarian operator, the 2 x 400 kV transmission line, Gabčíkovo – Gönyű (Hungary) will be completed as 2 x 400 kV transmission line, Gabčíkovo – Gönyű – Veľký Ďur at the location where the transmission lines cross the Slovak/Hungarian border, meaning that one leg of the 2 x 400 kV transmission line, Gabčíkovo – Veľký Ďur will be looped at Veľký Meder directly to the Gönyű substation.

With respect to the Slovakia – Ukraine profile, two alternatives are under consideration for improving the existing 1 x 400 kV transmission line, Veľké Kapušany – Mukachevo. One will result in its reconstruction into a double transmission line (along the existing corridor) the second will lead to the complete replacement of this line with new 2 x 400 kV transmission lines from the Veľké Kapušany R400 kV substation to the Kisvárda substation in Hungary. The first alternative for the reconstruction of the 1 x 400 kV transmission line, Veľké Kapušany – Mukachevo, will primarily depend on the stance of the Ukrainian transmission system operator, which has rejected or not confirmed as of yet any proposals readying the improvement of this connection. Both of these alternatives are planned for completion after 2025.

The construction of another cross-border interconnection along the Slovakia – Czech Republic profile as well as another 2 x 400 kV Slovakia – Poland connection at Varín will come into consideration after 2030 at the earliest.

In terms of the need for any imports of electricity from abroad, it can be said that any needed electricity imports, which can be expected at the present, can be covered by the existing infrastructure of Slovakia's transmission grid until 2030.

3.5.8.3 Most pressing inland transmission infrastructure projects

- 2 x 400 kV transmission lines, Gabčíkovo – Veľký Ďur.
- 400 kV Gabčíkovo substation (this investment project is included in the PCI list).
- Substation Bystričany – Transformation 400/110 kV Complex
- On-going exchange/replacement of obsolete equipment in Slovakia's transmission system.
- Transition over to remote control and unmanned operation of substations on Slovakia's transmission system.

- Increasing the reliability of 400/110 kV substations.

3.5.8.4 Other long-term projects

- Doubling the northern leg of Slovakia's transmission system.
- Doubling the southern leg of the transmission system.
- Replacing 220/110 kV substations with 400/110 kV substations.
- Progressively constructing new inland transmission capacities in accordance with reserved corridors within the Land Development Concept of Slovakia.
- 2 x 400 kV transmission lines, Lemešany – Voľa – Veľké Kapušany.

3.5.8.5 Most pressing prepared projects for cross-border transmission lines

Slovakia's transmission system operator has classified the following projects in its mid-term investment plan as priority investment projects considered projects of common interest (PCIs):

- 2 x 400 kV transmission lines, Gabčíkovo – Gönyű – Veľký Ďur.
- 2 x 400 kV transmission lines, Rimavská Sobota – Sajóivánka (Hungary).

3.5.8.6 Other long-term cross-border projects

- 2 x 400 kV transmission lines, Veľké Kapušany – Mukachevo (Ukraine) (doubling of existing transmission lines) or 2 x 400 kV transmission lines, Veľké Kapušany – Kisvárda (Hungary).
- 2 x 400 kV transmission lines, Varín – Poland.
- 2 x 400 kV transmission lines, Varín – Nošovice (CZ) (doubling of existing transmission lines).
- 2 x 400 kV transmission lines, Považská Bystrica or Bošáca – Otrokovice (CZ).

The estimated costs for the development of inland infrastructure are EUR 697.1 million. The estimated costs for the development of the Slovak segments of international transmission lines are EUR 44.6 million. These investment costs comply with the current version of the Long-Term Investment Plan published by SEPS, a.s. and include not only investments into new transmission lines and substations but also investments into innovations and the improvements of installations.

These costs are defined on the basis of a qualified estimate using the 2013 price level, without consideration for inflation at the time of addition to the investment plan or any changes to the technical solution at the time of implementation. They are included in SEPS, a.s. planned investments until 2023 and do not consider investment costs for projects on a longer projected time line.

3.5.9 Expected and required changes in providing support services

The concept for the development of the generation base must ensure the ability of the system to provide sufficient regulated capacity to maintain balance over the long term. Adequate

capacity of flexible regulation power sources to provide support services must be constructed in order to ensure the regulability of the system.

More recently, the provision of support services have come from smaller heat sources and multiple smaller thermal power plants considered public heat plants and facility power plants. The assurance of support services using SE, a.s. power plants exclusively has been gradually transformed into a competitive environment with the possibility of providing support services to both producers and consumers.

Changes made in the area of support services should be directed towards creating the conditions for the secure and reliable operation of the electricity grid and electricity supply and should reflect:

- the needs of the transmission system operator related to available generation capacity and the development of demand for electricity;
- guaranteeing the security of providing support services;
- the capacities and finances of support service providers;
- the creation of a fully competitive environment;
- connections between support service systems, regulation electricity and the manner in which deviations for settlement subjects are assessed.

3.5.10 Intelligent metering systems and intelligent networks

3.5.10.1 Intelligent metering systems

Intelligent metering systems (IMS)[3] promote the active involvement of end users on the electricity market. They are one of the ways of achieving the national targets for energy efficiency and represent a basic component of future intelligent networks. New tariff products approved in Slovak legislation facilitated by the deployment of IMS will contribute to increased efficiency in the end use of electricity and will motivate end users to decrease their consumption by saving on electricity costs.

The objective of introducing an IMS is to create the required prerequisites for the active management of consumption by end users, the integration of distributed sources of electricity, the smoothing of power demand curves by shifting consumption to off-peak hours and efficiently controlling distribution systems while developing e-mobility, increasing the deployment of RES, etc. IMS development is focused at the level of low voltage systems. More significant points of supply at higher voltage levels are currently covered by technologies that include portions of IMS functionalities and will be fully replaced by IMS technologies in the future.

Directive of the European Parliament and of the Council No 2009/72/EC concerning common rules for the internal market in electricity, which is a part of the Third Energy Package, creates a European legislative framework for the introduction of intelligent metering systems. Slovakia aligned national legislation with the EU's Third Energy Package in the area of intelligent metering systems with Act No. 251/2012 Coll. on Energy as of 1 September 2012. The Energy Efficiency Directive (2012/27/EC) supports the roll out of intelligent metering systems to provide end users with a sufficient quantity of information on actual consumption

[3] An **intelligent metering system** is a set of components based on specific meters and other technical means facilitating the acquisition, processing and transmission of metered data on the generation or consumption of electricity or gas and capable of providing this data to market participants.

in a timely manner and at a sufficient frequency to efficiently manage consumption and optimise their costs.

Slovakia committed to implement IMS on the basis of the completed Economic Assessment of Long-Term Costs and Benefits. The economic assessment stipulates the introduction of IMS for electricity consumers with annual consumption of at least 4 MWh at the low voltage level. This represents approximately 23% of all expected points of supply in 2020 with approximately 53% of the annual consumption of electricity at the low voltage level. Details for the roll out and operation of IMS in the power industry are defined in Ministry of Economy Decree No. 358/2013 Coll. The Regulatory Office, in cooperation with the Ministry of Economy, completed methodology guidelines for power and gas undertakings with respect to optimising the use of electricity and gas including providing services to electricity consumers focused on energy efficiency and IMS support.

Subsequent action and the schedule for preparing and implementing IMS deployment in the power industry in Slovakia is based on the conclusions of the economic assessment and from the "Proposed solution for introducing intelligent metering systems in the Slovak energy sector", submitted by the Ministry of Economy and approved by the Slovak government. Subsequent action and IMS implementation is divided into two phases according to this material:

1. Implementation 1 (testing) – involves the deployment of approximately 6,000 intelligent meters by April 2015;
2. Implementation 2 (wide scale deployment) – a target of approximately 620,000 intelligent meters by the end of 2020.

The purpose of the testing phase implemented as a pilot project is in particular to verify the following parameters:

- IMS functionality in practice;
- installation processes and IMS integration processes into the distribution network;
- costs and benefits of IMS for the individual parties on the market.

The testing phase will also be used to optimise and standardise technologies and communication and software solutions and to test tariff and business models and products.

Wide scale deployment of the IMS will be based on the results of the testing in Phase I in compliance with the schedule until the end of 2020. IMS deployment is planned in a gradual manner beginning with the most significant points of supply depending on the magnitude of annual electricity consumption or depending on the quantity of maximum reserve capacity. The framework schedule for subsequent preparation and implementation of the IMS in the energy sector to 2020 was approved by the Slovak government in Resolution No. 358/2013 titled "Proposed solution for the roll out of intelligent metering systems in the Slovak power industry".

The deployment of intelligent metering systems will allow distribution network operators and electricity suppliers to have more detailed information on the energy behaviour of individual end users available and such information will be made available to the involved parties on the market with the goal of creating the prerequisites needed for active consumption management with the involvement of consumers themselves. Intelligent networks should then provide the required overview of the operating conditions on energy system, ensure their effective management and to a large degree automate the economically and ecologically-optimised operation of the system and the use of self-correcting mechanisms in the event of malfunctions or failures.

3.5.10.2 Intelligent networks

Intelligent networks[4] are a highly topical issue in EU energy policy. The support and development of intelligent networks is one of the key directions that should contribute to the fulfilment of the objectives of the Europe 2020 strategy in the area of energy and EU climate and energy targets (20-20-20).

An intelligent network can be characterised as a modern electrical network with bidirectional digital communication between the supplier and consumer, intelligent generation and consumption metering and with monitoring and control systems.

