Proposal of the National Energy Programme of the Republic of Slovenia for the 2010–2030 Period: "Active Energy Management"

draft

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FINAL REPORT ON THE "NATIONAL ENERGY PROGRAMME" PROJECT

Key facts about the National Energy Programme 2010–2030	
Responsibility:	The Ministry of the Economy is directing the NEP proposal preparation
Name of the Programme:	National Energy Plan of the Republic of Slovenia 2010–2030
Adoption procedure:	The NEP shall be adopted by the National Assembly on proposal by the Government
Purpose of the programme	With the national energy programme, the long-term development objectives and orientations of energy and energy-supply systems are set, taking the environmental and technological criteria, development of public infrastructure and the infrastructure of national importance into account; also, encouragements and mechanisms for promotion of renewable energy sources use and implementation of measures for efficient energy use are set.
Reason for the NEP preparation	This is a regular preparation of the national energy programme, specified by the Energy Act. For achievement of the climate and energy package objectives, next to adopted measures and politics, additional measures are necessary. The valid National Energy Programme (ReNEP) adopted in 2004 was not implemented, thus, preparation of additional implementing mechanisms is necessary. Additional reason for the NEP revision are changed circumstances in the international area, in particular in the markets of energy products and energy technologies.
Subject:	Efficient use and supply of energy. NEP does not include the measures of the Action plan for renewable energy sources for the 2010–2020 period.
Period of NEP renovation:	As a rule, the NEP is renewed every five years.
Planning period:	from 2010 to 2030
Area:	Republic of Slovenia

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INTRODUCTION

The objectives of the national energy programme

To provide conditions for the secure, competitive and environmentally sustainable supply of energy and energy services to users is ranked among the most important current development challenges. Already, the Energy Act (EA) from 1999 set the provision of conditions for secure supply of energy services to users according to market and sustainable development principles, bearing in mind efficient energy use, economic exploitation of renewable energy sources, and conditions of environment protection. The National Energy Plan (NEP) is founded on three bases. Energy policy is becoming more and more a subject of EU common policy. The general objectives of the Slovenian energy policy are harmonised with EU common policy as follows: environmental sustainability, security and competitiveness.

In Slovenia, the vision of future activities in the energy industry is presented by the establishment of conditions for transition to low-carbon society, upon which the following priority fields have a leading role: efficient use of energy (EUE), exploitation of renewable energy sources (RES), and development of active electricity-distribution networks, supporting such progress. The NEP gives orientations for the exploitation of the efficient use of energy economic potential in all sectors to the maximum, sets ambitious objectives with regard to exploitation of RES, and establishes conditions for the significant reduction of dependency on use of fossil fuels, along with their long-term gradual cessation. The necessary care will be required upon ensuring security and competitiveness of the electricity supply in the period until 2030, when all existing thermal power plants (in total for 981 MW) that have low efficiency values and will soon end their operational life will cease to operate and, after 2016, they will also be inappropriate for operation due to environmental requirements. Nevertheless, the vision also presents the gradual reduction in the use of domestic fossil sources, and in the medium-term, will be limited to one location with exploitation of lignite taking place in one production unit[1], while complete cessation of lignite use is expected around 2050. In this period, renewable energy resources will be promoted; the NEP plans the share of RES above 50 per cent in relation to gross final electricity consumption by 2030. The NEP proposes further long-term exploitation of nuclear energy in Slovenia by extending the operational life of the existing nuclear power plant, and foresees the construction of a new unit on a location next to it. Actual realisation of the new nuclear power plant will depend on conditions in the market, business decisions, and social acceptability of the project.
Ambitious transition to low-carbon society in relation to energy management is, in addition to measures of the energy policy, enabled and supported by the measures of policies related to the energy policy. Thus, in the NEP, the Government of the Republic of Slovenia also predicts basic grounds for measures of taxation policy, spatial planning policy, housing policy, research and development, education and general development policy of the State, necessary to achieve the planned effects of the energy policy.

Long-term transition to low-carbon society and simultaneous pursuing of the objectives of security and competitiveness demand essential changes in energy management. To ensure sufficient investment potential with regard to the energy end-consumers for all profitable measures of efficient energy use and exploitation of renewable energy resources will be of key importance. One objective of the NEP is also the adequate management of social changes for realisation of necessary technological changes with regard to energy management that, in particular, brings measures of

[1] 550 MW will replace the existing units; the project is being implemented. There are powers at production unit thresholds stated throughout this document.

energy efficiency for the prevention of energy poverty, which is becoming more and more important for reasons of higher prices of energy in the future, to the fore.[2].

Stability and predictability of energy policy instruments are also of fundamental importance for the business sector, thus, the NEP builds on established mechanisms of support environment and implementation of already adopted programmes and measures; therefore, it summarises the totality of already adopted measures and proposes mechanisms for improving their implementation. Measures of operative programmes for energy efficiency, renewable energy resources, cohesion policy and measures for commitments from EU Funds in the sustainable energy industry and reduction of emissions of greenhouse gases, respectively, are included in the NEP[3]. The NEP "summarises" the measures and, after expiry of these operational programmes, plans their continuation to an even larger extent. With inclusion in the NEP by means of decision making of the National Assembly (NA), more stability and a long duration of these measures is ensured, as well as, with additional mechanisms, their implementation.

The NEP points out certain technologies and projects, but remains open to all technologies. Support and efforts will be directed towards ensuring priority to fields that, due to shortcomings of the markets, are less likely to establish themselves, as follows: efficient use of energy, exploitation of renewable energy resources, and active networks.

NEP content

The NEP is prepared in accordance with demands of the EA[4] and determines long-tem development objectives and orientations, taking into consideration the environmental and technological criteria, the development of public infrastructure and infrastructure of national importance, incentives and mechanisms for the promotion of RES use, and implementation of the measures for EUE. It contains objectives, orientations and strategies of the use and supply of energy, measures for achievement of the objectives, perspective energy balances[5] and estimate of effects in relation to achievement of the objectives.

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[2] Due to movement in the world markets, necessary renovation, and replacement of the relatively high share of already depreciated energy infrastructure in Slovenia, as well as gradual internalisation of external costs.

[3] National efficiency energy action plan for the period 2008–2016 (AN-URE); Operational Programme for Limiting Greenhouse Gas Emissions until 2012 (OP GHG); Operational Programme of Environment and Transport Infrastructure Development for 2007-2013 (OP ETID); Action plan for renewable energy sources for the 2010–2020 period (AN-OVE).

[4] The EA defines general objectives of the energy policy (EA, Articles 2 and 9), special objectives from the standpoints of environment protection and competitiveness (EA, Articles 10 and 11), and NEP content (Article 13).
The necessary constituents of implementing and other documents in relation to development planning are defined in the *Decree on the Criteria and Procedures for Preparing the Draft National Budget*, which needs to be taken into consideration upon preparation of the NEP in sections in which financing from the national budget is foreseen.

[5] The mandatory constituents of energy balances are (the EA, Article 15): the forecasts according to individual types of energy, while bearing in mind the measures of efficient energy use and principles of sustainable development, the method of satisfying supply with individual types of energy, taking into consideration primary (renewable and non-renewable sources) and final energy, ecological burdens deriving from production and use of energy, the necessary level of supplies and reserve capacities for achieving the planned level of security of supply, and the methods of promoting more ecologically appropriate fuels.

The measures for achievement of NEP objectives are structured in sub-programmes, namely in four sub-programme segments:

I. **Sustainable Use and Local Energy Supply, with the following sub-programmes:** Efficient use of energy, Use of energy in transport, Renewable energy sources, Local energy supply and cogeneration of heat and electricity;
II. **Electricity Supply:** Electricity generation, Electricity transmission, and Electricity distribution network;
III. **Fuel Supply:** Natural-gas supply, Liquid fuels, Coal and nuclear energy;
IV. **Horizontal Sub-Programmes:** Development of electricity and natural gas market, Taxes and regulated prices, Education and training, Research and development, and Spatial planning.

Each sub-programme defines the objectives, strategy and support environment that will enable achievement of the objectives, namely: it determines tasks, deadlines and responsibilities for the preparation and implementation of the mechanisms, as well as the most important actors for the sub-programme and the foreseen effects and means necessary for implementation.

To increase feasibility of the NEP and to assure early checking of admissibility of measures by means of comprehensive environmental impact assessment (CEIA), the NEP defines the development of the public infrastructure and infrastructure of national importance precisely for each facility and supplements the orientations of the Ordinance on Spatial Planning Strategy of Slovenia. For fulfilment of the NEP objectives, NEP facilities will be included in water management plans (WMP).

A special chapter estimates the effects of the proposed NEP scenario. The estimates of effects are given in comparison to other analysed scenarios, and with justification of the proposed scenario selection. A long-term balance for the selected scenario does not mean prediction of future use and supply, but expected development if the conditions are fulfilled; in particular, the establishment of the planned or proposed mechanisms of the support environment. Also, the economic effects of scenarios are estimated: the range of investments will significantly increase in all sectors. All scenarios were also assessed within the framework of the comprehensive environmental impact assessment.

For their implementation, the following resources will be of fundamental importance: financial resources and personnel, adequate organisation, management and implementation of the NEP.

Decision making on the NEP

Public consultation on the NEP began in April 2009, with publication of the Green Paper – a discussion document – in which the strategic questions for forming long-term development vision with regard to energy management and implementation instruments were exhaustively presented[6]. There has been a significant response to the consultation in the form of proposals and comments by environmental non-governmental organisations, regional organisations and incentives, energy companies, interest groups, individuals and other institutions, which had to be concerted and observed in the process of NEP preparation.
To establish and asses impacts on the environment, and to include the demands with regard to environment protection, nature preservation, protection of human health and cultural inheritance

[6] In the public consultation on the NEP, the Ministry of the Economy (ME) received comments and standpoints from 47 organisations, groups or individuals, which are published on its webpage.

into the plan, the CEIA[7] was implemented in accordance with the Environment Protection Act. The public consultation on the Report on determination of the scope of an environmental report from the CEIA for the NEP (from June to August 2010) was also included in the CEIA procedure. Although both public consultations are non-obligatory phases of inclusion of public in the preparation of programme documents, the Ministry wished to strengthen cooperation of the wider professional and interested public for a better quality and decision-making during NEP preparation.

Further steps of decision-making are shown in the table (Table 1). The NEP shall be adopted by the National Assembly on proposal by the Government (EA, Article 13). The public consultation of the Draft NEP Proposal will last 2 months, presumably from [20 May to 20 July. Parallel to that, the public consultation on the Environmental Report for the NEP, and cross-border consultation on both documents will be held. In the CEIA procedure for the NEP, the measures of the Action plan for renewable energy sources for the 2010–2020 period (AN-OVE) shall also be assessed. The AN-OVE measures are fully included in the NEP sub-programme[8].

Table 1: Further steps of considering and deciding on the NEP

Decision-making procedure for NEP
Opinion of the MESP regarding suitability of *the NEP Proposal* and the *ER NEP* for public consultation
The public consultation on *the NEP Proposal* and the *ER NEP*
Notice - notification to neighbouring countries concerning cross-border activities of the NEP
The NEP Proposal and the ER NEP supplemented by the comments from public consultation
Opinion of the MESP regarding admissibility of the *ER NEP.*
The Government procedure for *the NEP Proposal*
Decision-making procedure for *the NEP Proposal* in NA

Documents Considering and deciding on the NEP encompasses two documents:

- *National Energy Programme for the 2010–2030 period – Active Energy Management (NEP);*
- *Environmental report for comprehensive environmental impact assessment for the National Energy Programme for the 2010–2030 period (ER NEP).*

In support of deciding on the NEP, the following **supportive** documents are prepared:

- *Long-term Energy Balances of the Republic of Slovenia for the 2010–2030 Period*[9]:
  - *Part 1: Starting Points;*
  - *Part 2: Results;*
- *Complementing professional bases for the NEP with assessment of the hypothetical scenario of energy industry development upon closing Velenje Mine and cessation of the electricity generation from domestic coal until 2007;*

[7] Upon creation of the NEP, the participation of the public (Article 34a of the Environment Protection Act – ZVO, Official Gazette of the Republic of Slovenia, official consolidated text 1, 39/2006, 70/2008, 108/2009) and the comprehensive environmental impact assessment (Article 39 ZVO) are obligatory.

[8] See Table 7 in the Appendix of the environmental report entitled Environmental report for comprehensive environmental impact assessment for the National Energy Programme for the 2010–2030 Period.

[9] Comparison of NEP scenarios in the Long-term Energy Balances 2010–2030 is a professional basis for the National Energy Programme for the 2010–2030 period as a part of analysis of NEP impacts, given in the Long-term Energy Balances of the Republic of Slovenia for the 2010–2030 Period – The Results. NEP and long-term energy balances for diverse NEP scenarios are drawn up in accordance with the demands of the Energy Act (EA). Staring points for forming the scenarios with their detailed description can be found in the following document: Long-term Energy Balances of the Republic of Slovenia for the 2010–2030 period – Starting Points.

- *Annual Energy Outlook for 2008;*
- sector elaborates – *Professional Bases for the NEP Sub-Programmes;*
- a study – *Potential sites for setting up wind farms.*

The impacts of the NEP with regard to the criteria of security, environment and competitiveness for diverse scenarios are detailed in long-term energy balances. Overall assessment of NEP impacts on the environment in accordance with the CEIA procedure is given in the NEP Environmental Report.

FRAMEWORK OF PROGRAMME IMPLEMENTATION

1 State of implementation and challenges

Changes in the international environment

Today, the energy industry is a strategically, and with regard to its scope, an extremely important activity, is facing a development turning point. A variety of new circumstances in the global environment demand rethinking of the development of energy activities and services, while measures for improving implementation of energy policy are also necessary. The circumstances have significantly changed, and the future is uncertain.

In Slovenia, the key challenge of the future development of the energy industry is to continue providing balance among three general objectives of energy policy, namely: (1) as low as possible impacts on the environment (2) adequate security of supply, and (3) improving competitiveness of society and economy. Due to bigger ambitions and challenges with regard to all three objectives, adequate management of necessary changes and providing social cohesion are also important objectives.

Transition to low-carbon society Based on the latest scientific knowledge, interconnected international activity to prevent dangerous consequences of climate change is necessary. Thus, in accordance with the findings of the Intergovernmental Panel on Climate Change (IPCC), the warming of the atmosphere needs to be limited to below 2°C compared to the level before industrialisation, and greenhouse gas (GHG) emissions need to be reduced by 50% by 2050 compared to the level in 1990. The developed states must reduce their GHG emissions from 80% to 95% in this period. International efforts for the conclusion of a binding and exhaustive international agreement for future climate activities are supported by Slovenia within the framework of the European international environmental policy. In November 2009, the NA adopted the Declaration on Slovenia's active role in making new world policy on climate change.

The transition to low-carbon society is not merely environmentally imperative, but is also economically profitable over the long-term, since the costs of preventing global warming are five to ten times lower than the costs of adaptation and remediation of damage due to negative consequences of climate change, according to the estimates. In this regard, the indirect benefits for the economy, employment and health due to simultaneous reduction of air pollution are not fully evaluated, therefore, the final balance is even more positive.

Security of supply The expected bigger energy import dependency aggravates questions of strategic security of supply. Regarding the supply of oil and coal, current measures (90-days stocks of oil) are, for reasons of global diversity of supplies, sufficient. Several incidents between Russia and Ukraine, particularly those from the beginning of 2009, pointed out necessary measures to improve the security of supply with natural gas, which are already being implemented in the EU. A part of the agreement is also the development of the global market with liquefied natural gas (LNG). The balance between solutions for ensuring security of supply within the framework of international connections on one hand, and ensuring own capacities and reserves on the other, is one of the development dilemmas of the energy industry in Slovenia.

Changed economic circumstances Relatively high prices of energy on international markets of fuels and energy are expected. In 2007 and 2008, the high prices were a consequence of highly increased demand for energy in rapidly developing economies, which will most likely repeat, differently by types of energy, when the financial and economical crisis is over. The recovery might

be slow, lasting for a decade or even more. Additional burdens for the economy include the very volatile prices of energy, and particularly of electricity. Since risks are increasing in industry, more stable prices are not expected in the future. Additional uncertainty regarding prices of energy products is brought by the emissions market that is still forming, while future prices depend on a variety of factors – including on future international agreements. With the economic crisis, the conditions for accessing capital also changed for energy companies, hindering new investments. The crisis also influenced the demand for energy. In Slovenia, between 2007 and 2009, the use of electricity through transmission network was reduced by 16%, and has again increased in 2010[10].

Development and breakthrough of green technologies The development of energy technologies is a big challenge: how to capture the dynamics of technological development, accelerate early takeover of the technologies, and exploit new, rapidly growing markets in the field of technologies for generating, converting and using energy, especially RES. With transition to low-carbon society, the markets of green energy technologies and services are being established and are among the most rapidly developing global markets on which the economic crisis did not have a significant influence. These markets are more demanding than classical energy markets, since their activities typically demand higher educational levels and higher investments in research and development than the average in the economy. They are a large employment generator. Thus, the overcoming of economic and non-economic barriers is necessary for an even larger breakthrough in the technologies and services of efficient use of energy, and of renewable energy sources. In particular the EUE, despite profitability of measures, demands sufficient investment funds from the energy end-consumers, which involves partial, yet extensive redirection of financial flows from big investments in production capacities and import of fuels to an extremely large number of smaller investments by the end-consumers, demanding changes not only in the energy policy, but also in other development policies of the State.

European dimension In the European Union, after adoption of the Treaty of Lisbon, the common energy policy was also formally established, connecting the Member States, especially upon large infrastructural projects with regard to development of the European networks, regulation of the EU internal market and development of technologies.

The EU is increasing ambitions of its environmental policy within the Climate Action and Renewable Energy Package, and is striving for ambitious and exhaustive international agreement on climate change after 2012 within the framework of the United Nations Framework Convention on Climate Change (UNFCCC). The European Union is leading a firm climate policy by means of adoption of objectives and measures of the Climate Action and Renewable Energy Package, objectives of reducing GHG emissions, improving energy efficiency and increasing the share of RES, and is attaching high priority to these objectives in the development strategy until 2020[11].

Electricity and natural gas markets With the establishment of the electricity market, the conditions in the Slovenian electric power system changed. The third package of the EU energy directives and regulations from 2009 requires further improvements of the electricity and gas markets. In February 2011, the EU Summit confirmed determination for establishment of an efficient market, and set the final deadline to the end of 2014.

Simultaneous pursuing of the objectives for autonomy of the electric power system (in particular, its operation in critical circumstances) and competitiveness of supply is becoming a large challenge. All new production facilities will have to be competitive in the wider regional market. The economy of scope dictates as large as possible production units, but in the Slovenian system, smaller units are more appropriate, since less reserve capacities need to be provided upon failure

[10] In 2010, the final electricity consumption increased by 5.8% compared to in 2009 (preliminary data).

[11] See the chapter entitled *NEP Strategic Framework*.

of the largest units, while with smaller units, the diversification of sources, locations, suppliers and technologies for energy generation is also easier to achieve. The necessary renovating and completing of the electricity infrastructure requires large investments, the returns on which are mainly long-term, while in situations of very volatile prices of energy, the risks are increasing. The upgrading of the gas transmission system for ensuring collective safety and security of supply, as well as multilateral trading with natural gas, is necessary.

Achievement of ReNEP objectives and other objectives of the energy policy

Energy intensity Slovenia was over-taken with the economic and energy crisis in the form of structural delays upon the energy supply, which has not significantly changed in the last 27 years, and the use of energy in the economy with a large share of the energy-intensive industry and a relatively small share of high-tech activities and services. The energy intensity is reducing, but is still far above the EU average. In expectation of another rise of energy prices, the influence of high energy intensity on competitiveness is even bigger and, in harsh conditions, even more burdening. Energy-intensive industries are very sensitive to energy prices. Thus, the expected price rise may cause restructuring, and thereby lower demand.

In 2008, the energy-intensive use of primary energy was still higher by 54% in Slovenia compared to the EU-27 levels. Also, in Slovenia the sufficient disconnection between economic growth and the use of energy has not yet been achieved. The energy-intensive use of primary energy was decreasing most rapidly in the second half of the nineties of the previous century, and after 2000, the dynamics of the decrease levelled off. In the 2000–2008 period, it decreased by 10.7% or 1.7% annually. In this period, two key factors were changing: the reduction of energy use intensity, especially in the cessation of operation of some energy-intensive productions that were influenced more significantly, while at the same time, an extreme increase of the use of energy in transport influenced the indicator to turn in the other direction.

Merely part of the measures for reduction of energy use intensity for the primary energy is in the domain of the energy policy; mainly, they have to find their place in other development policies of the State. Smaller energy intensity is an important factor of the competitiveness of economy.

Use of electricity The movements of the final energy consumption, and particularly of electricity, also show rather different development from the EU average, especially from the movements in the richest countries of the EU. In the last two years, the use of electricity decreased due to economic crisis, but with the largest users of energy, this is mostly a consequence of production with partial capacities. Due to the quick increase of electricity use, providing sufficient capacities for electricity supply in Slovenia, particularly in winter periods of high use and low hydrology, depends more and more on neighbouring electric power systems. Also, ensuring sufficient reserve capacities depends on commercial contracts. For further providing of favourable electricity balances, of security of supply in critical periods, and for reasons of replacing capacities that are at the end of their useful operational life, building new electric power plants is necessary. Regardless of the moderate growth in the use of electricity in the period that also includes the crisis in the last years, fulfilling the environmental commitments for improving energy efficiency, introducing a larger share of RES and reduction of GHG emissions, accepted by Slovenia in international agreements and by EU directives (Directive 2006/32/EC, Directive 2009/28/EC, and others), is threatened.

Use of energy in transport Special attention must be given to the use of energy in transport, which increased from 2004 to 2008 by 48%, showing a complete absence of sustainable transport energy in

the State and threatening fulfilment of the obligations under the Kyoto Protocol and other international obligations of Slovenia and, above all, the binding target share of RES in final energy consumption.

Objectives of EUE Slovenia, as a Member State of the EU, has adopted the objective to achieve 1% of energy savings annually and 9% in the period from 2008 to 2016, respectively. In Slovenia, improvements in the field of energy efficiency are so far too slow and their scope is not big enough to provide overall implementation of the set objectives deriving from Directive 2006/32/EC[12] and the National efficiency energy action plan, 2008–2016. In 2008, on average, less than half the savings of the final energy foreseen in the plan were achieved. There are very few incentives for measures of the efficient use of electricity. On the EU level, the objective of improving energy efficiency by 20% until 2020 was adopted, but dividing the effort to achieve this objective among the Member States is still under negotiations.

Objectives of RES development In 2008, hydroelectric power plants contributed 93.3% of all electricity generated from RES. In relation to the heat supply, wood biomass prevails among RES, contributing more than half of the total heat supply from RES. Within the Climate Action and Renewable Energy Package, the EU set the objective to increase the use of RES to 20% in final energy consumption by 2020. The objectives of the Member States are defined by Directive 2009/28/EC[13]; within this framework, Slovenia adopted very ambitious objectives – to achieve a 25% share of RES in gross domestic final energy consumption (today it stands at 15%), and a 10% share of RES in final energy consumption in transport.

Previous development of RES did not achieve the majority of objectives set in the Resolution on the National Environmental Action Plan (ReNEP) for 2010. We were merely approaching the target 25% share of RES with regard to heat supply in 2010. In 2010, the target objective of 33.6% of RES with regard to the electricity supply was met, according to the first estimates, although this is partly a consequence of high hydrology and lower use during the economic crisis. Therefore, it was only partly met on account of the measures. To increase the share of RES, the final energy consumption will have to be reduced, and simultaneously, the production from RES increased.

The objective of ReNEP to double the electricity generation by cogeneration of heat and electricity (CHE) will not be achieved**;** by 2008, **a** mere 38.5% increase of the production by means of CHE was achieved. The growth practically stopped in 2005. In 2009, the renewed scheme of promoting CHE, being the basis for further development of the field, was approved: incentives were also introduced for CHE in industry, where the potential is the biggest.

Capacities for electricity generation ReNEP implementation also failed in this segment. The necessary investments in the electricity industry that would improve competitiveness, provide enough production capacities in the country and improve environmental characteristics of production, were limited to a few smaller projects. In the past, Slovenian energy policy called for dynamic exploitation of water potential in large facilities. From 2004 until now, the generating capacities of HPP have increased by 10%. Implementation of following projects: finishing the HPP chain on the lower Sava River and construction of the HPP chain on the middle Sava River are still a little behind schedule. Consistent with ReNEP, the pumped-storage hydroelectric power plant was built.

In the last twenty-seven years, sustainable new thermal energy sources have not been built; instead, in the last ten years, the existing production devices were more intensively maintained to provide electricity availability. The existing thermal energy capacities are technologically obsolete and facing the end of their prolonged operational life, while the deadlines for replacing the existing

[12] Directive 2006/32/EC on energy end-use efficiency and energy services.

[13] Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

units are too soon due to new environmental standards for emission concentration limits in the air, which will enter into force at the beginning of 2016. All the existing classical thermal energy facilities that are intended for electricity generation are planned for closure before 2027 (in total for 981 MW) and a majority of them before 2016 (518 MW or 53%). By 2015, 148 MW of reserve capacities (32% of all reserve thermal energy capacities) will also be shut down. Renovation or replacement of the existing capacities in locations of thermal power plants will not be sufficient for providing secure and quality electricity supply to Slovenia until 2030; also, there will be no substantial investments in the efficient use of energy and dispersed electricity generation.

Development of markets, production and networks Slovenia successfully fulfilled the set objective of the full opening of the electricity and natural gas market. Also, the second objective of ReNEP – efficient and transparent functioning of regulated energy activities – is gradually being realised, but several indicators do not show a very favourable picture. In the Slovenian electricity and natural gas market, there is a relatively high concentration of supply and a major market share of the largest electricity producers and suppliers is typical. Also, the largest supplier has a dominant position on the natural gas market. In recent years, there has been practically no trading with electricity on the organised market, while the organised market for natural gas has not been established. For more efficient operation of the electricity market, the more explicit role of stock exchange is necessary. Opportunities for electricity market development lie particularly in the exploitation of the position of the electricity network in Europe, at the junction of several supply areas with diverse characteristics of generation and consumption. The Slovenian transmission network could be one of the electricity trade nods, if adequate professional, market and organisational approaches are developed.

Development and renovation of the electricity distribution network lag behind the plans, and at the same time, we are facing new challenges with regard to planning and construction of active networks for inclusion of dispersed production and active management of energy consumption, new technologies, and providing and monitoring of the electricity quality. A new and innovative approach to the system of measurements, control over consumption and other approaches with regard to active networks provide further development of established industry, knowledge in the field of marketing, and relevant information technologies.

The domestic production of energy machines, devices and the provision of energy services is more and more poorly integrated in the development policy, despite significant possibilities and rich tradition. Investments in technologies of sustainable energy (EUE and RES) in rapidly growing markets of this particular segment of energy technology and services also offer employment opportunities in smaller economies.

International environmental commitments and the energy industry The GHG emissions from the energy industry are increasing; in 2008, they increased by a mere 6%, particularly due to an increase of energy use in transport and namely by 18% this year. To achieve the Kyoto objective, the emissions outside the European Emissions Trading Scheme[14] are relevant; the most uncontrolled are the emissions from transport. In 2008, the emissions to which the obligation of the State refers were higher than the target emissions of the Kyoto Protocol by 6%.

[14] In national emission records, the emissions equal to granted emissions coupons according to the national distribution plan are considered for devices within the European Emission Trading Scheme plan, irrespective of actual emissions of these devices being smaller or larger. For this reason, emissions from energy activities and from a large part of industry do not influence the national commitment of satisfying the Kyoto Protocol, and thus, also do not influence the cost of the State for buying emissions quotas. They merely have influence on economic operators, and consequently, on the prices of their products.

Sulphur dioxide emissions are, as a consequence of adopted regulations and implemented measures, rapidly decreasing. In 2008, emissions were significantly lower than the target emissions for 2010.

Energy use and supply also contribute a considerable share to common emissions of nitrogen oxides in the State. In 2008, NOx emissions amounted to 47.2 million tonnes and have again exceeded the target value of 45 million tonnes in 2010. In 2008, NOx emissions considerably increased (by 5.7%), in particular due to larger use of diesel fuel in transport (in 2008, the increase in transport amounted to 2.4 million tonnes).

ReNEP implementation

Reports on the implementation of the ReNEP (Annual Energy Outlooks) and national operative programmes[15] point to large setbacks in the implementation of measures planned in programme documents from the field of energy industry. Monitoring implementation of strategies and programmes is insufficient; the responsibilities for reporting and remedying problems upon implementation are not defined and control mechanisms are not established. Moreover, the responsibilities for the management itself of implementation of programmes as a whole, and for implementation of individual measures, are not yet precisely defined. Similar characteristics of energy programmes and strategies implementation can also be found on the local level, upon implementation of local energy concepts.

Preparation and management of NEP implementation Part of the reason that the ReNEP is not being implemented derives from the status of the programme documents in the State. The process of forming programme documents was not conducted as a decision procedure regarding future activities of the Slovenian Government and other actors. Shortcomings were also present in the ReNEP document itself, since in it, the holders of tasks for preparing NEP mechanisms were not defined, including mechanisms that provide conditions for implementing private initiatives and deadlines for carrying out the tasks. The sources of funds for implementation of the programme and related investments were also not sufficiently precisely determined. The organisation necessary for programme realisation was not specified, nor was the necessary reinforcement of the staff and its relocations, respectively.

Inter-ministerial cooperation necessary to implement such complex measures, as planned by the ReNEP, was not adequate. By 2009, despite ambitious plans in the fields of EUE and RES, there was not sufficient political support in accordance with the declared ambitions provided, nor was there sufficient financial resources or personnel necessary for the realisation.

Only a transposition of European directives was relatively successful, although, with rare exceptions, merely minimum acquis required in the directives was transposed, while the purpose of the directive was often not fully achieved. With regard to fulfilling the set objectives on the national level, the development of instrumentation for achieving these objectives is lacking; also, difficulties arise from practically everywhere. The foreseen investment plans are being implemented in a very limited scope.

Efficient use of energy The ambitious ReNEP objectives in the field of EUE were not achieved. The key unresolved question was ensuring sources of finance for EUE incentives planned in the

[15] The Operational Programme of Environment and Transport Infrastructure Development, OP ETID, and the Operational Programme for Limiting Greenhouse Gas Emissions until 2012, OP GHG-1.

ReNEP. Also, after adoption of the programme for drawing on the European cohesion funds[16] that assigned funds for the efficient use of energy in the public sector for the period from 2007 to 2013, the drawing of funds to a larger extent started as late as in 2010. Only this drawing of cohesions funds and adoption of the Regulation on energy savings ensured to final customers[17] provided financial resources to the extent planned in the ReNEP for promoting EUE. To achieve even higher objectives of EUE, which will be indispensable in the future, the implementation of a variety of measures oriented towards the alleviation of subsequent obstacles for larger market breakthroughs of the measures for EUE will be necessary. EUE is a specific field of energy industry, since it regards several tens of millions of investment decisions of end-consumers in the next twenty years, and thus, adequate allocation of investment funds for their implementation, and new knowledge of technology and service providers. Also, the quality and availability of information on benefits and practical aspects of measurements implementation for the end-consumers is important, and, to this day, is not yet provided by the markets themselves. A large potential for improvements also lies in the organisation and integration of services responsible for promoting EUE with other actors; also, a larger number of personnel will have to be included in these tasks. In addition, EUE and RES are insufficiently included in higher education.

Renewable energy sources Obstacles for larger breakthroughs of RES for heat generation are similar to the ones for EUE. Slightly different obstacles apply for electricity generation from RES. By means of the set objectives, the development of solar and biogas power plants is harmonised. But investors in wind power plants and small hydroelectric power plants are faced with obstacles, since the transparent procedures within the framework of spatial planning for solving conflicts between interests of nature protection and reduction of GHG emissions in relation to nature protection, are not established. The environmental starting points for such facilities are indeterminate, the State is not active in directing investors, and the investors do not include spatial and environmental starting points in project planning early enough. Social consensus regarding to what extent – if any – the damage to nature upon electricity generation from RES is reasonably allowed, is not yet achieved. Larger breakthroughs in CHE from wood biomass will depend on further development of district heating systems and co-incineration of waste in large district heating systems. Larger energy utilisation of wood biomass is also conditioned by the development of the scrap wood market and the development of the entire chain of wood-processing industries. A general obstacle for the projects of electricity generation from RES, district heating and CHE is lack of interest by capitally adequate investors to establish themselves in this field; in addition, preparation of these projects demands additional knowledge that smaller investors don't possess. For comprehensive introduction of sustainable energy technologies, new concepts with regard to planning are required, as follows: planning of networks, spatial planning and planning of the energy industry in local communities and settlements.

Line facilities An example of poor ReNEP realisation is also in the field of electricity transmission. In the last five-year period, no longer transmission line was built. Several renovations of the existing overhead power lines were carried out; by upgrading from one to two systems, some new TS were built and plenty renovated, but this is not something with which to be satisfied.

The key obstacle for slow implementation of projects in the electricity transmission network is the long duration of spatial placement procedures. The legal framework in this field is changing. Measures for the evaluation of compensation to the affected persons upon construction of facilities, and criteria for overhead power line cable installation to the 110 kV network, are indeterminate. There are not enough financial resources allocated to investments in the electricity distribution network; part of the reason lies in methodology for determining network charges, which is not

[16] Operational Programme of Environment and Transport Infrastructure Development for 2007-2013 (OP ETID), the development priority of Sustainable energy.

[17] Official Gazette of the Republic of Slovenia, No. 114/2009

development-oriented; namely, not depending on successfulness or efficiency of investment plan implementation.

Electricity generation In the period from adoption of the ReNEP, two hydroelectric power plants were built on the middle Sava River (Boštanj, 32 MW in 2006, and Blanca, 42 MW in 2009), investment in the gas turbine in TPPŠ (2 x 42 MW) was made, and hydroelectric power plants were renovated, achieving a total additional capacity of 28 MW (total new HPP for 102 MW). The PHPP Avče pumped-storage power plant was built as a capacity for storing electricity (185 MW, in 2010). HPP Krško (39 MW in 2013) is under construction and the investments in TPPŠ block 6 (549 MW planned, beginning of operation in 2014) is being implemented. Also, the activities for extension of the NPPK operational life are being carried out continuously.

The obstacles upon implementing larger investments are as follows: long spatial placement procedures – particularly for HPP, lack and fragmentation of investment potential of the energy companies, fragmented development and technical teams, and simultaneous relatively small number of projects. These obstacles hinder adequate concentration of knowledge and experiences and cause difficulties in state property management. The distinction between the State's development and ownership functions is not clear and the quality of property management is thus far too low.

The projects that are demanding due to their placement in space are hindered by inappropriate conflict management.

Delays in investing will have large impacts on future electricity generation costs in the State, since there will be a significantly larger share of production burdened with almost simultaneous amortisation of investments costs and their financing.

2 Expectations in the field of technological development worldwide[18]

This chapter presents expectations regarding development and breakthrough of technologies in global markets that will have key effects on future energy use and supply. At today's rapid development of energy and transport technologies, the strategic determination of the Republic of Slovenia for restructuring the energy sector and the comprehensive transition to low-carbon society is adopting new technologies early on, particularly in the fields of EUE and local supply of energy. In Slovenia, the future of the energy industry will be linked with technological changes for which the sector must prepare itself, since they bring plenty of new opportunities. In the following years, a radical change of approach to new technologies will have to be enabled, namely from their design to their breakthrough onto the market. The new energy technologies will be of key importance for the successful fight against climate change and must enable achievement of objectives with costs that can be borne by the economy. By 2030, in particular, the above-mentioned technologies will be of key importance.

Energy efficiency is the first and basic step of energy sector restructuring. Today, the technologies of EUE are mainly competitive, but their breakthrough on the markets is limited worldwide due to diverse obstacles and, particularly, limited investment possibilities of the energy end-consumers: financial resources, information and evaluation. We expect the necessary social changes and related changes of financial flows will be carried out in the next decade, which will significantly accelerate the breakthrough of competitive energy-efficient technologies.

Further development of low-energy and low-carbon buildings will significantly reduce the needs for supply of buildings with heat. The market breakthrough of already mature technologies will be accelerated, the development of technologies will be directed especially towards lowering the costs for technologies and the development of new materials, but also towards increasing the utilisation rate of technologies for local energy generation integrated in buildings: in particular, of photovoltaic power stations, micro-cogeneration of heat and electricity (micro CHE), use of solar heat (also for cooling), etc. The establishment of new technologies will be supported by further development of services and management of their quality: planning, implementing, construction supervision, sustainable target monitoring of energy use and active management of energy in buildings.

Active networks and virtual power plants The transition from the existing passive into the new, active distribution network is expected, which will, by means of information and communication technology, enable connecting of consumers, suppliers and producers, and development of new services intended, in particular, for the optimisation of costs, the increase of security and the reduction of environmental impacts upon energy management. Development of additional services for end-consumers will enable the following: dynamic tariffs, linking of dispersed producers and consumers of energy in virtual power plants, management of networks of producers on the low-voltage level, introduction of smart measuring devices for consumers of energy, natural gas, district heating and water, etc. The development of control techniques for large

[18] This chapter presents expectations regarding development and breakthrough of technologies in global markets. The technologies that had and will still have a key impact on future energy use and supply are selected. Questions related with introduction and development of technologies in Slovenia are dealt with in the sub-programmes. Detailed analysis of impacts is given in documents 'Long-term Energy Balances NEP 2010–2020' entitled Starting points, and Results.

electricity producers will continue, including electricity transmission and other energy activities. The active networks are a requisite for information connection of dispersed electricity sources and consumers into '**virtual power plants**' for their optimal management according to the needs and situation in the electricity system (for example, virtual power plants will be capable of offering some system services in addition to market services).

Development of the exploitation of RES will be aimed, in particular, at reducing production costs of these technologies, and at increasing their utilisation rate. The economy of scope with regard to production of devices upon increased demand for these technologies will especially influence cost reduction. A large breakthrough of dispersed technologies dependent on weather conditions will require simultaneous development and upgrading of management of networks to active networks, including optimisation of electricity generation.

The breakthrough of new technologies and energy sources in transport will influence both the use of energy in transport and the connecting of vehicles to a low-voltage electricity network. In particular, we expect the breakthrough of electric storage battery vehicles, and in the long run, of vehicles running on hydrogen, as well as the breakthrough of systems for decentralised energy generation from RES for vehicles.