Intelligent metering systems are the fundamental components of intelligent networks. Intelligent networks deliver changes that improve the standing of the consumer, simplify the widespread integration of renewable energy sources into distribution systems, enable and support the development of electromobility and the storage of electricity, increase energy efficiency and reduce losses while making a major contribution towards environmental protection and support for technological development and representing a potential opportunity for job creation. These networks are able to control the direct interaction and communication between consumers (households and companies), network operators, electricity producers and suppliers. An intelligent network is able to flexibly respond to distributed generation and consumption of electricity even in an environment in which electricity flows in both directions. The result of this improved and more targeted management is a network with significantly higher operational security, higher efficiency, lower losses and lower operating costs.

The deployment of intelligent networks is expected to facilitate optimised and more precise management of distribution networks, enabling the connection of multiple consumers without the need for investments into the new construction of networks. Electricity supplied into the electricity grid from a large number of decentralised generation sources through different distribution networks cannot be regulated without the use of modern telecommunications technologies, which help streamline the operation.

An intelligent network, with continuous IMS monitoring, should be capable of responding in an optimum manner to the current distribution of generation and consumption capacities at any moment in time. Experience from other European countries with more widespread IMS technology as the cornerstone of building intelligent networks has shown that the extent of interruptions in electricity supply to consumers has been diminished and losses in the system have been reduced.

Developing energy storage capacities is another topic of safe integration of green energy into the system. Such system enables the storage of locally produced energy and its subsequent consumption based on demand. The integration of locally stored energy in storage appliances, energy reservoirs and electric vehicles with their storage capacities is therefore an important element of an intelligent network. Concepts for managing local consumption based on good mapping and analysis of conditions in the system so that electricity at the site of generation does not need to be transformed into a higher voltage level and then back to a lower voltage level at a remote site of consumption have also been developed in addition to energy storage.

[4] An **intelligent network** is a perfected energy network to which bidirectional digital communication between the supplier and consumer has been added in addition to intelligent metering, monitoring and control systems.

There is an expectation that detailed knowledge of consumption over time will lead to change in consumer behaviour facilitated by IMS along with the development of intelligent networks will become an effective tool for managing consumption, potentially delivering general benefits and smoothing of load diagrams in the system itself with impact on deviations and the volume of support services needed to regulate unbalanced electricity generation and consumption.

An important condition for resolving support for intelligent networks is standardisation of suitable technologies for local conditions in Slovakia and a possibility of the interchangeability of their primary components so as to allow the integration of solutions and devices from different manufacturers.

Power industry objectives:

- self-sufficiency and appropriate pro-export capacity in electricity generation;
- a flexible, low carbon and sustainable structure of the generation base;
- optimum capacity of the transmission system and cross-border transmission capacities;
- adequate, accessible and competitive final electricity prices.

Measures to achieve power industry objectives:

Measures in the area of developing the generation source base:

- preserve and continue to optimise the structure of electricity generation sources in terms of economic and environmental sustainability and the security of the electricity grid;
- complete periodic and long-term plans for the electricity grid that consider the trends in production technologies and the use of specific fuels, market trends as well as technological advances on the side of final consumption to a large extent;
- improve energy security by supporting the construction of sources able to stabilise the electricity grid;
- safeguard the safety and reliable integration of decentralised electricity generated from RES into the grid;
- deploy intelligent metering systems and develop intelligent networks;
- ensure that the operators of high-efficiency cogeneration installations can continue to offer load balancing and other operational services to the electricity grid operator;
- create instruments to support the purchasing of electricity from high-efficiency cogeneration as proposed within Green Public Procurement for electricity pursuant to EU-proposed criteria;
- create supporting financial instruments to promote high-efficiency cogeneration, for instance decreasing the excise duty on natural gas used to generate electricity and heat in high-efficiency cogeneration installations.

Measures in the area of developing the transmission system and cross-border transmission capacities:

- develop and increase transmission capacities in domestic and cross-border transmission lines to safeguard the safe and reliable operation of the Slovak transmission system with considerations given to the influence of third parties and the development of trading and cross-border exchanges of electricity within integrated

markets and giving priority to the use of corridors with existing transmission lines during such development;

- plan and coordinate investments into new cross-border transmission lines within preparation of ENTSO-E regional investment plans;
- strengthen as a priority the Slovakia – Hungary border profile as soon as possible using new cross border interconnections by implementing transmission system connection projects classified in the EU PCI regional list in the development of trans-European TEN-E energy infrastructure;
- cooperate with neighbouring operators of transmission networks at the regional and EU level in the area of resolving issues of unplanned flows of electricity (e.g. loop-flows);
- continue in the decommissioning and replacement of relevant portions of the 220 kV system and related development of the 400 kV system as a consequence thereof;
- improve the operational security and reliability of electricity supplied to users by the Slovak transmission system and continue in the regular compilation and updating of the plan to prevent the occurrence and spread of system-related malfunctions in the Slovak transmission system and the plan for restoring system operations after a black-out type malfunction.

Measures in the area of regional integration and the unified European electricity market:

- support additional opening up of the market, increase cross-border trade in electricity, regional integration of markets and increased competition as supported by EU legal regulations with the objective of improving the security of supply and competition on the wholesale market (complete implementation of the EU's Third Energy Package and the implementation of the market target model);
- continue on in regional initiatives focused on connecting national markets (market coupling) and expanding common market areas (expansion of the Czech Republic – Slovakia – Hungary market area to include Romania);
- actively participate in the process of harmonising market rules and system operating rules with EU rules (preparation and implementation of so-called network regulations).

Measures in the area of developing intelligent metering systems and intelligent networks

- motivate the electricity grid operator to actively monitor the development of intelligent network technologies so as to apply relevant technologies where cost-effective with respect to the security of the system and energy supply assurance;
- continuously re-evaluate the scope of IMS deployment and increase IMS penetration in a cost-effective manner in order to maximise the overall benefits of deploying IMS and the development of intelligent networks with considerations given to technological advances;
- ensure that IMS technical parameters meet the requirements of European legislation in the area of energy efficiency with the goal of creating the conditions for informing consumers in order to better manage their consumption;

- ensure that IMS technical parameters support solutions for building and developing intelligent networks by securing the interoperability of IMS components and adequate communication capabilities;
- support the local or wide spread testing of intelligent networks and develop intelligent cities, towns and regions by 2035, develop system management activities towards building intelligent networks at the level of distribution systems and Slovakia's electricity grid;
- create the conditions for building local intelligent networks with nearly equal balance while minimising flows to the surroundings;
- use IMS and intelligent networks to support electromobility;
- increase the number of households equipped with intelligent appliances and IMS with the possibility of remote surveillance over a diagram of household electricity consumption;
- develop conditions for storing electricity as close to the site of consumption as possible.

3.6 Heat supply

Heat generation, supply and consumption represent an important share of energy supply in Slovakia. The quantity of consumed heat can be quantified on the basis of data on final heat energy consumption supplemented by the consumption of the fuels used to generate such heat.

Table 18 Final energy consumption of heat recorded as the statistical indicator "heat" classified by individual sectors of the national economy (Source: Statistical Office of the Slovak Republic)

	2007	2008	2009	2010
Industry	2,581	2,888	3,454	4,459
Transport	0	0	0	0
Households	20,161	18,546	19,192	20,563
Agriculture	231	226	187	142
Services	8,197	8,298	9,330	10,485
Total [TJ]	**31,170**	**29,958**	**32,163**	**35,649**
Total [GWh]	8,728	8,388	9,006	9,982

Given that heat generation for heating, preparing hot water and technological purposes is fundamentally higher, it is apt to supplement data to include heat generation from fuels that are not recorded in the statistics as "heat". Analysis of usable heat across the individual sources of heat generation indicates that annual generation of usable heat is approximately 130 – 140 PJ.

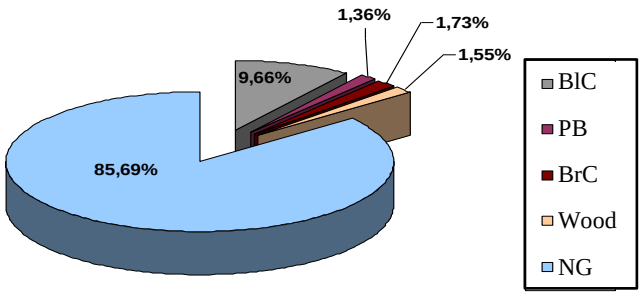
Table 19 Annual heat generation in TJ (Source: Slovak Innovation and Energy Agency, individual sources calculated based on fuel consumption from Statistical Office of the Slovak Republic data)

	2007	2008	2009	2010
Centralised heat supply – heating plants, including industrial plants	20,651	18,842	22,905	27,651
Centralised heat supply – heat plants and central boilers	19,357	18,374	16,821	17,989
Individual heating supply – local boilers (households and services)	90,183	91,883	88,704	97,320
Total heat generation [TJ]	130,191	129,099	128,430	142,960
Total heat generation [GWh]	36,164	35,861	35,675	39,711

The highest share of heat generation is attributed to individual heating sources in which natural gas has the largest share, reflecting the broad gas infrastructure coverage in Slovakia. Heat generation in individual sources by type of primary energy is depicted in Figure 26.

The share of other primary energy sources such as biogas, solar energy and geothermal energy to generate heat in individual heat sources is less than 1%.

Fig. 26 Share of heat generation in individual heat sources by fuel in 2011 (Source: Ministry of Economy)



3.6.1 Current situation

Slovakia can currently be characterised by the well-developed centralised heat supply system which covers more than 30% of total heat consumption.

Heat generation itself prevails in industrial heating systems in centralised heat supply system *(taking advantage of the cogeneration of electricity and heat)*. Other heat production is provided in large part by local or district heating sources *(boiler rooms and heat plants)* with their own distribution systems.

Fig. 27 Structure of heat sources in centralised heat supply systems by installed heating capacity. Only convertible installed capacity dedicated to heat production is considered in the case of power plants. (Source: Slovak Innovation and Energy Agency)

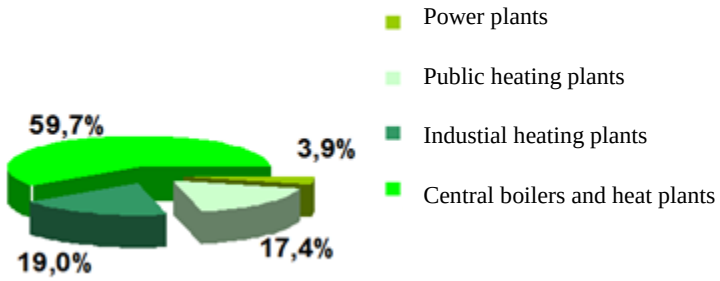
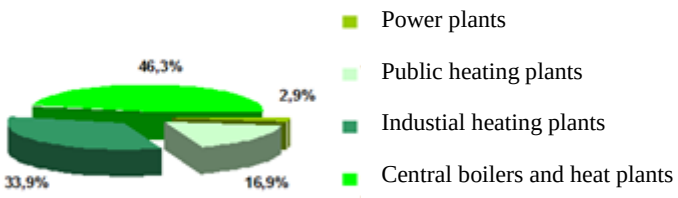
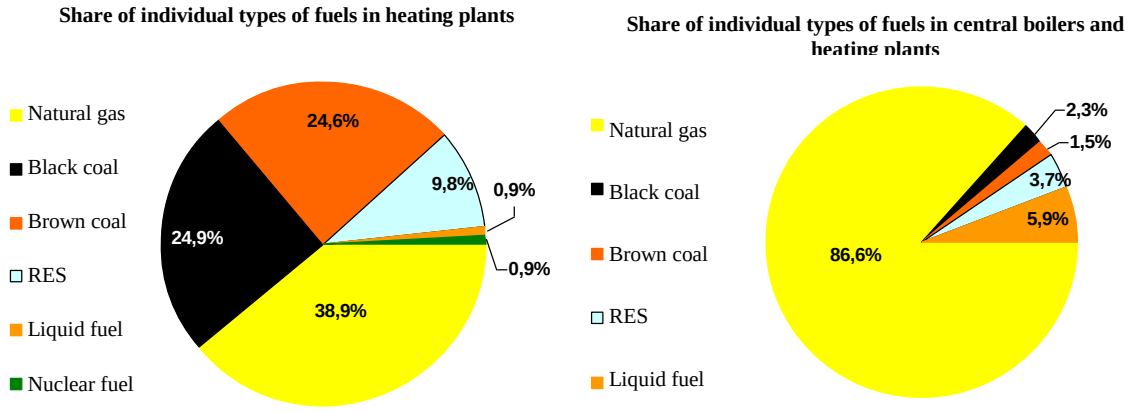


Fig. 28 Structure of heat supply by heat source in centralised heat supply systems (Source: Slovak Innovation and Energy Agency)



According to the type of fossil fuels, solid fossil fuels are predominant in the industrial heating plant segment while natural gas forms up to 86% of the fuel base in other centralised heat sources.

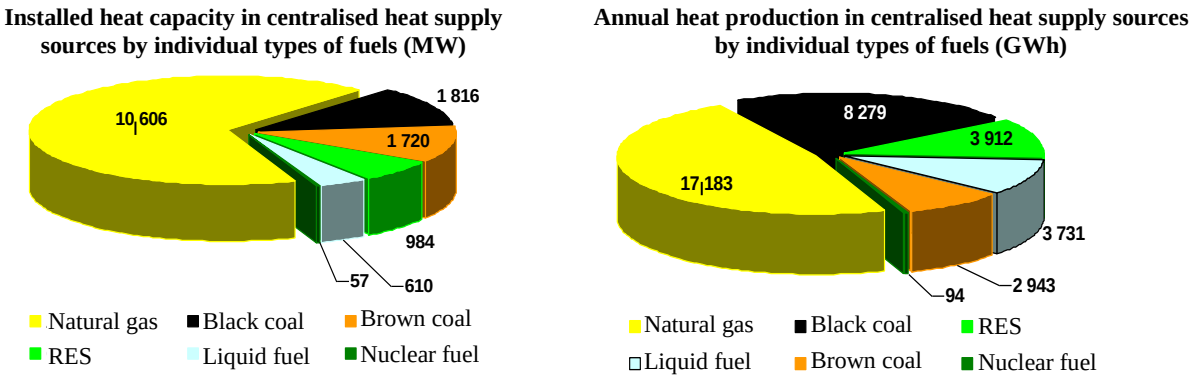
Fig. 29 Share of individual types of fuels in heat production (Source: Slovak Innovation and Energy Agency)



A majority of the heat sources and heat distribution systems that actually supply heat were constructed and developed in the past in conjunction with the intensive development of urban areas, in particular the construction of municipal housing and related civil infrastructure and amenities up until 1990.

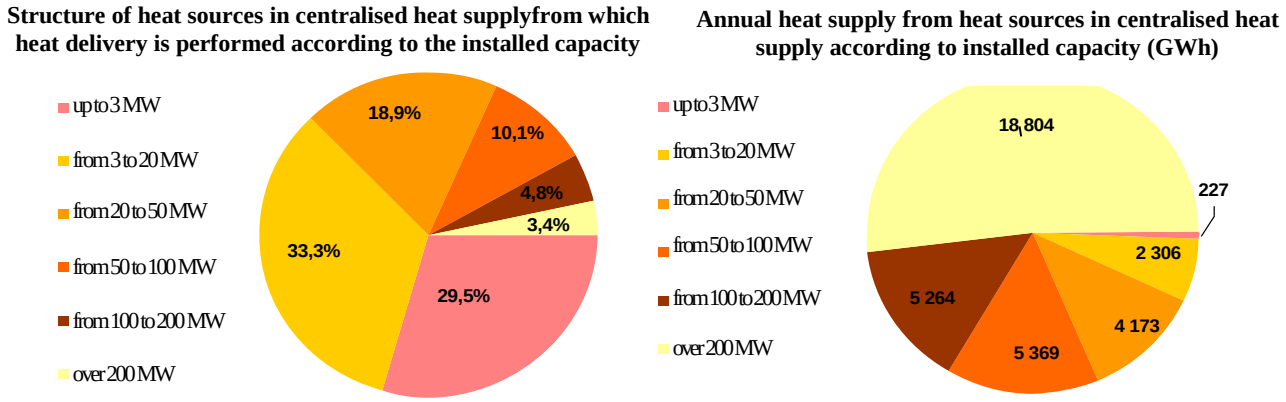
The owners or administrators of apartment buildings as well as industry, the public sector and other consumers providing services account for most of the heat delivered from centralised heat supply systems. Heat from centralised heat supply systems is provided to approximately 16,100 apartment buildings with a total of 650,620 apartments in which more than 1.8 million residents reside.

Fig. 30 Structure of the installed heat capacity in heat sources and annual heat production by individual types of fuels (Source: Slovak Innovation and Energy Agency)



Around 320 business undertakings are currently active in the heat supply sector in Slovakia and hold permits to conduct business in the thermal industry pursuant to Section 5 of Act No. 657/2004 Coll. on Thermal Energy.

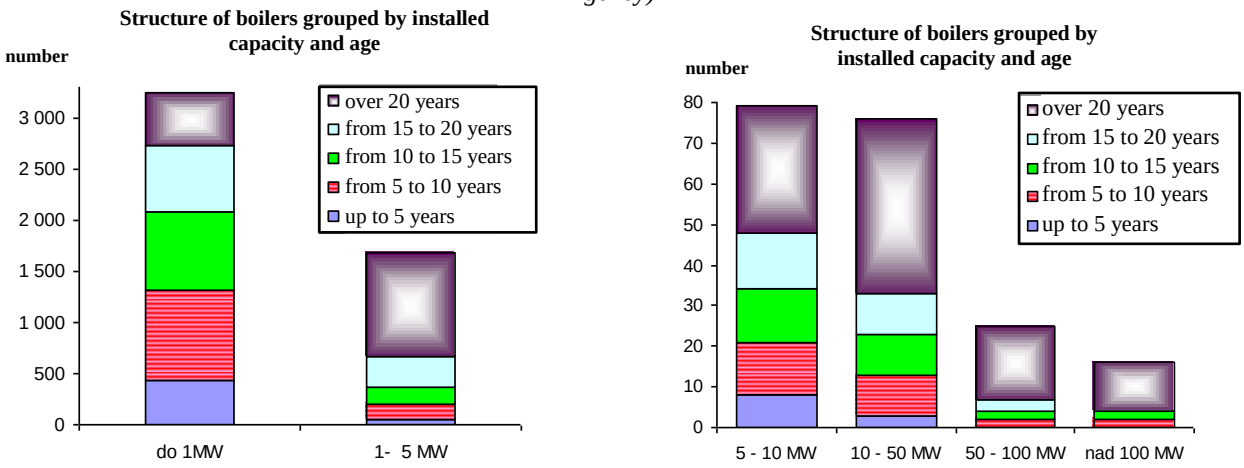
Fig. 31 Structure of heat suppliers by total installed heat capacity in heat sources and share in heat supply (Source: Slovak Innovation and Energy Agency)



The graphs show that only 3.4% of business undertakings supplying heat with total installed heat capacity in heat sources larger than 200 MW account for more than 50% of total heat supply.