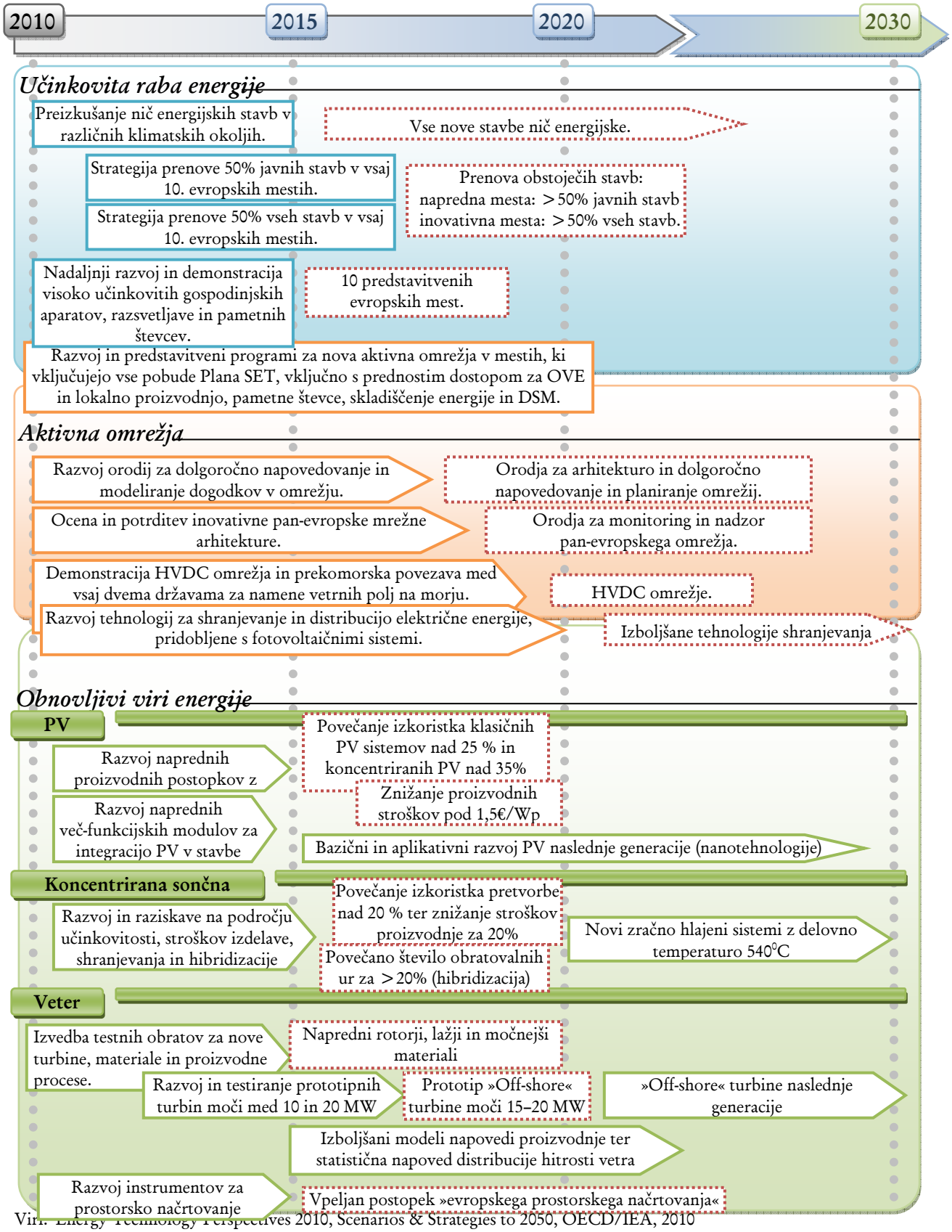
Development of production of second-generation biofuels will be oriented towards multipurpose processing of cellulosic and lignocellulosic biomass in biofuels and other products with higher added value. Currently, the development of adequate technology is in a demonstration phase and further development will depend a lot on incentives based on additional benefits of such production, including environmental impacts over entire operational life. For the two prevailing processing procedures – thermochemical conversion and biochemical conversion of celluloses in biodiesel or bioethanol – gradual commercialisation is expected. Cost reduction for biochemical conversion will depend particularly on enzymes in the process, and for thermochemical conversion, on optimisation of following several phases of the procedure: biomass management, gasification and synthesis of gas. Full commercialisation of these technologies is expected by 2030. The pressures of biofuel production on food production will decrease with the second generation and, due to larger demand, sustainable criteria for exploitation of forests and other sources of biomass will be necessary.

Technologies for carbon capture and storage (CCS) are, upon exploitation of fossil fuels, at their intermediate phase between advanced low-carbon technologies and the current situation.

Other technological changes will tailor the energy picture only at a later stage or in a less pronounced way, since their development will be more gradual. Technologies for the exploitation of fossil fuels will continue improving. In the long run, underground coal gasification may become an important opportunity with the use of coal as clean gasified fuel for electricity generation. Today's technologies of third-generation nuclear reactors will be replaced by nuclear reactors of the forth generation. It is expected that the fourth generation will function in the phase of prototype in 2030. The development of small reactors, as for example IRIS, will reach their commercial phase after 2030. The commercial use of fusion is not expected to occur earlier than fifty years from now, but its development in the form of development of materials useful with high temperatures can bring new technological solutions to other fields in the energy industry.

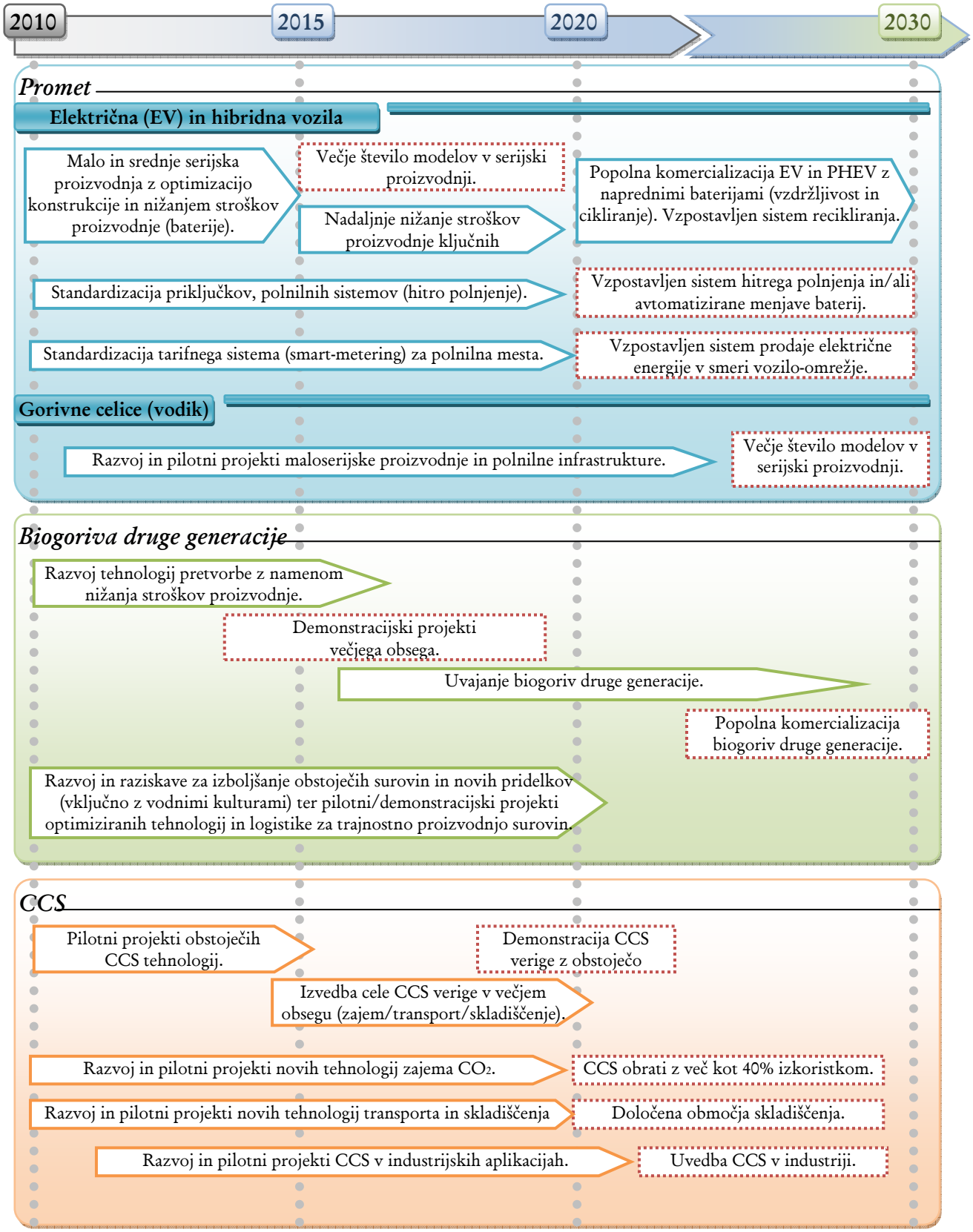
In Slovenia, the recognition and promotion of promising fields for technological development and technological renovation of energy activities will have to be improved[19].

[19] See the *Research and development* sub-programme.



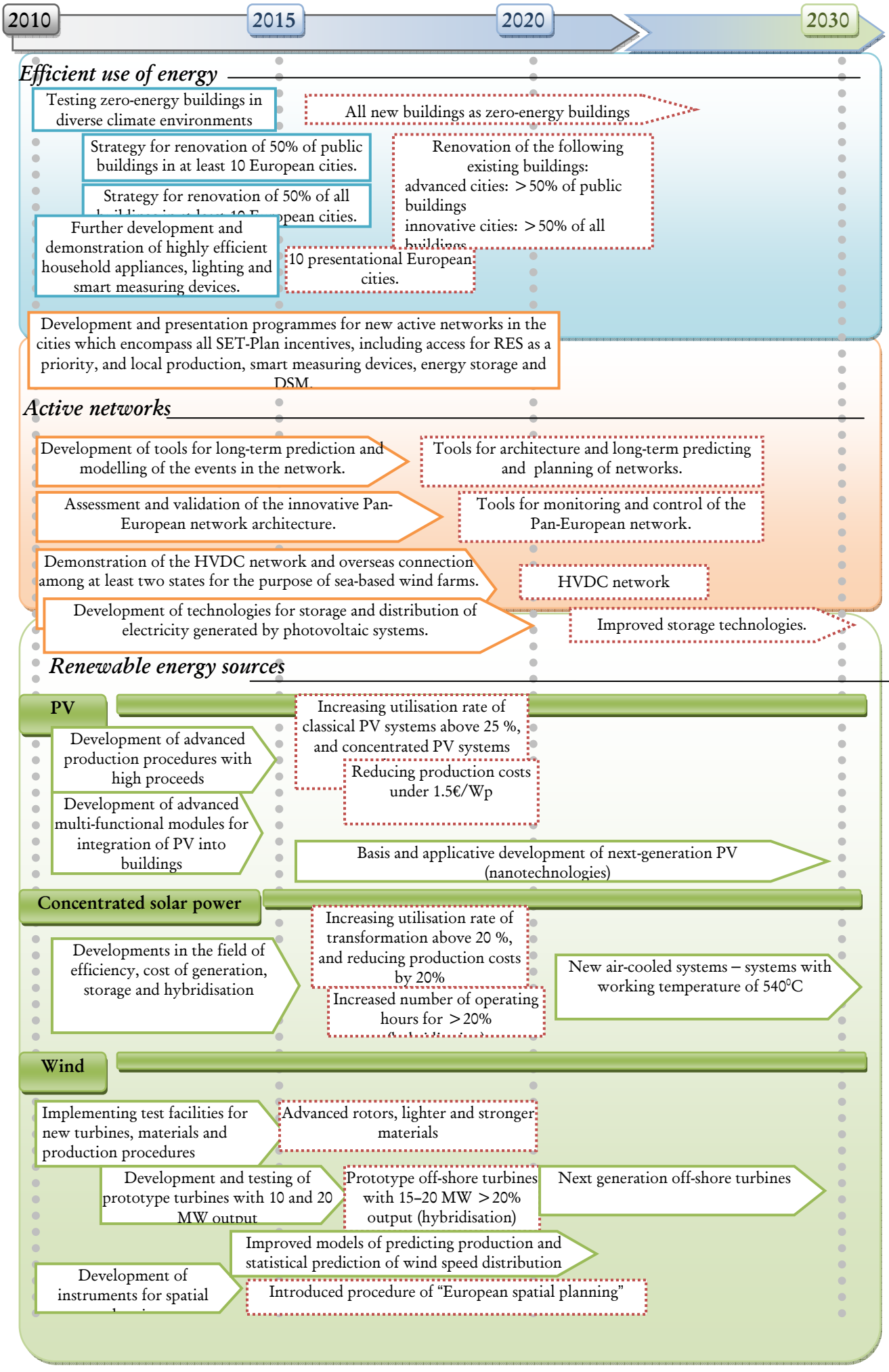
Vir: Energy Technology Perspectives 2010, Scenarios & Strategies to 2050, OECD/IEA, 2010
Investing in the Development of Low Carbon Technologies (SET-Plan), A Technology Roadmap, SEC(2009) 1295

Slika 1: Pričakovani razvoj tehnologij URE in OVE v svetu v obdobju do leta 2030



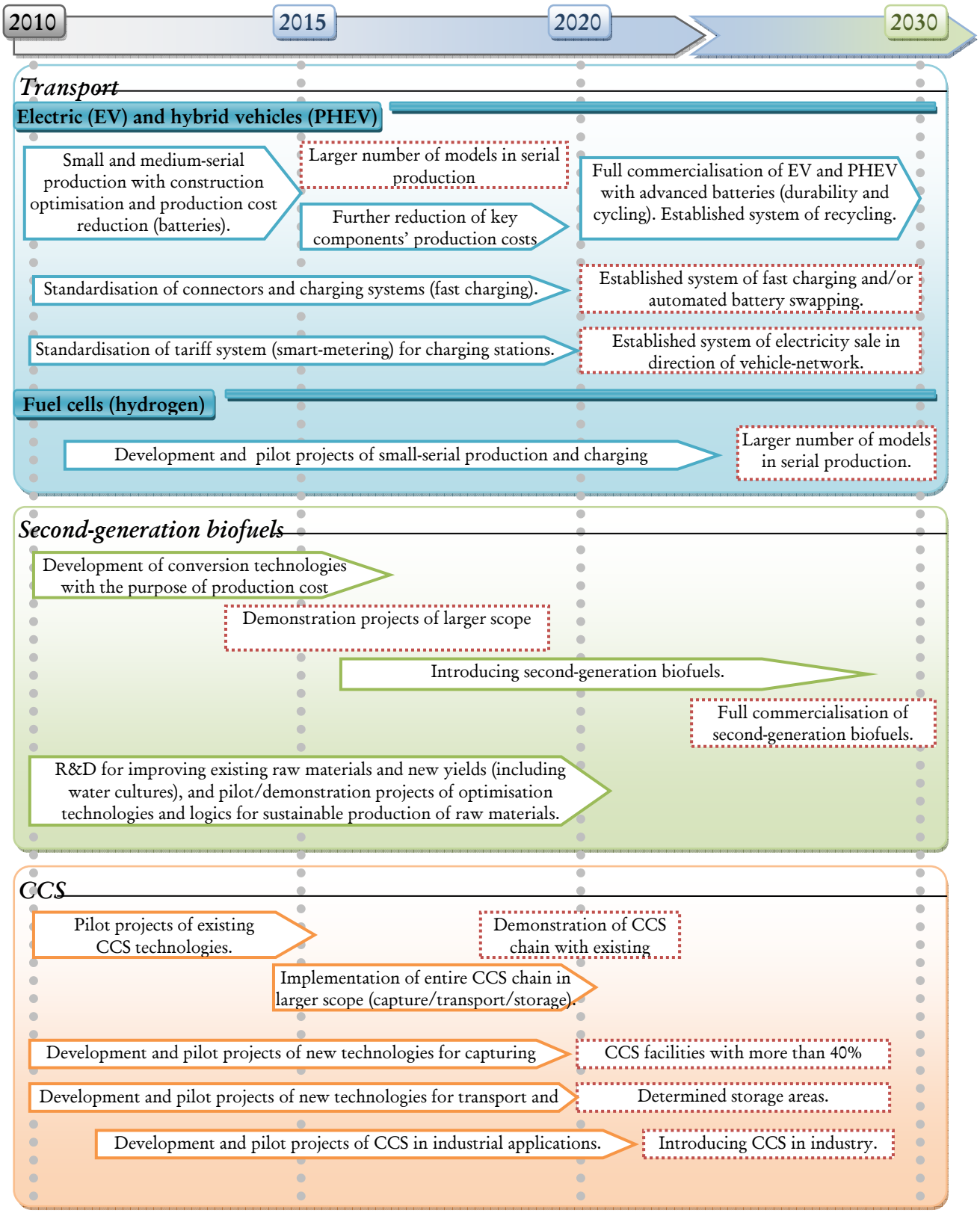
Viri: Energy Technology Perspectives 2010, Scenarios & Strategies to 2050, OECD/IEA, 2010
Investing in the Development of Low Carbon Technologies (SET-Plan), A Technology Roadmap, SEC(2009) 1295

Slika 2: Pričakovani razvoj tehnologij v prometu, biogoriv in zajema in shranjevanja ogljika (CCS) v svetu v obdobju do leta 2030


2010
2015
2020
2030
Efficient use of energy
Testing zero-energy buildings in diverse climate environments
All new buildings as zero-energy buildings
Strategy for renovation of 50% of public buildings in at least 10 European cities.
Renovation of the following existing buildings:
advanced cities: >50% of public buildings
innovative cities: >50% of all buildings
Strategy for renovation of 50% of all
Further development and demonstration of highly efficient household appliances, lighting and smart measuring devices.
10 presentational European cities.
Development and presentation programmes for new active networks in the cities which encompass all SET-Plan incentives, including access for RES as a priority, and local production, smart measuring devices, energy storage and DSM.
Active networks
Development of tools for long-term prediction and modelling of the events in the network.
Tools for architecture and long-term predicting and planning of networks.
Assessment and validation of the innovative Pan-European network architecture.
Tools for monitoring and control of the Pan-European network.
Demonstration of the HVDC network and overseas connection among at least two states for the purpose of sea-based wind farms.
HVDC network
Development of technologies for storage and distribution of electricity generated by photovoltaic systems.
Improved storage technologies.
Renewable energy sources
PV
Development of advanced production procedures with high proceeds
Increasing utilisation rate of classical PV systems above 25 %, and concentrated PV systems
Reducing production costs under 1.5€/Wp
Development of advanced multi-functional modules for integration of PV into buildings
Basis and applicative development of next-generation PV (nanotechnologies)
Concentrated solar power
Developments in the field of efficiency, cost of generation, storage and hybridisation
Increasing utilisation rate of transformation above 20 %, and reducing production costs by 20%
Increased number of operating hours for >20%
New air-cooled systems – systems with working temperature of 540°C
Wind
Implementing test facilities for new turbines, materials and production procedures
Advanced rotors, lighter and stronger materials
Development and testing of prototype turbines with 10 and 20 MW output
Prototype off-shore turbines with 15–20 MW >20% output (hybridisation)
Next generation off-shore turbines
Improved models of predicting production and statistical prediction of wind speed distribution
Development of instruments for spatial
Introduced procedure of "European spatial planning"

Sources: Energy Technology Perspectives 2010, Scenarios & Strategies to 2050, OECD/IEA, 2010
Investing in the Development of Low Carbon Technologies (SET-Plan), A Technology Roadmap, SEC(2009) 1295

Picture 1: Expected worldwide development of EUE and RES technologies in the period until 2030



Sources: Energy Technology Perspectives 2010, Scenarios & Strategies to 2050, OECD/IEA, 2010
Investing in the Development of Low Carbon Technologies (SET-Plan), A Technology Roadmap, SEC(2009) 1295

Picture 2: Expected worldwide development of technologies in transport, biofuels, and carbon capture and storage (CCS) in the period until 2030

3 SWOT analysis

In the field of energy industry, Slovenia has a variety of advantages that can contribute to the achievement of NEP objectives, in particular: balanced structure of sources for energy supply, existing locations for energy infrastructure and good geostrategic position and connection with neighbouring systems. The key opportunities lie in two apparently excluded segments of energy industry development, as follows: intensive transition to new energy paradigm based on promotion of EUE and RES in close connection with further development of green energy technologies and further development of energy generation in classical production units with an aim towards marketing in the wider region. In addition, further inclusion in the projects of new international connections is also an important opportunity.

Table 2: Analysis of strengths, weaknesses, opportunities and threats

STRENGTHS

- balanced structure of sources for electricity generation and harmonious development:
  - three key production sources (coal, water and nuclear energy)
  - open possibilities for further diversification
  - presence of low-carbon energy sources: RES, NE
  - presence of low-carbon domestic energy sources: RES, lignite
- sovereign electric power system with all functions developed that are needed for its functioning in the State
- important potential for EUE and RES with positive impacts on security, competitiveness and environment:
  - presence of instruments for promoting EUE and RES
  - high profitability of EUE projects
  - developed industrial production, capable of producing technologies of EUE and for RES
  - ability for innovations and development of green energy technologies in the wider European and global area
- geographical position:
  - vicinity of foreign markets and a junction of several supply areas with diverse characteristics of production and consumption in Slovenia
- tradition of connecting in the European area and electric power system; high technical level:
  - technical knowledge in the sector
  - participation of Slovenian companies in the projects of neighbouring countries
  - openness for new technologies
- efficient use of space:
  - energy locations with available resources and infrastructure
  - possibility of increasing transmission capabilities (internal and cross-border) of networks for natural gas and electricity (internal and cross-border) within existing paths
- integration into the EU policy:
  - European networks and international energy policy
  - instruments on the EU level and their co-forming
  - financing from EU funding: EU funds, EU programmes, etc.
- relatively high consent regarding general objectives of energy industry development.

WEAKNESSES

- structural delays:
  - underdimensioned activities of EUE and RES in relation to potentials and benefits
  - old facilities in electricity industry (obsolescence, poor utilisation rates, burdening of the environment) that need to be renovated or replaced
  - poor productivity in electricity sector
  - disregarding environmental external costs
  - high energy intensity
- no domestic reserves of oil and natural gas; the only domestic fossil fuel is coal
- no storage capacities for natural gas
- absence of connection with certain neighbouring electric power systems (Hungary)
- very large separated facilities considering the size of the entire electric power system:
  - relatively higher demands for security of operation
  - more complex decision-making on investments
  - harder management of commercial risks
  - management of knowledge for implementing investments
- organisation of electricity industry:
  - low investment potential
  - fragmented sector
  - slow implementation of regulations regarding organisation of electricity industry
- dispersion and weak connection among actors in the field of EUE and RES
- energy markets:
  - absence of competition, in particular in the field of NG
  - indetermination with regard to legislation and the protection of market participants
  - weak regulator
  - non-development of an organised electricity market
- spatial placement of energy facilities of long duration, poorly developed conflict management; not sufficiently efficient administrative procedures
- absence of proactive role of the State and of orienting investors towards suitable locations for RES
- not enough technical personnel in certain segments, causing bottleneck situations, especially upon introduction of new technologies
- non-implementation of the set plans.

OPPORTUNITIES	THREATS

- a new paradigm in the energy industry playing a leading role of economic development in the field of green energy technologies:
  - Slovenian companies can, as providers of green energy technologies and services, position well in the rapidly developing global market
  - additional posts with higher added value, demanding higher educational structure and larger share of investments in research and development will be created
  - environmental demands and demands for a higher level of security of supply are becoming a driving force for use and development of dispersed energy technologies of EUE and for RES, and of smart networks
  - closer cooperation in international value chains
  - in the Western Balkans, Slovenia can take a leading role upon development of a new energy paradigm and its co-formulation on the EU level
- integration of projects in the regional market: electricity generation as an export economic activity
- coexistence of new sustainable and classical energy solutions
- cooperation in the EU strategic energy projects for better integration of national energy markets in the EU single market and higher level of market openness:
  - projects for diversification of supply routes and of sources of natural-gas supply
  - projects for construction of new international transmission connections for electricity transmission
- turning point in the development of technologies:
  - prospects of green energy technologies for integrating research, development and economy
  - strengthening research potential and abilities for introducing new technologies
  - development of an energy industry parallel to new development drive of traditional activities, such as wood economy, civil engineering, etc.
  - development of new support services, etc.
  - new technologies in transport and increased possibility of RES exploitation
- improved efficiency of knowledge transfer and better alliance of experts
- improved education in the field of energy management
	- shortcomings of a risk management approach;
	- climate change
	- variability of energy product prices in world markets, uncertain prices of emissions coupons and other environmental taxes
	- influence of liberalisation of the energy markets on security of supply – no development, low investment levels, short-term decisions
	- lagging behind the international development trends with irreparable consequences for the economy
	- long-term development delays and poorer competitiveness by means of traditionally set development of the energy industry
	- uncertainty in forecasts of flows and use of energy and technological development for the distant future (2030)
	- wrong assessment of recession impacts and delay in measures that have long implementation deadlines
	- differences in conditions of the neighbouring markets (emissions coupons, etc.)
	- non-transparency and poor quality of investment decision procedures
	- big expectations of the energy sector regarding financing and implementing projects
	- a weak inclusion in the EU energy projects and poor utilisation of earmarked funds
	- lack of personnel for implementation of investments, especially of personnel with multidisciplinary knowledge necessary for achieving the set objectives
	- large share of energy-intensive activities in the economy;
	- non-sustainable use of energy sources
	- impacts of RES on nature and use of agricultural land
	- absence of sustainable transport policy that is threatening fulfilment of Slovenia's international obligations in this field
	- excessive dependency on future monopolistic large providers of mobility and solutions in this field, due to high entrance costs of new actors
	- slow response of educational and research activities to changes
	- lack of information and poor awareness of general public;
	- allocation of investment potential and inability of end-consumers for investments in EUE and RES due to consumer and production patterns
	- weak mechanisms and indeterminate procedures of seeking consensus on key strategic decisions in the energy industry
	- penalties for non-fulfilment of taken over obligations

4 Compliance of the NEP with previous strategic guidelines

The NEP is a key strategic document of energy industry development in Slovenia. It follows basic guidelines of energy policy, determined by the EA, and builds on the ReNEP 2004 in which the priority objectives of energy policy in Slovenia were formed in accordance with the following strategic guidelines in the field of energy industry in the EU: improving security of supply, competitiveness and reducing environmental impacts.

A wider development context of the NEP is specified in the valid Slovenian Development Strategy (SDS) from 2005 and the Reform Programme for the Implementation of the Lisbon Strategy in Slovenia, 2008. The NEP Proposal is harmonised with the strategic guidelines of climate and energy policy on the EU level from the field of energy industry and the State's international agreements.

The Slovenian Development Strategy (SDS) At the forefront of the strategy is overall welfare of the individual, including economic, social, environmental, political, legal and cultural dimensions of development, also indicating passing the objectives of the Lisbon Strategy in Slovenia. The NEP particularly supports the first priority of the SDS – competitive economy and faster economic growth, and the fifth one – connecting measures for achieving sustainable development. The Government is starting preparation of a new Slovenian Development Strategy for the period from 2013 to 2020 that will also include a description of development policy in the field of energy industry. The new Slovenian Development Strategy is being prepared.

The Slovenian Exit Strategy 2010–2013 predicts the development of energy infrastructure among the priority measures, namely updating the electricity transmission network and promoting generation of electricity from CHE and RES and promoting measures for increasing the amount of heat from RES in all sectors. The horizontal priority is transition to an environmentally efficient, low-carbon society. The Exit Strategy predicts adjustment of energy infrastructure spatial placement and financial incentives for RES and EUE. The measures of EUE and for RES are considered as an element of social policy and of a raise in competitiveness in individual activities.

The Reform Programme for the Implementation of the Lisbon Strategy 2009-2012 (October 2008) specifies measures from the field of energy industry: ensuring open and competitive markets, sustainable construction and measures that will have a significant impact on energy management, as follows: upgrading tax system.

Spatial Planning Strategy of Slovenia (SPSS) This Strategy determines a formulation of spatial planning, its use and protection, bearing in mind social, economic, and environmental factors of spatial development. The majority of NEP measures entirely follow the orientations and principles of SPSS. Among new decisions from the NEP not yet covered in SPSS, the possibility of constructing a new nuclear power plant and energy exploitation of watercourses located outside the potential area of HPP is defined in the spatial strategy.

Environmental and climate policy of the State and the EU are described in detail in the chapters Challenges and Effects. Environmental and climate objectives and international obligations are, pursuant to the EA, integrated among the objectives of energy policy and essentially define the future development of the energy industry. They are discussed in all NEP chapters. Compliance of the NEP with the environmental objectives of the State is verified with the CEIA procedure. The Climate Change Act, which is also an element of Slovenia's Exit Strategy and the Climate Strategy are being prepared.

With the **Treaty of Lisbon,** the division of responsibilities for EU energy policy between the Union and the Member States is specified. The foundation of EU energy policy is an internal market in respect of preserving and improving the environment and with the following objectives: to ensure functioning of the internal market, security of supply, encouragement of energy efficiency and energy savings, development of new and renewable energy sources, and encouragement for interconnection of energy networks. The Exclusive right of the Member States is that they set the conditions for exploitation of their energy sources, selection among diverse energy sources and the general structure of their energy supply. The Treaty grants authorisation to the EU Council for acting in the event of severe difficulties with energy supply and renders support by the Union upon development of pan-European networks in the energy industry possible. Also, after entry into force of the Treaty of Lisbon, the tax measures of the Union continue to be adopted in agreement with all Member States.

The Climate Action and Renewable Energy Package formed according to the decisions of the EU Council from 2007 defines priorities of EU energy policy for achieving the objectives of sustainability, security and competitiveness, harmonises them with the objectives of preventing climate change, and promptly responds to changed world circumstances, as follows: **EU Energy Security and Solidarity Action Plan** – second strategic energy review defines in detail the measures for increasing security and determines the vision of the energy industry until 2050.

With the Europe 2020 Strategy – a strategy for smart, sustainable and inclusive growth, the following EU objectives of Climate Action and Renewable Energy Package gained validity: improving energy efficiency, reducing GHG emissions, and increasing the share of RES; it has also ranked the so called 20-20-20 objectives among the priority objectives of EU economic development till 2020.

Energy 2020 – a strategy for competitive, sustainable and secure energy The strategy corrects deficiencies of the previous implementation of measures for achieving 20-20-20 objectives. It is focused on 5 priority tasks with which NEP orientations are harmonised, namely the efficient use of energy, construction of a pan-European integrated energy market, secure, safe and affordable energy supply, strengthening of the role of Europe in the field of energy technologies and innovations, and strong international energy partnership, particularly with the neighbouring countries. The Strategy also gained strong support in the EU Council.

Other energy-related policies in Slovenia To achieve NEP objectives, the implementation of measures in energy-related policies, particularly transport policy, state property management, tax policy, spatial development, housing policy, working of public administration, regional policy, agriculture and forestry, research and development, and education, is necessary. The **State property management strategy** is also being prepared for the energy field.

Adopted operative programmes from the energy field The NEP takes adopted relevant operative programmes in the country into consideration and adequately places them in the energy strategy until 2030. It also proposes certain changes and amendments to the OP. For the NEP, the following are particularly relevant:

- *National efficiency energy action plan for the period 2008–2016 (AN-URE[20]);*
- *Operational Programme for Limiting Greenhouse Gas Emissions until 2012 (OP GHG-1);*
- *Operational Programme of Environment and Transport Infrastructure Development for 2007-2013 (OP ETID);*
- *Action plan for renewable energy sources for the 2010–2020 period (AN-OVE).*

[20] Revision of this action plan is under preparation.

NEP STRATEGY

1 NEP objectives and priority fields

General objectives

The objectives of energy policy in Slovenia for the period from 2010 to 2030, which are equal in status, are to provide:

- **security** of energy and energy service supply;
- **environmental sustainability**, combating climate change;
- **competitiveness** of the economy and society, and available and accessible energy and energy services respectively;
- social cohesion.

Through balanced implementation of the set objectives, the National Energy Programme (NEP) will enable active energy management and the long-term transition of Slovenia to a low-carbon society. Efficient use of energy, exploitation of renewable energy sources and development of active networks for electricity distribution are the priority fields of the energy policy for improved security of energy supply and competitiveness of society and for gradual transition to a low-carbon society.

The operational objectives of the NEP for 2030, compared to the 2008 levels, are the following:

- a 20% improvement in efficient use of energy by 2020 and 27% improvement by 2030;
- a 25% share of renewable energy sources (RES) in gross final energy consumption by 2020 and 30% share by 2030;
- a 9.5% reduction of greenhouse gas emissions from combustion of fuels[21] by 2020, and 18% reduction by 2030;
- reduction of energy intensity by 29% by 2020 and by 46% by 2030;
- provision of 100% share of almost-zero-energy buildings among new and renovated buildings by 2020 and by 2018 in the public sector;
- reduction of dependence on imports to the maximum level of 45% by 2030, and diversification of energy-supply resources at the present or better level;
- further improvement of international energy integration of Slovenia for greater diversification of energy sources, supply routes and further integration with neighbouring energy markets.

[21] Within the objective of reducing GHG emissions, all the emissions from fuel combustion, both from sources that are subject of accepted international obligations of Slovenia (the Kyoto protocol, Decision No. 406/2009/EC), and from sources that reduce emissions within the framework of the European Emissions Trading Scheme (Directive 2009/29/EC), are included. The stated objective of reduction relates to the measures within Slovenia.

Priority fields of energy policy

On the basis of the EA, the development orientation towards a low-carbon society and the contribution of various fields to the achievement of NEP objectives, the following fields have been proposed as priority fields for activities:

- **efficient use of energy;**
- **exploitation of renewable energy sources;**
- **development of electricity distribution networks through introduction of active networks.**

Priority fields of heat use and supply Improved energy efficiency of buildings will be a key measure of future energy policy for heat supply. A parallel and ambitious transition to low-carbon sources will be implemented in the form of accelerated introduction of RES and preservation of fossil fuels for heat production only as part of high efficiency CHE, related to accelerated development of district heating systems. Incentives will be provided for a comprehensive programme of energy-saving building restoration, development of financial mechanisms for their implementation and an increased role of energy suppliers for the promotion and implementation of the efficient use of energy projects. The leading role in the restoration of buildings will be played by the public sector, which will set an example. Measures to increase the competitiveness of industry with improved efficiency of use and management of energy will be supported.

Priority fields of use and supply of electricity The key measure will be the control of growth of electricity use by improved energy efficiency in all sectors. A new investment cycle of constructing facilities for electricity generation will be initiated. Development of electricity generation from RES will be accelerated: besides the development of production from hydro energy, the share of energy production of other RES and high-efficiency CHE will considerably increase. The share of electricity from RES according to gross final energy consumption will increase above 50% by 2030. Most of the existing obsolete and environmentally unacceptable thermal energy facilities will be replaced by new units; long-term development will focus on competitive low-carbon electricity generation. The development and construction of active networks to support increased efficiency of use and dispersed electricity generation from high-efficiency RES and CHE are foreseen.

Use and supply of energy in transport Measures will focus on improved energy efficiency of vehicles and driving, introduction of new energy products through the establishment of charging infrastructure and introduction of electric vehicles and vehicles fuelled by other alternative fuels, which will contribute to reduced local and global burdens on the environment.

2 NEP STRATEGY

Strategy of sustainable use and local supply of energy

Sustainable use and local supply of energy is the most important segment of the energy industry in the development context. Accelerated development will be based on increased quality of energy services with lower energy input, which constitutes one of the basic elements of the transition to a low-carbon society, will essentially influence the competitiveness of society in the future and will contribute to improved security of supply with reduced dependence on imports and fuel import costs. Development will also be based on measures and objectives identified in the EU Climate Action and Renewable Energy Package and other national development strategies.

The efficient use of energy will also be implemented as a priority field of development of Slovenia for stimulation of economic growth and development of jobs. The NEP sets ambitious objectives for the long-term reduction of final energy consumption without transport (a reduction of final energy consumption by 7% from 2008 to 2030) and control of growth of electricity use (controlling such use to limit the increase to no more than 7% from 2008 to 2030).

The *Energy Efficiency Action Plan for the period 2008–2016* will be fully implemented and upgraded with a more ambitious plan for the period until 2020 or 2030. The key factor of success for this sub-programme is provision of investment resources from end-consumers of electricity for implementation of measures. The NEP therefore also plans incentives for providers of new services related to funding and implementation of measures for EUE. A prerequisite for this is the provision of adequate personnel capacities at all levels. Changes in the organisation of public administration intended to support EUE and RES are also planned. EUE will set an example for the integration of policies: fiscal, housing and spatial-planning policies to achieve the objectives set.

EUE will be supported by "green fiscal policy" measures[22]; in parallel with increased taxes, a scheme supporting energy efficiency will be introduced for vulnerable population groups, along with a system of voluntary agreements for improved efficiency of energy use and exploitation of RES linked to tax relief for industry.

Renewable energy sources The objective is to exploit, as a priority, all environmentally suitable RES to achieve a long-term increase and attain the target share of RES in the gross final energy consumption, namely: heat – a 33% share by 2020 and a 37% share by 2030; electricity – 40% by 2020 and a 53% share by 2030. The NEP will also enable a development breakthrough in RES that are currently less exploited, so that the scope of exploitation of hydro energy and wood biomass, on the one hand, and other RES on the other will be approximately the same in 2030. Plans for heat generation foresee stimulation of exploitation of wood biomass, solar and geothermal energy, and exploitation of wood biomass in high efficiency CHE and district heating systems as priorities, while plans for electricity generation foresee further exploitation of wind, solar and hydro energy, and wood biomass and biogas in high-efficiency CHE.

All sectors will provide all conditions necessary for optimum implementation of the *Action plan for renewable energy sources 2010–2020*. A programme-management system will be established,

[22] The competitiveness of society as a whole requires the lowest possible social costs and the highest possible benefits in the provision of energy services. External activity costs must also be taken into account. The State may improve internalisation of external costs with an appropriate fiscal and price policy of regulated prices. This involves transfer of the fiscal burden from goods, such as employment, to the exploitation of natural resources and preservation of fiscal neutrality.

alongside systematic alleviation of obstacles for implementation, especially administrative obstacles, and active supervision of programme implementation. The achievement of the objective, namely a 25% share for RES, will greatly depend on implementation of the programme for improved EUE and development and implementation of sustainable transport policy in Slovenia and the EU.

The key elements of the system of a support environment will continue to be the support scheme for electricity generation from RES, the Rules on energy performance of buildings, and incentives for energy-saving restoration of buildings. Also foreseen are improvements at all levels of planning of projects of RES exploitation, procedures of spatial planning, and targeted fiscal policy and incentive schemes for heat generation from RES. The long-term transition to a low-carbon society will require exploitation of RES to a considerably greater extent and conditions for this must be provided in spatial planning acts.

Development of active electricity-distribution networks Active networks will increase the flexibility, accessibility, security and economics of electricity supply and they present support to the greater efficiency of use and dispersed generation of electricity from RES and high-efficiency CHE.

Use of energy in transport Introduction of new energy products in transport is planned, with emphasis on the introduction of electric vehicles and the establishment of charging infrastructure for electric vehicles, compressed natural gas, liquefied petroleum gas, hydrogen and biofuels. Improved efficiency of vehicles and driving will also contribute to alleviation of local and global environmental burdens. Slovenia will support the sustainable use of biofuels and a development orientation towards exploitation of second-generation biofuels.

Measures related to transport and other policies influencing the volume of transport in the country and development of public freight and passenger transport, especially railways, are also critical for the development of energy use in transport. The NEP does not define these measures; instead they are a part of transport policy and related development policies (spatial policy, etc.).