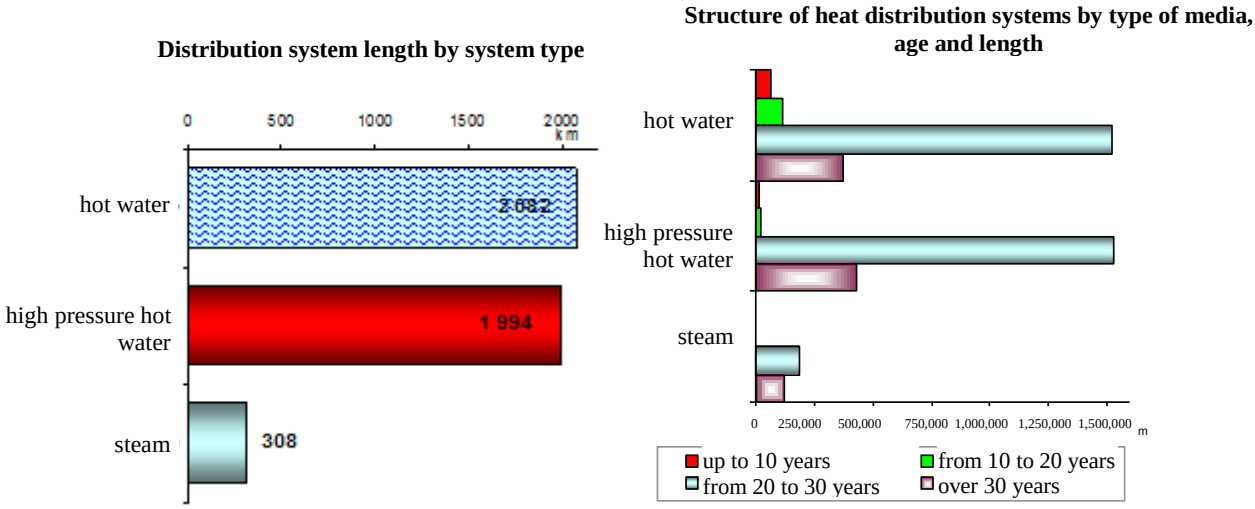
Boilers used in centralised heat supply systems are very diverse in terms of age, technical parameters and type of fuel. Analysis completed by the Slovak Innovation and Energy Agency demonstrated that a numerical majority of boilers in operation are less than 15 years old, but boilers more than 20 years old account for a majority of installed capacity. Boilers with lower installed capacities have appeared in central heat supply systems since 2000 and most of these boilers burn natural gas.

Fig. 32 Structure of boilers grouped by installed capacity and age (Source: Slovak Innovation and Energy Agency)



Hot water and high pressure hot water distribution systems are predominant in centralised heat supply systems. Steam distribution systems are primarily used to supply heat to industrial consumers. A majority of such heat distribution systems are between 20 and 30 years old, what is reflected in their technical condition.

Fig. 33 Structure of heat distribution systems (Source: Slovak Innovation and Energy Agency)



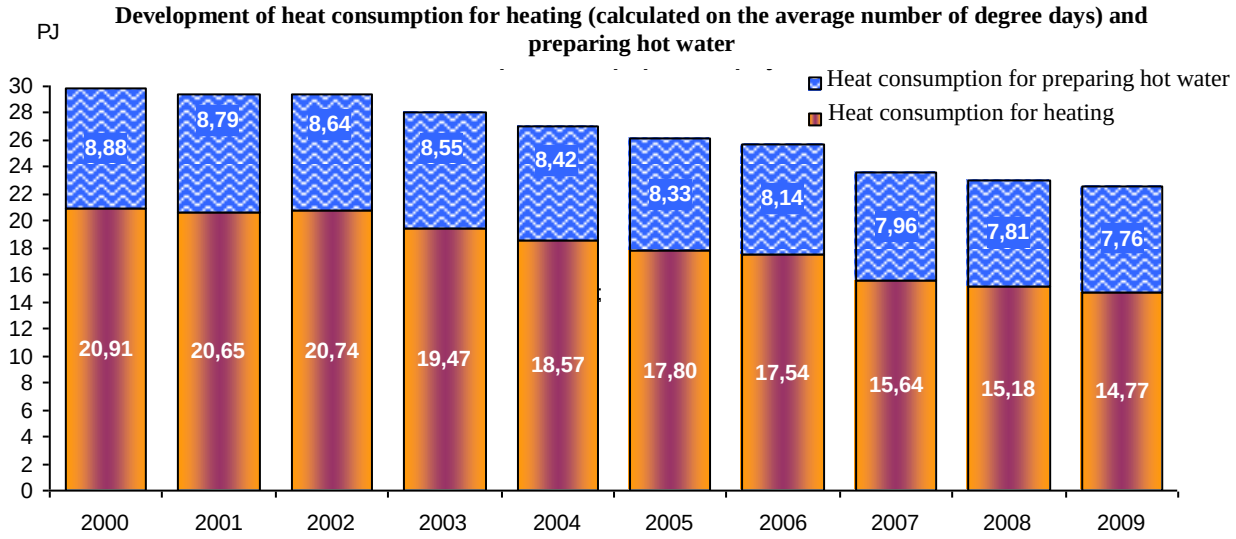
Given the significant decrease in heat demand over the past 10 years, a portion of primary heat distribution systems are now oversized, which has resulted in increased relative heat losses in distribution systems. Steam distribution systems are particularly problematic in primary heat distribution systems as they exhibit significant wear and low efficiency.

3.6.2 Current situation involving centralised heat supply systems

1. Primary energy sources have now reached the level of global prices. A major increase in production costs was recorded in recent years, in particular costs for fuel inputs.
2. Heat consumption itself has been declining over the long term and this trend is expected to continue. A significant decrease in the production and supply of heat from centralised heat supply systems over the past ten years is a result of the termination of heat supply *(primarily industrial consumers in cities with developed centralised heat supply systems given the construction of building heat sources, most often using natural gas)* and as a result of savings for heating and preparing hot water on the production side *(installation of modern technical equipment to produce heat)* and on the consumption side *(hydraulic regulation, installation of thermostatic valves and insulating buildings)*. The behaviour of end users *(cost saving measures, sometimes to the detriment of their personal comfort)* given rising heating prices also have an impact on heat consumption.

   The decline in heat consumed for heating and preparing hot water has been calculated for *roughly 16,000 apartment buildings in which more than 1.8 million residents reside*. Heat consumption to prepare hot water has decreased by 13% while heat consumption for heating has decreased by approximately 30%.

Fig. 34 Development of heat consumption for heating (calculated on the average number of degree days) and preparing hot water (Source: Slovak Innovation and Energy Agency)



Act No. 657/2004 Coll. on Thermal Energy created the legislative framework based on which heat supply now has a regional nature. It is expected that the mandatory completion of a municipality thermal energy development concept will become the binding strategic document on the basis of which the development of heating supply will be guided in the short term in individual municipalities. Heating sources *(thermal plants, heat plants and boiler rooms)* have become partially oversized as a result of the reduction in heat supply. The same applies for heat distribution systems and, as a result, the energy efficiency of heat distribution using such systems is reduced.

3. Long-term return on investment and a lack of financing mechanisms contribute to a lack of investment funds for modernising centralised heat supply systems.
4. Many heating plants in recent years have focused on investments into equipment able to provide support services to secure operational reliability of the electricity grid. The market for this service is becoming saturated, primarily due to an increase in providers whose investments into new equipment to generate electricity were intentionally targeted at support services involving electricity generation without the use of heat.
5. The price for heat is regulated pursuant to Act No. 250/2012 Coll. on Regulation in Network Industries and on amendment of certain acts and implementing regulations issued by the Regulatory Office used to define the scope of regulation, the manner in which regulation is performed, the scope and the structure of eligible costs, the manner in which adequate profits are determined and the reference materials for pricing proposals for the five-year regulatory period.

3.6.3 Expected developments

The implementation of energy efficiency measures in heating systems in recent years and the gradual insulation of buildings has led to a decrease in heat consumption. As a result, the share of fixed costs in the unit price of heat has increased. In order to remain competitive, heat suppliers must find new consumers for heat, which is particularly difficult at present due to the slowdown in residential and civil construction as well as anticipated legislative measures and the development of an increasing number of new construction materials.

Increased investments must be expected in the near term in centralised heat supply systems, and in particular in thermal plants burning solid fuels, induced by the need to overhaul heat installations to comply with new and stricter emissions limits for air pollutants coming into force in 2016. Thermal plants do have the ability to draw out this deadline in the Transitional National Programme by 2020 and in the Special Regime in Centralised Heat Supply Systems by 2022. Changes in rules for trading greenhouse gas emission allowances will also have an impact on the economics of heat generation.

The gradual overhaul of technically-obsolete and economically inefficient heat distribution systems and eventually changes in the manner in which heat is supplied from four-pipe systems to two-pipe systems with compact residential heating stations will also result in further increases in investment costs for central heat supply.

This high level of heat supply centralisation creates favourable technical prerequisites for the use of renewable energy sources. The construction of heat sources using RES (primarily forestry and agriculturally-produced biomass, geothermal energy and waste) are potential solutions for centralised heat supply systems.

Old heat distribution systems must be overhauled in order to decrease losses and improve heat supply efficiency in centralised heat supply systems. The state aid scheme for increasing energy efficiency is appropriate for use in overhauling these heat distribution systems.

Local communities will play a decisive role in stabilising the market for heat by providing an economically-friendly and environmentally acceptable method of supplying heat based on the good concepts of the community thermal energy development.

Objectives in the area of thermal energy:

- deliver sustainable heat supply, i.e. secure, reliable, accessibly priced, efficient and environmentally sustainable heat delivery, with priority given to centralised heat supply systems;
- increase the share of heat from locally available RES;
- increase the efficiency of heat generation and distribution;
- develop efficient centralised heat supply systems.

Measures to achieve these objectives:

- support the economically efficient use of RES, in particular using locally available biomass and wastes, including support for mixed fuel systems;
- support efficient centralised heat supply systems with heat supply from RES and scavenged heat from industrial processes;
- apply a system of mandatory evaluation of the energy intensity of heat supply in the form of an energy audit at regular intervals;
- decrease the administrative burden related to heat supply by centralising data in an efficiency monitoring system when using energy;
- regularly update thermal energy development concepts at the level of local communities;
- prepare and implement supporting mechanisms for the construction and overhaul of heat distribution systems;
- complete a heat map for the comprehensive assessment of heat needs and define the potential use of high efficiency cogeneration of heat and electricity, RES and waste;

- continue work on creating a stable and predictable regulatory framework over the long term;
- evaluate options for creating conditions to use thermal plants to supply electricity in emergency situations;
- create conditions for the overhaul of existing and the construction of new centralised heat supply systems while giving consideration to the development of the trend in demand for heat and cooling depending on the mass-scale insulation of buildings, replacement of windows, the installation of solar collectors and requirements on new buildings;
- conduct analysis of the economic, environmental and social impacts of the decentralisation of heat supply and propose effective measures to eliminate unsystematic processes.

These measures require the following:

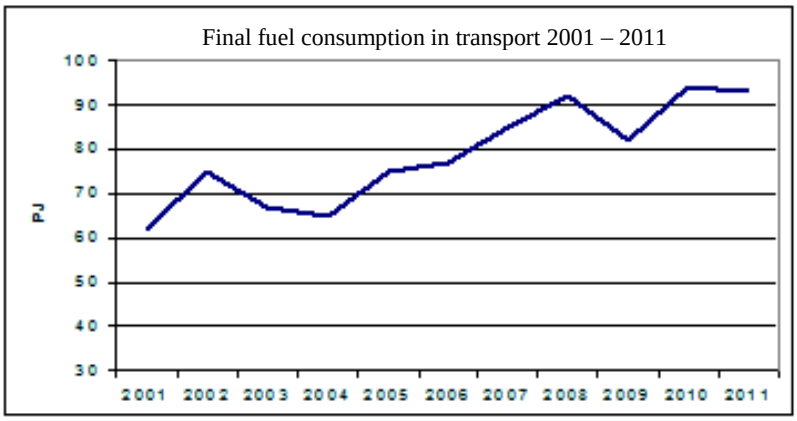
- prefer centralised heat supply with cogeneration of electricity and heat over electricity generation using fossil fuels without any heat use and secure operations to maximise their use in providing regulation electricity;
- use thermal plant infrastructure when constructing installations for municipal waste recovery for energy usage or the sorting of solid municipal waste as a fuel;
- optimise electrical power in thermal plant sources so as to minimise support for electricity generation and the efficiency of conversion achieves a level of at least 70%.

This will achieve a decrease in supported electricity generated using fossil fuels by 500 – 700 GWh, which will result in a decrease in electricity prices for consumers.

3.7 Transport

Transport will become a serious problem in the future with vehicle transport the primary culprit since final energy consumption and air pollution continue to increase. The response to this negative trend must be an increase in the greening of transport.

Fig. 35 Development of final fuel consumption in transport 2001 – 2011 (Source: Ministry of Economy)



3.7.1 Greening of transport

These efforts involve reducing emissions of pollutants and greenhouse gas emissions in the transport sector. This effort primarily requires a massive support for the development and broader use of public mass transport, intermodal transport, alternative fuels, non-motor transport and electromobility.

3.7.2 Biofuels

The strategic target in the transport sector to 2020 is to achieve a 10% share of RES in fuel consumption. This target will primarily be achieved using conventional biofuels and electricity generated from RES used mainly in rail transport. The arrival of more advanced biofuels is expected once analysis of the available input raw materials and the technological and financial intensity of production have been made. Subsequent development in this field will depend on the findings of the Commission's study which should deliver the needed data. The use of biomethane decreases emissions by around 80%. Slovakia is attempting to latch onto the latest trends in terms of the arrival of new technologies.

Biofuel blends have a positive impact on the decrease of CO_2 emissions while their share in fuels should increase in the future (bioethanol and biodiesel). Standard fuels will be supplemented by more ecological fuels with lower CO_2 emissions such as biogas and biomethane, compressed natural gas (CNG), liquefied propane gas (LPG), hydrogen and electricity to help achieve the transport target of decreasing pollutant emissions in road transport and non-road motorised equipment by 6%.

A boom in electric vehicles may play a major role in the process of achieving qualitative changes in the industrial base. An advisory working group was created by the Ministry of Economy named the *Slovak Platform for e-mobility* and is charged with developing and supporting electromobility in terms of the implementation and operation of a comprehensive and integrated system for the actual use of electric vehicles, evaluating the benefits of electric vehicles for the national economy in terms of environmental impacts, job growth and state revenues, an increase in the competitive benefits to the Slovak economy, mapping the

situation involving electric vehicles in selected European Union member states, analysis and recommendations from strategic documents of the European Union and draft policy to support electromobility in Slovakia including support for managing the electricity system. The *Strategy for the Development of Electromobility in the Slovak Republic* was completed in 2013.

The use of intelligent networks and electromobility is related to the decentralisation of generation whereas it can be expected that batteries in vehicles could provide up to 20% of the capacity for future potential use in the system during charging and discharging over the long term. Two types of supply will occur in this situation: from generation through the system to the batteries in vehicles during charging and if necessary the flow from the batteries to the system during their discharging. The deployment of more small and decentralised power sources to the network will then be supported. The objective is to balance the system so that generation equals consumption.

Multiple systems are being developed for charging batteries along three main lines:

- exchanging batteries for charged batteries in special charging stations (requires the unification of batteries but is very fast and such stations have a much higher chance of contributing to maintaining balance);
- charging batteries in electric vehicles, which involves two specific methods, either quick charging stations or slow chargers with insignificant increases in consumption that are stable for long hours. Night-time charging of batteries has a favourable impact on increasing household utilisation of excess generation capacity at night, primarily produced by nuclear power plants.
- charging batteries in electric buses using stationary traction lines installed in cities with such systems for mass public transport.

Only 27 electric passenger cars and 8 electric commercial vehicles are registered for use on Slovakia's roads according to data provided by the Car Industry Association of the Slovak Republic (2013).

Vehicles utilising compressed natural gas (CNG) are playing a more important role globally in transport, in particular in mass transport. Their use can decrease CO_2 emissions in the transport sector by 20 to 30% as well as particulate emissions (soot) and thereby contribute to cleaner and healthier air in urban areas. The drawbacks of such fuel are higher initial costs to purchase vehicles and the sparse network of filling stations.

Transport objectives:

- greening of transport by introducing ecological fuels;
- improve the standing of public mass transport;
- achieve at least a 10% share of RES in fuel consumption in transport;
- apply the principle of "polluter pays".

Transport measures:

- support the development and broader use of public mass transport, and rail transport in particular;
- support the use of ecological fuels, biofuels, CNG, LPG, electric vehicles as well as non-motor transport (cycling).

Instruments for supporting CNG use in transport[5]:

- support the use of CNG in transport by decreasing the tax burden (excise duty) on fuels or by providing tax relief for vehicles using this fuel (road tax);
- create mandatory quotas for the number of CNG vehicles for the public sector used for local purposes (waste collection, state and city police, customs office, etc.).

[5] These instruments comply with support for alternative fuels in transport as presented by the European Commission in the "Clean Power for Transport" package, including the draft directive for the development of infrastructure for alternative fuels.

3.8 Energy research and development

3.8.1 International cooperation in research and development

Slovakia is widely integrated into international activities in the area of research, development and innovation in the form of bilateral contracts on scientific and technical cooperation with states inside and outside of the EU. Slovakia is a member of the IEA. Slovakia is also involved in scientific and technical cooperation through universities and the Slovak Academy of Sciences within the EU in the form of the Seventh Framework Programme of the EU and EURATOM.

Science and technology will primarily be supported in the period up to 2015 by Slovakia from the following sources of funding:

- state budget;
- EU structural funds;
- private sector funding;
- international funding.

Support for science and research represents one of the priorities of the EU's Strategy to 2020. The Commission adopted the strategic *"Strategic Energy Technology Plan"* or SET Plan representing the technological pillar of EU energy policy.

The most significant activities of the SET plan are industrial initiatives, which were officially kicked off at conferences in Madrid and Brussels in 2010. One of these industrial initiatives is an initiative involving nuclear energy. Within this initiative, Slovakia is involved in the Allegro project, a nuclear energy cooperation project between Slovakia, Hungary, Czech Republic and France.

The Allegro Project is a research project involving a prototype of a fast breeder reactor cooled with inert helium gas focused on the research and development of the reactor's cooling system. The project originated as a joint proposal from three Central European organisations (Slovak company VUJE, a.s., Czech company ÚJV Řež, a. s. and the Hungarian Academy of Sciences KFKI) in negotiations with the French organisation CEA (Commissariat à l'Énergie Atomique) for the construction of this prototype in one of the three countries (Slovakia, Czech Republic or Hungary) within the SET Plan as an initiative for sustainable nuclear energy. Currently the preparatory phase of the project is under way with VUJE, ÚJV and KFKI having already committed to cooperate on its preparation until a decision is made as to the country in which the prototype will be built.

The International Renewable Energy Agency (IRENA) has the objective of supporting the development and sustainable use of all forms of renewable energy, thereby contributing to the protection of the environment and air quality, economic growth, reducing poverty, spurring on regional development and limiting pressure on natural resources to improve the security of energy supply. IRENA should also function as a centre of excellence for RES technologies and provide support to its members in the area of politics, investment mechanisms and financing and assist countries with availability and the transfer of technology and knowledge. Upon signature of the IRENA statute on 26 June 2009 and its subsequent ratification on 5 April 2010, Slovakia became one of the 25 countries involved in ensuring that IRENA became a fully functional international organisation on 8 July 2010.

3.8.2 National Centre for RES Research and Applications

The *"National Centre for RES Research and Applications"* has been established at Slovak University of Technology. Slovak University of Technology has received support for this centre from the European Regional Development Fund within Operational Programme Research and Development. Four faculties at Slovak University of Technology are involved in the National Centre for RES Research and Applications: the Faculty of Chemical and Food Technology, the Faculty of Electrical Engineering and Information Technology, the Faculty of Mechanical Engineering and the Faculty of Civil Engineering. Biomass, solar and hydropower are the driving themes of research at the National Centre.