Local energy supply The NEP foresees intensive development of local energy supply based on district heating and cooling systems, exploitation of RES, high-efficiency CHE and exploitation of waste heat. Generation of heat in local energy supply systems will achieve the prescribed 80% share of heat from low-carbon resources (heat generation from RES, CHE or waste heat). At least a 20% share of energy from RES will be mandatory in all district heating systems.

A new support scheme for generation of heat from RES for district heating systems, control of methods of heating by regulations and taxes, improved preparation and implementation of local energy concepts and integration of local energy industry in municipal acts are foreseen.

Cogeneration of heat and electricity is a priority technology for improved efficiency of energy transformation. The share of CHE will increase in all sectors. By 2030, a 16% share of CHE in gross final energy consumption is planned. Priorities include exploitation of CHE in industry and stimulation of CHE in district heating systems, service activities and multi-dwelling buildings. Provision of stability and efficient implementation of a support scheme for electricity generated by high-efficiency CHE are critical for an increased share of CHE. CHE will also be gradually implemented in general use.

Electricity supply strategy

Development of the electricity market The provision of more transparent and efficient operation of the market will significantly contribute to the competitiveness, security and long-term stability of electricity supply. The planned measures include further integration and merging of the Slovenian market with neighbouring markets, separation of market and regulated activities in accordance with requirements of the EU directives, establishment of a balancing market, increased stock-market liquidity, introduction of smart measuring devices for consumers (100% by 2017) and implementation of consumer-protection measures.

Electricity generation in large units is subject to market competition. The State will stimulate development of electricity generated from RES: alongside development of production from hydro energy, the share of production from other RES and high-efficiency CHE will considerably increase. Most thermal-energy facilities are obsolete and environmentally unacceptable. The priorities among electricity generation in large units are completion of the chain of hydro-power plants (HPP) on the lower Sava River and construction of the chain of HPP on the middle Sava River; exploitation of other environmentally acceptable HPP and of other RES is also planned[23]. Further measures include maintaining diversity of sources, technologies and locations in electricity generation at least at the present level, provision of a majority share of production from domestic energy resources, further long-term exploitation of nuclear energy in Slovenia by increasing the period of operation of Nuclear Power Plant Krško (NPPK) and construction of a new nuclear power plant in Krško (NPPK 2) bearing in mind social acceptability and directed use of fossil fuels with the long-term objective of transition to a low-carbon society: exploitation of high-efficiency CHE, further exploitation of the Velenje Mine in connection with competitive electricity generation and gradual closure of the mine around 2054, and gradual cessation of the use of other coal. Autonomous operation of the electricity system for emergency operation will be ensured through adequate production and reserve capacities in accordance with international rules, their adequate diversification, provision of all functions of electric power system in the country, and integration of Slovenia in the international area.

Transmission of electricity The objective is the construction and strengthening of internal connections (completion of the internal loop to a 400-kV network by construction of the Beričevo-Krško overhead power line), improved connections with the neighbouring countries (Hungary and Italy) and strengthening of the 110-kV network for increased security of operation and connection of dispersed production sources. The methodology for determining network charge will be changed, with the charge also partly burdening electricity producers. Regulations and procedures for faster placing of connections for electricity transmission in physical space will be improved and criteria for use of underground electricity connections will be developed. Construction of interconnectors for new major generation units will be the responsibility of producers.

Electricity distribution network The regulatory framework determining the network charge for consumers and producers of electricity will be changed so as to allow for the implementation of investments for reconstruction of the network, improved quality and security of supply, development adapted to the foreseen need for higher connected load and a greater scope of electricity generation in the distribution network and transition to an active electricity-distribution network. Besides carrying out their present tasks, network operators will be obliged to coherently implement a programme introducing smart measuring and calculation devices for consumers of electricity, natural gas, district heat and water end-consumers. Providers of the public utility service (PUS) of electricity distribution will be responsible for simplified and standardised

[23] For dispersed generation of electricity from RES, see the *Strategy for the Sustainable Use and Local Supply of Energy*.

connection of new dispersed production units and addition of a charging infrastructure for electric vehicles to the network.

Fuel supply strategy

Although classical (fossil) fuels will keep their central role in the provision of energy in the mid-term period, these activities will be subject to major changes due to expected price rises and a gradual transition from fossil to low-carbon sources.

Natural-gas market Gradual convergence with neighbouring markets will be crucial for the natural-gas supply. Competitiveness of the natural-gas market in Slovenia will be improved in connection with the EU market and in the area of the Energy Community, including development of trade in open public markets in the region.

With the gradual reduction of needs for heat due to improved energy performance of buildings and introduction of RES, future gas consumption will largely depend on electricity generation, especially from high-efficiency CHE in the local supply and industry. The provision of energy services from RES or district heating systems will be a priority before the expansion of gas networks to new areas.

Natural-gas supply Construction and maintenance of the energy infrastructure will be oriented towards enabling efficient operation of the EU internal energy market and secure energy supply. Development in the period from 2010 to 2030 will be oriented towards securing the supply of existing and new consumers of natural gas, including natural-gas consumption for the generation of electricity and heat, development of transmission capacities, especially participation in international projects for further diversification of supply routes for existing and new sources of natural gas, and storage capacities for improved security and competitiveness of supply. At the same time, Slovenia is establishing itself as a regionally important country for natural-gas transit.

Slovenia will ensure the support environment for optimal development and implementation of investments in the transmission network for natural gas, and in efficient marketing of capacities to allow a high level of utilisation of transmission and distribution capacities. Decisions on the implementation of projects will continue to be based on demand for transmission capacities and the economic justification of investments. Infrastructure projects enabling adequate transmission capacities and alignment with the N-1 infrastructure standards will be realised, including elimination of network bottlenecks, possibility of two-way flow in connections with neighbouring transmission networks, connection of new consumers (electricity generation units, especially CHE, introduction of gas network to parts of the country without coverage), and supply of existing consumers, participation in international projects of construction of pipeline connections, provision of connections with terminals for LNG in the region, and access to new storage capacity in the region. The possibility of natural-gas storage in Slovenia will be examined.

Liquid fuels The objective is to ensure supply with petroleum products that is satisfactory in quantity and quality and is environmentally acceptable. As a gradual but continuous rise of prices of oil and petroleum products is expected, active development in this field will require management of change in gradual reduction of demand for petroleum products in the country in the future (heating, transport), and provision of security of supply and appropriate strategic and commercial stocks. Existing storage facilities are sufficient for provision of the compulsory 90-day stocks of liquid fuels.

Increased use of biofuels and electricity in transport will aid Slovenia in reducing its import dependency on petroleum products. The potential of present technologies for production of

biofuels is limited. Second-generation biofuels will be extremely important for Slovenia, and Slovenian players may appropriately position themselves in the international technological development through demonstration projects and other measures.

Coal GHG emissions are the major problem in using coal, so exploitation of domestic coal in the future will be limited to exploitation of lignite in the Velenje Mine, for electricity generation. The objective is a long-term reduction in the total use of coal. The NEP foresees a gradual closure of the Velenje Mine by 2054 at the latest. The closure of the Trbovlje-Hrastnik Mine (THM) is foreseen by 2015, in accordance with the *Act Regulating Gradual Closure of the Trbovlje-Hrastnik Mine and Development Restructuring of the Region*. Despite a gradual reduction of the extent of use, coal remains an element of domestic energy supply due to its strategic security and contribution to diversification of energy sources for electricity generation, especially in relation to reducing risks in energy supply in economic or political emergencies.

Nuclear energy is currently one of the three key sources in diverse electricity supply (hydro energy, nuclear energy, lignite[24]); it is a low-carbon, and very competitive source of electricity generation in the long term. Prices and security of nuclear fuel supply are stable due to the diversity of supply routes. The most important objectives in nuclear energy are further safe operation of nuclear facilities in Slovenia and maintaining the independence of the supervision authority (the Slovenian Nuclear Safety Administration). Construction of a permanent disposal facility for low and intermediate level waste (LILW) will be ensured. The extension of the operational life of Krško Nuclear Power Plant until at least 2043 is of key importance for long-term competitive electricity supply. The construction of a new nuclear power plant facilitates the transition to a low-carbon society. Construction of a new nuclear power plant of 1,100 to 1,700 MW is possible on a location in Krško. The project is positive from the perspective of energy; what is required is an appropriate distribution of the increased costs of system services among producers and consumers of energy. With a life expectancy of 60 years, the project may be extremely competitive; it will, however, pose a great challenge to investors in the period of construction and repayment of loans of the second block. Due to the size of this project, electricity generation will largely depend on the regional electricity market, especially in the initial period of operation. Actual realisation of the new nuclear power plant will depend on conditions in the market, business decisions, and social acceptability of the project. In terms of personnel capacities, organisation of implementation and financial sources, the implementation of the investment is the most demanding project of the draft NEP requiring mobilisation of a large part of Slovenian development potential, and is important in the framework of the strategy of development for Slovenia. Slovenia will help to form and adopt measures of the international community in the field of nuclear safety.

Strategies of other policies supporting the achievement of NEP objectives

Taxes and regulated prices To aid successful implementation of objectives set by the NEP and improved effects of proposed measures, fiscal policy will pursue the objectives of green fiscal policy (the Slovenian Exit Strategy). Key elements in the transition to sustainable energy options will be gradual inclusion of external costs in the price of energy through increases in energy taxes, stimulation of sustainable energy options in other taxes and policy-making oriented towards the development of regulated prices for network use, which will lead to modification of the policy of subsidies or considerably reduce necessary subsidies for transition to a low-carbon society. The introduction of new or modification of existing taxes (such as the property tax under preparation,

[24] To a lesser extent, electricity is generated from natural gas.

energy taxes such as excise duty and environmental duty for atmospheric pollution by CO2 emissions in connection with voluntary agreements for the economy, taxes, other duties and tax relief on motor vehicles, accelerated amortisation, and tax relief for research and development in this field), so that the development of these taxes – levels of taxation and tax relief – will take into account the use of sources and the environmental burden.

Education and training Implementation of the ambitious NEP objectives requires more knowledge in all target groups than present energy strategies. The objective is to promote knowledge as the main source of increased national competitive ability in the energy industry. The NEP plans targeted education for high-quality preparation and implementation of projects in the field of energy efficiency and green energy technologies and their placing in public and private buildings (among architects, decision-makers, etc.), and targeted education and training of public administrators for operationalisation of legislation in the field of sustainable energy and efficient energy management in the public sector.

Research and development The NEP proposes that the field of sustainable use of energy and local supply becomes an example and priority field of integration of the economy with research and development for the advancement of new products, production processes, services and solutions in the energy industry suitable for transfer to the economy. An important element of this is integration in the broader European research area. A system for funding demonstration projects will be established.

Spatial planning Measures within spatial policy will be prepared to support NEP objectives. Improvements of spatial-planning policy are also foreseen, with measures oriented especially towards improved decision-making processes in the issuing of permits for priority national infrastructure projects, including relevant legislative amendments. Further activities for stimulation and regulation of energy-efficient spatial planning are also planned. In spatial placement of energy facilities, a proactive role of the State is foreseen as well as a new mechanism by which the State will invest in the preparation of expert bases for drawing up national spatial plans and overseeing procedures of placing RES power plants, which are recognised as facilities of national importance for the achievement of the prescribed objective of a 25% share of RES in final energy consumption, and for which investors have not yet been identified.

NEP implementation

Financing Investments in energy suply shall be covered by revenue from the sale of energy and energy services in the markets. The closure of the Trbovlje-Hrastnik Mine and construction of a low and intermediate-level waste repository is financed from budget funds in accordance with the law.

The total value of the programme investments for the 2010–2030 period amount to EUR 25,017 million for the proposed REF INT scenario. On an annual basis, this is in average EUR 1.1. billion investments, presenting approximately 3% of the Slovenian GDP in 2009. Almost 92% (EUR 22.8 billion) of all funds will be ensured by companies (publicly or privately owned) and natural persons with their own capital and loans from commercial banks and the Eco Fund. Investment burden in the amount of 8% (EUR 2.2 billions) will be ensured from public financial sources.

For achieving the environmental objectives, the NEP plans the promotion of investments in EUE, RES and local energy-supply systems from public financial sources in the amount of EUR 4.0 billion in the period from 2011 to 2030. The incentives are necessary due to imperfection of markets that still do not evaluate or internalise environmental damages and benefits in the energy market price. Public financial funds for promoting EUE, RES and local energy industry will be raised in a method that will orient people and companies towards the efficient use of energy and in accordance with the polluter pays principle as an additional charge to the price, respectively. By means of existing mechanisms, 66% of necessary public funds are ensured; for ensuring the missing funds, the NEP plans to draw on the revenue of auctions within the European Union Emissions Trading Scheme and the introduction of a new bonus for promoting heat supply from RES. The NEP's objective is to significantly increase financing of projects from the European funds by 2020.

Higher incentives, as for mature technologies, will be intended for technologies in the initial phase of breakthrough on the market, but in a limited scope and will be gradually reduced. The NEP plans demonstration projects for introducing new technologies, services and financial products.

Selecting strategic guidelines

The selection of strategic guidelines is based on objectives and orientations of the energy policy, the Energy Act, and the Treaty of Lisbon, and on analysis of diverse scenarios of energy policy in Slovenia by 2030 that meets these objectives. The effects of these two strategies of sustainable use and local supply of energy, and three scenarios of electricity supply, were analysed. The effects of energy scenarios were examined in one, target scenario of economic development and a uniform scenario of all external circumstances. We examined the sensitivity of the results on movements in transport. The primarily assessed scenarios for the NEP were not examining strategic aspects of pending investments. Due to public dilemmas in relation to pending investment in TPPŠ block 6, an additional two scenarios of electricity supply were analysed, which enable assessment of strategic aspects of energy industry development in the event of cessation of this investment[25].

[25] The analysis was limited to assessment of strategic aspects of the energy industry development without TPPŠ6, and is not sufficient for assessment of consequences with regard to cessation of investment from the standpoint of company or project.

Other pending investments and already adopted measures were not examined in the analysis. All scenarios were also assessed within the framework of the comprehensive environmental impact assessment.

The two strategies of energy policy in the field of sustainable use on local supply of energy encompass measures of EUE in all sectors, the use of RES for heat supply, and dispersed production of electricity, including wind farms, CHE and local supply of energy. **The Reference strategy (REF)** includes necessary measures for fulfilling the adopted commitments. **The Intensive strategy (INT)** establishes **a** support environment for implementation of all profitable projects of EUE, which ensures larger economical effects and an advantage in technological race in the field of green energy technologies. The strategy is more ambitious with regard to promoting the exploitation of RES, development of local supply and CHE in all sectors.

Analysed scenarios/strategies successfully follow the set objectives of sustainable development and transition to low-carbon society, security of supply and competitiveness. In all analysed scenarios/strategies, all minimal requirements of Climate Action and the Renewable Energy Package and of other international obligations and standards are fulfilled in the field of security of supply.

An important advantage of the scenarios is development in the direction of **reducing emissions, larger energy efficiency, larger exploitation of RES, improved strategic and operational security of supply and ensuring competitiveness.**

In the NEP, there is an **intensive strategy of promoting the sustainable use and local supply of energy** proposed and selected. The advantages of this strategy in comparison to other analysed reference strategies are as follows: smaller emissions and larger robustness upon implementing objectives of Climate Action and Renewable Energy Package – in particular 25% share of RES in gross final energy consumption – and Kyoto Protocol, smaller energy consumption, larger share of RES in 2030, smaller net export and smaller import dependency; the improvement of energy intensity is larger; and, all the other indicators of security of energy supply and of larger reduction of GHG emissions according to the reference scenario are better. The weakness of the intensive strategy is slightly higher emissions of nitrogen oxides and dust particles due to use of wood biomass. The intensive strategy also presents a better development starting point for long-term transition to low-carbon society.

In supply scenarios of supply with energy we are comparing key options of future supply with electricity. The main challenges are construction of new hydroelectric power plants, replacement of key existing hydroelectric power plants and directed consumption of fossil fuels (efficient use of domestic coal and use of natural gas in CHE). The following three estimated scenarios of development of electricity supply differ with regard to key investments in production units:

- **the basic scenario (BS)** presumes continuation of pending investments and implementation of measures for their completion respectively (HPP on lower Sava, block 6 in TPPŠ), prolongation of operational life of NPPK, acceleration of construction of new hydroelectric power plants, modernisation of the existing ones and construction of new high-efficiency units for CHE; it also examines construction of new gas and steam power plants in relation to conditions on international markets;
- **the nuclear scenario (NS)** is the upgraded basic scenario and presumes measures that will enable long-term exploitation of nuclear energy in Slovenia with construction of the new NPPK 2 unit next to the location of the existing 100 MW nuclear power plant, which will start operating before 2030;
- **the gas scenario (GAS)** is also the upgraded basic scenario directed towards even larger diversification of sources for electricity supply in comparison to the current ones – by means of increasing the share of the fourth segment – with construction of two gas and

steam power plants (GSPP) powered by natural gas until 2030, with the total power of 800 MW.

The scenarios differ with regard to the year 2030 as follows: the nuclear and gas scenarios point to advantages over the basic scenario with regard to energy indicators and indicators of operational security of supply. The gas scenario presents an acceptable alternative according to all aspects, but does not prove advantages over the other two scenarios. Electricity generation is more expensive than in the other two scenarios, the GHG and NO_x emissions are larger, and so is the import dependancy and sensitivity to changes in the energy prices on international markets. Despite higher costs of supply, the gas scenario is less demanding than the nuclear scenario in terms of investments. For reasons of lower costs of supply and smaller emissions the following scenarios of electricity supply are particularly adequate for the NEP: the basic and nuclear scenarios. The basic scenario satisfies the need of Slovenia by 2020, while the nuclear scenario is more long-term oriented and provides further long-term exploitation of nuclear energy in Slovenia. From the standpoint of security and competitiveness and due to the demanding nature of project implementation, the overlapping of the operation of NPPK 2 and NPPK is strictly necessary. Within the impact assessment, 2022 is taken into consideration as the first possible year of operation of the facility, but realistically, the year of construction of the facility will be subjected to entrepreneurial optimisation. In addition, the ralisiation depends on social acceptability of the project. The basic scenario is, up to the section on construction of NPPK 2, the same as the nuclear scenario and gives information on how the nuclear scenario will be implemented in the event of NPPK 2 suspended construction.

The selected strategy of electricity supply was compared with two other strategies that presume cessation of pending investments in block 6 in TPPŠ. An additional two scenarios are assessed by taking intensive promotion of efficient use of energy and dispersed generation of electricity into consideration, as follows:

- **additional nuclear scenario (AS NE)** without block 6 in TPPŠ included, considers construction of 400 MW gas and steam power plants and a 1000 MW nuclear power plant;
- **additional gas scenario (AD GAS)** without block 6 in TPPŠ included, considers construction of two GSPP with a total of 800 MW.

The advantages of scenarios without block 6 in TPPŠ are in the field of environment; with regard to investments, they are slightly less demanding, while the advantages of the scenario with block 6 in TPPŠ are in larger strategic security of supply in 2030, lower expected energy price and smaller sensitivity to price changes on the international energy markets in 2020 and slightly lower electricity prices in 2020. All scenarios enable the fulfilment of international obligations of the State and all scenarios are expected to provide electricity prices that will be competitive on international markets. Upon selection of a scenario, there are especially long-term benefits for the environment with better strategic security of supply and slightly higher electricity prices in 2030 weighted in scenarios with block 6 in TPPŠ included. An additional selection criterion is the fact that the investment in block 6 is pending and, consequently, the scenarios without block 6 in TPPŠ are burdened with costs of termination of contracts and of investment-related activities.

NEP SUB-PROGRAMMES IN THE FIELD OF SUSTAINABLE USE AND LOCAL SUPPLY OF ENERGY

The sustainable use and local supply of energy is the most important segment of the energy industry in the development context. Accelerated development of these fields, based on growth of quality energy services with smaller energy input, is one of the basic elements of transition to low-carbon society, and will be critical for the competitiveness of society in the future. It also indicates reduction of dependence on imports and fuel import costs. The development will also be based on measures and objectives identified in the EU Climate Action and Renewable Energy Package and other national development strategies.

Competences of Slovenian companies, established institutional framework, positive experiences with a variety of established promotional instruments and, in particular, strengthening of the activities in the field of sustainable energy in 2009, are the foundation for upgrading to the NEP.

Key orientations in the field of sustainable energy are as follows:

- stability, predictability and transparency of support environment;
- development of markets for technology, services and products;
- stimulating investors for implementation of investments that are, as a rule, significantly smaller in their scope than investment in classical energy activities;
- adequate organisation of state institutions and efficient operation of regional and specialised energy agencies;
- demonstration projects;
- training, education, research and development.

3 Efficient Use of Energy

Sub-programme objectives

The efficient use of energy is a key measure of energy policy for increasing the competitiveness of society. It significantly contributes to improved security of energy supply and reduces impacts on the environment. Timely promotion of the efficient use of energy enables smooth transition to low-carbon society. This involves provision of quality energy services with significantly reduced energy input. Sub-programme objectives are as follows:

- energy efficiency improved[26] by 20% by 2020 and by 27% by 2030;
- reducing energy use, with transport excluded, by more than 7% by 2020 compared to 2008 levels, and zero growth of energy use in the period from 2020 to 2030;
- consistent implementation of EUE as a priority field of development of Slovenia, and stimulating economic growth and creation of jobs in the field energy efficiency.

Operative objectives in the field of EUE are as follows:

- provision of 100% share of almost-zero-energy buildings among new and renovated buildings by 2020, and by 2018 in the public sector;
- reduction of annual costs of energy in the public sector by EUR 40 million annually by 2015, by EUR 85 million annually by 2020, and by EUR 130 million annually by 2030[27];
- control of growth of electricity use excluding the use in transport, so that the growth will be lower than 5% by 2020 and lower than 7% by 2030 in comparison with the use in 2008.

Programme strategy

For meeting sub-programme objectives, the Slovenian Government will provide adequate support environment for the following:

- improving energy efficiency of settlements and local communities by the following means:
  - energy-saving restoration, especially of buildings in the public sector and multi-dwelling buildings – priority comprehensive building restoration;
  - constructing almost-zero-energy buildings;
  - improving energy efficiency of the public infrastructure, such as public illumination, water supply, etc;
- improving energy efficiency of companies by means of the following:
  - efficient use of electricity as a priority;
  - special programmes in small and medium-sized enterprises (SMEs) and in energy-intensive industries;
- promotion of energy management systems and introduction of smart measuring devices.

The key sub-programme orientations are as follows:

- enabling implementation of all measures of EUE with returns larger than 10% and providing 10% of savings with non-investment and low-investment measures by 2015;
- developing markets of services, technologies, and products of EUE for improving energy efficiency and providing quality information on the markets as a priority;

[26] Improvement according to base-line scenario Primes, version 3, 1 April 2008.

[27] Savings compared to the use in 2008; current energy prices are taken into consideration.

- developing financial services for investments in EUE (pubic-private partnership, contract energy costs reduction, etc.), which will enable implementation of a large number of smaller investments of energy end-consumers; increasing the scope of demand for these services, especially in the public sector;
- strengthening and connecting actors;
- pro-active international policy, particularly involvement in establishing measures on the EU level, developing markets in the region and directing international aid to Slovenia towards EUE;

Significant increase in the number of incentives, enlargement of their scope and further expansion of diversity of incentives for EUE projects are foreseen. Key elements of the support environment are as follows:

- regulations for the following: regarding EUE in buildings, minimum requirements for energy efficiency of products, green public procurement, green state aid;
- product labelling and providing quality labels; providing quality information on products, services and providers on markets that influence the use of energy;
- economic incentives, direct financial aid for EUE, fiscal policy and pricing policy[28]: energy tax, excise duty policy, property tax, etc., adequate financial incentives for vulnerable population groups;
- incentives for development of financial markets and supply of adequate financial mechanisms (green loans, public-private partnership, contract energy costs reduction, etc.);
- systematic promotion of good practices in relation to EUE and exploitation of RES – especially by means of demonstration projects – and provision of quality information on benefits and practical aspects for deciding and acting in the field of EUE;
- incentives for the development of life-long learning and higher education for transition to society with less energy use[29];

For successful achievement of the set objectives in the field of EUE, next to energy policy measures, measures for promoting EUE need to be included in the relevant contextual policies[30], particularly the following:

- improving efficiency of public sector operation;
- housing policy;
- promoting regional development;
- stimulation of entrepreneurship and development of small end medium-sized companies (SMEs), especially stimulation of green energy technologies production and energy services development, and promoting implementation of measures of EUE in SMEs;
- spatial planning; energy efficient spatial planning;
- education and training;
- research and development policy;
- placement of EUE as a priority field in the development strategy of Slovenia.

Support environment

The key programme documents for promoting EUE[31] for the NEP is the National efficiency energy action plan for the period 2008–2016 (AN-URE). Additional measures in the NEP will ensure

[28] Only for regulated prices. See the *Taxes and regulated prices* sub-programme.

[29] See the *Education and training* sub-programme.

[30] See the sub-programmes 'Research and development', 'Education and training', and 'Taxes and regulated prices'.

continuous promotion of EUE until 2030, expand promotions to new segments and increase feasibility of measures from AN-URE implementation, since they are not yet implemented in the planned scope.

For **coherent implementation of measures from adopted programme documents,** the following additional measures will be necessary:

- preparation of a detailed plan for implementation management, organisation and personnel for carrying out all activities in the AN-URE programme; completion of reporting system for AN-URE so that the reports for improving AN-URE implementation will be drawn-up on an annual basis; publication of procurement plan for grants;
- technical support for preparation of projects in the public sector, households consulting, united information point.

For providing continuity of measures once the operative programmes expire and their preferential treatment upon implementation of energy policy, the NEP builds on already established measures and summarises the most important measures of EUE that are already being implemented. For achievement of the more demanding objectives, the NEP plans further measures presented hereinafter in sets.

EUE 01: A set of incentives for energy costs reduction in the public sector

Implementation of measures for EUE in the public sector is important due to demonstration effects of the sector and for reasons of directing markets and reducing costs in the public sector. In energy-efficient buildings, there are better living conditions; thus, the measures are oriented towards energy-efficient new constructions and energy-saving restoration of hospitals, kindergartens and elderly homes as a priority. Primary and secondary schools can be extremely important mediums of changes of energy culture in the local environment, while universities present an appropriate environment for development and demonstration of new approaches and technologies. For certain, the public sector must start with the measures for reducing energy costs in state and local administrations (ministries, urban municipalities, etc.). The costs of investments in measures of EUE are typically returned in a few years, but in public sector, it is reasonable to connect the measures with an increase in the quality of energy service (e.g. with measures in schools in order to simultaneously achieve higher standard for lighting and its higher energy efficiency). The objective of measures for EUE in the public sector is to provide a 50% share of new and restored almost-zero-energy buildings by 2015 and a 100% share by 2018. The objectives will also be achieved by means of the following:

- preparation and implementation of **energy-efficiency lighting in schools project** and simultaneous development of financing model for this measure within the framework of public-private partnership;
- **operation of technical office within the framework of Public Real Estate Management Fund** (being established), the purpose of which is to establish a system of energy management and energy-saving restoration of facilities. Tasks of the technical office cover the following:
    - implementation of energy management system in the public sector following the example of SIST EN 16001:2009 and energy bookkeeping, annual objectives and contingency plan within this framework;

[31] Measures from the field of EUE are also defined in the programme documents of the **cohesion policy**: Operational Programme of Environment and Transport Infrastructure Development for 2007-2013 (OP ETID) within the framework of the priority task Sustainable energy of **green public procurement**: Action plan for green public procurement for the period 2009–2012 (AN ZeJN) and **climate policy**: Operational Programme for Limiting Greenhouse Gas Emissions until 2012 (OP GHG-1); All stated measures are also covered in AN-URE.

  - implementation of measures of energy-saving restoration within the framework of annual investment plans; paying attention to public-private partnership, e.g. contract energy costs reduction as one possibility for implementing energy-saving restoration. Examining this possibility will be obligatory for buildings or sets of buildings, the energy costs of which exceed the limit prescribed by law;
  - the project introducing smart measuring devices in public administration buildings;
  - system for providing quality preparation and implementation of projects of energy-saving restoration, including projects of public-private partnership in the public sector, as follows:
    - consulting – providing permanent technical assistance upon preparation of investment documentation; projects tasks for project construction documents, projects for implementation and revision of project documents;
    - control of projects that use public funds for energy-saving building restoration;
    - training for efficient energy management and implementation of investments in EUE;
  - establishing central register for energy bookkeeping;
  - managing demonstration projects for establishment of new financial mechanisms and technologies;
  - preparing acts in relation to the stated measures; minimal obligatory content of energy bookkeeping, energy management and upgrading acts for green public procurement;
  - introducing the energy management system to all ministries by 2014, in urban municipalities by 2015 and all municipalities by 2020 by means of the following:
- appropriate remuneration system: preparing measures for efficiency dividend[32];
- supplementation of Action plan for green public procurement and regulation in preparation, particularly for the measures not governed by the Rules on efficient use of energy in buildings (PURES);
- measures in public utility service: public illumination, water supply, etc. Introduction of public-private partnership in this segment.

URE 02: Vast energy-saving restoration of single-dwelling and multi-dwelling buildings for lower costs and a higher quality of living

Directing renovations to almost-zero-energy technologies adapted to climate change with an objective of improving quality of living and reducing costs. The key measures are as follows:

- ensuring financial incentives for investments as follows: scope of aid bound by effects in direction of promoting comprehensive renovations;
- gradual revision of PURES with stricter requirements for energy-efficient buildings in accordance with the dynamics of the renewed directive on energy-efficiency buildings (Directive 2010/31/EC) and integration of an aspect of energy-efficient residential buildings in spatial and construction legislation;
- incentives for demonstration projects and their management;
- citizens consulting and information; further development of the ENSVET consulting network, information on products, services and providers that influence energy use and promotion of model realised projects; calculator for calculating energy savings on the Eco Fund's webpage;

[32] Efficiency dividend means participation of the individual energy consumer in the spending unit in the amount of achieved energy costs savings and is more precisely determined in Article 66č of the Energy Act (Official Gazette of the Republic of Slovenia, No. 27/2007 – official consolidated text 2, 70/2008, 22/2010).

- operation of the centre (Eco Fund in connection to the ENSVET consulting network) for activities of informing, awareness raising, consulting and educating in the field of EUE and contract energy costs reduction for residential and especially multi-dwelling buildings; junction of demand by potential costumers and supply by providers of contract energy costs reduction;
- taking the energy performance of buildings as a criterion for creation of new taxes into consideration; tax incentives for energy-saving building restoration within the framework of property tax[33];
- limiting the necessary consent of the multi-dwelling building owners for carrying out energy-saving restoration;
- using the reserve fund[34] as an instrument for credits insurance for the purpose of energy-saving building restoration;
- promoting introduction of smart measuring devices;
- promoting green loans and development of financial mechanisms (see EUE 08).

EUE 03: Aid scheme for vulnerable groups

The scheme is intended for preventing energy poverty and increasing the resistance of lower income households to the energy price rise by means of implementing measures for EUE. The planned measures are as follows:

- preparing rules on grants of aid for implementing measures for EUE to low income households;
- implementing the measures of EUE in partnership with local communities and the Ministry of Labour, Family and Social Affairs (for providing complete transfer of experiences with forms of aid for vulnerable groups and adequate access to information and support upon implementation of measures). Transfer of good practices on energy-saving renovation from abroad;
- larger adaptability in legislative regulation of contract energy costs reduction, which would enable non-profit housing organisations (NHO) to exploit this instrument within the framework of the public sector;
- enabling drawing of EU funds for energy savings to households and non-profit housing organisations and providing these funds from the European Regional Development Fund (ERDF).

EUE 04: Measures for EUE for larger competitiveness of the economy

For the economy, the measures for EUE are especially important within management of production costs and provision of competitiveness. In the economy, the planned measures for larger energy efficiency depend on the size of companies and their energy intensity. For larger companies, the introduction of energy management systems, employment of energy management, financial incentives for implementing measures for EUE, and voluntary commitments in relation to tax relief, are important. For small and medium-seized companies (SMEs), the development of packages of services that enable type solutions with frequent repeatability are important. The most important measures are as follows:

- promoting the introduction of an energy management system – Standard SIST EN 16001:2009 – in companies;
- incentives for consulting and preparation of investment projects, revision of methodology of energy audit (EA) – collected data on energy use and costs must enable the preparation

[33] See the sub-programme *Taxes and regulated prices*.

[34] The reserve fund is intended for covering expenses of maintaining buildings and their necessary improvements and for repayment of the loans taken for such purposes. It is more precisely determined in Article 119 of the Law of Property Code, Official Gazette of the Republic of Slovenia, No. 87/2002 and 18/2007.

of necessary documents for preparation of contract energy costs reduction, certifying reviewers for EA;
- energy taxes, tax relief and voluntary commitments for reducing electricity use;
- a set of measures for effective electricity use in energy-intensive activities;
- introducing contract energy costs reduction: parallel preparation of legislation, and implementation of demonstration projects for its testing;
- **scheme for small and medium-seized companies:** incentives for developing offer for parcels of measures intended for small and medium-sized companies (tourism, trade and other activities; business zones, technological centres, etc.): consulting, targeted training and financing, and implementation of measures.

EUE 05: Regulations on design and labelling of products:

- active role in creating regulations on minimal energy efficiency of products on the EU level;
- upgrading energy performance certificate by estimating the use of energy in operational life.

EUE 06: System for provision of quality preparation and implementation of measures:

- certifying consultants, architects, providers and managers;
- limiting Eco Fund subsidies on projects drawn up by certified architects or providers;
- introduction of a results-monitoring programme for implemented projects of EUE that received government grants (first five years after subsidization).

EUE 07: Programmes of EUE implemented by energy suppliers:

- education and training of providers;
- preparation of regulations.

EUE 08: Incentives for the development of new financial mechanisms:

- a support environment for implementation of measures with contract energy costs reduction in public-private or private-private partnership, as follows: legal arrangements of the field adjusted for NHO, examining this arrangements with demonstration projects, incentives for projects preparation, subsidies and aid for investors and owners of residential buildings for implementing projects for contract energy costs reduction;
- incentives for development of products intended to finance EUE at energy end-consumers (green loans).

EUE 09: Measures for strengthening, development and connection of actors:

- strengthening of local communities for transition to low-carbon society; inclusion of at least one urban municipality in the EU "Smart Cities" programme; financing energy managers from energy savings;
- further development of local energy agencies;
- promoting providers of energy services and financial products;
- promoting development and use of knowledge;
    - research and development activities;
    - strengthening professional activity,
    - education and training on all levels within the framework of sustainable energy fields;
- incentives for technological and entrepreneurial development in the field of green energy technologies and services of EUE, particularly the energy-efficient construction of facilities

as a priority field of economic development, and in the field of information technologies for EUE[35];
- increasing independence of the Eco Fund;
- incentives for connecting actors.

EUE 10: Integration of EUE promotion in contextual policies:

- increasing efficiency of public sector operation upon promoting EUE (more efficient legislation preparation, more simple acquiring of construction licences for projects of EUE, etc.);
- directing preparation of legislation, strategic documents and training and research related to promotion of EUE within the following framework:
  - housing policy;
  - regional development, and cohesion policy;
  - entrepreneurship;

  The grounds for integration of EUE in fiscal policy, spatial planning, education and training and research and development policy are determined in separated sub-programmes.
- establishment of a strong, independent and professional agency for promoting EUE with a long-term objective of its active role in the international area;
- inclusion of EUE as a priority field in the development strategy of Slovenia.

EUE 11: Participating in international policy-making for promoting EUE:

- directing international aid to other states for promoting EUE and RES;
- incentives for connecting actors internationally;
- cooperation in regional and international organisations operating in the field of EUE and RES.

Table 3: Tasks, time limits, responsible institution and financial resources of the *EUE* sub-programme

Task	Time limit	Public funds [EUR million]	Responsibility
Implementation of AN-URE	2016	243	ME
Implementation of AN ZeJN/measures for EUE	2013	-	GODEA/MF
Implementation of OP GHG/measures for EUE	2012	215	MESP
Implementation of OP ETID/measures for EUE	2013	124	ME
EUE 01 – Public sector			
Project for energy-efficiency lighting in schools	2011–2013		MES, ME/Eco Fund
Technical office of the Public Real Estate Management Fund	by 2011		ME, MPA
Project for energy management in the public sector	2014		ME, MPA
Establishment of the system for quality assurance of investments in EUE	2012		ME, MPA
Central register for energy bookkeeping	2012		ME, MPA
Demonstration projects management	2011–2013		ME, MPA
Preparation of regulations	2011–2012		
Incentives for implementing measures for EUE in public utility service (public illumination, water supply, etc.)	2011–2020		ME/Eco Fund
EUE 02 – Buildings/general			
Revision of PURES in accordance with renewed EUE directive	?		MESP

[35] See the sub-programme 'Research and development'.

Task	Time limit	Public funds [EUR million]	Responsibility
Development of financial mechanisms	2011–2015		ME, MF
Project introducing smart measuring devices	2011–2014		ME
EUE 02 – Residential buildings/households			
Upgrading the ENSVET network	permanent activity		ME
Measures of housing policy	2011–2012		MESP
Operation of consulting centre for EUE and contract energy costs reduction for residential buildings	2011/permanent activity		Eco Fund
EUE 03 – Scheme for aid to low-income households			ME/Eco Fund/Municipalities/MLFSA
EUE 04 - Measures in the industry			
Promoting introduction of energy management systems			ME/Eco Fund
Support for preparing EUE projects			ME/Eco Fund
Voluntary agreements for EUE			ME/Eco Fund
Scheme for SMEs			ME/Eco Fund
EUE 05 – Regulations			
Upgrading energy performance certificate (LCC)			ME
EUE 06 – Project introducing a system for provision of quality preparation and implementation of measures			ME
EUE 07 – Project for launch of EUE promotion by energy suppliers (Article 66 of the EA)			ME
EUE 08 – Project for new financial mechanisms development for promoting EUE			ME/MF
EUE 09 – Measures for development and connection of actors			
Project of development of energy services providers			ME/GOCC, PAEFI
Incentives for entrepreneurial development of green energy technologies and services			ME/GOCC, PAEFI
Incentives for connecting actors in the field of EUE			ME
EUE 10 – Integrating promotion of EUE in policies related to the energy policy			
Further inclusion of promoting EUE within the following: ○ reforms of public administration; ○ green fiscal reform; ○ housing policy; ○ promoting regional development; ○ promoting entrepreneurship and development of SMEs; ○ spatial planning; ○ education and training; ○ research and development policy;			 MPA ME/MF MESP SVLR PAEFI MESP MES, GODEA, GOCC MHEST
Establishment of the agency for EUE			Slovenian Government
EUE 11 – Participating in international policy-making for promoting EUE			
Incentives for international activities in the field of EUE			ME
International aid for EUE by Slovenia			ME/MFA

Actors

The key actors for implementing the sub-programme are as follows:

- The Slovenian Government: coordination of policies influencing EUE and ensuring EUE as a priority;
- ME: legislative framework for EUE, financial incentives for EUE for industry from the EU funds and budget, development of financial mechanisms, voluntary agreements for the industry, stimulating EUE services and technologies providers and financial products providers for financing EUE in time of the breakthrough to Slovenian and export markets; education and training; coordinating alleviation of obstacles in the field of EUE; consumer protection, products labelling, providing quality information on markets; development of green public procurement for the field of EUE (technical aspects) in cooperation with MF; promoting demonstration projects;
- Eco Fund: financial incentives for the projects of EUE in residential buildings, in service activities, small and middle-sized companies and industry; development of financial mechanisms; central point for promoting EUE in households in liaison with the EN SVET network;
- MPA – Public Real Estate Management Fund technical office for introducing the energy management system in the public sector; implementation of the projects of EUE in the public sector in cooperation with MES, MFA, MLFSA and MHEST; development of financial mechanisms in cooperation with MF and ME; central point for promotion, awareness raising and training for EUE in the public sector in liaison with the Eco Fund (financial mechanisms) and the EN SVET network (technical aspects), and local energy agencies (support to municipalities); demonstration projects;
- Government Office for Local Self-Government and Regional Policy: management of funds and programmes for promoting EUE within the framework of the cohesion policy; provision of funds for promoting EUE in low-income households;
- Ministry of Finance: green public procurement, fiscal policy, legal grounds and development of financial mechanisms for financing EUE (public-private partnership, partnership for financing EUE, voluntary agreements, etc.);
- Ministry of the Environment and Spatial Planning – Spatial Planning Directorate and Environment Directorate establishment of the quality assuring system (quality preparation of projects); certification of consultants, architects, providers and managers; regulations for energy efficiency in buildings; development of mechanisms for energy-efficient spatial planning; education and training;
- Government Office of the Republic of Slovenia of Climate Change promotion and awareness raising;
- Municipalities: introducing energy management systems in municipal buildings, energy-efficient spatial planning, coordination and promotion of activities for preventing energy poverty;
- EN SVET consulting network:
- Local energy agencies: supporting municipalities upon energy management system introduction.
- Professional organisations and interest groups (technological platforms, chambers, for example Chamber of Architecture and Spatial Planning, Chamber of Engineers, etc.); connecting actors; quality assurance system (quality of projects preparation, training of providers and investors);
- Energy suppliers: preparation and implementation of EUE programmes for energy end-consumers;
- Banks – development of financial products offer for financing EUE;
- Owners of real estate, building managers, owners and boards of directors of companies, investors for real estate market, energy services providers: preparation, implementation and financing of the measures for EUE in residential buildings (new and reconstructed buildings), and in the economy;
- Providers of technologies, services and products (including architects): in particular, in the field of energy-saving construction, cooling, heating and air-conditioning, of energy

management systems, energy-saving household appliances, electric engine drives, etc. implementation of measures.

Expected effects

Table 4: Expected response of the actors to the incentives of the *EUE* sub-programme

Measures for EUE for end-consumers	Expected scope of implementation of measures
Low-energy, passive and almost-zero-energy buildings in the housing sector and service activities, all new and renovated buildings in the scope of 4% of the housing fund annually; Measures for improving efficiency of buildings: replacement of windows, thermal isolation of façades, improving efficiency of heating systems	2800,000m2 of residential area of low-energy and passive construction by 2030 in new buildings; renovations, 4% of the housing fund annually; in the public sector, renovation of 66% of buildings by 2030 (of which, 59% according to low-energy standard); in remaining service sector, 46% (of which, 26% according to improved standard);
Energy-efficient household appliances	improved intensity of new devices, faster replacement with new ones
Measures for EUE in service activities (office equipment, lighting, technologies in service activities, etc.)	improved intensity of new devices, faster replacement with new ones
Measures for EUE in energy-intensive activities of the processing industry: production of steel thermal processes upon production of paper	reducing specific use of energy by: 20% 24%
Implementing measures of the National efficiency energy action plan, 2008–2016, and additional activities for EUE in industry:	
frequency regulation of electric motors	90% market share by 2030
energy-efficient electric motors, pumps and fans	70–80% market share by 2030
measures for EUE in the field of compressed air,	average reduction of energy use by 20%
energy-efficiency lighting	improved specific uses
energy-efficient industrial boilers	improved utilisation level by 2 to 6%
thermal pumps, wood-biomass boilers	(see the *RES* sub-programme)
other measures	improving specific use by 0.5% annually
Energy-efficient public illumination	improved specific uses

Financing

Financing sources:

- contribution for EUE;
- EU funds from the financial perspective 2007–2013: funding assured for OP ETID, sustainable energy priority task;
- funds from ERDF, namely up to 4% of the total amount, will be allocated for energy-saving restoration of the housing sector as aid to vulnerable population groups;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS);
- European fund of the European Energy Programme for Recovery – in preparation
- EU funds from the financial perspective 2014–2020:
- loans (Eco Fund, etc.);
- private sources and financing by the third parties.

Table 5: Funds required for implementing the *EUE* sub-programme and financing sources in the 2010–2020 period

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	[EUR million]										
Public funds required for financing the measures for EUE	32,0	51,9	51,1	50,4	48,8	51,4	53,6	53,4	52,4	51,4	50,5
Sources of budget funds											
CF - 07 - 13- 6. Sustainable energy RP	0,0	0,0	18,3	18,4	18,2	28,5					
Cohesion Fund	17,3	18,0	0,0	0,0	0,0	0,0					
Other public sources of funds:											
Ecological fund – subsidised interest rates	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7	0,7
Ecological fund, grants – appendix EUE36	8,7	9,8	11,0								
Companies for energy supply – appendix EUE	10,9	12,3	13,7								
Funds for programmes of increased energy efficiency [37]				24,2	26,4	28,7	29,4	30,1	30,7	31,4	32,1
Other sources (missing funds)	5,6	-11,1	-7,5	-7,1	-3,5	6,5	-23,5	-22,7	-21,0	-19,3	-17,7

Monitoring sub-programme implementation

The sub-programme will essentially influence the major NEP indicators as follows:

- improving energy efficiency by 20% by 2020;
- improving energy intensity by 45% by 2030;
- reducing GHG emissions;
- achieving a 25% share of RES;
- improvements with regard to import dependency.

Table 6: Indicators for monitoring the *EUE* sub-programme

Objective	Indicator	Unit
Achieving energy savings according to Directive 2006/32/EC	Energy savings (prescribed methodology for monitoring AN-URE) (contribution to achievement of target 9% share)	[GWh]
Stabilisation of energy use growth	The final energy consumption without transport The use of electricity without transport	[toe] [GWh]
Improving EUE in the public sector	Annual energy costs in the public sector Energy costs reduction in the public sector (energy savings compared to the energy use in 2008) – value according to the current energy prices Energy use in the public sector	[EUR] [EUR] [GWh]
Energy-efficient buildings, the objectives according to Directive 2010/31/EU	Share of almost-zero-energy buildings, renovated buildings, especially in the public sector	[%]

[36] Regulation on energy savings ensured to final customers (official Gazette of the Republic of Slovenia, No. 114/09) determines the amount of contribution and supplements by 2010.

[37] The Energy Act (Official Gazette of the Republic of Slovenia, No. 27/2007-UPB2, 70/2008, 22/2010) In Article 66 b defines supplement for financing measures of EUE and for RES.

4 Use of energy in transport

Sub-programme objectives

The sub-programme objective is to provide accessibility and to promote the use of environmentally friendly vehicles and fuels, as follows:

- reducing energy use and emissions of greenhouse gases by means of improved efficiency of vehicles and driving: reducing average specific emissions of new passenger cars per run kilometres from 156g of CO_2 emissions/km in 2007 to 130g/km by 2015 and 95g/km by 2020, and of light vans to 175g CO_2 emissions/km by 2016[38];
- providing a 10% share of RES in transportation by 2020, thus fulfilling the obligations of Directive 2009/29/EC. achieving a minimal 4.9% share of RES in transportation by 2015;
- providing a 50% share of RES for charging electric battery vehicles and hydrogen vehicles by 2015 and a 100% share of RES by 2020 on public charging stations;
- developing energy and charging infrastructure for the efficient use of modern, more environmentally friendly vehicles, namely:
    - providing more than 1000 public charging stations for electric battery vehicles by 2015, and more than 3000 new public charging stations by 2020;
    - providing 5 charging stations for hydrogen vehicles by 2015 and 20 charging stations by 2020;
    - providing adequate charging infrastructure coverage for compressed natural gas (CNG) and liquefied petroleum gas (LPG) in transport.

Strategy of the programme

The programme defines measures of energy policy for providing better efficiency of vehicles and driving, introducing new fuels in transport and construction of charging infrastructure; it also supplements the preparation of sustainable transport policy in this segment[39].

The Slovenian Government will form a support environment for achieving programme objectives, and thus enable the following:

- use of more efficient vehicles with internal combustion engines;
- promoting economical driving and rational use of vehicles;
- introducing electric battery vehicles and hydrogen vehicles;
- construction of charging infrastructure for electric battery vehicles, hydrogen vehicles, and CNG and LPG vehicles;
- adequate charging infrastructure coverage in transport for transit and inner transport;

[38] Pursuant to Regulation (ES) No. 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles and the Proposal for a Regulation of the European Parliament and of the Council Setting emission performance standards for new light commercial vehicles as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles {SEC(2009) 1454}{SEC(2009) 1455}.

[39] Measures related to transport and other policies influencing the volume of transport in the country and development of public freight and passenger transport, especially railways, are also critical for the future energy use in transport. ReNEP does not define these measures; instead they are a subject of transport policy and contextual policies (spatial policy, etc.).

- introducing biofuels and other RES in agriculture;
- introducing clean technologies and fuels in public transport;
- promoting the use of biofuels of second or later generations[40];
- introducing active networks[41].

The key sub-programme orientations are as follows:

- sufficient charging infrastructure coverage for electric battery and modern vehicles and development of economic activities related to energy services needs to be established as a priority field by 2020, building on synergy between development of technologies and services, and construction of infrastructure;
- systematic promotion of personnel development and promotion of pilot and demonstration projects integrated in development in the European area;
- comprehensive consideration of environmental impacts by vehicles:
- adjusting the intensity of acting in accordance with the global technological and development trends after 2020 for promoting use of vehicles with different propulsion technologies;
- target participation in European strategic projects and projects of standardisation in the field of modern vehicles and charging infrastructure;
- proactive role of Slovenia upon establishment of modern, environmentally friendly vehicles, enabling participation in EU policy-making.

The effects of the programme on security of supply and environmental impacts will be significantly better and achieved by smaller costs, once the comprehensive sustainable transport policy with measures for reducing the need for transport and for larger share of public transport is ready.

Support environment

Preparing and implementing the energy-efficiency programme in transport is also a prerequisite and integral part of transport policy, including implementation of all measures from the field of transport policy in the following adopted operative programmes: National efficiency energy action plan for the period 2008–2016, MESP, 2008; Operational Programme of Environment and Transport Infrastructure Development 2007–2013; MESP, 2007; Operational Programme for Limiting Greenhouse Gas Emissions until 2012, MESP, 2009; Action plan for green public procurement, 2009, GODEA, and Operational programme for the protection of ambient air against pollution caused by PM10, MESP, 2009.

The key elements of the support environment for sustainable use of energy in transport will be the following:

- tax measures: taxation on fuels and vehicles, road use charges in relation to environmental criteria with gradual increase of tax rate range, including zero-level of taxes for biofuels;
- promoting purchase of environmentally friendly vehicles in the public sector within the framework of green public procurement;
- financial incentives for purchase of electric battery vehicles, such as buses, cargo vehicles, passenger cars, electric two wheelers and energy-efficient cargo vehicles with internal combustion engine and hydrogen vehicles;

[40] Production of biofuels is dealt with in the sub-programme *Liquid fuels*.

[41] See the 'Electricity distribution networks' sub-programme.

Table 7: Draft proposal for incentives in the form of subsidies

	Cars and four-wheelers of L6e and L7e categories	Scooters and motorcycles	Power assisted cycles
Technological condition	hybrid system with the possibility of charging from socket battery-vehicles with battery with specific energy exceeding 100Wh/kg hydrogen-fuelled	batteries with specific energy exceeding 100Wh/kg	batteries with specific energy exceeding 100Wh/kg
Subsidy	use under 150Wh/km: 20% or maximum EUR 4000	use under 30 Wh/km: 20% or maximum EUR 800	use under 10 Wh/km: 20% or maximum EUR 400

- forming development model for construction of charging infrastructure for electric vehicles and promoting construction;
  - preparing legal bases for mandatory construction of charging infrastructure for electric vehicles in hydrogen vehicles;
  - connecting development of charging infrastructure for electric battery vehicles with spatial planning;
- organising activities of supplying vehicles with hydrogen as market activities;
- preparing regulation and standards for this field, co-formulating regulation and standards on the EU level;
- adopting technical standards accepted for project engineering and functioning of charging stations for compressed natural gas and compressed natural gas vehicles by adopting the European standards;
- pilot and demonstration projects;
- strengthening of human capacities, in particular, education for preparation and implementation of projects related to development of technologies and services to production and construction of infrastructure.

Table 8: Tasks, time limits, responsible institution, and financial resources of the *Use of energy in transport* sub-programme

Task[42]	Time limit	Funds by 2020[43]	Responsibility
Implementation of already adopted measures in the following programmes: OP ETID, AN-URE OP GHG		EUR 36 million EUR 19 million	
Tax measures	2011, 2015, 2020	[]	MF
Subsidies for passenger electric battery, hybrid and hydrogen vehicles	2011-2020	[EUR 49.5 million]	Eco Fund
Green public procurement for ecological vehicles, including electric battery vehicles and hydrogen vehicles	2011–2020	0[44]	MF
Promoting RES in transport in accordance with AN-OVE	2011–2015	[]	MESP
Technical standards for charging infrastructure and vehicles		[]	SIST
Construction of charging infrastructure for electric vehicles[45]			

[42] Also harmonising with other Governmental programmes/activities and necessary changes of legislation for programme implementation.

[43] Framework estimates.

[44] For reasons of lower vehicle consumption, it is expected that this measure will not bring additional costs.

Task[42]	Time limit	Funds by 2020[43]	Responsibility
Design of a development model, and demonstration projects	2011–2012	[EUR 0.575 million]	ME/GOCC
Pilot project and regulation preparation	2011–2012	[EUR 1.1 million]	ME/GOCC
Non-technological measures (introducing economical driving, promotion activities, transfer of foreign practices)	2011–2020	[EUR 1.4 million]	ME/GOCC

****Total amount of incomes from motor vehicle tax (MVT).*

Expected effects

Table 9: Expected response of actors to the incentives of the *Use of energy in transport* sub-programme and market development

Measures in transport	Expected scope of implementation of measures
Introducing biofuels – mixing biodiesel with diesel fuel, and bioethanol with petrol	additional 6.84 PJ by 2020 and 0.66 PJ by 2030
Promoting use of biofuels for specific fields: agriculture, public transport	10% share of engine fuels in public transport and 35% share in agriculture
Improving energy efficiency of vehicles with internal combustion engines, including use of energy-efficient tyres	in accordance with the minimal energy and emissions efficiency of vehicles in tyres in the EU
Replacing fuels by establishing the following: electric battery vehicles hybrid vehicles plug-in hybrid vehicles hydrogen vehicles CNG vehicles LPG vehicles	 2.7% of vehicle fleet by 2020 and 10.2% by 2030 5.9% of vehicle fleet by 2020 and 29.2% by 2030 4% of vehicle fleet by 2020 and 12.6% by 2030 1% of vehicle fleet by 2020 and 5.1% by 2030 0.7% of vehicle fleet by 2020 and 0.9% by 2030 0.7% of vehicle fleet by 2020 and 0.9% by 2030
Charging infrastructure for the following: electric vehicles hydrogen vehicles CNG vehicles LPG vehicles	 3000 public charging stations for electric vehicles by 2020 20 hydrogen charging stations adequate coverage adequate coverage

Actors

The key actors for implementing the sub-programme are as follows:

- ME: charging infrastructure and demonstration projects;
- Ministry of Finance: tax measures,
- Ministry of Transport: sustainable transport policy;
- Ministry of the Environment and Spatial Planning: spatial planning;
- Eco Fund: financial incentives for electric battery vehicles, hydrogen vehicles and charging infrastructure;
- Government Office of the Republic of Slovenia of Climate Change: promotion;
- Local communities: spatial planning, introducing charging infrastructure;
- SODO: development of smart networks and enabling technical conditions for installation of charging infrastructure for electric battery vehicles;

[45] Detailed calculations are stated in expert groundwork for the NEP.

- traders of the fuels for the propulsion of motor vehicles: introducing charging infrastructure for hydrogen vehicles;
- End-consumers: carriers and other owners of cargo vehicles, owners of passenger cars in public transport, private companies and natural persons.

Financial sources

Sources of funds:

- EU funds from the financial perspective 2007–2013: OP ETID, priority task of sustainable energy;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS) (from 2013);
- budget.

Table 10: Funds required for implementing the *Use of energy in transport* sub-programme and financing sources

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	[EUR million]										
Public funds required for co-financing investments –transport	0.1	0.7	0.7	0.7	0.7	0.7	5.3	5.3	5.3	5.3	5.3

Monitoring sub-programme implementation

Table 11: Main indicators for monitoring the sub-programme *Use of energy in transport*

Objective	Indicator	Unit
Achieving 10% of target share of RES	Share of RES in transport Share of biofuels in transport	[%] [%]
Improving efficiency and reducing emission of new vehicles	Specific GHG average emissions of all newly sold vehicles	[CO_2 g/km]
Development of charging infrastructure	Number of charging stations (for electric vehicles, hydrogen vehicles, CNG and LPG vehicles)	[no.]

5 Renewable energy sources

Sub-programme objectives

The objectives of the Slovenian energy policy for renewable energy sources are:

- provision of a 25% share of RES in final energy consumption by 2020 and a 30% share of RES by 2030; after 2030, the share of RES has to be further increased in final energy consumption;
- provision of a 10% share of RES in transport by 2020[46];
- implementation of EUE and RES as the priorities of economic development.

The sub-programme considers generation of heat and disperses electricity generation in units below 10 MW[47]. The operational objectives of the sub-programme are as follows:

- a 33% share of heat generation from RES by 2020 and a 37% share by 2030;
- a 12% share of dispersed generation of electricity from RES by 2020 and 18% by 2030, thus contributing to achieving a 53% share of electricity generation from RES in the gross final electricity consumption by 2030;
- provision of a 20% share of RES in district heating systems by 2020[48];
- stimulation of 100% use of RES in five municipalities by 2020 and in 20 municipalities by 2030.

Sub-programme strategy

For achieving the objectives of the 'Renewable energy sources' sub-programme, the Slovenian Government will provide for an appropriate support environment that will enable:

- energy-saving building restoration especially in the public sector and construction of active buildings representing the most technologically advanced facilities; provision of a 100% share of nearly zero-energy buildings among new and renovated buildings by 2020 and by 2018 in the public sector[49];
- replacement of fuel oil for heating by wood biomass and other RES;
- replacement of electricity for preparation of sanitary hot water by solar energy and other RES;
- accelerated construction, expansion and renovation of systems of district heating with RES, waste heat from industrial processes and high-efficiency CHE[50];
- generation of electricity from RES;
- introduction of biofuels and other RES in transport and agriculture, and introduction of electric vehicles[51];
- development of distribution networks for inclusion of dispersed electricity generation including development of active/smart networks[52];

[46] See the 'Use of energy in transport' sub-programme.
[47] Also for the sub-programmes 'Use of energy in transport' and 'Electricity generation'.
[48] See the 'Local supply of energy' sub-programme.
[49] The objectives of the recast Directive 2010/31/EU on the energy performance of buildings.
[50] See the 'Cogeneration of heat and electricity' sub-programme.
[51] See the 'Use of energy in transport' sub-programme.
[52] See the 'Electricity distribution networks' sub-programme.

- development of industrial production of technologies of EUE and RES.

The key orientations are as follows:

- development of markets of sustainably produced fuels (wood biomass, biogas, etc.), high-efficiency technologies, quality services and provision of financial incentives for their development;
- enable the exploitation of economically justified RES potential: biomass, water energy, solar energy, wind energy, geothermal energy, landfill gas, gas from the sewage treatment plants, biogas, and provide a wide range of technologies for their exploitation;
- priority promotion of:
  - generation of heat from wood biomass and solar energy;
  - generation of electricity from the energy potential of watercourses;
  - high-efficiency CHE and district heating systems on wood biomass;
- establishment of RES and EUE (green energy technologies) as a priority of Slovenia's development strategy and establishment of a close connection between the development of RES and economic development;
- ensure the leading role of the public sector in implementation of EUE and RES;
- provision of greater efficiency of the public administration in the areas affecting the exploitation of RES; provision of a pro-active role of the State in the assessment of locations from the position of environmental suitability;
- priority exploitation of locations with the lowest environmental impact – direction of construction of production facilities in the locations most suitable from the position of land use, social acceptability, availability of resources and integration in the infrastructure; priority promotion of integration of solar power stations in buildings;
- reinforcement of education and training in the field of energy management;
- provision of economically efficient and stable environment for operation of heat distributers;
- consistent implementation of planned measures in RES in the adopted programme documents.

The key elements of the support environment by 2020 are as follows[53]:

- economic incentives: continuation of established support scheme for generation of electricity from RES and high-efficiency CHE, preparation of related scheme for heat, direct financial incentives and appropriate tax policy[54];
- appropriate financial incentives for vulnerable population groups;
- regulations for methods of heating and cooling: introduction of compulsory share of RES in district heating systems, upgrade of provisions for use of RES in buildings;
- improved planning: accelerated inclusion of RES in the spatial plans at national and local levels; simplification of administrative procedures and procedures for investments and verification of efficiency of procedures using demonstration projects;
- quality management system in planning and implementation of projects and quality of biofuels;
- incentives for development of financial markets and suitable financial mechanisms;
- support for the establishment of a wood-biomass market;
- measures of education and training, research and development, and stimulation of development of industrial production of green-energy technologies;
- systematic promotion of good practices of EUE and RES, and provision of quality information for evaluation in all decisions related to the use of RES.

[53] See also the sub-programmes: 'Regulated prices and taxes', 'Research and development', and 'Education and training'.

[54] See also the sub-programme: 'Taxes and regulated prices'.

Many measures promoting RES are already being implemented within the adopted programme documents, particularly within the Operational Programme of Environmental and Transport Infrastructure Development for 2007–2013 (OP ETID), the Operational Programme for Limiting Greenhouse Gas Emissions until 2012 (OP GHG), the Action plan for green public procurement for the period 2009–2012 (AN ZeJN) and the Action plan for renewable energy sources for 2010–2020.

The precondition for achieving the set objective of a 25% share of RES in the gross final energy consumption is also managing the increasing use of energy[55].

Support environment

The Action plan for renewable energy sources for 2010–2020 comprises the following measures in supply of heat and dispersed electricity generation:

- incentives for generation of electricity from RES;
- continuation of support schemes for electricity generated from RES and high-efficiency CHE, including the renovation of the operating support system for generation of electricity from RES by taking into consideration the development of the technology market;
- certificates of the source of electricity;
- regulation of connection to the network:
    - technical criteria and procedures for connection of small units;
    - tariffs for connection to the network;
    - verification of investment intentions;
    - coordination of the planning of networks with the development of RES, including updating the preparation of local energy concepts;
    - accelerated implementation of active/smart networks.

Incentives for generation of heat from RES - multisectoral

- scheme of operating support for generation of heat from RES for heating in district heating systems and individual heating systems;
- promotion of the use of RES in local communities[56];
- financial incentives for the systems of the local energy supply from RES by:
    - direct investment incentives within the Operational Programme of Environmental and Transport Infrastructure Development for 2007–2013 (OP ETID) and incentives from the Eco Fund;
    - co-investments of the Eco Fund;
- a compulsory 20% share of RES and a compulsory 80% share of RES or CHE in district heating systems;
- implementation of an improved pricing model of district heating and control of these prices by AGEN-RS;
- preparation of a set of regulations on the heating and cooling methods (the rules on the heating methods in settlements, amendments to EA);
- promotion of RES in local energy concepts and voluntary obligations for municipalities;
- certification of heat generation from RES.

Implementation of zero-energy buildings and promotion of RES in buildings

- Rules on efficient use of energy in buildings, update:

[55] For energy policy measures and management of growth of final energy consumption, see the sub-programmes *Use of Energy* and *Use of energy in transport*. Achievement of the share is also affected by the measures of the transport policy and the State's development policy that are not included in NEP.

[56] See the 'Local supply of energy' sub-programme.

  - in accordance with the recast Directive on the energy performance of buildings (in the adoption procedure), provision of a 100% share of nearly zero-energy buildings among new and renovated buildings by 2020 and by 2018 in the public sector;
  - compulsory use of RES, CHE or district heating in all new buildings above 250 kW;
- financial incentives intended to the construction of low-energy and passive buildings, use of decentralised systems for energy supply with emphasis on RES (installation of wood-biomass boilers, solar power systems and heat pumps for heating and preparing hot water) – implementation of OP ETID 2007–2013 and incentives in households;
- financial incentives in the construction of nearly zero-energy buildings;
- development of financial instruments for financing by third partners and external energy supply.

RES in public buildings

- implementation of the use of RES as an important requirement and criterion in public procurement of construction, renovation, rental and maintenance of buildings;
- promotion of RES within the energy management system in the public sector[57];
- projects for improving administrative proceedings with the implementation of demonstration projects.

RES in the housing sector

- improvements of the housing legislation for: decreasing the required consent of owners of a multi-storey dwelling for implementing the energy-saving building restoration and installing the devices for energy generation from RES on the shared parts of the building; using the reserve fund as an instrument for loan insurance for energy-saving building restoration;
- implementing green mortgage loans;
- regulating energy contracting that would enable non-profit housing organisations (NHO) to utilise this instrument within the public sector.

Exploitation of wood biomass in the wood-processing industry and other industries:

- financial incentives for installing large boilers using wood biomass;
- exemptions of CO_2 tax.

Green taxes and state aid:

- tax incentives[58]: promotion of RES within the property tax, excise duty, CO_2 tax.

Increase of efficiency of the public administration in the areas affecting the development of RES:

- the project of improving the administrative procedures for RES projects with the implementation of demonstration projects (implementation of the demonstration project of wind farms with emphasis on spatial placement procedures).

Accelerated preparation of spatial plans for wind farms:

- Through a public procurement, the Ministry of the Economy will select a professional organisation that will begin, on behalf of and for the account of Slovenia, with the preparations of expert groundwork for preparing the national spatial plans for spatial placement of wind farms, for which the investor is still unknown. After the elaboration and adoption of the appropriate groundwork, the Ministry of the Environment and Spatial

[57] See the 'Efficient use of energy' sub-programme.
[58] See the 'Taxes and regulated prices' sub-programme.

Planning will initiate, on behalf of Slovenia, the spatial planning procedures. After adopting the Decree on the national spatial plan, the State will lease these energy locations, and the State's input will be either repaid, or the State will participate in the project's ownership and sell it at a later time.

Improved planning:

- research and classification of locations for exploitation of RES relating to the spatial, environmental suitability and the required adaptation to climate change, including the preparation of geographical maps;
- amendments to the Spatial Planning Act, the Construction Act and the implementing acts (PURES rules), so that the improvement of EUE and RES will be possible with integrated planning of buildings and settlements (new and renovated) for optimum satisfaction of user needs and by observing the principle of sustainable construction in the entire lifecycle of a building (LCC) or settlement. Low- or zero-energy use of energy in buildings and settlements is based on a suitable position and arrangement of buildings (solar urbanism), architectural design (e.g. improved building design, advanced materials, e.g. nanomaterials, natural materials, integrated planning of buildings with low-energy use and low CO_2 emissions by observing LCC), etc.;
- technical guidelines for spatial planners in planning business and residential areas for the use of RES for heating and cooling.

Establishment of the wood-biomass quality assurance system:

- promotion of development of wood-biomass collection centres;
- establishment of the wood-biomass quality assurance system (preparation and implementation of the rules on wood-biomass quality and the amendment to the rules regulating the wood-biomass classification; preparation of the rules on quality assurance in the distribution and storage of wood fuel);
- regulation of the concession system and financing of the studies for using geothermal energy for electricity generation.

Reinforcement of capacities for preparation and implementation of projects[59]:

- establishment of the quality assurance system in the implementation of RES projects
- (scheme and implementation of quality standards for expert designs, planning and implementation of heat generation systems and hot-water supply network from RES)
- promoting expert and research activities with the goal of maintaining the continuity of knowledge in the field of RES and transfer of knowledge and technologies to domestic industry[60].

Table 12: Tasks, time limits, responsible institution and financial resources of the *Renewable energy sources* sub-programme

Task	Time limit	Resources [EUR million]	Responsibility
implementation of OP ETID – incentives for RES for: a) boiler rooms on wood biomass, exploitation of solar energy b) geothermal energy c) small and medium-sized district heating systems on wood biomass	invitations to tender 2011–2015	63.8	ME
implementation of AP RES measures	2020	898.13	ME
promotion of constructing active buildings, implementation of demonstration projects in schools and social housing for the elderly	invitations to tender	15.8	Eco Fund ME

[59] See the *Education and training* sub-programme.

[60] See the *Research and development* sub-programme.

Task	Time limit	Resources [EUR million]	Responsibility
preparation of the set of regulations on the heating and cooling methods (amendment to PURES, the Rules on the heating methods in settlements, amendments to EA)	2012	[]	ME
renewal of support schemes for electricity generated from RES	2014, 2019, 2024	[]	ME
regulation of the concession system and financing of the studies for using geothermal energy for electricity generation	2012	[]	
the project of improving the administrative procedures for RES projects with the implementation of demonstration projects establishment of the system of continuous improvements of administrative procedures	2011 2012	[]	ME
accelerated preparation of spatial plans for wind farms: preparation of expert groundwork for preparing the NSP for RES power plants, for which the investor is not known (public procurement) spatial placement (NSP) lease of energy locations			ME MESP ME
research and classification of the locations for RES exploitation: relating to the spatial and environmental suitability (including mapping) implementation of the demonstration project of wind farms with emphasis on the spatial placement procedures	Phase I: 2012 Phase II: 2015	[]	ARSO
establishment of the wood-biomass quality assurance system (preparation and implementation of the rules on wood-biomass quality and amendment to the rules regulating the wood-biomass classification; preparation of the rules on quality assurance in distribution and storage of wood fuel;)	2011	[]	
quality assurance in the implementation of RES projects (scheme and implementation of quality standards for expert designs, planning and implementation of heat generation systems and hot-water supply network from RES)	2011	[]	MESP
tax incentives		[]	MF
development of financing models	2012	[]	ME

Expected effects

Table 13: Expected response of the actors to the incentives of the *Renewable energy sources* sub-programme and market development

Measures of dispersed electricity generation and supply of heat from RES	Expected scope of implementation of measures
micro, small and medium-sized power plants:	
wind farms (wind farms in the Enclosure A.1 above 10 MW, wind farms under 10 MW at other locations and other wind farms for which the spatial planning procedures are ongoing)	119 MW by 2020 and 295 MW by 2030
other wind farms	
small hydroelectric power plants	43 MW by 2020 and 18 MW by 2030
solar power plants	337 MW by 2020 and 567 MW by 2030
geothermal power plants	0 MW by 2020 and 25 MW by 2030

Measures of dispersed electricity generation and supply of heat from RES	Expected scope of implementation of measures
CHE on wood biomass	14 MW by 2020 and 20 MW by 2030
CHE on landfill gas	
CHE – other biogases and treatment plants	32 MW by 2020 and 1 MW by 2030
heating systems utilising RES by 2020:	
geothermal heating systems	10 systems by 2020 and 20 systems by 2030
solar collectors	669,000 m^2 by 2020 and 1,557,000 m^2 by 2030
wood-biomass (WBM) boilers in households	78,000 units by 2020 and 122,000 units by 2030
WBM boilers in the public sector and other service activities	8,000 units by 2020 and 16,000 units by 2030
WBM boilers in industry (220 kW)	200 units by 2020 and 280 units by 2030
WBM boilers in industry (2,000 kW)	50 units by 2020 and 70 units by 2030
BMDH systems (> 1 MW)	55 systems by 2020 and 67 systems by 2030
BMDH local systems (< 1 MW)	370 systems by 2020 and 417 systems by 2030
heat pumps	52,000 units by 2020 and 107,000 units by 2030
further promotion of a wide range of technologies for exploitation of RES for heating by 2030	

Actors

Promotion:

- ME: preparation, management, coordination and implementation of key activities;
- Eco Fund: financial incentives;
- "the Agency for Efficient Use of Energy and Renewable Energy Sources": non-financial incentives;
- local communities: co-formulation and implementation of legislation on the heating methods; incentives;
- local energy agencies: stimulation and promotion of implementation.

Investors:

- local communities: elementary schools and kindergartens, elderly homes, social housing, municipal buildings; other actors in the public sector:
- energy companies (supply of district heating, electricity generation, WBM): building owners, investors in the real-estate market.

Financing:

- investors;
- Eco Fund, banks.

Parties responsible for preparation of projects:

- investors;
- building managers;
- designers;
- providers of technologies.

Parties implementing the projects: providers of technologies (PV, the construction sector).

Procedures, quality of project preparation, training of parties implementing the projects and of investors:

- MESP – Spatial Planning Directorate, Environment Directorate;
- professional organisations and interest groups, chambers (Slovenian Chamber of Architecture and Spatial Planning, Slovenian Chamber of Engineers, etc.);
- universities.

Financing

Financing sources:

- contribution for ensuring support in electricity generation at CHE and from RES;
- EU funds from the financial perspective 2007–2013:
  - OP ETID, priority task of sustainable energy;
  - rural development programme;
  - funds from the ERDF up to 4% of the total amount may be used for energy efficiency renovation of the housing sector as an aid to vulnerable population groups;
- EUE contribution (for heat pumps, improvement of efficiency of combustion plants, solar power systems for heating sanitary hot water);
- budgetary resources: support for EUE and RES;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS) from 2013;
- EU funds from the financial perspective 2014–2020;
- support scheme for heat supply from RES;
- loans (Eco Fund, etc.);
- own funds of companies for heat supply;
- private sources.

Table 14: Funds required for implementing the *RES* sub-programme and financing sources

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	[EUR million]										
public funds required for financing – RES	70.5	96.6	101.8	109.1	118.0	137.7	115.4	115.7	114.1	113.8	112.7
budgetary resources											
CF - 07 - 13- 6. RP Sustainable energy	0.0	0.0	9.4	9.4	9.3	14.6					
Cohesion Fund	8.9	9.2									
other public funds											
Eco Fund – subsidised interest rate	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Eco Funs – grants – contribution for EUE	2.2	2.5	2.8								
CHE & RES scheme (funds for RES)*	35.2	37.7	39.8	43.0	45.8	57.0	58.5	59.0	57.9	58.0	57.1
funds for the programmes for increasing energy efficiency				6.0	6.6	7.2	7.3	7.5	7.7	7.9	8.0
other sources (missing funds)	-23.5	-46.5	-49.1	-49.8	-55.5	-58.2	-48.8	-48.5	-47.9	-47.3	-46.8

Monitoring sub-programme implementation

Table 15: Main indicators for monitoring the *RES* sub-programme

Objective	Indicator	Unit
achievement of a 25-percent target share of RES	contribution to achieving the RES share the share of electricity generation from dispersed sources of RES the share of heat generation from RES	[%] [%] [%]
effectiveness of procedures	delays, unresolved procedures	[no.]

6 Local supply of energy

Sub-programme objectives

The main objectives of the sub-programme are establishing, adopting and implementing intensive development strategies of local supply of energy based on district heating (DH) and cooling systems, RES, high-efficiency CHE, and waste heat exploitation. The aspects of energy use in local supply are considered by the 'Efficient use of energy' sub-programme. The general objectives of the sub-programme are as follows:

- increased coverage of district heating systems:
  - increased share of district heating in the structure of final energy consumption for heating by 2030 by at least 40%;
  - increased share of buildings supplied from local or district heating systems, especially new buildings and buildings in the public sector;
- gradual transition to resources with low-carbon emissions in the local energy industry to achieve an 80% share of low-carbon resources by 2020: RES, high-efficiency CHE and waste heat;
- development of district cooling supply: construction of at least [five] district cooling systems by 2015;
- transition of five municipalities to 100% supply of energy from RES by 2020 and at least twenty municipalities by 2030.

Sub-programme strategy

A support environment shall be established enabling:

- a gradual transition to resources with low CO_2 emissions (under 0.2 kg CO_2/kWh) in the local energy industry;
- increased coverage of networks for heat supply, long-term priority expansion of district and local heating systems (hereinafter both referred to as DH);
- development of district supply of cooling as the priority cooling supply;
- increased efficiency and reduction of heat loss in the existing networks of local and district heating;
- stimulation of local communities for the transition to RES;
- stimulation of private investors and development of financial instruments;
- accelerated introduction of advanced technologies of management of heat-supply processes.

The sub-programme orientations are as follows:

- planning the local supply of energy for clearly delimiting the fields with regard to the method of heating/cooling between energy supply systems;
- ensuring the advantage of EUE[61];
- in planning the heating of settlements and local communities with regard to the source, to provide the following priority order of heat supply:
  - district heating systems;

[61] See the 'Efficient use of energy' sub-programme.

    - generation from RES (CHE and separated generation) and use of industrial waste water;
    - high-efficiency CHE from natural gas;
    - individual natural gas supply.
- providing economically stimulating and stable business environment for public utility service providers of heating and cooling distribution.

Key elements of the support environment:

- regulations for heating and cooling in settlements;
- pricing of district heating;
- implementation of the strategy and objectives of the sub-programme in new local energy concepts, renewal of the existing local energy concepts by 2015, and linking the concepts and the spatial acts of municipalities;
- long-term operational support to heat and electricity generated from RES and high-efficiency CHE[62];
- direct financial incentives for investments in networks of district heating and cooling and support to heat generation in DH systems;
- green public procurement;
- suitable pricing, excise duty and fiscal policies;
- institutional development of financial instruments and business environments of a public-private partnership.

Support environment

Implementation of the Operational Programme of Environment and Transport Infrastructure Development for 2007-2013 (OP ETID), namely in building wood-biomass boiler rooms, exploitation of solar and geothermal energy in the public sectors, exploitation of wood biomass in the wood-processing industry – linking with the district heating systems, and constructing wood-biomass local and district heating. The programme will be carried out without additional measures as planned.

Amendment to the legislation and preparation of regulations, which will provide for priority use of DH systems and a gradual transition to low-carbon sources in DH systems:

- ***minimum compulsory shares of low-carbon sources and technologies in DH systems:***
    - 20% share of heat from RES in all district heating systems by 2020 and 45% share by 2030 (RES_share >= 20%);
    - 80% share of heat in all district heating systems generated from RES, CHE[63], or wastewater by 2020 (RES_share + CHE_share >= 80%);
    - 100% share of heat from RES, high-efficiency CHE or industrial wastewater in the new DH systems from 2012;
- ***minimum compulsory share of heating from low-carbon sources in buildings – within the Rules on efficient use of energy in buildings (PURES):***
    - ensure compulsory use of district heating, RES or CHE, or industrial wastewater in all new and renovated buildings with heat consumption over 250 kW, where this is technically feasible and economically reasonable;
- compulsory share of heating from low-carbon sources in buildings financed from public funds:

[62] See the sub-programmes 'Renewable energy sources' and 'Cogeneration of heat and electricity'.

[63] CHE from low-carbon sources only: especially RES, natural gas and gradually alternative sources (e.g. hydrogen); see the *Cogeneration of heat and electricity* sub-programme.