3.8.3 Laboratory for Researching Intelligent Networks

There is interest in managing a national pilot project in connection with the pilot project led by network companies. The role of the laboratory in this case would be to test new technologies on the side of the network, consumption and production, and interoperability. The laboratory centre should also be a presentation centre for educational purposes.

Research and development objectives

The priority in energy research and development is safeguarding sustainable energy in Slovakia.

Research and development objectives in energy comply with the *"Research and Innovation Strategy for the Intelligent Specialisation of the Slovak Republic"* (2013) document.

Research and development in this area will be focused on new and renewable, ecologically friendly energy sources, rationalisation of energy consumption in all sectors of the economy and energy distribution such as:

- exploration of domestic reserves of energy raw materials, geothermal energy and their efficient exploitation;
- development of technologies to obtain electricity and heat from RES (hydro, solar, wind and biomass);
- research in nuclear energy focused on security and the storage of spent fuel;
- research into fourth generation reactors and nuclear fusion (Slovakia's involvement in the worldwide ITER and DEMO projects);
- development of new energy transmission systems (power cabling without stray electric and magnetic fields);
- development of technology to increase energy efficiency and to decrease energy intensity.

Measures to achieve these objectives:

- create a strategic plan for energy research and development based on the strengths of the country and aligning the use of public finances with production and consumption priorities, in particular with respect to energy efficiency, fourth generation nuclear reactors and RES such as biomass;
- introduce a mechanism for monitoring and assessing advances made in research and development in the energy sector in the interests of maximising the cost effectiveness of public expenditures;

- consider increasing public expenditures on research and development in the energy sector so as to reach a comparable level to other member states of the IEA;
- support more intensive research and development activities on the part of industry also by providing fiscal stimuli and facilitating partnership between the government, industry and the academic community;
- increase efforts in the area of technical education with the goal of covering future demand for researchers, engineers and technicians.

3.9 Education and increasing awareness

3.9.1 Background

One of the important prerequisites for achieving the targets set in energy policy is the level of education of experts in the energy sector and related specialisations as well as awareness among the general public. These matters deserve appropriate attention given that insufficient education and a lack of experience can negatively impact the quality of work at all levels. The fact that energy education has not been given sufficient attention over a long term is confirmed by the following findings:

- basic information on energy usage and the energy sector, when communicating with the general public, is simply insufficient, and is compounded by the fact that the understanding of physical units used in the industry and this sector and in particular their multiples has also gotten worse;
- the average end users should review their energy consumption and decide how much to consume, but often times these consumers simply lack sufficient information, in particular with respect to their heat consumption;
- the energy sector is sometimes portrayed in the media by commentators who themselves have not mastered the correct terminology and who thereby put the incorrect expressions into circulation among the public;
- insufficient integration of practical experience at secondary trade schools and universities does not prepare students for the actual conditions in the energy sector and many of them are simply unable to find work or positions in the industry without additional training and education;
- new and innovative technologies, in particular involving the use of RES and energy savings are often installed without any experience in the field of expertise and the specific properties of these technologies are simply ignored or neglected during installation;
- continuing education represents an unfair burden for experts involved with the design, construction and operation of energy installations due to a lack of financial and professional appreciation for engineering activities;
- technical education and professional experience are often not the priority when selecting employees in the energy sector.

The need to increase the quality of work in energy-related sectors is one of the prerequisites for achieving energy targets and objectives. A specific guarantee of the quality of work and completed activities is needed especially in the areas of the energy sector where independent entities are involved. Slovakia must examine if its qualification, accreditation and certification schemes for energy experts are sufficient and if they create a sufficient basic level of qualification for the fulfilment of the specified activities. The Commission drafted the "BUILD UP SKILLS" initiative in conjunction with the expansion of energy efficiency measures in the construction sector focused on the analysis of education and training from the perspective of energy efficiency and RES and the subsequent improvement in professional skills by using qualification programmes in particular for builders and tradesmen working with building technical installations. Education of the professional community should be expanded to the providers of energy services.

3.9.2 Energy agencies

The Ministry of Economy coordinates and provides education, and increases awareness in Slovakia in the energy sector, with the exception of building energy efficiency programmes, mainly through its contributory organization Slovak Innovation and Energy Agency (SIEA) organisation. SIEA focuses on the education and training of professionally certified persons in the energy sector, organises professional seminars and conferences, provides group and individual consulting activities at four regional offices, publishes specialised publications for a number of different target groups, works with universities and professional associations and participates in international projects focused on education and training. The Ministry of Transport, Construction and Regional Development of the Slovak Republic coordinates educational activities focused on the energy efficiency of buildings and secures these activities through the Slovak Chamber of Civil Engineers.

Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC defined the professional qualifications for technicians for installations using RES such as biomass boilers, heat pumps, solar thermal systems and photovoltaic installations.

Tests of professional competency for doing business in the energy and thermal energy sector, for regular inspections of boilers, heating systems and air conditioning systems and for energy auditors are regularly organised pursuant to generally binding legal regulations. Systems for improving qualifications in other areas of energy efficiency should also be created or expanded. The draft energy efficiency directive includes the requirement for qualification programmes for the providers of energy services and energy managers.

SIEA is implementing "Support for education and consulting within the efficient use of energy and RES, including increasing awareness among the general public" in the form of the "Live with energy" project intended for a number of target groups including children and young people, households, the public sector and entrepreneurs within Operational Programme Competitiveness and Economic Growth in order to increase the level of education and awareness of energy efficiency and the use of RES in particular. Structural fund financing of the project is planned for the end of 2015. Strengthening the role of the energy agency in the field of energy efficiency should help develop energy efficiency activities in the area of increasing awareness and the level of information among the general public and professional circles.

Regional energy agencies in Nitra, Šaľa and Žilina, partially financed from the Community's Intelligent Energy – Europe programme, provide consulting at the local level. The cities of Nitra and Moldava nad Bodvou are involved in the Covenant of Majors initiative, which brings together municipalities making the commitment to decrease CO_2 emissions by at least 20% by 2020, and have completed a sustainable energy action plan. Consulting is also provided by commercial energy companies.

The activities of professional organisations (Association of Energy Managers, Association of Industrial Ecology in Slovakia, etc.), non-profits (Energy Centre Bratislava, the Biomass Association, CITENERGO, and others) and funds all contribute to energy education efforts. The non-investment EkoFund established by SPP, a.s. completed needs analysis for undertakings in the gas industry and needs analysis for secondary trade schools with a technical focus in cooperation of the Slovak Chamber of Trades and prepared a 4-year "Building Energy Installation Technician" academic programme with a school-leaving exam launched in September 2010 in cooperation with selected schools and the State Institute of Vocational Education. This academic program reflects the latest trends in modern technical energy installations using natural gas in combination with RES.

Objectives of education and increasing awareness

The basic manifestations of climate change and greenhouse gas emission reduction requirements are the driving forces for the need to inform the public about the energy sector and technology that mitigates negative environmental impacts. Support for RES, energy efficiency and energy savings all have the greatest potential with respect to education and building awareness among the public. These are cross-cutting energy areas that can help drive development on a national scale. Basic information about sustainability and related energy savings and RES should be included in education at primary schools to help drive home the idea of a sustainable way of life from the very first years.

The completion of a *National Strategy for Increasing Informedness and Awareness of Energy Efficiency* focused on the public, starting with children and including experts and producers, would be a good step in this direction. The strategy should support the development of information and education among the general public and professional circles with respect to energy efficiency, support the implementation of informational campaigns involving energy efficiency and support the implementation of consulting and educational projects for state and local government employees in the area of energy efficiency with the objective of monitoring and evaluating energy savings as well as proposing measures to make efficient use of public funds for energy efficiency efforts. Education on the basics of financing and available financial instruments should drive improvements in energy efficiency and the development of RES. The national strategy should count on intelligent metering systems as the basis used for providing information about consumption and generation from distributed sources among consumers.

The new energy efficiency directive requires an increase in awareness among the public in terms of managing their energy consumption. End user awareness of their energy consumption, in particular electricity, gas, heat and hot water, must be increased. This fact conditions a re-evaluation of the information currently presented on invoices so that only the information that a consumer is able to exploit in a practical manner when making decisions, such as reducing consumption or changing suppliers, remains after such review. End users will also have the ability to request electronic access to additional data. Data for at least three previous years or a shorter period of time if a contract was signed later must be made available. Information must be provided in fifteen minute intervals at least once a month or upon request from the end user. If the final consumer is able to see the development of consumption in context with the use of appliances, only then will the consumer be able to change their behaviour and save more.

End users should also receive clear and understandable explanations as to the manner in which their billing is created if so requested, in particular if such billing is not based on actual consumption. Billing should allow consumers to compare different offers and their consumption with the average consumer; likewise billing documents should contain contact information for an independent consulting centres, organisations and energy agency.

Sufficient information regarding intelligent metering systems must also be provided with periodic education of end users so that they are able to take advantage of all the benefits provided by IMS.

Success can only be expected with a professional approach, which serves as justification for the focus on the following objectives:

- professional consulting and relevant information for experts and the general public;
- increase interest in physics, energy, and the energy sector among children and young people;
- practical experience;

- professionalism and professional pride;
- qualified state and local government.