  - within PURES and Green public procurement for public buildings, PURES and the rules for granting state aid as well as the legal acts related thereto, and for all buildings being constructed, leased or renovated and co-financed with public funds, the use of district heating, RES, CHE or industrial waste heat will be compulsory for heating where this is technically feasible and economically reasonable:
    - in new buildings and major renovations of buildings from 2012;
    - transition of all existing buildings to this method of heating – 40% of buildings by 2020 and 80% of buildings by 2030;
  - the requirements and criteria for green public procurement will be prepared for an accelerated connection to district heating, use of RES and high-efficiency CHE;
- upgrade of the planning of DH and cooling systems in local communities:
  - preparing a legal framework for determining the method of heating, cooling, and preparing sanitary hot water in particular areas of energy supply within the local energy industry. Preparation of methodology used for specifying the criteria for optimum division of areas of energy supply and sensible combination of networks, in which district heating with high-efficiency CHE systems is the framework of heating network operation for a group of larger buildings or an area with dense heat consumption, while in scarcely populated areas the exploitation of wood biomass will have priority in the local district systems. Linking the methodology for specifying the heating methods with the methodology for preparing energy concepts.
  - the procedures will be determined for verifying the suitability of local energy concepts, monitoring their implementation, and implementing corrective actions at a national level;
  - the legal bases will be prepared for the inclusion of the implementation of local energy concepts in general and individual acts of self-governing local communities;
- **update of the methodology and procedures for determining and validating the district heating prices** by the Energy Agency of the Republic of Slovenia (AGEN-RS), which will provide for economically efficient and stable operation and appropriate income of heating and cooling distributers as well as external heating suppliers, taking into consideration the specific characteristics of high-efficiency CHE, the public-private partnership and the option of external supply of heating;
- **regulation of the position of energy system managers in closed economic areas,** which will provide these economic areas (the existing and new) with the possibility of integrated management of the energy sector in the form of a special uniform local public utility service for the supply of heating, cooling, gas and electricity (concession).

Planning of energy supply in local communities and efficient implementation of projects:

- preparation and implementation of local energy concepts:
  - coordinating the existing local energy concepts with NEP objectives, orientations and tasks, as well as operational programmes and action plans in the supply and use of energy;
  - inclusion of the implementation of local energy concepts in general and individual acts of self-governing local communities, preparing the municipal spatial plans based on orientations from local energy concepts or specified methods of heating, cooling and preparing sanitary hot water;
  - implementing the invitations to tender for concessions for district heating and cooling systems from high-efficiency CHE and RES, and industrial waste heat;
- accelerated preparation of locations and projects based on heat generation from RES and high-efficiency CHE, and district heating and cooling systems; incentives for project preparation;

- the procedures will be established for verifying the suitability of local energy concepts, monitoring their implementation, and implementing corrective actions at a national level. An analysis of prepared local energy concepts and their implementation will be performed, as well as an analysis of prepared compulsory local energy concepts.

Promotion of low-carbon sources within the tax policy[64].

Efficient implementation of the support scheme for electricity generated from high-efficiency CHE and from RES[65].

Investment support schemes: establishing a new investment support scheme, updating the existing ones, and implementing the schemes, enabling:

- accelerated connection to the systems of district or local heating in 2011–2015;
- expansion of the existing and construction of new district heating and cooling networks in 2013–2018;
- decrease of losses in the network and the efficient use of energy in the local supply systems (renovation of systems, elimination of leaks, reduction of heat loss, system optimisation, operation optimisation, energy-efficient engine drives, and other EUE measures);
- replacement of fossil-fuel combustion plants, inefficient combustion plants with RES devices, and heat storage in the district or local heating systems;
- central heating systems in multi-storey dwellings for eliminating "energy poverty" of low-income households[66];
- central heating systems in large buildings within the integrated energy-saving building restoration (and decreased needs for cooling and heating), as well as for connecting to the district heating systems;
- capital investment of the Eco Fund in the local energy industry in case of demonstration projects, e.g. low-temperature local and district heating, inclusion of heat generated from the solar energy in the district heating systems, seasonal heat storage, transition of municipalities to 100% supply of energy from RES, etc.;
- incentives for preparation of projects.

Energy efficiency[66];

Institutional reinforcement of actors who contribute to the development of the local energy industry and the efficient use of energy:

- training of persons responsible for preparing local energy concepts in local communities and preparation of projects for energy supply in the public sector, actors in the public-private partnership, and persons responsible for procedures for issuing authorisations relating to CHE and RES;
- establishing an independent advisory service for providing support to municipalities in developing the local energy industry, spatial placement and concessions;
- incentives for linking of actors;
- establishing a joint promotional/information access point for the local energy industry.

Reinforcement of capacities for preparation and implementation of projects[67].

Establishment of a quality system of expert design, planning and implementation of district heating and cooling systems, and comparative analyses of PUS DH.

[64] See the sub-programmes 'Renewable energy sources' and 'Taxes and fees'.

[65] See the sub-programmes 'Cogeneration of heat and electricity' and 'Renewable energy sources'.

[66] See the 'Efficient use of energy' sub-programme.

[67] See the 'Education and training' sub-programme.

Development of local wood-biomass supply chains and wood-biomass logistics centres.

Table 16: Tasks, time limits, responsible institution, and financial resources of the *Local supply of energy* sub-programme

Task	Time limit	Resources	Responsibility
implementation of OP ETID – investment incentives for RES for: a) wood-biomass boiler rooms, exploitation of solar and geothermal energy in the public sector b) exploitation of wood biomass in the wood-processing industry – linking with the district heating systems c) small and medium-sized DH systems on wood biomass	invitations to tender 2013	 []	ME
efficient implementation of the support scheme for electricity generated from RES and CHE[68]		[]	
preparation of regulations			
prohibition of heat generation from fuel oil and electricity in the new heating systems (except for the heat pump)	2011	[]	ME
compulsory use, prescribed shares and scope of CHE and RES in all local and district heating systems	2011	[]	ME
dynamics of substituting the supply of heat generated from fossil fuel in the existing local and district heating systems with the supply of heat generated from CHE, RES or industrial waste heat	2011	[]	ME
exclusive use of CHE and RES in new district heating and cooling systems and all new and renovated buildings with heat consumption above 250 kW	2011	[]	ME
methodology for determining the method of heating, cooling and preparing sanitary hot water in particular areas of energy supply within the local energy industry, and amendment to the methodology for preparing local energy concepts	2012	[]	ME
external access to district heating and cooling networks by RES and CHE energy producers	2011	[]	ME
a new model of determining and validating the prices of district heating by AGEN-RS	2012	[]	AGEN-RS
a quality system of planning, implementing and monitoring the local energy concepts at a national level	2011	[]	ME
inclusion of implementation of local energy concepts in general and individual acts of self-governing local communities	2011	[]	ME, MESP
amendment to the Decree on Green Public Procurement (accelerated implementation of CHE, RES and connection to district heating in the public sector)	2011	[]	GODEA, ME
definition of energy contracting as a financing method that does not cause borrowing of municipalities	2011	[]	MF
amendment to the Public-Private Partnership Act (accelerated implementation of energy contracting in the public sector)	2012	[]	MF
regulation of the position of energy system managers in closed economic areas	2011	[]	ME
local energy concepts			
amendment to the local energy concepts prepared up to the adoption of NEP	2012	200,000	local communities
analysis of local energy concepts and their implementation, implementation of corrective actions	permanently	[]	ME
support to municipalities in developing the local energy industry (advisory service for the development of the local energy industry and its spatial placement)	2011	[]	ME, MESP
promotion of DH within the tax policy	2011	[]	MF
financial incentives			

[68] See the sub-programmes 'Renewable energy sources'and 'Local supply of energy'.

Task	Time limit	Resources	Responsibility
preparation of support schemes for promoting district heating	2011 - 2030	[]	ME, AGEN-RS, Borzen
promotion of connection to the CHE and RES district and local heating systems	2011 - 2015	[]	Eco Fund
Promotion of expansion of the existing and construction of the new CHE and RES district heating and cooling networks	2013 - 2020	[]	Eco Fund
promotion of energy contracting in agriculture (contractual supply of heat and electricity from RES)	2011 - 2020	[]	MAFF
promotion of the local energy industry in case of demonstration projects (capital investments of the Eco Fund)	permanen tly	[]	Eco Fund
institutional reinforcement training of persons responsible for preparing local energy concepts in local communities and preparation of projects for energy supply in the public sector, actors in public-private partnership and persons responsible for procedures for issuing authorisations relating to CHE and RES establishing a joint promotional/information access point for the local energy industry **reinforcement of capacities for preparation and implementation of projects**[69]	permanen tly	[]	ME, MPA
establishment of a quality system of district heating and cooling and a comparative analysis of the performance of these services	2012	[]	AGEN-RS
preparation of locations and RES and CHE energy supply projects in the district heating and cooling systems: preparation of municipal spatial plans implementation of invitations to tender for concessions for district heating and cooling systems from CHE and RES, and industrial waste heat development of local wood-biomass supply chains and wood-biomass logistics centres		[]	local communities

Expected effects

Table 17: Expected response of actors to the incentives of the *Local supply of energy* sub-programme and market development

Measures in the district heating and cooling systems	Expected scope of implementation of measures
connection of consumers and expansion of district heating networks	increase of the share of heat supply by 33.8% by 2020 and by 19.7% by 2030
EUE in district heating and cooling systems	improvement
construction of DH systems: small district heating systems with an average thermal power for production of 500 kW; large systems with an average size of 4 MWt	increase of heat production in DH systems by 15.4% by 2020 and by 8.2% by 2030 in the existing and new DH systems
construction of district heating systems	minimum 60 MW DH systems by 2030
exploitation of waste for energy purposes [70]	7 MWe (1.5 PJ fuel/year)

Table 18: Expected autonomous response of actors to the market conditions

Measures in natural gas distribution systems	Effect
connection of consumers and expansion of natural gas distribution networks	increase

[69] See the 'Education and training' sub-programme.

[70] The measures are included in the operational programmes for waste management.

new natural gas distribution systems	increase

Actors

- **investors:** the owners of district heating systems, infrastructure in the business zones, energy supply companies, providers of energy services, municipalities;
- **financial institutions:** Eco Fund, banks and others;
- **preparation of projects and support with decisions:** designers, energy managers, local communities;
- **stimulation, promotion and training:** ME: preparation, management, coordination and implementation of key activities, GOLR within the promotion of the cohesion policy, MESP within the promotion of the Rules on efficient use of energy in buildings, MF and GODEA within the promotion of green public procurement, local communities, energy companies;
- **promotion:** ME: preparation, management, coordination and implementation of key activities; Eco Fund: financial incentives; local communities, local energy agencies;
- establishment of a quality assurance system, reinforcement of actors, education and training: chambers, associations, professional organisations, higher education.

Financing

Promotion of district heating systems is financed through the contribution for EUE. The funds of the cohesion policy are also planned within the OP ETID. For financing CHE in the district heating systems, a support scheme was established for electricity generation from CHE and RES paid by every end consumer. After 2013, part of the revenue from the auctions of GHG emission trading will be used for financing district heating systems. The expected total costs for promotion of district heating systems by particular year are shown in the table below.

Financing sources:

- contribution for ensuring support in electricity generation in high-efficiency CHE and from RES;
- EU funds from the financial perspective 2007–2013:
  - OP ETID, priority task of sustainable energy;
- budgetary resources;
- European fund of the European Energy Programme for Recovery – in preparation;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS) from 2013;
- EU funds from the financial perspective 2014–2020;
- support scheme for heat supply from RES;
- loans (Eco Fund, etc.);
- own personal funds for heat supply;
- private sources.

Table 19: Funds required for implementing the *Local supply of energy* sub-programme and financing sources

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	[EUR million]										
public funds required for financing the 'Local supply of energy' sub-programme	23.5	46.5	49.1	49.8	55.5	58.2	48.8	48.5	47.9	47.3	46.8

Monitoring sub-programme implementation

Table 20: Main indicators for monitoring the *Local supply of energy* sub-programme

Objective	Indicator	Unit
meeting the criterion of 80% of CHE or RES in district heating systems	the number of DH systems that meet the criterion the share of heat generation from CHE or RES in DH systems	[no.] [%]
meeting the criterion of 20% of CHE or RES in district heating systems	the number of DH systems that meet the criterion the share of heat generation from CHE or RES in DH systems	[no.] [%]
expansion of networks	the number of new connections and use	[no.], [GWh]
	growth level (new: existing)	[%]

7 Cogeneration of heat and electricity

Sub-programme objectives

The sub-programme supports the implementation of key strategic NEP objectives in the field of EUE with high-efficiency CHE, thus contributing to the achievement of NEP objectives for improving the security of supply and competitiveness and reducing the environmental impact. The sectoral objectives are as follows:

- achievement of an 18% share of CHE in gross final energy use by 2020 and a 22% share by 2030;
- achievement of the target share of CHE in district heating systems[71];
- as a source of heating, new and renovated buildings will use district heating, RES, CHE, or waste heat.

Sub-programme strategy

For meeting the objectives, the Slovenian Government will provide a support environment for:

- priority stimulation of CHE on the basis of RES;
- development of high-efficiency CHE based on RES and natural gas in all sectors:
  - industry,
  - district heating systems,
  - service activities,
  - residential buildings;
- development of micro CHE.

By observing the following policies:

- to ensure that, as an energy source for CHE after 2020, exclusively the low GHG emission sources are used (under 0.23 kg CO_2eqv/kWh), especially RES and natural gas, and the gradual implementation of alternative sources, hydrogen, etc., is provided for;
- the leading role of the public sector in the implementation of CHE;
- reinforcement of the local communities for developing the district heating systems and using CHE[71];
- ensure compulsory use of district heating, RES, CHE, or industrial waste heat in all new and renovated buildings with heat consumption over 250 kW where this is technically feasible and economically reasonable;
- stimulation of development and knowledge transfer, early acquisition and verification of new technologies, and development of new financing mechanisms, particularly with the pilot projects.

The key elements of the support environment for developing CHE are as follows[72]:

- efficient implementation of the support scheme for electricity generation from high-efficiency CHE is the key stimulating mechanism;
- regulations for the methods of heating and cooling in settlements and buildings;

[71] See the 'Local supply of energy'sub-programme.

[72] See the sub-programmes 'Regulated prices and taxes', 'Research and development', and 'Education and training'.

- tax policy directed towards gradual internalisation of external costs within the green public finance reform;
- green public procurement and green state aid;
- significant reinforcement of education and training in this field;
- implementation of the quality assurance system;
- support in project preparation and consulting;
- technological development demonstration projects.

Support environment

Efficient implementation of support scheme of electricity generated from high-efficiency CHE:

- renewal of the scheme in accordance with the EA: years 2014, 2019 and 2024;
- **information and promotion:** establishment of an information point, promotion of the scheme in various target groups, provision of information on the advantages and practical aspects of CHE use;
- **provision of technical assistance for investors:** upgrade of the free-of-charge energy consulting network EN SVET for citizens, the technical office for the public sector[73], establishment of consulting services for small and medium-sized companies (with upgrading the existing systems for consulting) and promotion of project preparation in the industry;
- establishment of the system of continuous improvements of administrative procedures including a dispute settlement body.
- **update of the rules for connection to the network**[74]: unification of technical criteria and procedures for connection (instructions for connection by the size class of devices and with regard to the condition of the network, training), unification of technical criteria and procedures for units smaller than 11 kW (standard at the level of the device), implementation of tariffs for charging the costs for connecting to the network according to the uniform methodology (decree);

Promotion of the use of CHE and RES in district heating systems[71]. The objective is to ensure the compulsory 20% minimum share of heat generated from RES in the district heating systems by 2020 at the latest, and a further 60% share of heat generated in the district heating systems either from RES or CHE from any source or combination of sources of both heat generation methods. (Share_RES >= 20%; Share_RES + Share_CHE >= 80%) by 2020 at the latest in all existing systems. A 100% share of heat generated from RES or CHE in all new DH systems has to be ensured from 2012 onwards.

Promotion of CHE in buildings/general:

- revision of the Rules on efficient use of energy in buildings;
- **the compulsory share of CHE in the heating systems of buildings above 250 kW within PURES:** ensure compulsory use of district heating, RES, CHE, or waste heat in all new and renovated buildings with heat consumption over 250 kW where this is technically feasible and economically reasonable from 2012 onwards;

Promotion of the use of CHE in the public sector and all projects (co-)financed by public funds:

- to ensure supply of heat mostly from the district heating systems and to promote integrated energy-saving building restoration in the public sector and all projects (co-

[73] See the 'Efficient use of energy' sub-programme.

[74] See the 'Electricity distribution networks' sub-programme.

)financed by public funds (green state aid), namely in new buildings from 2015 onwards, and in existing buildings, by a minimum of 40% by 2020 and a minimum of 80% by 2030;
- **technical office:** assistance in CHE project preparation in the public sector[73];
- **green public procurement:** promotion of CHE within the Decree on green public procurement (being prepared) or within its revisions;
- **green state aid:** horizontal inclusion of the criteria for RES in the buildings in the invitations to tender, so that all projects financed with the funds from the European funds in the period up to 2013 will provide heating from district heating systems, RES, CHE, or waste heat if it is technically feasible and economically viable; expansion of the concept to other types of state aid;
- **development of financing models:** especially public-private partnership, energy contracting, etc.;
- **demonstration projects** for promoting new technologies, and development and verification of new financing models of the investments in CHE in the public sector.

Promotion of CHE in multi-storey dwellings and service activities:
- **promotion of the development of financial products** or financing models for the housing sector, separately for multi-storey dwellings;
- demonstration projects and systematic promotion of good practices;
- **provision of support for decisions:** free technical consulting, training of building managers;
- **establishment of the system for quality assurance implementation;** certification of energy consultants and other measures;
- promotion of integrated renovation of buildings, including CHE[13] systems;

Promotion of CHE in the economy (industry and service activities):
- promotion of the development of CHE financing models;
- financial incentives for connecting to the district heating systems;
- **reinforcement of capacities for preparing and implementing the projects in industry**[75] (support for project preparation);
- **promotion of CHE in SME** within the promotion of CHE in small and medium-sized companies; establishment of consulting services for small and medium-sized companies (with upgrading the existing systems for consulting).

Technological development demonstration projects;

Co-formulation of the rules for promoting CHE at the EU level (co-formulation of methodology for monitoring the effects of CHE on the objectives of the climate and energy policies, etc.[76]);

Table 21: Tasks, time limits, responsible institution, and financial resources of the *CHE* sub-programme

Task	Time limit	Resources	Responsibility
renewal of support schemes for electricity generated from RES	2014, 2019, 2024	[]	ME
efficient implementation of the scheme		[]	
information point	2011		MPA
provision of technical assistance to investors	2011		ME
system of continuous improvements of administrative procedures	2012		MPA
update of the rules for connecting to the network	2011		ME/SODO

[75] See the 'Education and training' sub-programme.

[76] See the 'Local supply of energy' sub-programme.

Task	Time limit	Resources	Responsibility
promotion of CHE in buildings amendments to PURES the compulsory share of CHE in the heating systems of buildings above 250 kW within PURES		[]	
promotion of CHE in the public sector the compulsory share of supply of heat from DH technical office green public procurement green state aid development of financing models demonstration projects	 2011 2011 2011 2012 2012 from 2011	[]	
promotion of CHE in multi-storey dwellings and service activities: development of financial products demonstration projects and promotion of good practices provision of support for decisions quality assurance system promotion of integrated renovation of buildings	 from 2011 permanently permanently 2012 2012	[]	 ME ME/Eco Fund/ GOCC/EnSvet ME ME ME/Eco Fund
promotion of CHE in the industry: development of financing models connection with the CH systems reinforcement of capacities CHE in SME		[]	
international cooperation	2011-2011	[]	ME
technological development demonstration projects	2011-2020	[]	MHEST

Expected effects

Table 22: Expected response of the actors to the incentives of the *CHE* sub-programme and market development

Measure	Expected scope of implementation of measures
high-efficiency CHE (replacement or modernisation of old facilities and systems for heat supply and new systems)[77]:	
CHE on NG in industry	165 MW by 2020 and 95 MW by 2030
CHE on NG in district heating systems (without TE-TOL)	20 MW by 2020 and 6 MW by 2030
CHE on NG in service activities	28 MW by 2020 and 27 MW by 2030
CHE on NG in households	11 MW by 2020 and 25 MW by 2030

Actors

- **investors: the owners** of industrial companies, district heating systems, infrastructure in the business zones, energy supply companies, business and multi-storey dwellings, one-storey dwellings, the public sector, **the companies for energy supply and other providers of energy services;**
- **financial institutions:** Eco Fund and others – financial products for CHE financing;

[77] It concerns various high-efficiency technologies on natural gas for energy consumers and local heat supply systems. For CHE and RES, see the *Renewable energy sources* sub-programme. Co-combustion of biomass in large thermal power plants and the planned gas and steam CHE in TE-TOL have been discussed in the *Electricity generation* sub-programme.

- **preparation of projects and support with decisions:** designers, energy managers, local communities, building managers, managers;
- **stimulation, promotion and training:** ME: preparation, management, coordination and implementation of key activities, promotion of the system of support for electricity generation from high-efficiency CHE and implementation of the cohesion policy, GOLR within the promotion of the cohesion policy, MESP within the promotion of the Rules on efficient use of energy in buildings, MF and GODEA within the promotion of green public procurement, local communities, energy companies, especially companies that supply natural gas, **non-governmental organisations**;
- **promotion of EUE:** ME: preparation, management, coordination and implementation of key activities; Eco Fund: financial incentives; "the Agency for Efficient Use of Energy and Renewable Energy Sources": non-financial incentives; local communities: co-formulation and implementation of legislation, incentives; local energy agencies;
- establishment of a quality assurance system, connection of actors, education and training: chambers, associations, professional organisations, higher education.

Financing

The promotion of CHE shall be financed within the support schemes for electricity generated from CHE based on the contribution for providing support to generation of electricity from high-efficiency CHE and RES paid by every end consumer. After 2013, the scheme will be partly financed from the revenue of auctions in the coupon market of carbon dioxide emissions. The demonstration projects will be financed from the Fund and the revenue from auctions. The expected total costs for support of high-efficiency CHE by particular years is shown in the table below.

The foreseen financing sources are:

- contribution for ensuring support in electricity generation in CHE and from RES;
- budgetary resources;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS) from 2013;
- EU funds from the financial perspective, 2014–2020;
- support scheme for the heat supply from RES;
- loans (Eco Fund, etc.);
- own funds of energy companies (public and private), strategic investors and other private sources.

Table 23: Funds required for implementing the *CHE* sub-programme and financing sources

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	[EUR million]										
financing sources: support scheme for electricity generation from CHE	22.9	27.6	27.1	29.8	33.9	46.5	50.1	55.0	56.8	61.7	65.3

Monitoring sub-programme implementation

Table 24: Main indicators for monitoring the *CHE* sub-programme

Objective	Indicator	Unit
achievement of 30% generation from CHE in the final consumption of electricity by 2030	the share of generation from CHE with regard to the final consumption of energy	[%]

Objective	Indicator	Unit
achievement of the criterion of 100% CHE, RES or district heating in public buildings and buildings co-financed by public funds	the number of buildings meeting this criterion heated surface of the buildings meeting this criterion	[%] [m^2]

NEP SUB-PROGRAMMES IN THE FIELD OF ELECTRICITY SUPPLY

Key policies in this area are as follows:

- an efficient electricity market within the European regulation for openness, greater transparency and competitive supply of consumers;
- an efficient, development-oriented regulatory framework and stability, predictability and transparency of legislative framework;
- further development of the transmission and distribution network related to implementation of investments for renovation of the network, improved quality and extension of dispersed electricity generation;
- priority exploitation of the potential of RES in electricity generation and the provision of most electricity production from domestic energy sources;
- monitoring the success of preparing and implementing the NEP projects as the effectiveness criteria of management and supervisory bodies of mostly state-owned companies;
- training, education, research and development.

8 Electricity generation

Sub-programme objectives

The sub-programme objectives are to provide:

- competitive generation of electricity in Slovenia and profitability of companies' operation;
- reduction of environmental burden and long-term transition to low-carbon sources;
- 40% share of electricity generated from RES in gross final electricity consumption by 2020, and 53% share of RES by 2030, thus contributing to meeting the objective of 25% share of RES in gross final energy consumption by 2020;
- autonomy of electricity system in emergency conditions and diversification of integration with neighbouring markets;
- appropriate quality and security of electricity supply by end-consumers.

Sub-programme strategy

For meeting the objectives, the Slovenian Government will provide a support environment for:

- priority exploitation of the potential of RES in electricity generation;
- exploitation of high-efficiency CHE[78];
- diversification of sources in electricity generation maintained at least at the present level;
- provision of most production from domestic energy sources;
- further exploitation of Velenje Mine in connection with electricity generation and gradual closure of the mine until 2050;
- further long-term exploitation of nuclear energy in Slovenia;
- gradual cessation of use of imported coal for electricity generation by 2020;
- accelerated introduction of low-carbon technologies for electricity generation.

By observing the following orientations:

- accelerated implementation of investments for replacing the generation capacities that will cease to operate by 2015;
- financing the projects with income in the market;
- providing reserve power for primary regulation in Slovenia;
- providing reserve power for secondary and tertiary regulation in Slovenia in accordance with ENTSO-E regulations, namely, between at least 66% and 100% for secondary regulation and at least 50% share for tertiary and secondary regulation together. Under economy conditions, the full scope of regulation in Slovenia is provided, otherwise the remaining reserve power is provided in the area without limitations of overhead power lines;
- integrating new units in the international trade of electricity and coordinating their size with the requirements, which they cause in the Slovenian electricity system, for additional system services;
- enabling the development of electricity generation as an export economic activity by observing environmental objectives;
- providing competitiveness of projects in the regional market and appropriate profitability of projects;

[78] See the 'Cogeneration of heat and electricity' sub-programme.

- burdening of producers with all disproportionate costs for a transmission network;
- interconnectors to the existing network will be part of the power plant construction project, both organisationally and financially;
- directing the construction of production facilities to the existing locations of power plants and industrial locations most suitable for electricity generation from the perspective of land use, available infrastructure, personnel capacities, social acceptability and integration in the electricity transmission network;
- best available technologies (BAT) are used for the units above 10 MW. For small units, the advantages of early adoption of modern technologies are exploited;
- in the reconstruction of existing thermal energy facilities, BAT technologies and energy products with low specific GHG emissions are used, thus contributing to meeting the EU objective within the ETS;
- observing high environmental standards, particularly the use of the latest NOx purification devices – use of secondary measures for NOx purification (denitrification devices based on catalytic or non-catalytic process) on fossil fuel devices that will begin to operate after 2015;
- providing the possibilities for building carbon-capture devices at a later time in all new fossil fuel production units.

Key elements of the support environment:

- providing for the implementation of investments by timely decisions on the matters under the authority of the State;
- providing financial support to RES and high-efficiency CHE for achieving environmental objectives;
- systemic monitoring of financial sources for project implementation and promoting the reinvestment of profits of energy companies in sustainable energy options;
- limited support to domestic production;
- know-how, capacity building, transfer of good practice, including within publicly-owned companies;
- increased efficiency of procedures for spatial placement of new production facilities, especially facilities exploiting RES.

Support environment

For achieving the objectives of the sub-programme 'Electricity generation in the transmission network', the support environment will consist of the following actions within the authority of public administration:

- improving the legal acts regulating the spatial placement of power production facilities and quality management of these procedures; improving the decision-making processes, including communication with the public[79];
- in case of utilising public funds, timely decisions on funds at an appropriate level;
- regulating the relationships with concession contracts for all hydroelectric power plant projects in NEP;
- establishing strict criteria for granting government guarantees in accordance with the EU regulations for NEP priority projects and timely decision-making;
- in managing the state capital investments, the promotion of:
  - timely and transparent decisions on constructing new facilities based on quality preparation of projects, including from the position of financing and the corporate model of implementation of investment;
  - an accelerated preparation of implementation documentation for all key NEP projects;

[79] See the 'Spatial planning' sub-programme.

  - promoting reinvestment of profits of energy companies in sustainable energy projects, promoting the cooperation of energy companies in project implementation, and execution of projects in strategic partnerships: with long-term contracts for the sale of produced electricity;
  - establishing specialised teams and transferring knowledge for managing large investments in energy companies;
  - accelerated implementation of investments for replacing the generation capacities that will cease to operate by 2015;
- implementing the obligation for every state-owned energy company operating in the free market to allocate at least 15% of the profit for EUE research and development, production of electricity and heat on RES and CHE;
- for constructing new reserve capacities for tertiary regulation in Slovenia by 2012, SOPO shall carry out an international invitation to tender for a 15-year long-term provision of reserve capacities in the territory of Slovenia between 200 and 250 MW, provided that the economic conditions are met; the invitation to tender for providing tertiary reserve has to enable cooperation of energy consumers or groups of energy consumers that would provide this service either with positive or negative power;
- the calculation of network charges shall be changed so that a part of the costs for operation/construction of networks is carried by the producers, except for RES and CHE with high efficiency, namely in proportion to the unit size. The producers shall bear all disproportionate costs caused to the system, particularly the costs for providing system services and disproportionate loss in the system. (ME, AGEN-RS and ELES shall prepare the legal acts regulating this field, including the methodology for calculating the contribution of producers for a transmission network);
- in constructing the units requiring additional increase of reserve capacities, SOPO may determine an obligation for project holders to provide for the tertiary reserve, while taking into consideration the disproportionate costs incurred by the unit for the system. (AGEN-RS and ELES shall prepare the acts regulating this area);
- arrangement for the coordinated construction of new power plants and interconnectors to the existing network, which should be part of the projects for constructing the power plant, both organisationally and financially (ME and AGEN-RS shall prepare the acts regulating this area);
- implementing the mechanism of international invitations to tender for new production capacities as allowed by Directive 2005/89/EC, only in case of delaying the implementation of NEP projects in such a scope that would endanger the electricity supply;
- strengthening the capacities for preparing and implementing the projects at all levels[80];
- promoting expert and research activities in the economy and the research field with the goal of maintaining the continuity of knowledge in the field of energy, and transfer of knowledge and technologies to domestic industry[81];

Table 25: Tasks, time limits, responsible institution, and financial resources of the *Electricity Generation* sub-programme

Task	Time limit	Resources	Responsibility
amendments to the methodology for preparing and evaluating investments of a public nature by adopting a regulation, and for preparing and evaluating investment projects in state-owned companies or recipients of State aid;	2011	[]	ME, MF
amendment to the regulations for spatial placement of energy facilities;	2011	[]	MESP, ME
amendment to the acts relating to concessions;	2011	[]	ME, MESP

[80] See the 'Education and training' sub-programme.

[81] See the 'Research and development' sub-programme.

Task	Time limit	Resources	Responsibility
invitation to tender for reserve capacities for TRR in Slovenia;	2011	[]	ME, ELES, AGEN-RS
amendment to the EA for support mechanisms in accordance with Article 64r for BAT technologies;	2011	[]	ME
decision-making, preparation (including financing sources), establishing the conditions for the implementation, and implementing key NEP projects for electricity generation (Table);	(see Table)	[]	energy companies
provision of conditions for implementing the other NEP projects for electricity generation (Table);	(see Table)	[]	
NEP projects monitoring;	permanently	[]	companies, ME, AUKN
strengthening the capacities for preparing and implementing the projects and promoting the establishment of specialised teams;	permanently	[]	ME, energy companies

Sub-programme actors

The State does not have direct actions for ensuring the implementation of investment for electricity generation; however, it can indirectly direct and encourage through authorisations and other allowed mechanisms for directing market activities and the State's role as the owner; therefore, it is that much more important to define the role and responsibilities of particular actors.

The preparation and decisions on investment projects depend on the quality of development plans of state-owned companies and their implementation, namely, on many actors responsible for these companies: (investment/development departments, company management, supervisory board, State-owner); the State directs profit into development through its role as the owner; an efficient implementation of procedures by the State, MESP, ME and the local communities (EIA, CEIA, NSP, concessions, authorisations, etc.); early consideration of environmental criteria in preparing the projects (postponement); timely verification of social acceptability of projects (prior to spatial placement).

Expected effects[82]

Table 26: The expected response of actors to the measures of the sub-programme *Electricity Generation* and market conditions – investment projects by 2020

Projects/facilities	Threshold power (MW)	Planned time limit	Project holder/operator/promoter
extension of the operational life of NPPK		2023	NPPK
reconstruction of HPP on the Drava River: HPP Zlatoličje HPP Formin	Δ 24 (additionally) Δ 12 (additionally)	2013 2018	DEM
HPP chain on the lower Sava River: HPP Krško HPP Brežice HPP Mokrice	39 41 30	2013 2015 2018	HPPSS

[82] The data on the units under 10 MW (including wind farms) is listed in the sub-programmes *Renewable energy sources* and *Cogeneration of heat and electricity*.

Projects/facilities	Threshold power (MW)	Planned time limit	Project holder/operator/promoter
TE-TOL, gas and steam unit, CHE First phase Second phase	 from 107 to 134 from 107 to 134	 2015 2020	TE-TOL
TPP Brestanica (gas turbine)	153	2015	TPPB
TPP Šoštanj block 6	549	2015	TPPŠ
TPP Trbovlje (further exploitation of the location for energy purposes), options: gas and steam power plant new source of tertiary reserve, gas turbines	 290 from 130 to 190	2015	TPPT
new source of tertiary reserve, gas turbines (the existing energy and industrial locations)	170	2015	---
HPP chain on the middle Sava River, phase I: HPP Suhadol HPP Trbovlje HPP Renke HPP Ponoviče HPP Kresnice HPP Jevnica	 43 35 36 68 29 29	 2018 2020 2022 2024 2026 2028	HSE
PHPP Kozjak	400	2018	DEM

Table 27: The expected response of actors to the measures of the sub-programme *Electricity Generation* and market conditions – investment projects by 2030

Projects/facilities	Threshold power (MW)	Planned time limit	Project holder/operator/promoter
other HPP by 2030, 246 MW: • the area of potential energy utilisation of the Mura River – the border section with Austria to the motorway bridge at Vučja vas on the inner Mura (total power from 1.5 MW to 55 MW depending on the environmental suitability) by 2030 • the area of potential energy utilisation of the middle Sava River, phase II, depending on the environmental suitability at the section from Medvode to Jevnica • other undetermined locations between 2020 and 2030	246 MW	 2018 – 2030 2020 – 2030 2020 – 2030	 DEM HSE HSE, etc.
other PHPP	185	2028	HSE
reconstruction of HPP Moste	48	2022	SEL
Nuclear Power Plant Krško (block 2)	1.000[83]	2022 - 2030	GEN ENERGIJA
gas and steam power plants, two units	2 x 396	2022 - 2030	-

In the environmental report, the energy utilisation of the middle Sava River from Medvode to Jevnica has been assessed with D. For constructing an HPP on this section, an appropriate decision procedure will be initiated, which the Nature Conservation Act provides for if necessary.

[83] The version of 1,600 MW is also possible.

Financial resources

Financing sources:

- own personal funds of energy companies (public and private), strategic investors and other private sources;
- loans;
- contribution for ensuring support in electricity generation at CHE and from RES;
- budgetary resources for implementing the arrangement of the water infrastructure and the national and local infrastructure for constructing an HPP on the middle Sava River in accordance with the Act Governing the Conditions of the Concession for the Exploitation of Energy Potential of the Lower Sava River (ZPKEPS), Official Gazette of RS, No. 20/82004-UPB1, 91/2007;
- support mechanism for 15-percent electricity supply from domestic energy sources for supporting production at TPPT;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS) from 2013.

No public funds are required for implementing the sub-programme[84]. Investments shall be covered by revenue from the sale of energy and energy services in the market. The total value of investments (without financing costs) in electricity generation (in the units above 10 MW) for the proposed scenarios from 2010 to 2030 amounts to EUR 3.4 billion for the scenario BS INT and EUR 7.4 billion for the scenario NS INT[85][84].

Monitoring of implementation

Table 28: Main indicators for monitoring the *Electricity Generation* sub-programme

Objective	Indicator	Unit
achieving the RES target share	share of electricity generation from RES	[%]
GHG emission reduction	GHG specific emissions	[kt CO_2 eqv/kWh]
	GHG emissions of sectors CRF and NFR 1.A. 1.a	[kt CO_2 eqv]
economic performance of state-owned companies	return on invested funds	[%]
diversification of electricity generation sources	the predominant share of the most frequent sources by purpose of use	[%]
energy dependency of sources	the production share from domestic sources with regard to electricity consumption	[%]
age of facilities	the remaining operating life weighted with power or production	[years]
adequacy of capacities	adequacy of capacities according to the international ENTSO-E methodology	assessment according to the methodology

[84] See the chapters on Impact assessment and Financing.

[85] See the chapters on NEP impact assessment and Financing.

9 Electricity transmission

Sub-programme objectives

The sub-programme objectives, which will enable meeting the NEP objectives, are as follows:

- to increase robustness and flexibility of the Slovenian transmission network by:
  - constructing internal connections at the highest voltage level of 400 kV;
  - constructing new cross-border connections;
- connection of new generation capacities to the transmission network;
- reinforcement of 110 kV transmission network;
- to improve the quality of the electricity supply for the transmission network;
- maintain or increase security of feed at transmission level while reducing the costs of operation and maintenance per unit of network length, and increase efficiency of investments.

Sub-programme strategy

For meeting the set objectives, the Slovenian Government will provide a support environment for:

- construction and reinforcement of internal connections at the highest voltage level of 400 kV: by concluding the internal 400 kV loop by overhead power line between TS Beričevo and TS Krško, and transition of the inner 200 kV network to 400 kV voltage level;
- connection with neighbouring countries by constructing new cross-border European connections: with a new 400 kV connection with Hungary by 2016 and a new connection with Italy by 2018, and for bringing the markets closer, regional connection and strengthening of the internal European electricity market;
- interconnectors to the existing network for new production capacities;
- reinforcement of 110 kV network by constructing new overhead power lines and reconstructing the existing lines to increase security of operation, make the network capable of connections of dispersed sources of production, and fulfil the need for a greater connected load of producers and network consumers;
- introduction of the concept of smart networks at transmission level.

Sub-programme orientations are as follows:

- in planning the projects, appropriate use of commercially sold mature new technologies has to be provided for;
- by constructing new overhead power lines and reducing the costs of operation and maintenance per unit of network length (per unit of network length);
- achieve more efficient implementation of investments in the transmission network with quality education, better organisation and exploiting competition by suppliers of equipment and services;
- strengthen the system of education and research in the field of project management, technology, economy and ecology in the energy industry, both within university programmes and specialised institutions as well as within companies in this industry;
- in ten-year development plans, process the suitability of the amount of required funds for the planned investments within the regulatory framework specified by AGEN-RS, by taking into consideration the companies' performance;
- burdening of producers with all disproportionate costs for a transmission network;

- interconnectors to the existing network will be organisationally and financially part of the power plant construction project;
- further promoting of the system operator in the international space as the manager of the regulation block Slovenia, Croatia, and Bosnia and Herzegovina.

The key elements of the support environment for developing the electricity transmission activities:

- improving the legal framework, including the procedures for more efficient and faster spatial placement of facilities and construction of power facilities;
- efficient protection of protected zones of existing and planned power lines, and acceleration of spatial planning procedures for linear facilities;
- the methodology for determining network charges will be development-oriented and formed based on development projects and effectiveness in their implementation. It will also be altered to burden producers for the disproportionate costs they cause[86];
- coordinated course of construction of new power plants and interconnectors to the existing network, which should be organisationally and financially part of the power plant construction project;
- arrangement of the field of development of smart networks at transmission level;
- monitoring of the quality of the supply at transmission level, and increasing this quality by constructing new facilities and implementing new technologies and systems.

Support environment

For the field of electricity transmission, the following new and amended actions within the authority of public administration are required, which will help to create an appropriate support environment for achieving the objectives of developing electricity transmission:

- actions in the field of spatial planning (see the *Spatial planning* sub-programme);
- preparation of legal acts regulating the borders of the transmission network in relation to other parts of the energy system for increasing the efficiency of operation;
- the calculation of network charges shall be changed so that a part of the costs for operation/construction of networks is carried by the producers, except for RES and CHE with high efficiency, namely in proportion to the unit size. The producers shall bear all disproportionate costs caused to the system, particularly the costs for providing system services and disproportionate loss in the system. (ME, AGEN-RS and ELES shall prepare the legal acts regulating this field, including the methodology for calculating the contribution of producers for a transmission network);
- in constructing the units requiring additional increase of reserve capacities, SOPO may determine an obligation for project holders to provide for the tertiary reserve, while taking into consideration the disproportionate costs incurred by the unit for the system. (AGEN-RS and ELES shall prepare the acts regulating this area);
- arrangement for the coordinated construction of new power plants and interconnectors to the existing network, which should be part of the projects, both organisationally and financially, for constructing a power plant (ME and AGEN-RS shall prepare the acts regulating this area);
- for constructing new reserve capacities for tertiary regulation in Slovenia by 2012, SOPO shall carry out an international invitation to tender for a 15-year long-term provision of reserve capacities in the territory of Slovenia up to 250 MW, provided that the economic conditions are met; the invitation to tender for providing tertiary reserve has to enable cooperation of energy consumers or groups of energy consumers that would provide this service either with positive or negative power;

[86] Implementation of G tariff, also see the *Electricity generation* sub-programme.

- amendments to the Construction Act (ZGO) and EA are required for an appropriate regulation of constructing linear facilities, namely:
    - definition of the Aggregate Economic Cadastre of Public Infrastructure (ZK GJI) as the basis for executing reconstruction of the existing overhead power lines;
    - amendment to the Act and preparation of an act that will define, in detail, the borders of transmission infrastructure between system operators of transmission and distribution networks;
    - better regulation of obtaining property right and expressing public purpose;
    - amendment to the Act and preparation of a regulation detailing the conditions for constructing in the protected zone;
    - definition of the rights of energy inspection in the field of construction, operation and maintenance of energy networks with the possibility of imposing sanctions;
- important elements of meeting the set objectives also include investments in secondary equipment, telecommunications infrastructure, management centres, and implementation of new technologies and education. The scope of investments in the next ten years represents similar efforts as the construction of the 400 kV network in Slovenia between 1975 and 1985 that followed the construction of the 220 kV network. It has been 25 years since the previous major investment cycle, and during this time, only one OPL 400 kV (Maribor – Kainachtal 1992) was built. For successful implementation of the investments, it will be necessary to invest in education and development. It concerns knowledge within universities and educational centres as well as research institutions in the field of the energy industry. The transfer of good engineering practice and modern approaches is also important, along with the use of new technologies in constructing the network based on experience from other countries, as well as through direct cooperation with other transmission companies. The knowledge and experience available within organisations of professions have to be exploited to the highest extent possible (CIGRE, ENTSO-E, EURELECTRIC, and similar others);
- provision of conditions for managing the regulation block of Slovenia, Croatia and BiH, and gradual expansion of international activities of the transmission network system operator, particularly in European Energy Community countries.

Table 29: Tasks, time limits, responsible institution, and financial resources of the *Electricity Transmission* sub-programme

Task	Time limit	Funds/costs*	Responsibility
management of NDP procedures in reasonable time	permanently		MESP
issue of construction licences in reasonable time	permanently		MESP
elaboration and adoption of a decree on the criteria for using underground power connections in Slovenia	2011		MESP, ME, Slovenian Government
amendment to the EA	2011		MESP, ME, Slovenian Government
elaboration and adoption of the National Strategic Spatial Plan	2011		MESP, ME, Slovenian Government
start of the NSP procedure for all priority facilities from NEP	2011		ME, MESP
po	next regulatory period		AGEN-RS
elaboration and adoption of a decree that will regulate a coordinated course of construction of new power plants and interconnectors to the existing network	2011		ME

Actors

The key actors for implementing the sub-programme are as follows:

- Ministry of the Economy: full implementation of NEP, preparation and amendment of legislation;
- Ministry of the Environment and Spatial Planning: efficient management of spatial planning procedures, in particular coordination between the Spatial Planning Directorate and the Environment Directorate within the Ministry, and preparation and amendment of legislation;
- System operator of transmission network (SOPO): NEP implementation and achievement of NEP objectives in the field of electricity transmission, preparation and implementation of the development plan, proposal of amendment to legislation for more efficient meeting of NEP objectives;
- System operator of distribution network (SODO): implementation of NEP strategy and achievement of NEP objectives in the field of electricity transmission for 110 kV facilities under the authority of SODO, preparation and implementation of the development plan, proposal of amendments to the legislation for more efficient meeting of NEP objectives;
- Educational and research institutions: education for implementing the programme and providing expert bases;
- electricity consumers: expression of interest of buyers of products and services in the field of electricity, particularly the requirements of quality supply and rational operation;
- stakeholders in the decision-making process: co-participation in decision-making processes on NSP and other public documents.

Key infrastructure projects

In continuation, the priority projects on the high-voltage transmission network are presented. The tables include new projects planned by 2020 and a few of the most important reconstructions. Nevertheless, the NEP priority is to implement reconstructions and renovations of the existing high-voltage network that extend the operating life and reduce specific costs of operation and maintenance. Where two amounts of foreseen costs are indicated in the tables, first the value of the facility in the period from 2010 to 2020 is indicated. Where a part of the funds has already been used, the total investment value is indicated in the brackets for comparison. The facilities are sorted by planned year of entry into operation. This way it is possible to check mutual harmonisation of projects of various companies. Between 2020 and 2030, the facilities are not presented in the table, because they have not yet been processed at the same level as those for the first ten years. They are listed in continuation; however, prior to including them in the companies' development plans, appropriate studies have to be conducted and arguments stated.

Voltage level of 220 and 400 kV:

- The highest voltage level of 400 kV will become even more important in the period concerned, because the closure of the 400 kV internal loop and a gradual transition of most of the 220 kV network to 400 kV are planned. Thus, the highest voltage level will be significantly reinforced.
- By new cross-border connections, the first connection with neighbouring Hungary is particularly important, because it represents an overhead power line connection with Slovenia's fourth neighbouring country and the reinforcement of overhead power line connections towards markets with cheaper electricity. The most important part of network construction has to be completed by 2020.
- After this year, the execution of the 400 kV loop in Primorska (TS Avče – new TS Gorica – TS Divača) is foreseen as well as the implementation of FACTS devices in TS Beričevo. 220

kV connections with the neighbouring countries after 2020 will gradually transition to the 400 kV level; however, the transition date depends on agreements between these countries and the situation in the network of neighbouring countries. These projects will be considered in detail in appropriate studies in the next ten-year development plans of ELES.

Voltage level of 110 kV:

- The 110 kV is owned by various companies. In continuation, priority facilities with the holders or operators of particular projects are also indicated for this voltage level, whereby the projects are grouped by areas and classified by the planned year of entry into operation. Thus, the coordination of timing of projects is evident. The projects planned by distribution companies have been considered by their value in the *Electricity distribution* sub-programme. The projects are listed by their name for the first ten years.
- After 2020, some other connections will be executed, such as the connection between central Slovenia and the northern Primorska (the connection TS Cerkno – Škofja Loka or TS Žiri – TS Logatec). The studies will reveal the suitability of the existing single-system connections and any necessary reinforcements. An example is the reinforcement of the 110 kV network due to the possibility of connecting new generation capacities on the Soča River and its tributaries, the Sava River and the Mura River. In the case of constructing GSPP Koper, it will be necessary to connect the power plant to TS Koper using an appropriate 110 kV connection.
- NEP deals with thus far known needs and initiatives in the field of electricity generation and the related network reinforcements. In the period concerned, undoubtedly, new needs and initiatives will arise, including from private investors, which will be in accordance with the NEP strategy and which will enable achievement of the set objectives. These facilities will require priority connection to the network and, if necessary, the network will have to be reinforced.

Other investments in the transmission network:

- Important elements of meeting the set objectives also include investments in secondary equipment, telecommunications infrastructure, management centres, and implementation of new technologies and education.

Table 30: Expected investments in the transmission network[87]

Projects/facilities	Planned time limit	Holder/ operator
400 kV overhead power lines		
OPL 2 x 400 kV Beričevo – Krško	2015	ELES
OPL 2 x 400 kV Podlog – Šoštanj (inclusion of TPPŠ6, transition from 220 kV to 400 kV)	2016	ELES
OPL 2 x 400 kV Cirkovce – Pince (H)	2016	ELES
OPL 2 x 400 kV Okroglo – Udine (I)	2020	ELES
OPL 2 x 400 kV Hrence – Kozjak (inclusion of PHPP Kozjak)	2018	HSE
OPL 2 x 400 kV Divača – Beričevo – Podlog – Cirkovce (transition from 220 kV to 400 kV and TS Kleče)	2020	ELES
transformer stations of 400 kV network and junctures – in accordance with the companies' development plans		
TS 400/110 kV Krško second transformer, OPL fields	2012	ELES
TS 400 kV TPPŠ6	2014	TPPŠ
NPPK 400 kV juncture	2016	ELES

[87] Sources: *The Development Plan of the Transmission Network in the Republic of Slovenia from 2009 to 2018, ELES, 2009; The Development Plan of the Transmission Network of the Republic of Slovenia from 2011 to 2020, ELES, 2010 (draft), HSE Development Plan,* various studies.

Projects/facilities	Planned time limit	Holder/ operator
TS 400/110 kV Crikovce	2016	ELES
TS 400/110 kV Beričevo, 300 MVA	2016	ELES
TS 400/110 kV Podlog, 300 MVA	2016	ELES
TS 400/110 kV Divača second transformer, 300 MVA	2016	ELES
TS 400/110kV Okroglo, transverse transformer	2020	ELES
TS 400/110 kV Avče	2020	ELES
TS PHPP Kozjak	2018	HSE
projects/facilities on the 110 kV network		
power lines: OPL 110 kV, OPL 2 x 110 kV, KBV 110 kV, KBV 2 x 110 kV, loop network – new constructions and reconstructions in accordance with the companies' development plans	by projects	ELES
TS 110/20 kV, TS 110 kV – many locations in accordance with the companies' development plans	by projects	ELES

Sub-programme financing

The foreseen total funds for implementing the programme of key infrastructure projects in the high-voltage transmission network in the period 2010–2020 amount to around EUR 670 million (Table 30). This amount includes the aforementioned projects (new constructions) only and does not represent all investments in the electricity transmission network. The planned investors in the transmission network are ELES, the system operator of the transmission network, and generation companies (interconnectors).

The value of the selected key projects on the highest voltage level of 400 kV amounts to over EUR 350 million. These facilities are:

- OPL 2 x 400 kV Beričevo – Krško;
- OPL 2 x 400 kV Cirkovce – Pince with TS Cirkovce;
- OPL 400 kV Okroglo – Udine;
- upgrade of the 220 kV network to 400 kV, and
- connections for new generation facilities.

The financing sources are the funds of the companies and the loans they take out. The network charges, determined by the respective regulatory framework, are the main source of operation for the transmission company and the distribution companies investing in the field of electricity transmission. The existing network charges are insufficient for the planned investments or for meeting the NEP objectives, and will have to be adjusted accordingly.

Additional funds shall be provided from European funds, which thus far have not had a major share in the value of investments in the field of transmission, along with the funds of the European Energy Programme for Recovery. The highest possible attention should be paid to the utilisation of funds from these sources, and the efficiency of utilisation should be improved.

The funds for investing in the electricity transmission network shall be defined in detail in the respective SOPO Development Plan and the operational plans of companies.

Monitoring sub-programme implementation

The proposal of indicators for monitoring the effectiveness of implementing the proposed NEP actions in the field of transmission is shown in the table below.

Table 31: Main indicators for monitoring the sub-programme *Electricity transmission*

Objective	Indicator	Value
increase the number of adopted decrees on NSP	the number of adopted decrees on NSP	[no.]
increase the number of issued construction licences for new transmission facilities from NEP (separately for OPL and TS)	the share of issued construction licences (complete) with regard to the number of new transmission facilities from NEP (separately for OPL and TS), % of obtained partial construction licences for every facility separately	[%]
reduction of costs of operation and maintenance per unit of network length at the same or increased security of feed	reduction of specific costs of operation and maintenance per unit of OPL length	[%]
provision of voltage quality in accordance with SIST EN 50160 for transmission network (110 kV level)	measurements of voltage quality according to SIST EN 50160	in compliance with the methodology
increase of robustness and flexibility of transmission network by constructing transmission capacities (for 400 kV level)	implementation of planned investments	[%]
implementation of active networks to the transmission level	implementation in accordance with the schedule	[yes/no]

Monitoring the share of issued construction licences for new facilities is of key importance for determining the actual efficiency of the changed support environment.

Monitoring the costs of operation and maintenance per unit of network length with suitable information technology and regular reporting of AGEN-RS are required. AGEN-RS will determine the target value of reducing the costs of operation and maintenance within the respective regulatory framework. Thus, the companies are stimulated to construct new overhead power lines that are most problematic (difficult spatial placement) from the position of construction.

Assessing the technological characteristics in accordance with the standard SIST EN 50160 with measuring equipment and measuring according to the standard SIST EN 61000-4-30 will enable monitoring of the quality of voltage (110 kV voltage level).

Checking the implemented investments with regard to the schedule will provide a picture of the actual efficiency of public administration relating to the support environment and companies in preparing and implementing the foreseen investments.

10 Electricity distribution network

Sub-programme objectives

The sub-programme objectives are to contribute to a reliable and long-term stable supply of electricity with the emphasis on providing:

- a planned level of uninterrupted supply to electricity consumers on the distribution network, and quality of voltage in accordance with the standards and continuous improvements of commercial quality;
- long-term development of the energy distribution network for meeting future consumption and a greater scope of dispersed electricity generation, including the implementation of active networks;
- lower costs of operation and maintenance per unit of network length at the same or higher level of long-term stability, reliability and availability of the distribution network, and efficient implementation of investments.

Sub-programme strategy

For achieving the objectives of the Electricity distribution network sub-programme, the Slovenian Government will provide for an appropriate support environment that will enable:

- further development of the distribution network related to the implementation of investments for renovation of the network, improved quality and extension of dispersed electricity generation, and requirements of larger supply power;
- implementation of transition from the existing passive to the new active distribution network;
- a leading role of the owners of the electricity distribution network in implementing *smart* measuring and calculating devices at consumers of electricity, natural gas, district heating and water; (the compulsory share of smart measuring and calculating devices at electricity consumers that SODO has to provide – 20% by 2012, 80% by 2014, 100% by 2016)[88], and implementation of dynamic tariffs (energy and network charges);
- the construction of appropriate communication channels in the distribution network for leading and managing the new active network;
- the expansion of activities of distribution companies with supply of additional services in the field of efficient use of energy by end-users, particularly in the field of energy management;
- high level of technical knowledge with permanent and systematic training for new development tasks.

Key elements of the support environment:

- development-oriented regulatory framework suitable for implementing investments for reconstruction of network, quality improvement, and development adapted to foreseen higher use and greater scope of electricity generation on the electricity distribution network;
- systematic inclusion of findings of regular and occasional quality control in the planning of networks, and intensive regulation of management systems and voltage quality control systems;

[88] Also see the *Electricity distribution networks* sub-programme.

- more efficient and faster spatial placement of energy facilities[89];
- implementation of a legal and functional separation of market and regulated activities in electricity distribution companies;
- unification of technical conditions and costs for connecting new units of dispersed electricity generation and end consumers to the distribution network;
- development of mechanisms for timely inclusion of new units of dispersed electricity generation and charging infrastructure for electric cars in the distribution network development plans;
- mechanisms for priority direction of constructing new units of dispersed electricity generation to the locations most suitable for electricity generation from the perspective of land use, available infrastructure, social acceptability and integration in the electricity distribution network;
- promoting (regulations, financial incentives and demonstration projects) the implementation of active networks with the goal of achieving greater adaptability, availability, reliability and economy of operation of the distribution network.

Support environment

For achieving the objectives of the sub-programme *Electricity distribution network*, the following actions are required:

- establishing the conditions for the implementation and implementation of key NEP projects in the development of the electricity distribution network:
    - renewal of methodology for calculating the network charges that will include a development component and simulations for improving the supply quality, and implementation of dynamic tariffs for calculating the network charges (also the costs for implementing active networks, including intelligent measuring devices);
    - financial incentives for target training for developing active networks;
    - promoting cooperation of distribution companies in the implementation of projects as well as the implementation of projects within strategic partnerships;
    - establishing specialised teams for accelerated implementation of active networks in Slovenia;
    - implementing the key NEP projects in the development of the electricity distribution network (reconstruction, expansion and reinforcement of the distribution network with regard to the projects prepared within the distribution development plans and for other dispersed sources of electricity, specified in other strategic plans (AP RES, local energy concepts, accelerated implementation of active networks, etc.));
- amendments to the methodology for preparing and evaluating investments of a public nature with a regulation that regulates the preparation and evaluation of investment projects in mostly state-owned companies or recipients of State aid;
- preparation of rules for an economy assessment method and the unification of technical rules and procedures for maintenance, reconstruction and construction of the electricity distribution network;
- update and coordination of the legal framework, including the procedures that will provide for more efficient spatial planning of energy facilities[90];
- preparation and adoption of a regulation and other important legal bases on the criteria for using the underground power connections, which will define clear and balanced criteria;

[89] See the *Spatial Planning* sub-programme.

[90] See the *Spatial Planning* sub-programme.

- amendment to the legal framework enabling the unification of technical conditions for connecting end consumers and dispersed electricity generation sources to the distribution network;
- preparation of legal acts for preventing the construction and use of devices (including generation devices) that have a negative impact on the voltage quality in the distribution network;
- simplification of the connection of new units of dispersed electricity generation to the network (SONDO annex):
    - determining minimum technical requirements for the smallest devices (minimum administrative and technical requirements for devices up to 11 kW – according to SIST EN 50438);
    - providing simplified procedures for connecting the smallest devices (up to 11 kW) to the network;
    - standardised connection for devices up to 1 MW that observes the characteristics of particular devices and the condition of the network at the connection point;
    - training of persons responsible for managing simplified and standardised procedures for connecting the devices;
- planning the distribution network development:
    - systematic and timely inclusion of new units of dispersed electricity generation in the distribution network development plans;
    - systematic and timely planning of distribution network development with regard to the expected increased number of electric cars;
    - preparation of the list of priority locations for constructing new units of dispersed electricity generation, which are most suitable for electricity generation from the perspective of land use, available infrastructure, social acceptability and integration in the electricity distribution network;
    - provision of funds for implementing the dispersed generation connections;
- in the construction of interconnectors to the new units for electricity generation over 1 MW, the extension of the guarantee by the investor, defined by the System operating instructions for electricity distribution network (SONDO), so that it will guarantee the refund of costs of reinforcing the network even in the case that the investor in the generation facility should withdraw from the construction;
- amendment of acts (EA and SONDO) that will enable establishing a tariff system for calculating the costs of connection of dispersed electricity sources up to 1 MW to the distribution network;
- preparation of required legal bases for an accelerated implementation of active networks, implementation of *smart* measuring and calculating devices at electricity consumers, and ensuring a leading role of electricity distribution network managers in integrating the measurements of the consumption of electricity, natural gas, district heating and water (the compulsory share of *smart* measuring and calculating devices at electricity consumers, which have to be provided by SODO – 20% by 2012, 80% by 2014 and 100% by 2016);
- accelerated implementation of *smart* measuring and calculating devices at electricity consumers:
    - elaboration of the plan of accelerated implementation of *smart* measuring and calculating devices;
    - elaboration of the plan of accelerated implementation of *smart* measuring and calculating devices (when 20% of all household consumers in Slovenia are equipped with the new devices, evaluation and any corrections needing to be made in the implementation are foreseen);
- establishing a system of reference indicators for monitoring minimum standards of the electricity supply (AGEN-RS), and monitoring the achievement of electricity supply standards;

- complete entrepreneurial and ownership separation of regulated and market activities in the field of electricity distribution with a planned increase of the share of state ownership in regulated activities to 100% and decrease of state ownership in market activities;
- implementation of a legal and functional separation of market and regulated activities in electricity distribution companies. The separation will be implemented in a manner by which the existing electricity distribution companies will transfer the activities of electricity purchase and sale to subsidiary companies on 1 January 2011;
- promoting the expansion of activities of electricity distribution companies: promoting the development and implementation of EUE programmes in electricity distribution companies (all companies);
- reinforcing the capacities and new knowledge for preparing and implementing the programmes[91];
- promoting the expert and research activities with the goal of further development and transfer of knowledge in the energy industry[92].

Table 32: Tasks, time limits, responsible institution, and financial resources of the *Electricity distribution network* sub-programme

Task	Time limit	Funds by 2020	Responsibility
establishing the conditions for the implementation and implementation of key NEP projects in the development of electricity distribution network: renovation of methodology for calculating network charges; financial incentives for target training for developing active networks; promoting cooperation of distribution companies in the implementation of projects within strategic partnerships; establishing specialised teams for accelerated implementation of active networks in Slovenia; implementing key projects of distribution network development;	2011, permanently	[]	ME, MF, AGEN-RS, SODO, distribution companies
implementing the key NEP projects in the development of the electricity distribution network (reconstruction, expansion and reinforcement of the distribution network with regard to the projects prepared within the distribution development plans and for other dispersed sources of electricity, specified in other strategic plans, accelerated implementation of active networks, etc.);		[]	SODO, distribution companies
amendments to the methodology for preparing and evaluating investments of a public nature with a regulation that regulates preparation and evaluation of investment projects in state-owned companies or recipients of State aid;	2011	[]	ME, MF
preparation and adoption of a regulation and other important legal bases on the criteria for using the underground power connections, which will define clear and balanced criteria;	2011	[]	ME, AGEN-RS, SODO
amendment to the legal framework enabling the unification of technical conditions for connecting end consumers and dispersed electricity generation sources to the distribution network;	2011	[]	ME, AGEN-RS, SODO
preparation of legal acts for preventing the construction and use of devices (including generation devices) that have a negative impact on the voltage quality in the distribution network;	2011	[]	ME, AGEN-RS, SODO
preparation of rules for an economy assessment method and unification of technical rules and procedures for maintenance, reconstruction and construction of electricity distribution network;	2011	[]	ME, AGEN-RS, SODO
simplification of the connection of new units of dispersed electricity generation to the network: determining minimum technical requirements for the smallest	2011	[]	SODO, AGEN-RS, ME

[91] See the *Education and training* sub-programme.

[92] See the *Research and development* sub-programme.

Task	Time limit	Funds by 2020	Responsibility
devices (minimum administrative and technical requirements for devices up to 11 kW – according to SIST EN 50438); providing simplified procedures for connecting the smallest devices (up to 11 kW) to the network; standardised connection for devices up to [1] MW that observes the characteristics of particular devices and the condition of the network at the connection point; training of persons responsible for managing simplified and standardised procedures for connecting the devices;			
planning the development of the distribution network for systematic and timely: inclusion of new units of dispersed electricity generation in the distribution network development plans; development of charging infrastructure for electric vehicles;	permanently	[]	SODO, distribution companies, Borzen
preparation of the list of priority locations for constructing new units of dispersed electricity generation, which are most suitable for electricity generation from the perspective of land use, available infrastructure, social acceptability and integration in the electricity distribution network;	2012	[]	SODO, MESP, ME, distribution companies
provision of funds for implementing the dispersed generation connections;	permanently	[]	AGEN-RS, ME, SODO
extension of the guarantee by the investor for implementing the projects (over 1 MW), defined by SONDO, so that it will guarantee the refund of costs of reinforcing the network even in the case that the investor should withdraw from the construction;	2011	[]	SODO, ME
amendment of acts (EA and SONDO) that will enable establishing a tariff system for calculating the costs of connection of dispersed electricity sources up to 1 MW to the distribution network;	2011	[]	ME, AGEN-RS, SODO
amendment to the legal framework enabling the unification of technical conditions for connecting end consumers to the distribution network;	2011	[]	SODO, distribution companies
preparation of required legal bases for accelerated implementation of active networks, implementation of *smart* measuring and calculating devices at electricity consumers, and ensuring a leading role of electricity distribution network managers in integrating the measurements of the consumption of electricity, natural gas, district heating and water (the compulsory share of *smart* measuring and calculating devices at electricity consumers, which have to be provided by SODO – 100% by 2017);	2011	[]	ME, AGEN-RS, SODO, distribution companies
accelerated implementation of *smart* measuring and calculating devices at electricity consumers:		[]	
elaboration of the plan of accelerated implementation of *smart* measuring and calculating devices;	2011	[]	SODO, distribution companies
elaboration of the plan of accelerated implementation of *smart* measuring and calculating devices (when 20% of all household consumers in Slovenia are equipped with the new devices, evaluation and any corrections needing to be made in the implementation are foreseen);	by 2017	[]	SODO, distribution companies
determining and monitoring the reference value indicators of electricity supply minimum standards;	permanently	[]	AGEN-RS, SODO
monitoring the successfulness of preparing and implementing the NEP projects as the effectiveness criterion of management and supervisory bodies of mostly state-owned companies;	permanently		ME, AGEN-RS, SODO, distribution companies
complete entrepreneurial and ownership separation of regulated and market activities in the field of electricity distribution; an increase of the share of state ownership in regulated activities to 100% and a decrease of state ownership in market activities;	2011	[]	ME, AGEN-RS, SODO, distribution companies

Task	Time limit	Funds by 2020	Responsibility
promoting the development and implementation of EUE programmes in electricity distribution companies (all companies);	permanently	[]	distribution companies, SODO
reinforcing the capacities and new knowledge for preparing and implementing the programmes;	permanently	[]	distribution companies
promoting expert and research activities with the goal of maintaining the continuity of knowledge in the field of energy, and transfer of knowledge and technologies to domestic industry[93];	permanently	[]	MHEST, ME, MESP, universities, research institutions
establishing an intersectoral governmental body under the authority of the Ministry of the Economy (Energy Directorate) with clear powers for removing administrative obstacles and accelerating the implementation of projects (reconstruction and development of the network, improvement of quality, and development adapted to foreseen higher consumption and generation of electricity on the electricity distribution network, implementation of active networks) in the field of electricity distribution network development in Slovenia;	2011	[]	Slovenian Government/ME

Key infrastructure projects

Table 33: Expected investments in the *electricity distribution network*

Projects/facilities	Planned time limit
High-voltage 110 kV grid: OPL 110 kV, OPL 2 x 110 kV, KBV 110 kV, KBV 2 x 110 kV – new and reconstructed buildings	by project[94]
transformer stations 110 kV/MV	by project
other investments in the reconstruction of the 110 kV grid, increase of capacity, and reconstructions of TS 110 kV/MV by 2020:	by 2020
7,000 km of new MV cables	by project
5,600 km of reconstruction of MV cables	by project
40 new distribution MV stations	by project
35 reconstructions of distribution MV stations	by project
5,300 new TS MV/0.4 kV	by project
2,200 reconstructions of TS MV/0.4 kV	by project
3,700 km of new LV cables	by project
8,300 km of reconstructions of LV cables	by project
transition to active networks and network management:	by 2020
automation and management of MV network	by project
operation of MV network – grounding of neutral point	by project
accelerated introduction of active networks, smart measuring and calculating devices with electricity consumers and distributed producers	by project
dispatching and call centres	by project
telecommunications infrastructure	by project
systems of electricity measuring	by project
information support	by project

[93] See the *Research and development* sub-programme.

[94] In accordance with the development plans of companies.

Sub-programme actors

- The Slovenian Government: coordination of all required activities of state bodies for meeting the set objectives, establishment of an intersectoral governmental body under the authority of the Ministry of the Economy (the Energy Directorate) with clear powers for removing administrative obstacles and accelerating the implementation of projects;
- ME: preparation and amendment to the legislation, coordination of key programme activities;
- MESP: preparation and amendment to the legislation, efficient management of spatial placement procedures;
- MF: preparation and amendment to the legislation (preparation and management of public investments);
- AGEN-RS: regulation of SODO activities, preparation and amendment to the acts, monitoring the implementation of key projects;
- SODO: development planning and implementing the distribution network development plan, preparation and amendment to the legislation, coordination of key projects, efficient management of spatial planning procedures;
- distribution companies: planning the development of distribution networks, provision of financial resources for executing and implementing the development plans, reinforcement of capacities and new knowledge for project implementation, efficient management of spatial planning procedures;
- Borzen: provision of a transparent electricity trade in Slovenia, monitoring the data on planned projects of dispersed electricity generation;
- MHEST: promotion of educational and research activities with the goal of maintaining a continuity of knowledge in the field of nuclear technology.

Financing

The costs of financing in the 2011–2030 period for the electricity distribution network amount to EUR 4,880 million.

Investment financing has to be presented in the development plans by financing sources, thus determining the required funds from the network charges for using the electricity distribution network[95].

In addition to the funds for maintenance, renovation and construction of the distribution network in accordance with the development plan, the funds have to be provided for implementing active networks and a greater scope of dispersed electricity generation on the distribution network. It is also necessary to provide the required financial resources for implementing the connections of dispersed generation and reinforcing the network.

The sources of funds are the funds of energy companies (the network charges for using the network for electricity distribution) and the European funds (funds of the European Energy Programme for Recovery and other programmes or funds).

[95] See the *Taxes and regulated prices* sub-programme.

Monitoring sub-programme implementation

The basics for monitoring the effects of new and reconstructed facilities of the electricity distribution network are:

- the starting condition of a particular part of the network which, prior to the works, is evident in the achieved quality level of the electricity supply. The quality of electricity supply consists of:
  - the commercial quality or quality of services that a company provides to the network users,
  - uninterrupted supply and
  - voltage quality.
- the planned quality level of electricity supply expected to be achieved by reconstructed and new facilities, and specified in the investment documentation.

The achievement of target values is monitored by AGEN-RS. The effects of new and reconstructed facilities will be evaluated on the basis of analyses of operation of a particular part of the distribution network and supply of consumers by comparing the actual and the planned situation. The achieved values of supply reliability, voltage quality and commercial quality will have to comply with the existing regulatory framework for a particular distribution network.

The proposal of indicators for monitoring the effectiveness of implementing the proposed NEP actions in the field of transmission is shown in the table below.

Table 34: Main indicators for monitoring the *Electricity distribution network* sub-programme

Objective	Indicator	Unit
accelerated implementation of *smart* measuring and calculating devices	implementation in accordance with the schedule the share of equipped *smart* measuring devices	[yes/no] [%]
accelerated implementation of active networks	implementation of planned investments with regard to the adopted plan	[%]
reduction of costs of operation and maintenance per unit of network length at the same or increased security of feed	reduction of specific costs of operation and maintenance per unit of OPL length	[%]
uninterrupted supply	SAIDI – the System Average Interruption Duration Index SAIFI – the System Average Interruption Frequency Index	[minutes per consumer] [number of interruptions per consumer (unplanned and planned)]
provision of voltage quality in accordance with SIST EN 50160 for the distribution network (110 kV level)	measurements of voltage quality according to SIST EN 50160	results
general quality	the total number of all complaints relating to quality the total share of all justifiable complaints relating to quality	[number[[%]

NEP SUB-PROGRAMMES IN THE FIELD OF FUEL SUPPLY

11 Natural gas supply

Sub-programme objectives

For a long-term, secure and efficient implementation of natural gas transmission through the gas network, the following objectives have been defined:

- secure supply of existing and new consumers of natural gas, including use of natural gas for electricity and heat generation;
- development of transmission capacities of the gas network towards further diversification of supply routes to existing and new sources of natural gas and storage capacities for increased security and competitiveness of purchases;
- optimally efficient development and implementation of investments in natural-gas transmission network;
- efficient marketing of new transmission capacities.

Sub-programme strategy

For meeting the objectives, the Slovenian Government will provide a support environment for implementing the infrastructure projects in order to:

- ensure security of supply by reinforcing the network in Slovenia by:
  - implementing infrastructure projects that enable adequate transmission capacities and alignment with the N-1 infrastructure standard;
  - eliminating bottlenecks in the network;
  - enabling a two-way flow in gas network connections with the neighbouring transmission networks;
- connect new consumers:
  - development of the network that will enable connection of new consumers – larger electricity generation units and CHE industrial systems;
  - introduction of gas pipeline network to parts of the country without coverage;
- enable further diversification of supply routes for accessing the existing and new natural gas sources and increased competitiveness by:
  - connecting to new international pipeline connections;
  - providing connections to LNG terminals in the region;
  - providing access to new available storage capacities in the region;
- increase competitiveness of natural gas supply in Slovenia by:
  - achieving high utilisation of transmission and distribution capacities;
- analyse the possibilities for the storage of NG in Slovenia.

The set objectives will be met by observing the following orientations:

- ensuring long-term security of supply and further development of supplying the consumers in Slovenia with natural gas;
- ensuring appropriate conditions for constructing adequate capacities of natural gas transmission both for the domestic and the European market;
- promoting the construction of infrastructure that contributes to further improvement of security of supply and increased competitiveness of purchases;
- inclusion in the international projects (planned international gas pipeline connections, LNG terminals in the region) for diversification of supply sources and supply routes, and implementation of natural gas transit across the country; the latter also includes ensuring

appropriate revenue from the transit, further contributing to the provision of security of supply;
- decisions on project implementation is based on the demand for transmission capacities and economic viability of investments;
- insofar as the projects of introducing the gas pipeline network to parts of the country without coverage are reasonable from the position of promoting a balanced regional development and special earmarked funds are provided, these funds may represent the source for covering disproportionate costs in the implementation of infrastructure projects;
- in achieving the N-1 infrastructure standard, the long-term objective is to meet this standard with economically reasonable costs;
- for easier spatial placement, the existing infrastructure corridors have to be exploited for the planned gas transmission network as much as possible.

Key elements of support environment:
- development-oriented determination of network charges for achievement of NEP objectives: objectives set by the NEP must be adjusted to funding (within a three-year period) of regulatory framework to enable efficient implementation of infrastructure projects for the achievement of set objectives;
- improved efficiency of spatial placement procedures of linear facilities[96], especially protection of corridors for the planned gas transmission network;
- mechanisms for monitoring investment realisation;
- appropriate tax policy for promoting the use of natural gas, particularly in transport.

Support environment

The support environment in the field of natural gas supply consists of the following actions:
- monitoring the implementation of infrastructure projects for:
  - implementing infrastructure projects that enable economically viable achievement of the N-1 infrastructure standard;
  - eliminating bottlenecks in the network;
- preparing a final analysis of the possibilities for natural gas storage in the country and adopting the decision on potential construction of an underground storage facility, including the assessment of storage alternatives;
- regulating the ownership structure of the natural gas system operator for ensuring independence in accordance with the provisions of Directive 2009/73/ES concerning common rules for the internal market in natural gas[97];
- specifying an empowered authority responsible for implementing the actions for ensuring the security of natural gas supply [AGEN-RS or ME];
- preparing the plan of preventive actions, including the actions for reducing the determined risks, and the plan for emergency situation with the action for reducing the impact of disruptions in natural gas supply at national or regional levels;
- regional participation of the system operator of the natural gas transmission network;
- preparing the mechanism that will promote the use of alternative substitute (liquid) fuels in case of an emergency situation of major consumers of natural gas.

Table 35: Tasks, time limits, and the responsible institution of the *Natural gas supply* sub-programme

Task	Time limit	Responsibility
monitoring the implementation of infrastructure projects		ME

[96] See the *Spatial Planning* sub-programme.

[97] See the *Electricity and natural gas market* sub-programme.

Task	Time limit	Responsibility
regulating the ownership structure of the system operator of the natural gas transmission network in accordance with the provisions of the applicable Directive	2012/2013	ME
regional participation of the system operator of the natural gas transmission network	permanently	ME/AGEN-RS/empowered authority
preparing the mechanism for the use of alternative substitute (liquid) fuels by major consumers of natural gas	2012	empowered authority
determining the authority responsible for implementing the actions for ensuring a secure supply of natural gas	3 months after the decree enters into force	Slovenian Government
classifying natural gas as one of the strategic raw materials – rationality analysis	2015	ME/Slovenian Government
preparing the final analysis of possibilities of natural gas storage in the country	2012	NG supplier/ ME/empowered authority
adopting the decision on storage construction	2015	

Key infrastructure projects

The implementation of the following key projects is planned.

Construction of infrastructure facilities for increasing the security of supply:

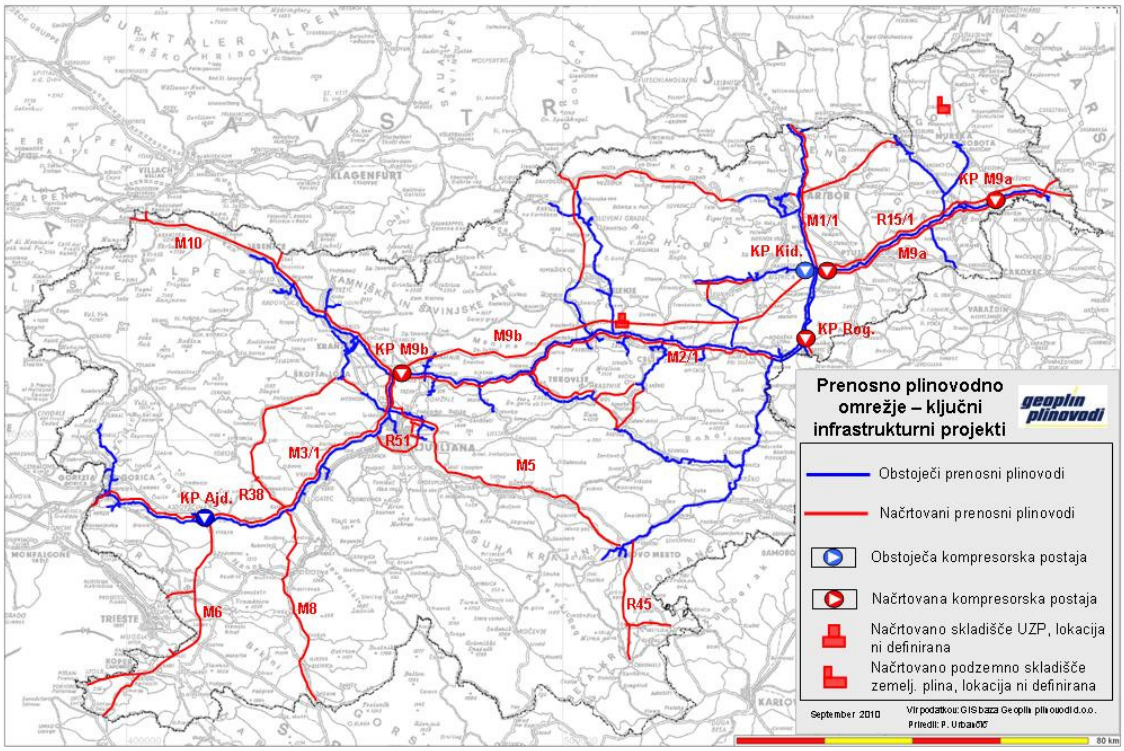
- in case of the disruption of a particularly large gas infrastructure on a day of extremely high demand of gas, which occurs once every 20 years according to statistical probability (e.g. the largest connecting pipeline for natural gas supply), the remaining infrastructure (N-1) must be able to provide adequate transmission capacity for covering the total requirements of the energy product in a closed area in a 60-day period of extremely high demand in the coolest periods. The planned projects are defined in Table 36;
- in accordance with technical possibilities, the system operator must provide a two-way flow of natural gas on the inter-state connecting pipelines in a cost-effective manner at least in the scope required for meeting the supply standard. The planned projects are defined in Table 36;
- reinforcement of the capacities on the sections where the existing network is congested;

Connection of new consumers and increasing consumption:

- developing the network that will enable the connection of new large consumers - larger units for electricity generation and industrial systems for CHE (M5 and R51 Vodice – Jarše – TE-TOL and MRP TE-TOL, etc.);
- introducing the gas pipeline network to parts of the country without coverage (R45 Novo mesto – Črnomelj, M5 Jarše – Novo mesto, M6 Ajdovščina – Koper);
- increasing the consumption of the existing consumers;

Implementation of infrastructure projects for inclusion in the planned international projects and markets. In coordination with the dynamics of international projects, priority inclusion in the next planned gas pipelines in the region is foreseen, including the connections to the LNG terminals and access to storage capacities:

- Southern Flow gas pipeline;
- Nabucco gas pipeline;
- TAP gas pipeline;
- TGL gas pipeline;
- LNG terminals: Krk and others.