Measures to achieve these objectives:

- support professional consulting activities provided by professional organisations and associations;
- support the development of efficiency measures and RES by increasing awareness through informational campaigns and advertising;
- apply programs for children and young people to increase interest in technical disciplines in creative ways, e.g. by creating clubs for children and young people focused on energy and its uses;
- propose and apply a more effective connection between school-based education and practical experience by completing graded and mandatory professional work experience in appropriate companies and by increasing the share of professional seminars delivered by true experts with practical experience; companies with state-owned ownership interests, budget supports and budget organisation and voluntary agreements with professional associations will primarily be used for such purposes;
- propose and deliver life-long energy education, coordinated with SIEA, focused on education and continuing education for professionally certified individuals, designers, operators, state and local government employees and the general public;
- apply the "Live with energy" programme until 2015 and secure continuation of the programme after 2015;
- intensify cooperation between the SIEA and regional energy agencies (Nitra, Šaľa, Žilina), non-profit organisations, professional associations and increase the involvement of Slovak entities in international projects focused on energy education;
- monitor the quality of the work of energy experts, in particular professionally certified individuals, use an appropriate method for highlighting errors made during work activities and apply penalties in a thorough manner if activities are not conducted in a professional manner by such professionals;
- increase the visibility of experts and their work, raise awareness of professionals by using the motto: "I'm proud to be an energy technician";
- introduce a mandatory system of education and demonstration of professional experience in technical disciplines for state and local government employees conducting energy-related activities;
- organise an information campaign and training for mayors of municipalities regarding progressive technologies employed in "the small energy sector" so as to facilitate the preparation, assessment and adoption of strategic materials pursuant to state energy policy at the local level;
- provide sufficient information regarding intelligent metering systems and periodically educate end users so that they are able to take advantage of all the benefits provided by IMS.

IV LIST OF ACRONYMS

AP	Action Plan
CEF	Connecting Europe Facility
CNG	compressed natural gas
CZT	centralised heat supply
EC	European Commission
NPP	Nováky power plant
VPP	Vojany power plant
EMO	Mochovce nuclear power plant
EPC	energy performance (energy efficiency) contract
ESCO	energy service company
GWh	Gigawatt hour
HDS	gross inland energy consumption
IEM	internal energy market
IKL	Ingolstadt – Kralupy nad Vltavou – Litvínov crude oil pipeline
IMS	intelligent metering systems
IS	intelligent systems
PpS	providing support services
NPP V2	Jaslovské Bohunice V2 nuclear power plant
NPP V1	Jaslovské Bohunice V1 nuclear power plant
kV	kilovolt
ktoe	kiloton fuel oil equivalent
KVET	combined heat and electricity production
LPG	liquefied petroleum gas
IAEA	International Atomic Energy Agency
MVE	small hydropower plant
Mtoe	megaton fuel oil equivalent
OECD	Organisation for Economic Cooperation and Development
OSC	Oil supply connections in Central Eastern Europe
RES	renewable energy sources
PJ	peta joules
PCI	projects of common interest
SE, a.s.	Slovenské elektrárne, a.s.
SEPS, a.s.	Slovenská energetická prenosová sústava, a.s.
SPP, a.s.	Slovenský plynárenský podnik, a.s.
SSE	Stredoslovenská energetika
TAL	Terst – Ingolstadt (D) crude oil pipeline
TEN-E	trans-European energy infrastructure
TUR	sustainable development
TWh	Terra watt hour
ÚRSO	Regulatory Office for Network Industries

VE	hydropower plant
VSE	Východoslovenská energetika
ZSE	Západoslovenská energetika

V PRIMARY LEGISLATIVE AND STRATEGIC DOCUMENTS

1 Legislative documents

Acts covering energy efficiency

- Act No. 476/2008 Coll. on Efficiency During Energy Utilisation (Energy Efficiency Act) and on amendment of Act No. 555/2005 Coll. on Energy Efficiency of Buildings and on amendment of certain acts as amended by Act No. 17/2007 Coll., as amended defines the obligations in the transformation, transmission, transport, distribution and final consumption of energy, defines the qualification scheme for energy auditors and thereby makes energy audits accessible to industry, agriculture and other sectors of the economy.
- Act No. 17/2007 Coll. on Regular Inspections of Boilers, Heating Systems and Air Conditions Systems and on amendment of certain acts as amended by Act No. 136/2010 Coll. is focused on the regular inspection of boilers, heating systems and air conditioning systems to contribute to monitoring efforts regarding the level of energy efficiency in fuel utilisation.
- Act No. 529/2010 Coll. on Environmental Design and Use of Products (Ecodesign Act) introduced a system for energy efficient products. The European Commission issued individual regulations related to energy-using products and links to these regulations are published on the Ministry of Economy's website: http://www.mhsr.sk/nariadenia-komisie/129465s.
- Act No. 182/2011 Coll. on Labelling Energy-Using Products and on amendment of certain acts defines the energy labels for energy-using products. The European Commission issued individually delegated regulations related to energy-using products and links to these regulations are published on the Ministry of Economy's website: http://www.mhsr.sk/nariadenia-komisie/129465s.
- Regulation (EC) No 1222/2009 of 25 November 2009 on the labelling of tyres with respect to fuel efficiency and other essential parameters.
- Act No. 300/2012 Coll. amending Act No. 555/2005 Coll. on Energy Efficiency of Buildings and amendment of certain acts as amended and amendment of Act No. 50/1976 Coll. on Land Planning and Construction Regulations (Construction Act) as amended.
- Act No. 314/2012 Coll. of 18 September 2012 on Regular Inspections of Heating and Air Conditioning Systems and amendment of Act No. 455/1991 Coll. on Trade Licensing (Trade License Act) as amended.
- Act No. 69/2013 Coll. amending Act No. 476/2008 Coll. on Efficiency During Energy Utilisation (Energy Efficiency Act) and on amendment of Act No. 555/2005 Coll. on Energy Efficiency of Buildings and on amendment of certain acts as amended by Act No. 17/2007 Coll. as amended by Act No. 136/2010 Coll.

Acts covering RES

- Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and amendment of certain acts as amended.
- This act transposed Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC into national legislation. Ministry of Economy Decree No. 599/2009 Coll. was adopted in order to implement certain provisions of the Act on the Promotion of Renewable Energy Sources and High-Efficiency Cogeneration.
- Amendments to Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and amendment of certain acts as amended.
- Act No. 492/2010 Coll. *amending Act No. 98/2004 Coll. on the Excise Duty on Mineral Oil* as amended and which amends Act No. 309/2009 Coll. on the Promotion of *Renewable Energy Sources*.
- Act No. 558/2010 Coll. *amending Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources* and amendment of certain acts and amending Act No. 276/2001 Coll. on Regulation in Network Industries and on amendment of certain acts as amended. An amendment of this act defined restrictions on the development of solar installations. Furthermore an extensive amendment was approved in connection with the implementation of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC primarily involved biofuels and structures.
- Act No. 136/2011 Coll. that once again amended Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources and amendment of Act No. 276/2001 Coll. on Regulation in Network Industries and on amendment of certain acts as amended.
- Act No. 189/2012 Coll. *amending Act No. 609/2007 Coll. on the Excise Duty on the Electricity, Coal and Natural Gas* and on amendment of Act No. 98/2004 Coll. on the Excise Duty on Mineral Oil as amended as amended and on amendment of certain acts amending Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources.
- This act significantly simplified administrative demands for electricity producers using renewable energy sources delivering electricity generated from renewable energy installations with total installed capacity of up to 10 kW. These are producers whose electricity is primarily supplied to their own electrical installations for internal use and excess electricity is returned to the distribution network. It is impossible to generate such a volume of generated electricity from the installed capacity of photovoltaic equipment installed on single-family homes, which are usually sized up to 10 kWp, so this amended act does not impose a new tax liability on small electricity producers. Small electricity producers are exempt from the provisions related to mandatory registration as taxpayers, filing tax returns or maintaining specific records.
- Act No. 382/2013 Coll. amending Act No. 309/2009 Coll. on the Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and on amendment of certain acts as amended and amending Act No. 251/2012 Coll. on Energy and on amendment of certain acts as amended by Act No. 391/2012 Coll. These legal stipulations concern the legitimate interests of regulated entities in electricity generation and the production of biomethane and restricting unfair practices of certain electricity producers within generation activities. This act changes the scope of support for photovoltaic power plants; only electricity producers with generation

installation with total installed capacity of up to 30 kW as opposed to 100 kW are eligible for support. This lessens the impact on final energy consumers as a result of rising electricity prices.

Acts covering the power, gas and oil industries

- A total of 12 amendments of Act No. 656/2004 Coll. on Energy and on amendment of certain acts as amended on the basis of the need to achieve harmonisation with EU legislation and practical experience have been adopted since 2006.
- Act No. 251/2012 Coll. on Energy and on amendment of certain acts of 31 July 2012 entered into force on 1 September 2012. This act repealed the previous Act No. 656/2004 Coll. on Energy and replaced it with new legislation. The rights of electricity consumers and gas consumers have been strengthened significantly with emphasis on the protection of vulnerable consumers. It stipulated the ability to significantly simplify the process of changing electricity and gas suppliers. This legislation complies with European legislation – Directives 2009/72/EC and 2009/73/EC of the European Parliament and of the Council, and guarantees that all electricity and gas consumers in households and small enterprises can make use of a universal service. The act contains a new set of options for separating production and supply activities from the operation of the transmission network or the pipeline network. Current legislation was enacted with the adoption of amendments of the Energy Act, specifically Act No. 391/2012 Coll., effective 1 January 2013, Act No. 352/2013 Coll. effective 15 November 2013, Act No. 382/2013 Coll. effective 1 January 2014 and the most recent amendment Act No. 102/2014 effective 1 May 2014.
- Amendments of Act No. 276/2001 Coll. on Regulation in Network Industries and on amendment of certain acts as amended: 107/2007 Coll., 112/2008 Coll., 283/2008 Coll., 73/2009 Coll., 309/2009 Coll., 142/2010 Coll., 547/2011 Coll., 558/2010 Coll., 117/2011 Coll., 136/2011 Coll. and 197/2012 Coll.
- Act No. 250/2012 Coll. on Regulation in Network Industries of 31 July 2012 entered into force on 1 September 2012. The new act ensures a higher level of independence for the Regulatory Office and strengthened its powers in the area of defining regulated prices as well as audit activities in regulated entities. The act significantly expanded the powers of the Regulatory Office in surveillance over the regulated entities. Price regulation of gas used for heating purposes in households has ended. Ministry of Economy commenting on provided pricing proposals was also cancelled once this act entered into force.
- The Act on Regulation in Network Industries was amended by a number of amendments, specifically Act No. 391/2012 Coll., Act No. 352/2013 Coll., Act No. 382/2013 Coll. and Act No. 102/2014 Coll.
- Act No. 391/2012 Coll. amending Act No. 238/2006 Coll. on the National Nuclear Fund for decommissioning of nuclear facilities and for management of spent fuel and radioactive waste (Nuclear Fund Act) and on amendment of certain acts as amended and which amends Act No. 251/2012 Coll. on Energy and on amendment of certain acts.
- Act No. 373/2012 Coll. on Emergency Stocks of Oil and Petroleum Products and on Resolving Oil Crises and on amendment of Act No. 309/2009 Coll. on Promotion of Renewable Energy Sources and High-Efficiency Cogeneration and on amendment of certain acts as amended.