Gas transmission network – key infrastructure projects (geoplin plinovodi)
- existing gas transmission pipelines
- planned gas transmission pipelines
- existing compression station
- planned compression station
- planned LNG storage, location not defined
- planned natural gas underground storage, location not defined

Figure 3: Gas pipeline network with planned investments by 2020

Table 36: Expected response of actors of the sub-programme *Natural gas supply*

Facility	Foreseen year of construction	N-1 indicator	Two-way flow	International connections
Compression stations				
CS Kidričevo, phase 1 (50 bar, unit 3)	2016*			yes
CS Kidričevo, phase 2 (70 bar)	2016*			yes
CS at M2/1 (70 bar)	by 2020*			
CS Rogatec	by 2020*			
Transmission pipelines				
M1/1 Kidričevo – Rogatec	2010			yes
M1/1 Ceršak – Kidričevo	2011			yes
M2/1 Rogaška Slatina – Trojane	2013		enabled	yes
M2/1 Trojane – Vodice	2013		enabled	yes
M5 and R51 Vodice – Jarše – TE-TOL	2014			
M3/1 Kalce – Ajdovščina	by 2020*	improving		yes
M3/1 Ajdovščina – Miren	by 2020*	improving	enabled	yes
M3/1 Kalce – Vodice	by 2020*	improving		yes
M6 Ajdovščina – Lucija	by 2020*			
M8 Kalce – Jelšane	by 2020*	improving significantly		yes
M9a Kidričevo – Lendava	by 2020*	improving significantly		yes

M9b Kidričevo – Vodice	by 2020*	improving significantly		
M10 Vodice – Žirovnica – Rateče	by 2020*	improving significantly	enabled	yes
Interconnector Slovenia – Hungary: Pince – Kidričevo	by 2020*	improving	enabled	

* *Time schedules of construction of all three sections of M3/1 transmission pipeline, M6, M8, M9a, M9b, M10 and R15/1, and the remaining compression stations will be adapted to the final decisions on constructing international pipeline projects for diversification of supply sources and supply routes of the Slovenian energy market, and the transit (LNG terminal in Croatia, Southern Glow, interconnection of the Slovenian and Hungarian gas transmission network), thus, the foreseen years of construction are indicated only for orientation.*

Actors

The key actors for implementing the sub-programme are as follows:

- Slovenian Government;
- Ministry of the Economy: legislation, support to regional cooperation, measures for security of supply, planning the security of supply;
- Ministry of the Environment and Spatial Planning: spatial placement;
- Energy Agency of the Republic of Slovenia: regulation of network charges and tariffs for the use of the natural gas transmission network;
- system operator of natural gas transmission network: implementation of the NEP strategy in the field of natural gas transmission and the development plan in accordance with the strategic documents of the State, the Slovenian Government, EU legal framework, and the decisions of market entities (demand for transmission capacities) while ensuring competitiveness of the economy;
- natural gas supplier: provision of storage capacities and diversification of supply sources.

Financing

The planned total funds for implementing the key infrastructure projects of the gas transmission network amount to EUR 200 million and EUR 1.45 billion for transmission pipelines. This amount includes the aforementioned projects (new constructions) only and does not represent all investments in the natural gas transmission network. The foreseen project investor is the system operator of the transmission network, Geoplin plinovodi.

The foreseen impact of project implementation is achieving the set objectives of the sub-programme for natural gas supply and indirectly of NEP objectives as a whole.

The financing source will be the company's own funds and the loans taken out by the company for implementing the projects. The main financing source of the system operator of the natural gas transmission network for covering the eligible costs and regulated return are the network charges, which the regulator determines for the current regulatory period.

Additional funds are presented by the assets from the European funds - in 2010, the European funds from the European Energy Programme for Recovery in the amount of EUR 40 million were acquired for three gas pipeline sections from the Austrian border to Ljubljana.

The funds for investing in the gas transmission network shall be defined in detail in the respective Development Plan of the system operator of the gas transmission network and the annual operational plans of companies.

Monitoring sub-programme implementation

Table 37: Main indicators for monitoring the *Natural gas supply* sub-programme

Objective	Indicator	Unit
achievement of N-1 infrastructure standard	according to the schedule	descriptively
security of supply	recording of phenomena, duration of reductions, implementation of actions for ensuring security	descriptively
availability of transmission capacities at the entry and exit points of the transmission system	share	[%]
the highest daily physical use of transmission capacities at relevant entry and exit points of the transmission system	share transmission capacity	[%] [Sm^3/day]

12 Liquid fuels

Sub-programme objectives

The objectives of the Slovenian energy policy for liquid fuels are:

- to provide secure, quality and environmentally sound supply of Slovenia with liquid fuels;
- to provide secure supply of appropriate liquid fuel reserves;
- to increase the RES share in the supply of liquid fuels;
- research for recording the sites of liquid fuels in Slovenia.

Sub-programme strategy

For achieving the objectives of the sub-programme Liquid fuels, the Slovenian Government will provide for an appropriate support environment that will enable:

- accelerated renovation, expansion and construction of new storage capacities for compulsory oil stocks in Slovenia;
- substitution of fuel oil for heating with wood biomass and other renewable energy sources[98] and low-carbon energy sources;
- introduction of biofuels and other RES in transport and agriculture, and introduction of electric vehicles[99];
- production of biofuels, particularly second-generation biofuels;
- development of sustainable biofuels, particularly second-generation biofuels.

The key sub-programme orientations are as follows:

- provision of between 90% and 100% of Slovenia's own reserves of crude oil and liquid fuels;
- provision of storage capacities of compulsory oil reserves in Slovenia and regular renewal of stocks in accordance with the European guidelines;
- provision of sustainable criteria in the use and production of biofuels;
- priority directing of development and production of biofuels to second-generation biofuels;
- stimulation of further research for recording possible sites of hydrocarbons in Slovenia;
- clear directing of consumers to substitute heating systems using fuel oil with the systems using RES (wood-biomass boilers, solar collectors and heat pumps, district heating systems using RES) or sources with low emissions of greenhouse gases (high efficiency CHE, exploitation of waste heat);
- achievement of objectives on use of biofuels in transport.

The key elements of the support environment of the sub-programme by 2020:

- implementation of investments in the renovation, expansion and construction of new storage capacities of compulsory oil stocks in Slovenia with timely decisions and cooperation with the public;
- development of mechanisms enabling development of biofuels production, especially of second-generation biofuels;

[98] See the *Renewable energy sources* sub-programme.

[99] See the *Use of energy in transport* sub-programme.

- stimulation of research and transfer of knowledge, especially in the field of sustainable second-generation biofuels, including continued research for recording potential sites of hydrocarbons in Slovenia and research in sustainable biofuels;
- reinforcement of education and training in the field of sustainable biofuels;
- economic and other incentives: appropriate pricing and tax policy and other mechanisms[100] that will clearly direct consumers to substitute the heating systems using fuel oil with the systems using RES (wood-biomass boilers, solar collectors and heat pumps, district heating systems using RES) or sources with low emissions of greenhouse gases (high efficiency CHE, exploitation of waste heat);
- stimulation of research and transfer of knowledge, including continuing research for recording potential sites of hydrocarbons in Slovenia and research in sustainable biofuels.

Support environment

For achieving the objectives of the *Liquid fuels* sub-programme, the following actions are required:

- Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products has to be transposed in the Slovenian legal order;
- renovation of capacities of compulsory oil stocks in Slovenia with the objective of providing 100% of own crude oil and liquid fuel reserves and an 10% for commercial stocks;
- preparation of legal acts that will further enable and stimulate cooperation between domestic and foreign companies in the field of research and production of liquid fuels, especially second-generation biofuels;
- preparation of legal acts that will enable a higher share of adding biofuels, where there is no obligation of informing end consumers of added biofuel; implementation of actions from the Action plan for renewable energy sources for the 2010–2020 period relating to the use of biofuels;
- research for recording possible sites of hydrocarbons in Slovenia;
- in the companies dealing with petroleum products, the State has to maintain the ownership share or further increase it; the State has to obtain at least a 25.01% co-ownership share of Instalacija d.o.o.
- expert and research activities with the objective of maintaining the existing and acquiring new knowledge, particularly in the field of sustainable biofuels.

Table 38: Tasks, time limits, responsible institution, and financial resources of the sub-programme *Liquid fuels*

Task	Time limit	Funds by 2020	Responsibility
transposition of Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products in the Slovenian legal order	2012	[]	ME
renovation, expansion and construction of new capacities of compulsory oil stocks in Slovenia with the objective of providing 100% of own crude oil and liquid fuel reserves and an additional 10% for commercial stocks	2014	[]	private companies in coordination with ME and the Institute of the Republic of Slovenia for Commodity Reserves

[100] See the *Taxes and regulated prices* sub-programme.

Task	Time limit	Funds by 2020	Responsibility
preparation of legal acts that will further enable and stimulate cooperation between domestic and foreign companies in the field of research and production of liquid fuels, especially second-generation biofuels	2012	[]	ME
[preparation of legal acts that will enable a higher share of adding biofuels, where there is no obligation to inform end consumers of added biofuel]	2012	[]	ME/MESP
research for recording possible sites of hydrocarbons in Slovenia	2020	[]	ME
expert and research activities with the objective of maintaining the existing and acquiring new knowledge, particularly in the field of sustainable biofuels	2020	[]	MHEST/ME/MESP/energy companies/universities/research institutions

Expected effects

Table 39: Expected response of actors of the *Liquid fuels* sub-programme

Facility/action	Expected scope
new storage capacities for the provision of compulsory stocks in Slovenia (the existing industrial locations)	existing[101]
development of biofuel production in Slovenia	

Actors

The key actors for implementing the sub-programme are as follows:

- Government of the Republic of Slovenia: coordination of all required activities of state bodies for meeting the set objectives;
- Ministry of the Economy: preparation and amendment to the legislation, coordination of key sub-programme activities;
- Ministry of the Environment and Spatial Planning: preparation and amendment to the legislation, efficient management of spatial placement procedures;
- Ministry of Finance: preparation and amendment to the legislation (preparation and evaluation of public investments, tax policy);
- Institute of the Republic of Slovenia for Commodity Reserves: implementation of activities required for creating and maintaining the compulsory reserves of oil and its products;
- private companies: renovation, expansion and construction of new storage capacities of compulsory oil stocks in Slovenia;
- Ministry of Higher Education, Science and Technology: promotion promotion of expert and research activities with the objective of maintaining the existing and acquiring new knowledge, particularly in the field of sustainable biofuels.

[101] Storage capacities will be required only in case of a greater growth of energy consumption in transport than expected, insofar as the sustainable transport policy in Slovenia and the EU is not prepared and implemented.

Financing

The source of financing for ensuring the stock of petroleum products is special compensation for implementing the public utility service of creating the compulsory reserves of oil and its products.

Monitoring sub-programme implementation

Table 40: Main indicators for monitoring the *Liquid fuels* sub-programme

Objective	Indicator	Unit
provision of compulsory stocks of petroleum products	the share of compulsory stocks in Slovenia the share of liquid biofuels in the total use of liquid fuels for motor vehicles	No. of days [%]
competitiveness	price trends of liquid fuels in the domestic market compared to the neighbouring markets	descriptively

13 Coal

Objectives

The sub-programme defines exploitation and handling of stocks of single fossil fuel extracted today in Slovenia. The sub-programme objective is to contribute to a secure, competitive and long-term stable supply of resources for electricity generation, while reducing greenhouse gas emissions and emphasising:

- greater diversity of resources and minimising the import dependence in electricity generation;
- long-term reduction of coal use with the goal of decreasing the GHG emissions - preserving the coal production in one coalmine to the extent that will enable competitive operation until its closure in 2054;
- research and knowledge transfer in the field of coal mining.

Sub-programme strategy

For meeting the objectives, the Slovenian Government will provide a support environment for:

- gradual reduction of use of coal by 2020 with the exception of exploitation of VCM;
- further competitive production of lignite at the Velenje Coal Mine and its gradual closure according to the planned termination of production in 2054;
- closure of the Trbovlje-Hrastnik Mine (THM) by 2015 in accordance with the Regulating the Gradual Closure of the Trbovlje-Hrastnik Mine and Development Restructuring of the Region Act (ZPZRTH)[102];
- recording natural resources[103];
- promotion of development and research projects in the field of carbon storage technologies and underground coal gasification technologies;
- preservation and exchange and transfer of knowledge through international connections – sale of intellectual services in the field of coal mining in the international market.

The key sub-programme orientations are as follows:

- coordination of objectives of a secure supply, reduction of GHG emissions, and competitiveness in the following manner:
    - the obligations of reducing GHG emissions from the climate and energy package will be fulfilled within the EU ETS; nevertheless, the extraction of coal in Slovenia from 2015 onwards will be limited to one coal mine, and the use of other coal will be significantly reduced and gradually terminated;
    - the use of coal will be limited to combustion plants with high efficiency based on BAT technologies;
    - the amount of annual coal production from Velenje Coal Mine (VCM) will be coordinated with ensuring VCM competitiveness and competitive electricity generation at TPPŠ;

[102] Official Gazette of RS, No. 26/2005-**UPB1** and 34/2010

[103] See the *Research and development* sub-programme.

- the planned amount of coal production at VCM will be gradually reduced from four million tonnes in 2021 to two million tonnes a year in 2040, and remain on this level to the end of exploitation of the Velenje extraction field – foreseen in 2054;
- the costs of VCM's gradual closure will be included in the coal price, therefore, no special law on financing the closure works will be necessary;
- after 2012, the support mechanism for a 15-percent electricity supply from domestic sources will be used only in considerably unfavourable market conditions and explicitly for BAT technologies (amendment to EA).

Key elements of support environment:

- state aid for THM closure and active monitoring of ZPZRTH implementation;
- promotion of research and knowledge transfer in the field of coal mining.

Support environment

For achieving the objectives of the *Coal* sub-programme, the following actions are required:

- active monitoring of competitiveness of production and price of coal from Velenje Coal Mine – after 2014, the base price of coal from VCM may not exceed 2.25 EUR/GJ;
- active monitoring of the THM closure in accordance with ZPZRTH;
- research confirming coal reserves in Prekmurje and the remaining reserves in THM in terms of recording natural resources[104];
- promotion of expert and research activities with the goal of preserving the existing and acquiring new knowledge, particularly in the field of carbon storage technologies and underground coal gasification technologies.

Table 41: Tasks, time limits, responsible institution, and financial resources of the *Coal* sub-programme

Task	Time limit	Funds by 2020	Responsibility
amendment to the EA for support mechanisms in accordance with Article 64r for BAT technologies;	2011	[]	ME
THM closure in accordance with ZPZRTH active monitoring of the THM closure in accordance with ZPZRTH	2015	EUR 94 million	ME/MESP
research of the remaining coal reserves in THM	2015	EUR 1.2 million	THM
research confirming the coal reserves in Prekmurje	2020	EUR 1.5 million	ME
research activities with the goal of preserving the existing and acquiring new knowledge, particularly in the field of carbon storage technologies and underground coal gasification technologies	2020	EUR 8 million (EUR 5 million for carbon storage, EUR 3 million for underground coal gasification)	MHEST/ME/MESP/energy companies/universities/research institutions

[104] See the *Research and development* sub-programme.

Actors

The key actors for implementing the sub-programme are as follows:

- Government of the Republic of Slovenia: coordination of all required activities of state bodies for meeting the set objectives;
- Ministry of the Economy: preparation, management, coordination and implementation of key programme activities – preparation and amendment to the legislation and active monitoring of THM closure;
- Holding Slovenske Elektrarne: ensuring competitiveness of production in Velenje Coal Mine and TPPŠ;
- Trbovlje-Hrastnik Mine: research of the remaining coal reserves in THM;
- Ministry of Higher Education, Science and Technology: promoting expert and research activities with the goal of preserving the existing and acquiring new knowledge, particularly in the field of carbon storage technologies and underground coal gasification technologies.

Financing

The planned funds for implementing this sub-programme include the funds for the closure of THM specified in ZPZRTH in the amount of EUR 94 million from the budget of the Republic of Slovenia in the period between 2010 and 2015.

Monitoring sub-programme implementation

Table 42: Main indicators for monitoring the *Coal* sub-programme

Objective	Indicator	Unit
reliability	the share of electricity generation from coal	[%]
competitiveness	the coal price for electricity generation	[EUR/t]
GHG emission reduction	GHG emissions from the production and use of coal	[kt CO_2 eqv]

14 Nuclear energy

Sub-programme objectives

The sub-programme objectives are to contribute to a secure, long-term stable and low-carbon supply of electricity[105] with the emphasis on:

- further safe operation of nuclear facilities in Slovenia;
- permanent and safe disposal of low- and intermediate-level waste (LILW) and preparation of a proposal of the resolution concerning decomposition and management of high-level waste (HLW);
- extension of the projected operational life of Nuclear Power Plant Krško (NPPK);
- further long-term exploitation of nuclear energy in Slovenia through construction of a new nuclear power plant;
- high-quality expert and research activities in the nuclear energy sector[106].

Sub-programme strategy

For meeting the objectives, the Slovenian Government will provide a support environment for:

- construction of a permanent LILW disposal facility at Vrbina in Krško Municipality;
- further long-term exploitation of nuclear energy in Slovenia by constructing a new power plant (a third-generation nuclear power plant meeting the latest internationally acknowledged standards of technology) at a site next to the existing NPPK;
- further preservation of independence of administrative authority for nuclear safety supervision;
- accelerated development of expert and research activities in the field of nuclear energy.

Key elements of the support environment:

- promoting high-quality expert activities in the sector with the goal of ensuring safe operation of nuclear facilities in Slovenia;
- providing funds for constructing a disposal facility for LILW (Fund for Financing Decommissioning of Nuclear Power Plant Krško and Disposal of Radioactive Waste from the Krško NPP, funds from the budget of the Republic of Slovenia for a proportionate share of institutional waste);
- constructing a disposal facility for LILW by 2023[107];
- reaching an agreement with the Republic of Croatia concerning NPPK-generated LILW, which is the responsibility of the Republic of Croatia under the reciprocal agreement;
- performing a revision of the Programme of the NPPK decommissioning and disposal of LILW and used[108] nuclear fuel (UNF) by observing the guidelines for UNF recycling;
- maintaining excellent operation of the NPPK and timely preparation and implementation of all necessary measures for extending the operational life of the NPPK;

[105] The aspects of electricity generation are considered in the *Electricity generation* sub-programme.

[106] See the *Research and development* sub-programme.

[107] An amendment to the Ionising Radiation Protection and Nuclear Safety Act is required.

[108] According to the existing legislation, the term 'spent nuclear fuel' is used. For the fuel that will be recycled, the term 'used nuclear fuel' was introduced.

- establishing an intersectoral governmental body under the authority of the Ministry of the Economy for coordinating the activities and achieving objectives of nuclear energy exploitation in Slovenia;
- quality, timely and transparent decisions on the construction of a new nuclear power plant on the site adjoining the existing NPPK;
- promoting the development of support activities in nuclear energy, enabling quality and safe operation of the existing power plant and greater synergy effects for the domestic economy and the economy upon constructing the new power plant;
- maintaining the exchange and transfer of knowledge through international links.

Support environment

For achieving the objectives of the *Nuclear energy* sub-programme, the following actions are required:

- update and harmonisation of legal acts enabling more efficient spatial placement of energy facilities[109];
- in addition to the proposed amendment to the Ionising Radiation Protection and Nuclear Safety Act, the time limit has to be agreed, by which the LILW disposal facility has to obtain authorisation for operation;
- active monitoring of the performance of preparing and implementing the LILW disposal facility construction project[110] at Vrbina in Krško Municipality according to the schedule prepared by ARAO;
- planning the handling of HLW (possible solutions, cost estimates) within the revision of the *Programme of NPPK decommissioning and disposal of LILW and SNF*[111] and implementation of measures arising from these programmes;
- active monitoring of implementation of the programme for managing the NPPK ageing processes, and implementation of necessary changes for extending the projected operational life of NPPK[112];
- implementation of all required procedures for making quality decisions on the construction of a new nuclear power plant adjoining the existing NPPK:
    - placing the investment in the new nuclear power plant in Slovenia's Development Strategy;
    - participation of the public in the decision on constructing a new nuclear power plant, including a public discussion;
    - elaboration of the national spatial plan (NSP);
    - provision of conditions for quality entrepreneurial decisions enabling optimum implementation of investments (revision of the preinvestment design (PID) with additional electricity market research in Slovenia in connection to the market in the

[109] See the *Spatial Planning* sub-programme.

[110] In accordance with the Governmental Decree on the Detailed Plan of National Importance for low and intermediate level radioactive waste repository at the location of Vrbina, municipality Krško, Official Gazette of RS, No. 114/2009.

[111] In accordance with the Treaty between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the regulation of the status and other legal relations regarding investment, exploitation and decommissioning of the Krško Nuclear Plant.

[112] The project of the NPPK ageing programme determined the scope, analysis and overview of all foreseen SSK, time-dependent analyses, and changes in the NPPK processes and documents. After a review, the Action Plan was elaborated, and its implementation will serve as the basis for extending the operational life of NPPK.

entire Community and region (EU and the Energy Community – the Balkans)), and ensuring transparency of procedures and contracts;

- reinforcement of personnel capacities for the preparation and implementation of projects related to nuclear energy (Radioactive Waste Management Agency (ARAO), Ministry of the Economy - Energy Directorate, Ministry of the Environment and Spatial Planning – Slovenian Nuclear Safety Administration, Nuclear Power Plant Krško, GEN energija d.o.o.);
- promotion of expert and research activities with the goal of reinforcing knowledge in nuclear technology and safety, and development of domestic industry[113];
- active participation in working out the European Union policy in the field of nuclear safety and use of nuclear energy.

Table 43: Tasks, time limits, responsible institution, and financial resources of the *Nuclear energy* sub-programme

Task	Time limit	Funds by 2020	Responsibility
Construction of LILW disposal facility with all necessary steps	[2023][114]	[]	ARAO
reinforcement of ARAO expert capacities with the goal of accelerated implementation of the LILW disposal facility construction project	2011	[]	ME
extension of the operational life of NPPK:		EUR 250 million[115]	
implementation of the Action Plan of managing the ageing processes at NPPK	permanently		NPPK
supervision of the implementation of the Action Plan of managing the ageing processes at NPPK	permanently		SNSA
active monitoring of implementation of the programme for managing the NPPK ageing processes, and implementation of necessary changes for extending the projected operational life	permanently		ME
decision on the construction of a new nuclear power plant adjoining the existing NPPK:		[]	
inclusion of the investment in Slovenia's Development Strategy	2011		ME at a strategic level, GEN at an operational level
participation of the public in the decision on constructing a new nuclear power plant, including a public discussion	permanently		ME
spatial planning (elaboration of NSP for the new power plant)	2013		
provision of conditions for a quality entrepreneurial decision	2011		GEN
quality personnel planning and provision of appropriate continuity of knowledge	permanently		GEN/NPPK

[113] See the *Research and development* sub-programme.

[114] An amendment to the Ionising Radiation Protection and Nuclear Safety Act is required.

[115] Funds for the extension of operational life of NPPK will be provided by the owners of the power plant, each 50%.

Task	Time limit	Funds by 2020	Responsibility
promoting expert and research activities for maintaining the continuity of knowledge in the fields of nuclear technology and safety, and industry development	permanently	[]	MHEST/ME/MESP/universities/research institutions
active participation in working out the European Union policy in the field of nuclear safety and use of nuclear energy	permanently	[]	SNSA/Energy Directorate of ME
reinforcement of expert capacities of ME – energy Directorate, SNSA, NPPK and GEN energija for the preparation and implementation of projects related to nuclear energy		[]	ME/MESP/NPPK/GEN
establishing an intersectoral governmental body under the authority of the Ministry of the Economy (Energy Directorate) with clear powers for removing administrative obstacles and accelerating the implementation of projects (LILW disposal facility, extension of the operational life of NPPK, construction of a new power plant, preparation of the proposal for a decision on handling of HLW)	2011	[]	Slovenian Government/ME

Actors

The key actors for implementing the sub-programme are as follows:

- Government of the Republic of Slovenia: coordination of all required activities of state bodies for meeting the set objectives, establishment of an intersectoral governmental body under the authority of the Ministry of the Economy (the Energy Directorate) with clear powers for removing administrative obstacles and accelerating the implementation of projects;
- Ministry of the Economy: preparation, management, coordination and implementation of key programme activities – preparation and amendment to the legislation, and preparation of expert bases for strategic political decisions and public discussion on the construction of a new nuclear power plant adjoining the existing NPPK;
- Ministry of the Environment and Spatial Planning: preparation and amendment to the legislation;
- Fund for Financing Decommissioning of NPPK and Disposal of Radioactive Waste from the NPPK: provision of funds for constructing the LILW disposal facility;
- Radioactive Waste Management Agency: construction of LILW disposal facility and planning the handling of HLW;
- Nuclear Power Plant Krško: preparation and implementation of required changes with the goal of extending the projected operational life of NPPK;
- GEN energija: elaboration of NPPK2 project, preparation of expert bases for entrepreneurial decisions;
- Slovenian Nuclear Safety Administration: preparation of regulations and inspection and safety assessment of nuclear facilities;
- Ministry of Higher Education, Science and Technology: promotion of educational and research activities with the goal of maintaining a continuity of knowledge in the field of nuclear technology.

Key projects

Table 44: Key projects of the *Nuclear energy* sub-programme by 2020[116]

Facility	Time limit
construction of LILW disposal facility at Vrbina in Krško Municipality (in accordance with the Governmental Decree on the Detailed Plan of National Importance for low and intermediate level radioactive waste repository at the location of Vrbina, municipality Krško (Official Gazette of RS, No. 114/2009)	2023[117]

Financing

Funds for the extension of the operational life of NPPK will be provided by the owners of the power plant, GEN energija d.o.o. and HEP d.d., each 50%. The foreseen required funds for implementing the investment programme amount to EUR 106 million. This amount only includes the construction of the LILW disposal facility. The costs for the extension of the NPPK operational life amount to [EUR 125 million] and are considered in the *Electricity generation* sub-programme.

Financing sources:

- own funds;
- Fund for Financing Decommissioning of NPPK and Disposal of Radioactive Waste from the NPPK;
- the budget of the Republic of Slovenia.

Monitoring sub-programme implementation

Table 45: Main indicators for monitoring the *Nuclear energy* sub-programme

Objective	Indicator	Unit
[excellence] of operation of NPPK	operational performance indicator forced shutdowns	[no.] [no./year]
LILW disposal facility	implementation in accordance with the schedule specified by the legislation or approved investment documentation	[yes/no]
extension of the projected operational life of NPPK	delays, unresolved procedures implementation of all planned activities determined by the legislation	descriptively
education of employees in key institutions	education hours of employees at ARAO, ME – Energy Directorate, SNSA, NPPK and GEN in the field of nuclear safety and use of nuclear energy	[no. of hours/year]

Inclusion in other reporting obligations: Environmental effects are regularly monitored by the Slovenian Nuclear Safety Administration and are annually published in the Report on ionising radiation protection and nuclear safety in Slovenia.

[116] The projects of extending the operational life of NPPK and constructing a new nuclear power plant have been considered in the *Electricity generation* sub-programme.

[117] An amendment to the Ionising Radiation Protection and Nuclear Safety Act (ZVISJV), Official Gazette of RS, No. 102/2004, is required.

HORIZONTAL SUB-PROGRAMMES OF THE NEP

15 Electricity and natural gas market

Objectives of the sub-programme

The objectives of the sub-programme are to contribute to the competitiveness, security and long-term stability of electricity supply and natural gas, by emphasising the following:

- the provision of more transparent and efficient operation of the market;
- the provision of security of energy supply through networks particularly by market mechanisms;
- enforcement of all consumer-protection measures as provided for by the European and national legislation.

Strategy of the sub-programme

With the aim to achieve the objectives of the sub-programme development of the electricity and natural-gas market, the strategy of the sub-programme will include the following directions:

- improvement of the operation of the electricity market in the Slovenian territory in connection with the market in the entire Community, in the EU region and in the area of the Energy Community[118], and the natural gas market in relation to key countries that are suppliers of natural gas, including development of public trade on open public markets in the region;
- provision of an appropriate separation of market activities (energy supply) and services of the public utility services of transmission and distribution;
- continuation of development and implementation of market mechanisms for the allocation of transmission capacities for energy supply and natural gas;
- strengthening of cooperation with other European network partners and implementation of the EU target model, and concerning natural gas, access to natural-gas storages and terminals;
- development of an efficient, internationally recognised marker for balancing derogations in the electricity market (balancing market);
- transparent operation of the organiser of the electricity market (Borzen) and energy stock-market in the Republic of Slovenia, aiming at reaching a transparent competitive sale of minimum 8% of domestic electricity consumption by 2014[119];
- strengthening the position of the electricity stock-market and its spread on South-eastern European markets;
- an enhanced introduction of smart measuring and calculation devices for consumers of electricity[120] and introduction of other active network elements to support increased efficiency of use of infrastructure (dynamic tariffs for energy and for the use of networks, contracts on interruptible supply);
- an active and more independent role of the regulatory body (Energy Agency of the Republic of Slovenia, AGEN-RS);

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[118] The European Energy Community consists of EU states, SE European states and (from 1 February 2011) Ukraine. Energy community states adopted energy markets' regulation under the EU legislation as of 2004.

[119] Merging of electricity markets between Italy and the Republic of Slovenia resulted in increased traffic on the BSP SouthPool market in 2011 to 6.5% of consumption in Slovenia. The electricity stock market can acquire the regional role only through a considerable increase in trade.

120 For electricity, see the *Network for electricity distribution* sub-programme.

- consumer protection as provided for by the European and national legislation. Providing for the protection of vulnerable consumers by means of appropriate mechanisms and authorisations of the AGEN-RS or another body;
- inclusion of external costs in the energy price, to result in market conditions contributing to the development goals; reduction of environmental impacts, development of energy technologies of EUE, RES and dispersed generation and human capital[121].

Support environment

The key elements of the support environment for the efficiency of the strategy are the following:

- preparation of legal basis for further market development in accordance with the EU third energy package (time limit in 2011) and further improvements;
- through amendments to acts, increase the powers of the AGEN-RS so as to be able to execute all tasks necessary for the operation of a competitive market, with the exception of those that are reserved for other bodies. In the law, provide for appropriate interventions of the AGEN-RS including efficient, proportional and dissuasive penalties, or an obligation that the violation is to be judged by the courts;
- for a permanent provision of efficiency and impartiality of the regulatory body, provide judicial protection and parliamentary oversight over the work and an appropriate rotation system with the regulatory body;
- transparent operation of the organiser of the electricity market (Borzen) and the energy stock-market in the Republic of Slovenia;
- to add the trade of long-term products on the energy stock-market to day-ahead marketing and thus reach a transparent competitive sale of the target share of domestic electricity consumption by 2014;
- support the energy stock-market in the regional connection through the projects of markets merging and spread of the activity in South-eastern Europe;
- powers to the regulatory body for an efficient implementation of separation of the transmission system from other activities of integrated undertakings;
- provide powers to the regulatory body relating to the field of first-instance dispute solution, including the possibility to obtain information necessary for investigation;provide powers to the AGEN-RS or other state bodies for an eventually necessary forced diversion of a part of contractually provided gas on the open market and powers similar in their content for electricity;
- for the operation of the transmission network for natural gas, enforce ownership unbundling of market and concession activities, in accordance with the third package directive (Directive 2009/73)[122]; in the distribution and supply of natural gas, enforce a detailed accounting separation that will be transparent even for final customers;
- designate bodies competent for the control of the achieved adequacy of the transmission networks for natural gas (transmission capacity in both directions, connections with storehouses, various LNG sources and terminals) for providing for the security of gas supply (N-1 and other requirements of the EU and national legislation);
- complete entrepreneurial and ownership separation of regulated and market activities in the field of electricity distribution;
- to increase the state property share in regulated activities to 100% and decrease the state property in market activities;

[121] See the *Efficient use of energy*, *Renewable energy sources* and *Taxes and regulated prices* sub-programmes.

[122] With regard to the possible arrival of new actors in the field of natural gas transmission (for example Russian Gazprom within the Južni tok (South Current) project), the establishment of an independent operator of transmission system is advisable.

- to implement legislation that would enable exchange, collection and publishing of data concerning electricity market trends;
- provide for the accessibility of clear information for consumers concerning rights and obligations, advantages and weaknesses of the competitive market, and advantages of inclusion in active networks on the basis of smart measurement devices and dynamic tariffs for electricity and network use;
- ensure independent analysis on the development of the electricity and natural gas market, and stimulate expert activities in the sector and participation of the public in attaining the programme's objectives.

Table 1: Tasks, time limits and responsible institution of the *Electricity and natural-gas market* sub-programme

Task	Time limit	{0<}0{>s ources	Responsibility
Adjustment of Slovenian legislation with EU directives (third package of EU regulations for the electricity market and further improvements)	2011, otherwise permanent	[]	MEA
Supplement legislation in order to provide appropriate powers for the energy regulator	2011	[]	Government of the RS, National Assembly
Further enforcement of market mechanisms for the allocation of transmission capacities	2014	[]	System transmission operators
Establishment of an operating balancing electricity market	2011	[]	Borzen, ELES, MEA, AGEN-RS
Support the energy stock-market in the regional connection through the projects of markets merging and the spread of the activity in South-eastern Europe			
Implement the separation between market activities and services of public utility services in the transmission and distribution of natural gas, considering the possibility of several owners of the transmission network	In 2011, select and enact the model, 2012	[]	Government of the RS, AGEN-RS, op. of sys. transmission
Complete entrepreneurial separation of regulated and market activities in the field of electricity distribution; accounting separation for natural gas	2011	[]	MEA, AGEN-RS, SODO, Distribution companies
Supplementation of the EA with AGEN-RS authorisations for directing a portion of electricity volumes on the open public market; analogue for natural gas	2011	[]	MEA, AGEN-RS
Accelerated introduction of smart measuring and calculating devices with electricity consumers and of tariffs for the more efficient exploitation of capacities (dynamic tariffs, contracts on interruptible supply)	Preparation of programme by the end of 2012, permanent task	[]	AGEN-RS, system operators and market operators
Stimulation of expert activities in the sector with the aim of full and proactive cooperation among appropriate national and joint bodies in the EU	permanent	0.4 mio EUR/year	MEA, AGEN-RS, Borzen
Information for customers about their rights and obligations; promotion of knowledge about the advantages and weaknesses of the natural gas free market; information about the situation on markets	Permanent task		Government of the RS, AGEN-RS and market operators
A detailed independent analysis of electricity and natural gas markets	2011 (then every two years)		AGEN-RS, Government

Operators

The following are the key operators for the implementation of this sub-programme:

- MAE: preparation and supplementation of legislation; coordination of the key programme activities;
- AGEN-RS: coordination of the key programme activities; systematic information of public; market analysis;

For electricity:
- Borzen: provision of transparent marketing in electricity in the Republic of Slovenia;
- BSP: Regional Energy Exchange;
- ELES: cooperation with other system operators in Europe; development of the balancing market;
- SODO: monitoring the implementation of complete entrepreneurial separation of regulated and market activities in the field of electricity distribution; elaboration of the plan and evaluation of the implementation of introduction of smart measuring and calculating devices;

For natural gas:
- Geoplin: implementation of separation under the selected model;
- Geoplin-plinovodi or an independent operator of transmission system(s) for natural gas: connections between other system operators; provision of capacities for the prescribed security;
- Distribution undertakings: implementation of accounting separation and transparent business operation for the customers;

For both:
- Distribution undertakings: preparation and implementation of the project of introduction of smart devices and other active network elements;
- Business associations, civil society: information about: the advantages and weaknesses of markets; market situation; rights and obligations of participants.

Financing

In the implementation of tasks, human resources of participating organisations will be activated, with appropriate overindebtednesses of public servants. Several new employments may be necessary for increasing the activity of the AGEN-RS, which is to be shown by periodical control of the analysis of operation. The amount of necessary public funds for stimulating expert and promotional activities is estimated at up to [EUR 400 000 per year].

Investments in smart measuring and calculation devices for energy consumers are dealt with in the electricity distribution sub-programme.

Sources of funds:
- budget funds;
- funds originating from sale and network charge;
- extras to the network charge for covering the costs of operation of the market organiser and the agency, and for the implementation of special tasks.

Monitoring programme implementation

The Government of the Republic of Slovenia and the AGEN-RS will monitor the effects of the sub-programme on the basis of quantitative and qualitative indicators of market competitiveness.

A broader analysis of the development of energy markets should be prepared on a periodical basis, but not less than once in two years, upon the order by the Government of the Republic of Slovenia, which will be useful for the promotion of activities of the Government of the Republic of Slovenia in this field.

Table 2: Main indicators for monitoring the *Electricity and natural-gas market* sub-programme

Objective	Indicator	Unit
Development of the natural gas and electricity market	Market shares Market concentration index (HHI) for Slovenia and the relevant partial markets	[%] [1]
Natural gas and electricity competitive prices in the domestic market in comparison to neighbouring markets	Movement of prices of natural gas and electricity in the domestic market in comparison to neighbouring markets	[%]
Frequency of transitions between suppliers	Indicator of transitions between suppliers, annually and during longer periods	[%]
Natural gas and electricity market integration with neighbouring countries	Integration level of markets by detailed statistical indicator	[1]

Inclusion in other reporting commitments: the situation in the electricity market is monitored by the AGEN-RS in annual reports for the Government, National Assembly and the European Commission.