- Act No. 414/2012 Coll. on Trading Emission Allowances and on amendment of certain acts is effective from 1 January 2013. This act defined trading greenhouse gas emission allowances in Slovakia among parties registered in Slovakia and in the EU and parties registered in the countries listed in the Kyoto Protocol to support a reduction in greenhouse gas emissions in a cost-effective manner and trading pollutant emission allowances.
- Act No. 218/2013 Coll. on Emergency Stocks of Oil and Petroleum Products and on Resolving Oil Crises and on amendment of certain acts.
- Act No. 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act) and on amendment of certain acts as amended (most recently by Act No. 143/2013 Coll.). This act defines the conditions for the peaceful use of nuclear energy in Slovakia while defining the activities and competencies of the independent authority charged with exercising state surveillance over nuclear safety (Nuclear Regulatory Authority of the Slovak Republic), the permitting process for the individual phases of nuclear installations, the rights and obligations of operators and the requirements for the professional competencies of personnel; the act also, *inter alia*, transposes European directives in the area of the legal framework for nuclear security, the responsibility and security of the management of radioactive wastes and spent fuel as well as the cross-border transports of radioactive materials.

Acts covering the heat industry

- Act No. 657/2004 Coll. on Thermal Energy as amended.
- Act No. 184/2011 Coll. amending Act No. 657/2004 Coll. on Thermal Energy as amended. This act entered into force on 1 July 2011 and more precisely specified the scope of business activities in the thermal industry, which resolved a number of issues that had previously been encountered in practice. The amendment of the act reflects the European Commission requirement for the full transposition of Directive 2004/8/EC.
- Act No. 100/2014 Coll. amending Act No. 657/2004 Coll. on Thermal Energy as amended valid from 1 June 2014.

Acts covering CO_2

- Act No. 258/2011 Coll. on the Permanent Geological Storage of Carbon Dioxide and on amendment of certain acts entered into force on 3 August 2011. This act is a normative part of a wider global effort to minimise the negative impacts of climate change.

Other legal regulations

- Regulation of the Government of the Slovak Republic No. 402/2010 Coll. amending Regulation of the Government of the Slovak Republic No. 246/2006 Coll. on the minimum amount of fuel produced from renewable energy sources in petrol and diesel brought to market in the Slovak Republic as amended by Regulation of the Government of the Slovak Republic No. 304/2008.
- Regulation of the Government of the Slovak Republic No. 426/2010 Coll. stipulating the details of the amount of levy on electricity delivered to end users and method of collection for the National Nuclear Fund for decommissioning of nuclear facilities and for management of spent fuel and radioactive waste.

- Ministry of Economy of the Slovak Republic Decree No. 372/2011 Coll. stipulating the calculation of annual heat production from electricity generation using biogas obtained through anaerobic fermentation. This decree stipulates the annual heat production, i.e. the quantity of heat that is produced over a calendar year with year-round electricity generation. This decree fulfils and specifies the requirement for efficient utilisation of biogas.
- Ministry of Economy of the Slovak Republic Decree No. 373/2011 Coll. implementing specific provisions of Act No. 309/2009 Coll. on Promotion of Renewable Energy Sources and High-Efficiency Cogeneration. This decree implemented the calculation method provided in Directive 2009/28/EC on the promotion of the use of energy from renewable sources as it clearly defined a method for calculating the share of energy from renewable sources and the calculation of the national target.
- Regulatory Office for Network Industries Decree No. 437/2011 Coll. amending Regulatory Office for Network Industries Decree No. 490/2009 Coll. stipulating the details of promotion of renewable energy sources, high-efficiency cogeneration and biomethane.
- Ministry of Economy of the Slovak Republic Decree No. 271/2012 Coll. stipulating the details of the scope of technical conditions for access and connection to systems and networks and the rules for operating systems and networks.
- Regulatory Office for Network Industries Decree No. 275/2012 Coll. stipulating the quality standards for electricity transmission, distribution and supply.
- Regulatory Office for Network Industries Decree No. 278/2012 Coll. stipulating the quality standards for gas storage, transport, distribution and supply.
- Ministry of Economy Decree No. 282/2012 Coll. of 18 July 2012 stipulating the technical requirements for thermal insulation of heat and hot water distribution systems valid from 1 October 2012.
- Ministry of Economy Decree No. 337/2012 Coll. of 26 October 2012 stipulating energy efficiency in energy conversion during the operation, overhauling and construction of electricity generation and heat producing installations.
- Ministry of Economy Decree No. 358/2013 Coll. of 28 October 2013 stipulating the procedure and conditions for deployment and operation of intelligent metering systems in the electricity sector.
- Regulatory Office for Network Industries Decree No. 24/2013 Coll. stipulating the rules for the operation of the internal electricity market and rules for the operation of the internal gas market.

2 Strategic documents

- The Energy Efficiency Concept of the Slovak Republic adopted by Resolution of the Government of the Slovak Republic No. 576 of 4 July 2007.
- 2008 – 2010 Energy Efficiency Action Plan adopted by Resolution of the Government of the Slovak Republic No. 922/2007 of 24 October 2007.
- Draft Strategy for the Final Stage of Nuclear Energy approved by Resolution of the Government of the Slovak Republic No. 328/2008 of 21 May 2008.
- Energy Security Strategy of the Slovak Republic approved by Resolution of the Government of the Slovak Republic No. 732 of 15 October 2008.
- Report on the operation of the electricity and gas markets in Slovakia – taken up by the Government of the Slovak Republic on 15 April 2009. The Regulatory Office for Network Industries submitted the report on the basis of Act No. 276/2001 Coll. on Regulation in Network Industries and on amendment of certain acts as amended by Act No. 107/2007 Coll.
- Concept for Use of the Hydropower Potential of Rivers in the Slovak Republic to 2030 adopted by Resolution of the Government of the Slovak Republic No. 178/2011.
- Regulatory Policy for the Upcoming 2012 – 2016 Regulatory Period (05/2011).
- 2011 – 2013 Energy Efficiency Action Plan adopted by Resolution of the Government of the Slovak Republic No. 301/2011 of 11 May 2011.
- Analysis of the number of known specific reserves of raw energy materials in the Balance of Stocks of Minerals on the basis of their real utilisation over a long-term perspective adopted by Resolution of the Government of the Slovak Republic No. 303/2011 of 11 May 2011.
- Report on the security of energy supply and resolving emergencies with definition of specific responsibilities for their resolution approved by Resolution of the Government of the Slovak Republic No. 450/2012 of 5 September 2012.
- Government of the Slovak Republic Resolution No. 449/2012 Updated analysis of state support for mining – this material introduced measures to streamlining support for mining with respect to the new CO_2 emission allowance trading system in 2013 and extension of the life span of the Nováky power plant after 2015 in connection with new environmental legislation regarding industrial emissions.
- Government of the Slovak Republic Resolution No. 381/2013 Draft job creation programmes in the Horná Nitra region in cooperation with Hornonitrianske bane Prievidza, a.s., focusing on resolving the situation connected to the expected reduction of coal extraction and the gradual exhaustion of extractable reserves in the Cígeľ mining area in connection with the overhauling and modernisation of the Nováky power plant and ultimately with impact on employment in the Horná Nitra region.
- Proposal to not use ownership unbundling of the gas transmission network operator approved by Government of the Slovak Republic Resolution No. 656 of 28 November 2012.
- Strategy for applying voluntary environmental policy instruments in the Slovak Republic, Government of the Slovak Republic Resolution No. 1091/2007.
- 2011 – 2015 National Green Procurement Action Plan in the Slovak Republic, Government of the Slovak Republic Resolution No. 22/2012.

- Strategy for the Final Stage of Peaceful Utilization of the Nuclear Energy in the Slovak Republic approved by Government of the Slovak Republic Resolution No. 26/2014.

3 Draft energy legislation

- Ministry of Economy of the Slovak Republic Decree stipulating the details and scope of updated professional training to conduct regular inspections of heating and air conditioning systems in buildings.
- Implementing regulations of the Ministry of Economy and the Regulatory Office for Network Industries on the basis of the provisions of Section 95 of Act No. 251/2012 Coll. on Energy and the provisions of Section 40 of Act No. 250/2012 Coll. on Regulation in Network Industries.
- Energy Efficiency Act – implementation of Directive 2012/27/EU of the European Parliament and of the Council of 14 November 2012 in energy efficiency (2014).

4 Strategic documents being prepared

- 2014 – 2016 Energy Efficiency Action Plan.
- Update of the Raw Material Policy of the Slovak Republic to focus on more intensive utilisation of domestic sources of raw materials.