16 Taxes and regulated prices

Objectives of the sub-programme

The sub-programme supports the realisation of NEP key strategic objectives for ensuring competitiveness, reliability and minimum possible environmental impacts within the framework of tax policy and price regulation. Key objectives of the sub-programme are the following:

- gradual inclusion of external costs in the price of energy through energy taxes;
- stimulation of sustainable energy options in other taxes;
- policy-making oriented towards development of regulated prices for network use.

Sub-programme strategy

The support environment will be prepared to stimulate:

- efficient energy use – energy and environmental efficiency of buildings, vehicles, devices and products;
- exploitation of RES;
- gradual withdrawal of energy sources with great impacts on the environment;
- development of active networks with the aim to provide greater flexibility on markets and inclusion of RES;
- investments in transmission networks that will enable further development of electricity markets, their competitiveness and reliable supply.

Key orientations of the sub-programme are the following:

- stimulation of sustainable energy options within the tax system upgrade that would be based on the principles of green tax reform by searching for an appropriate balance between work disburdening, stimulating competitiveness and employment, and a more simple tax system[123] The tax system upgrade that will direct towards sustainable energy solutions will lead to modification of the policy of subsidies or considerably reduce necessary subsidies for transition to a low-carbon society;
- fluctuation of relative energy prices for the support of sustainable energy options; elimination of price disparities, particularly those that occur in taxation;
- introduction of new or modification of existing taxes, such as the property tax under preparation, should provide for orienting markets towards sustainable energy options. Development of such taxes – levels of taxation and tax relief – will also take into account the environment (use of sources and environmental burden);
- in parallel with the increased energy tax, the most vulnerable groups should be taken care of on a provisional or permanent basis – to provide subsidies or allowances for the implementation of EUE measures for the most vulnerable groups;
- in parallel with the increase in energy tax, a tax relief system and a system of voluntary agreements for the economy should be established;
- network charge will be determined on the basis of development projects and success in their implementation;
- development of incentives for sustainable energy options within the framework of other taxes, such as accelerated amortisation, tax reliefs for research and development in this field, etc.

[123] The programme of reforms for the implementation of the Lisbon strategy in Slovenia 2008-2010, the Government of the RS, 2008.

Key instruments of the support environment are the following:

- energy taxes: excise duty and environmental duty for atmospheric pollution by CO_2 emissions in connection with voluntary agreements for the economy;
- property tax: within the new property tax system, energy properties of buildings are considered as a tax relief or tax level criterion;
- taxes, duties and tax relief on motor vehicles;
- methodology for determination of network charges;
- methodology for determining costs for heat in district heating systems and costs of cooling in district cooling systems.

Support environment

With a view towards attaining the objectives, set within the scope of the Taxes and regulated prices sub-programme, the following measures are foreseen:

Excise duty and other energy duties:

- stimulation of the exploitation of wood biomass as an energy source and elimination of disproportions through taxation in neighbouring countries;
- gradual increase of excise duty for extra light fuel oil (ELKO), so that by 2020 at the latest, the price of ELKO will be equal to the price of biofuel;
- gradual increase of electricity tax and introduction of reliefs and voluntary agreements for the efficient use of electricity in industry;
- environmental duty for atmospheric pollution by CO_2 emissions in connection with voluntary agreements for the economy;
- excise policy for engine fuels that will stimulate the use of biofuels, including plant oils, and stimulation of the use of biofuels for the powering of agricultural and forestry machinery.

Stimulation of EUE and RES within the tax and other property duties:

- since energy-saving restoration of buildings results in the increase of the value of real estate, the negative reversible effect of property tax on the energy-saving restoration of residential buildings should be eliminated and additional incentives for their complete renovation should be provided by introduction of temporary tax relief. The level of the temporary relief will be connected with the effects of renovation (verification will be based on energy labelling);
- similarly, the negative reversible effect should also be eliminated in respect of the charge for the use of building land and other property duties.

Stimulation of the use of sustainable fuels and efficient vehicles through taxes and other duties on motor vehicles:

- continuation of the vehicle taxation policy on the basis of GHG emissions and air pollutants and gradual increase of tax rate range;
- changes of annual duties on the use of motor vehicles, so that the determining criterion for the level of duties will be energy use or GHG and air pollutant emissions;
- reliefs for vehicles modified for the use of biofuels and other RES, whereby vehicles with the technically ensured exclusive use of biofuels, for example: B100, E85, hydrogen and other RES, will be classified in the lowest duty class, similarly as with electric vehicles.

Green tax reform:

- stimulation of EUE and of exploitation of RES within the framework of the green public finance reform that is under preparation.

Development-oriented network charge:

- development of the methodology for determining network charge for the transmission and distribution of electricity and natural gas that will be development-oriented, including the method for establishment of consistency between investments planned in development documents, and their implementation.

Establishment of a tariff system for connection to the electricity network:

- preparation of a legal basis and methodology for determining the price of connecting to electricity network for different tariff groups of energy consumers and dispersed producers up to 1 MW.

Determination of district heating:

- preparation of a legal basis and methodology for determining the network charge and the price of district heating and cooling, that will provide for an appropriate regulation of the activity in the direction of stimulation of investments in district heating and cooling systems through an ensured appropriate price level that is the basis for the efficient operation of distributors and implementation of investments. The competence of certifying the prices of district heating will be transferred from municipalities to the AGEN-RS.

Table 3: Tasks, time limits, responsible institution and funds of the *Taxes and regulated prices* sub-programme

Task	Time limit	Funds by 2020	Responsibility
Amendments to the Excise Duty Act	[]	[]	MF
Legal basis for tax reliefs and voluntary agreements for the efficient use of electricity in the economy	[]	[]	ME
Environmental duty for atmospheric pollution by CO_2 emissions	[]	[]	MESP
Stimulation of EUE within the framework of property tax	[]	[]	MF/ME
Gradual increase of tax rate range for vehicles on the basis of GHG emissions and air pollutants	[]	[]	MF
Changes of duties on the use of motor vehicles	[]	[]	MJ
Stimulation of use of biofuels within tax policy	[]	[]	MF
Stimulation of EUE and RES within the framework of the green public finance reform under preparation	[]	[]	
Changes of methodology for determining network charge for the transmission and distribution of electricity and natural gas that will stimulate the necessary scope of investments and development of active networks	[]	[]	AGEN-RS
Establishment of tariffs for connecting to the electricity network[124]	[]	[]	SODO/ME
Legal basis and methodologies for determining district heating prices	[]	[]	AGEN-RS

Players

- The Government of the Republic of Slovenia: tax system reform in the direction of green public finance reform;
- Ministry of Commerce in cooperation with the Ministry of Finance: legal basis for voluntary agreements for efficient use of electricity;
- Ministry of Finance: excise duties, property tax, taxation of vehicles;
- Ministry of the Environment and Spatial Planning: environmental duties;

[124] See the *Network for electricity distribution* sub-programme.

- Government Office of the Republic of Slovenia of Climate Changes: implementation of the OP GHG;
- Office of the Government of the Republic of Slovenia for Development and European Affairs: implementation of the Lisbon strategy in the Republic of Slovenia;
- Energy Agency of the Republic of Slovenia: regulation of network charges, regulation of prices of district heating;
- electricity distributor operator: prices for connecting to the network for transmission and distribution of electricity[124];
- Companies: voluntary agreements[125];
- Eco Fund: incentive schemes for vulnerable population groups and stimulation of measures in industry within the framework of voluntary agreements[125].

[125] See the *Efficient use of energy* sub-programme.

17 Education and training

Objectives of the sub-programme

The sub-programme supports the realisation of NEP key strategic objectives for providing competitiveness, reliability and minimum possible environmental impacts within the framework of education activities and training and the related policies and energy policy. Key objectives of the sub-programme are the following:

- strengthening the capacities for mastering global knowledge and technological development;
- promotion of knowledge as the main source of increased labour productivity and national competitive ability in energy;
- increased quality of offer, planning and management of systems, products and services in the field of energy management;
- provision of conditions for attaining other NEP objectives, particularly in the field of EUE and RES.

Sub-programme strategy

With the hope to attain the objectives of the sub-programme Education and training, the Government of the Republic of Slovenia will provide for an appropriate support environment that will enable the following:

- deepening and extending the knowledge in energy options, their evaluation and other decision-making aspects;
- deepening the knowledge on practical aspects of EUE measures and RES exploitation in wide use;
- targeted education and training of public administrators for operationalisation of legislation in the field of sustainable energy and efficient energy management in the public sector;
- targeted education to improve practical competence for high-quality preparation and implementation of projects in the field of energy efficiency and green energy technologies and their placing in public and private buildings (architects, installers, supervisors, decision-makers, etc.);
- implementation of multidisciplinary education programmes in all fields related to energy management, particularly in the field of sustainable energy, and wider training for working in multidisciplinary teams;
- lifelong learning by emphasising vocational training in the field of sustainable energy;
- accelerated inclusion of educational institutions in international projects.

- Key objectives of the sub-programme are as follows:stimulation of the development of education and training programmes that enhance the ability of critical judgment, creativity and multidisciplinary problem-solving in the energy field and in energy management;
- stimulation of multidisciplinary projects and programmes of lifelong education and training;
- direction of enterprises towards financing and inclusion in additional education and training programmes through tax policy;
- stimulation of new and strengthening of existing education and training programmes in the energy field, particularly sustainable energy;

- establishment of a basis of educational institutions that systematically update their education programmes with novelties in the energy field.

Key elements of the supporting environment by 2020 are the following:

- development of mechanisms that will provide for an accelerated development of education and training programmes for enhancing the ability of critical judgment, creativity and multidisciplinary problem-solving in the energy field;
- stimulation of the development of education and training programmes that enhance the ability of critical judgment, creativity and multidisciplinary problem-solving in the energy field and in energy management;
- introduction of compulsory education for energy managers in the public sector;
- systematic knowledge promotion as the main source of increasing work productivity and national competitiveness in the energy field.

Supporting environment

With the hope to attain the objectives of the Education and training sub-programme, the following measures are necessary:

- gradual increase in budgetary funds concentration in education and training priority fields, particularly in the field of sustainable energy;
- stimulation of mutual cooperation and multidisciplinary integration of domestic and foreign educational institutions in the education and training field, particularly in the field of sustainable energy;
- assessment and evaluation of educational institutions regarding the systematism of updating educational programmes by means of novelties;
- preparation of legal acts that will provide for the establishment of a base of educational institutions that update their education programmes by novelties on a systematic basis;
- establishment of a base of educational institutions that update their education programmes by novelties on a systematic basis;
- preparation of legal acts that will provide for the financial upgrade of quality novelties within the framework of development and innovation projects in the field of energy and sustainable development;
- updating and adjusting the legislation that will provide for compulsory education for energy managers in the public sector;
- direction of enterprises (tax policy) towards financing and inclusion in additional education and training programmes;
- systematic inclusion of topics from the energy field, particularly EUE and RES, in natural-science programmes in primary and secondary schools and universities, as well as in lifelong education and training programmes;
- systematic informing of general public and target groups about measures in the field of education and training.

Table 4: Tasks, time limits, responsible institution and funds of the *Education and training* sub-programme

Task	Time limit	Funds by 2020	Responsibility
Gradual increase in budgetary funds concentration in education and training priority fields, particularly in the field of sustainable energy	2011, trajno	[]	MF/MES/MHEST in cooperation with GOCC, GODEA, ME and MESP
Stimulation of mutual cooperation and multidisciplinary integration of domestic and foreign educational institutions in the education and training field, particularly in the field of sustainable energy	Permanent	[]	MES/MHEST/ ME/MESP

Task	Time limit	Funds by 2020	Responsibility
Assessment and evaluation of educational institutions regarding the systemisation of updating educational programmes by means of novelties	Annual	[]	MES/MHEST
Preparation of legal acts that will provide for the establishment of a base of educational institutions that update their education programmes with novelties on a systematic basis	2011	[]	MES/MHEST
Establishment of a basis of educational institutions that systematically update their education programmes with novelties	2012	[]	MES/MHEST
Preparation of legal acts that will provide for the financial upgrade of quality novelties within the framework of development and innovation projects in the field of energy industry and sustainable development	2012	[]	MES/MHEST
Updating and adjusting the legislation that will provide for compulsory education for energy managers in the public sector	2011	[]	ME
Direction of enterprises (tax policy) to financing and inclusion in additional education and training programmes	2011, trajno	[]	MF/ME in cooperation with energy enterprises and educational institutions
Systematic inclusion of topics from the energy industry, particularly EUE and RES, in natural-science programmes in primary and secondary schools and universities, as well as in lifelong education and training programmes	Permanent	[]	MES/MHEST in cooperation with GOCC/GODEA
Systematic informing of general public and target groups about measures in the field of education and training	Annual	[]	MES/MHEST in cooperation with GOCC/GODEA

Players

- The Government of the Republic of Slovenia: coordination of all necessary activities of state authorities for attaining the objectives set;
- Ministry of Higher Education, Science and Technology: preparation and supplementation of legislation; coordination of the key sub-programme activities;
- Ministry of Education and Sport: preparation and supplementation of legislation; coordination of key sub-programme activities;
- Ministry of Economy: preparation and supplementation of legislation;
- Ministry of the Environment and Spatial Planning: preparation and supplementation of legislation;
- Ministry of Finance: preparation and supplementation of legislation (gradual increase in budgetary funds concentration in education and training priority fields; tax policy);
- Government Office of the Republic of Slovenia of Climate Changes: cooperation in the development of education and training priority fields, particularly in the field of sustainable energy;
- Office of the Government of the Republic of Slovenia for Development and European Affairs: cooperation in the development of education and training priority fields, particularly in the field of sustainable energy;
- Educational institutions (primary and secondary schools, universities, development and research institutes, institutions and organisations specialised in lifelong education and training programmes); implementation of key activities of the sub-programme.

Financing

The foreseen total funds for the realisation of the Education and Training sub-programme amount to EUR [] million.

Monitoring programme implementation

Table 5: Main indicators for monitoring the *Education and training* sub-programme

Objective	Indicator	Unit
Implementation of NEP measures	Implementation of measures under the time budget set	year
Cooperation and multidisciplinary connection	Number of projects/programmes	descriptive
Inclusion of topics from the energy industry, particularly EUE and RES, in natural-science programmes	Number of projects/programmes	descriptive
Adequate funds for education and training in the energy industry	Share of funds for education and training in the energy industry in the GDP Share of funds for education and training in the energy industry in the sector	[%] [%]

18 Research and development

Objectives of the sub-programme

The sub-programme supports the realisation of NEP key strategic objectives for providing competitiveness, reliability and minimum possible environmental impacts within the framework of research and development activities and the related policies and energy policy. Key objectives of the sub-programme are the following:

- strengthening the ability in the field of competitiveness and technological development in the energy industry;
- preparation of new products, production processes, services and solutions in the energy industry suitable for transfer to the economy;
- transfer of international technological knowledge in the field of energy industry to the Slovenian economy;
- increase of the quality of offer, planning and management of systems, products and services in the field of energy management;
- provision of conditions for attaining other NEP objectives, particularly in the field of EUE and RES.

Sub-programme strategy

With the hope to attain the objectives of the Research and Development sub-programme, the Government of the Republic of Slovenia will provide for an appropriate support environment that will enable the following:

- long-term priority development of scientific disciplines that are in line with the development needs of the Republic of Slovenia and the interest of domestic economy, particularly in the field of sustainable energy;
- introduction of multidisciplinary research and development programmes in all fields related to energy management, particularly in the field of sustainable energy;
- implementation of targeted research and development programmes and demonstration projects that improve practical competence for high-quality preparation and implementation of projects in the field of energy efficiency and green energy technologies;
- better understanding of development energy options, their evaluation and other decision-making aspects;
- accelerated inclusion of research and development institutions in international projects.

Key orientations of this sub-programme are the following:

- stimulation of multidisciplinary research and development programmes and demonstration projects in the field of energy that show a direct interest of the economy or public sector and reach the national development objectives, particularly in the field of energy efficiency and green energy technologies;
- direction of enterprises to financing and inclusion in additional education and training programmes and demonstration projects through tax policy;
- stimulation of new and strengthening of existing education and training programmes in the energy field, particularly sustainable energy.

Key elements of the supporting environment by 2020 are the following:

- development of mechanisms that will provide for an accelerated development of useful and development researches in the energy field, particularly in the field of energy efficiency and green energy technologies;
- stimulation (regulations and financial incentives) of an increase in the share of research and development personnel in the entire economy;
- development of mechanisms that will provide for greater research and development and innovation cooperation or enterprises and research institutions and universities in joint development projects in the energy field, particularly in the field of energy efficiency and green energy technologies;
- systematic promotion of the results of research and development projects, with the aim to inform general public and target groups about solutions in the energy industry suitable for transfer to the economy.

Supporting environment

With the hope to attain the objectives of the Education and training sub-programme, the following measures are necessary:

- gradual increase in budgetary funds concentration in research and development priority fields, particularly in the field of sustainable energy;
- stimulation of mutual cooperation and multidisciplinary integration of domestic and foreign research and development institutions in the energy field, particularly in the field of energy efficiency and sustainable energy technologies;
- direction of enterprises (tax policy) to increase their share of research and development personnel and investments in research and development in the energy industry;
- research with the aim to verify environmental acceptability of the exploitation of RES;
- research with the aim to evaluate the RES exploitation potential, particularly in the field of wind and geothermal energy;
- research with the aim to record natural resources (coal, uranium, oil and natural gas);
- preparation of legal acts that will provide for financial upgrading of quality novelties within the framework of development and innovation projects in the field of energy and sustainable development;
- preparation of legal acts that will provide for a more stimulative environment for research activity and technological development, particularly in the fields of updating and connecting research infrastructure and stimulating the mobility of human resources;
- stimulation of the energy industry, particularly of EUE and RES (demonstration projects), within the framework of the National Research and Development Programme;
- establishment of the national research and development and educational centre for green technologies;
- each production or commercial enterprise in the energy industry owned or co-owned by the state that operates in the free market, annually earmarks at least 15% of profit for research and development of electricity and/or heat production from RES, CHE;
- systematic informing of general public and target groups about solutions in the field of energy suitable for transfer to the economy.

Table 6: Tasks, time limits, responsible institution and funds of the *Research and development* sub-programme

Task	Time limit	Funds by 2020	Responsibility
Gradual increase in budgetary funds concentration in research and development priority fields, particularly in the field of sustainable energy	2011, trajno	[]	MF/MHEST in cooperation with GOCC, GODEA, ME and MESP

Task	Time limit	Funds by 2020	Responsibility
Stimulation of mutual cooperation and multidisciplinary integration of domestic and foreign research and development institutions in the energy field, particularly in the field of energy efficiency and sustainable energy technologies;	Permanent	[]	MHEST/ME/MESP
Direction of enterprises (tax policy) to increase their share of research and development personnel and investments in research and development in the energy industry	2011, trajno	[]	MF/ME in cooperation with energy enterprises and research institutions
Research with the aim to verify environmental acceptability of the exploitation of RES	2015	[]	MESP/ME
Research with the aim to evaluate the RES exploitation potential, particularly in the field of wind and geothermal energy	2020	[]	MESP/ME
Research with the aim to record natural resources (coal, uranium, oil and natural gas)	2020	[]	MESP/ME
Preparation of legal acts that will provide for financial upgrade of quality novelties within the framework of development and innovation projects in the field of energy and sustainable development	2012	[]	MHEST/MES
Preparation of legal acts that will provide for a more stimulative environment for research activity and technological development, particularly in the fields of updating and connecting research infrastructure and stimulating the mobility of human resources;	2011	[]	MHEST
Stimulation of the energy industry, particularly of EUE and RES (demonstration projects), within the framework of the National Research and Development Programme	2011-2020	[]	MHEST in cooperation with GOCC and ME
Establishment of the national research and development and educational centre for green technologies	2012	[]	ME in cooperation with GOCC and MHEST
Establishment of a mechanism that obliges production or commercial enterprise in the energy industry owned by the state to annually earmark at least 15% of profit for research and development of electricity and/or heat production from RES, CHE or EUE	2012	[]	AUKN, ME
Systematic informing of general public and target groups about solutions in the field of energy suitable for transfer to the economy	Annual	[]	MHEST in cooperation with GOCC/GODEA

Players

- The Government of the Republic of Slovenia: coordination of all necessary activities of state authorities for attaining the objectives set;
- Ministry of Higher Education, Science and Technology: preparation and supplementation of legislation; coordination of key programme activities;
- Ministry of the Economy: preparation and supplementation of legislation;
- Ministry of the Environment and Spatial Planning: preparation and supplementation of legislation;
- Ministry of Finance: preparation and supplementation of legislation (gradual increase in budgetary funds concentration in research and development priority fields; tax policy);
- Government Office of the Republic of Slovenia of climate changes: cooperation in the development of research and development priority fields, particularly in the field of sustainable energy;

- Office of the Government of the Republic of Slovenia for Development and European Affairs: cooperation in the development of research and development priority fields, particularly in the field of sustainable energy;
- Universities, development and research institutes: implementation of key activities of the sub-programme.

Financing

The foreseen total funds for the realisation of the Research and Development sub-programme amount to EUR [] million.

Monitoring programme implementation

Table 7: Main indicators for monitoring the *Research and Development* sub-programme

Objective	Indicator	Unit
Cooperation and multidisciplinary connection	Number of projects/programmes	descriptive
New products, production processes, services and solutions in the energy industry suitable for transfer to the economy	Number of new products, production processes, services and solutions in the energy industry suitable for transfer to the economy	[No./year]
Adequate funds for research and development in the energy industry	Share of funds for research and development in the energy industry in the GDP Share of funds for research and development in the energy industry in the sector	[%] [%]

19 Spatial planning

Objectives of the sub-programme

The sub-programme supports the realisation of NEP key strategic objectives for ensuring competitiveness, reliability and minimum possible environmental impacts within the framework of spatial planning. Key objectives of the sub-programme are the following:

- implementation of efficient energy use in all fields of physical planning;
- improvement of physical planning of energy objects;
- enforcement of the quality of deciding and cooperating in decision-making about energy projects.

Sub-programme strategy

A support environment will be prepared that will provide for the development of energy infrastructure and stimulate the development of energy by taking account of the objectives of physical planning, by prioritising the following fields:

- efficient energy use;
- renewable energy sources;
- linear objects.

By taking into account the following orientations:

- development of energy-efficient urban planning and architectural design, particularly in the field of physically placing facilities, settlement systems and energy-saving construction forms for ensuring reduced energy consumption;
- the electricity generation locations will be exploited as a priority with the minimum impact on the environment – directed construction of production facilities on locations most suitable from perspective of land use, social acceptability, available resources, and integration in the infrastructure;
- priority promotion of integration of solar power stations in buildings;
- in further development of electricity generation, facilities are planned for the use of RES, such as wind, geothermal energy and others, by taking account of the efficiency of the selected system as well as the spatial, environmental and social acceptability;
- spatial development of the energy infrastructure is provided primarily in joint infrastructural corridors, whereby the aim is to reduce their number;
- improvements of the legal framework that regulates physically placing energy facilities and quality management of procedures;
- systematic, strict and active elimination of administrative obstacles, connected with physical placing of key projects.

Key elements of the support environment are the following:

- implementation of the Spatial Arrangements of National Importance Siting Act;
- supplementation of other acts and implementing regulations for the implementation of NEP objectives in the field of physical planning;
- proactive role of the state in directing RES investors on the most spatially acceptable locations;
- conduction of NSP for all NEP projects;
- establishment of a system of permanent improvements in the procedures of physically placing energy facilities.

Supporting environment

A support environment will be established to stimulate the development of energy that will include the following measures:

Energy-efficient spatial planning

- amendments to the Spatial Planning Act and the Construction Act and implementing regulations (Rules on efficient use of energy in buildings, etc.) to provide for the improvement of energy efficiency and the use of RES through a comprehensive planning of buildings and settlements (new and at renovations) for optimum satisfaction of the needs of a user and by taking account of the principles of sustainable construction in the entire life-cycle of the building (LCC) or the settlement. Low or zero energy use in buildings and settlements is based on the appropriate position and distribution of buildings (solar urbanism), architectural design (e.g. improved design of a building, advanced, e.g. natural materials, comprehensive planning of buildings with low energy consumption and low CO_2 emissions by considering LCC), etc.

Local energy supply and dispersed electricity generation from RES:

- urban technical directions for spatial planners in planning business and housing areas for using RES for heating and cooling and for the implementation of energy efficiency;
- supplementation of spatial order by the criteria for the equipment with charging infrastructure for electric-battery vehicles;
- proactive role of the state in identifying locations for the exploitation of water and wind energy: research and classification of locations for exploiting RES regarding the spatial, environmental acceptability and necessary adaptation to climate changes, including the preparation of geographic maps;
- preparation of expert bases for drawing up national spatial plans and overseeing procedures of placing RES power plants, which are recognised as facilities of national importance for achievement of the prescribed objective of a 25% share of RES in overall energy use, and for which investors have not yet been identified. After the appropriate bases are elaborated and adopted, the Ministry of the Environment and Spatial Planning will initiate procedures of physically placing these plants on behalf of the Republic of Slovenia[126]. Accelerated placing of RES in spatial plans at the state and local levels; simplification of administrative procedures for the implementation of investments and verification of the efficiency of procedures by means of demonstration projects;
- placing of the implementation of local energy concepts in general and individual acts of local self-government communities; elaboration of municipality spatial plans on the basis of directions from local energy concepts or prescribed ways of heating, cooling and preparation of sanitary hot water;

Networks:

- implementation of the Spatial Arrangements of National Importance Siting Act;
- efficient protection of protected zones of existing and planned power lines and faster spatial placement procedures of linear facilities;
- drawing up of the *Decree on criteria for the use of underground electricity power connections in the Republic of Slovenia,* which is to provide for clear and balanced criteria for the use of underground electricity power connections and other necessary legal base[127]. The Decree

[126] After the regulation on the state spatial plan is adopted, the state will lease out such energy locations; the state stake will be paid-off or the state will participate in the ownership of the project and sell it at a later stage.

[127] The decree is necessary for determining the scope of use of underground electricity power connections in the Republic of Slovenia on the basis of the state of the environment, impacts of the electricity power network on the environment, restrictions to the use of land, financial capabilities and interested users of the space.

should lay down clear criteria for the 110 kV level, while for higher voltage levels the network should, as the rule, not be calibrated;
- The Construction Act should be amended in respect of an appropriate regulation of the construction of linear facilities that posses their own specificity, as follows:
    - determine the Cumulative Cadastre of Public Infrastructure as the basis for the implementation of reconstruction of existing power lines;
    - more appropriately regulate the acquisition of property right and demonstration of public benefits.

General:
- initiate the NSP procedure for all priority facilities from the NEP. Improvement of decision-making procedures in issuing permits for the state infrastructure projects, including the change of legal framework in this field;
- training for an early inclusion of spatial grounds and verification of spatial and environmental feasibility and social acceptability in the planning of energy facilities;
- establishment of a system of permanent improvements by monitoring the procedures of spatial placing of energy facilities and implementation of measures for the elimination of obstacles including further improvements of legislation.

Table 8: Tasks, time limits, responsible institution and funds of the *Spatial planning* sub-programme

Task	Time limit	Sources	Responsibility
Amendment of acts and implementing regulations for energy efficient spatial planning and exploitation of RES	[]	[]	MESP
Preparation of legal basis for compulsory equipment with charging infrastructure for electric-battery vehicles	[]	[]	MESP
Classification of locations for exploiting RES (wind farms and hydroelectric power plants) regarding spatial acceptability	[]	[]	ME, MESP
Conduction of the procedures of physical placing of RES facilities of national significance for which investors have not yet been identified	[]	[]	ME
Placing local energy concepts in municipal spatial plans	[]	[]	municipalities
Implementation of the Spatial Arrangements of National Importance Siting Act	[]	[]	MESP
Amendments of legal basis that will provide for the protection of corridors	[]	[]	MESP, ME
Preparation of acts in relation to calibration criteria	[]	[]	MESP
Initiation of the NSP procedure for NEP facilities	[]	[]	ME
Training of planners and decision-makers in relation to spatial grounds	[]	[]	MESP, ME
Establishment of a system for monitoring the procedures for NEP facilities and permanent improvements of procedures of physical placing	[]	[]	ME MESP

Players

- the Ministry of the Environment and Spatial Planning: preparation and supplementation of legislation;
- Ministry of the Economy: preparation and supplementation of legislation, monitoring the procedures
- municipalities: placement of local energy concepts in municipal spatial acts and preservation or establishment of protected zones of existing and planned energy facilities in their spatial acts;

- energy enterprises;
- planners.

Financing

The foreseen total funds for the realisation of the Spatial planning sub-programme amount to EUR [] million.

Monitoring programme implementation

Table 9: Main indicators for monitoring the *Spatial planning* sub-programme

Objective	Indicator	Unit
Setbacks in physical placing procedures	Number of procedures in arrears Exceeding time	[No.] [mon]

NEP efficiency assessment

1 Selection of strategic orientation

In the comparative analysis of the effects of energy policy in Slovenia by 2030, six energy policy alternative scenarios were assessed. The following were considered particularly:

- development challenges that are faced by the Slovenian energy industry, including the analysis of external circumstances: international energy markets (prices and reliability of the supply of oil derivates, natural gas, solid fuels and electricity); trade in emissions; economic activities in the Republic of Slovenia; global technological development (particularly in traffic, active networks); and traffic policy in the EU;
- alternative strategic orientations of energy, depending on the wider development policy of the state; objectives and other obligations of the Republic of Slovenia arising from international agreements; energy policy in the EU, by taking into account adopted policies and measures as well as those under preparation;
- situation of the energy industry, projects in implementation and alternatives, on the basis of projects under preparation and analysis of the possibilities for projects in the field of energy use and supply; (we base upon the analysis of technical, economical, environmentally acceptable and reachable possibilities and assessments of possibilities for increasing the reachable potential by the instruments of energy policy in individual NEP fields);
- analysis of the response of players in the energy industry on external factors and energy policy measures in various scenarios;
- quantitative assessment of effects of the factors indicated with regard to the objectives set.

Scenarios that represent various ranges of energy policy measures by 2030 were developed to support decision-making on the following development dilemmas of the development of the energy industry:

- how to ensure maximum realisation of EUE potentials – how to ensure implementation of investments with end energy consumers;
- how to ensure maximum realisation of RES potentials and where to stop: at the environmentally acceptability limit, or to provide for the development of RES for certain selected projects through the predomination of public interest in increasing the share of RES over the nature protection objectives;
- compare the possibilities for transition to a low-carbon society by constructing the second nuclear power station or without the new unit;
- how to direct gradual decrease in the use of fossil resources in the supply of electricity, heat and in traffic? From the strategic point of view, is it still important to preserve diversification of resources at the present level and the use of domestic coal in the energetic mixture for electricity generation? Which combination of measures could provide for the exchange of fossil fuels for heating?
- how to accelerate the breakthrough of new technologies, particularly in traffic, and active for electricity distribution networks;
- further international linking of the state for increased competitiveness and security of supply.

Two strategies of sustainable use and local energy supply were analysed, as well as three electricity supply scenarios. We verified the effects of energy scenarios in one, target scenario of economic development and the uniform scenario of external circumstances. We verified the sensitivity of results on movements in traffic[128].

[128] Only certain measures that influence the use of energy in transport are the subject of energy policy (these are primarily measures for stimulating efficiency of vehicles, driving and exchange of energy product); other measures that have a

Energy policy strategies in the field of sustainable use and local energy supply encompass EUE measures in all sectors, the use of RES for heating supply and dispersed electricity generation including wind farms, CHE and local energy supply. The analysed strategies are the following:

- **reference strategy (REF)** includes emergency measures for fulfilling the adopted obligations;
- **intensive strategy (INT)** establishes support environment for the implementation of all profitable EUE projects, which ensures greater economic impacts and advantage in the technological competition in the field of green energy technologies. The strategy is also more ambitious in stimulating RES exploitation, development of the local supply and CHE in all sectors.

The three electricity supply development scenarios that were assessed differ in key investments in production units:

- **the basic scenario (BS)** presupposes continuation of ongoing investments or implementation of measures for their completion (HPP on lower Sava, block 6 in TPPŠ); increasing the period of operational life of NEK; acceleration of the construction of the planned and new hydroelectric power plants; modernisation of existing and construction of new high-efficiency units for CHE; and verifies the construction of new gas and steam power plants considering the conditions in international markets;
- **the nuclear scenario (NS)** is the upgrade of the basic scenario and presupposes measures that will provide for long-term exploitation of nuclear energy in Slovenia through construction of a new NPPK2 unit at the site next to the existing NPPK with a capacity of 1,000 MW that will start to operate before 2030;
- **the gas scenario (GAS)** is also un upgrade of the basic scenario in the direction of even greater diversification of energy-supply resources with regard to the present one – by increasing the share of the fourth energy product – through construction of two gas and steam power plants (GSPP) on natural gas by 2030 with a total capacity of 800 MW.

The initially assessed scenarios for the NEP did not verify strategic aspects of ongoing investments. Due to public dilemmas related to the investment in the sixth block of TPPŠ, two additional electricity supply scenarios were analysed that enable the assessment of energy development strategic aspects at the termination of such investment[129]. In the analysis, we did not verify any other ongoing investments and adopted measures. Both additional scenarios assume closing down of VCM by 2027. The grounds of both scenarios are still preservation of a comparable level of electricity generation in the state, as in the basic scenario, preservation of all state system functions, including systemic services, and preservation of the level of diversification of energy-supply resources, and highlights the consequences of a decrease of electricity generation from domestic coal. We assess the additional scenarios by considering the intensive development of use and dispersed electricity generation:

- **the additional nuclear scenario (AS NS),** without block 6 in TPPŠ, considers construction of the gas and steam power plant with the capacity of 400 MW and nuclear power plant with the capacity of 1,000 MW;

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significant impact on the scope of transport work and/or selection of the transport method and thus the use of energy, are the subject of transport, tax, spatial and other policies.

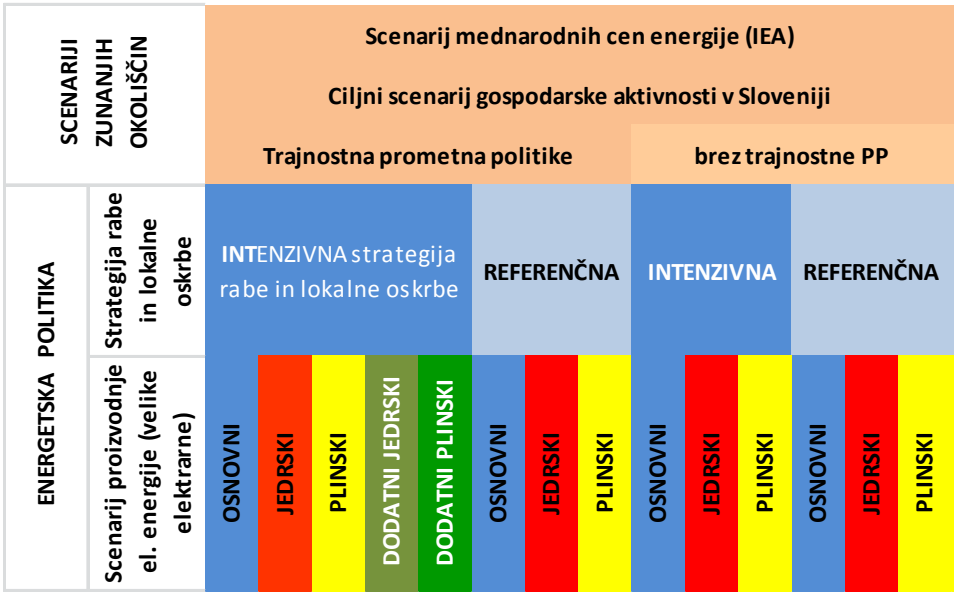
Since actions of such policies are essential for fulfilling the energy objectives of the Republic of Slovenia from the climate and energy package, but have not been yet adopted, nor prepared, in the sensitivity analysis, we assess fulfilling the objectives for the scenario when sustainable transport policy is not prepared or adopted.

[129] The analysis is limited to assessing strategic aspects of the development of the energy sector without TPPŠ6 and is not detailed enough for assessing the consequences of the discontinuation of investments from the enterprise or project point of view.

- **the additional gas scenario (AS GAS),** without the block 6 in TPPŠ, considers construction of two GSPP with a total capacity of 800 MW.

The possibility of NPPK2 with the capacity of 1,600 MW is considered as a sub-variant of both nuclear scenarios (NS INT and AS NS).

For other fields within the energy industry: transmission of electricity and transmission of natural gas was the uniform development scenario for the NEP that was assessed in detail; however, priority measures are defined within sub-sectors. Within the framework of the NEP's horizontal measures, the following policies are particularly connected with energy development: tax policy, housing policy, spatial planning, education and training, research and development, and general development state policy, which are dimensioned so as to support the measures of sustainable use and local energy supply, as well as energy supply in all sectors, and have a significant impact on NEP effects.



SCENARIOS OF EXTERNAL CIRCUMSTANCES

Scenarios of international energy prices (IEA)

Target scenario of economic activity in the Republic of Slovenia

Sustainable transport policies

Non-sustainable transport policies

ENERGY POLICY

Electricity generation scenario (big electric power plants)

Use and local supply strategy

INTENSIVE use and local supply strategy

REFERENCE

INTENSIVE

REFERENCE

BASIC

NUCLEAR

GAS

ADDITIONAL NUCLEAR

ADDITIONAL GAS

BASIC

NUCLEAR

GAS

BASIC

NUCLEAR

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BASIC

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Image 1: Flow chart of analysed NEP scenarios

Table 10: Names and indications of NEP scenarios in comparison to effects analysis

Name	Indication
Basic scenario/**Reference** strategy	**OSN REF**
Nuclear scenario/**Reference** strategy	**NS REF**
Gas scenario/**Reference** strategy	**GAS REF**
Basic scenario/**Intensive** strategy	**BS INT**
Nuclear scenario/**Intensive** strategy	**NS INT**
Gas scenario/**Intensive** strategy	**GAS INT**

Table 11: Names and indications of additional NEP scenarios in comparison to effects analysis[130]

Name	Indication
Additional nuclear scenario/**Intensive** strategy	**AS NS**
Additional gas scenario/**Intensive** strategy	**AS GAS**

Results of comparison of scenarios

The analysed scenarios/strategies successfully pursue the set objectives of sustainable development and transition to a low-carbon society, reliability of energy supply and competitiveness. In all analysed scenarios/strategies, we fulfil all minimum requirements of the climate and energy package, other international commitments and standards in the field of reliability of energy supply.

The important advantages of scenarios are the following:

- **reduction of emissions:** turn in the trend from the present GHG growth towards the long-term reduction of GHG emissions and further significant reduction of air pollutants;
- **greater energy effectiveness:** reduction of the use of overall energy and control of growth of electricity use; significantly greater energetic and environmental efficiency of energy transformations as a result of exploitation of RES, high-efficiency CHE, and exchange of thermal-energy facilities with the most available technology (BAT) for new technologies;
- **better exploitation of RES:** considerable increase in the use of RES for more than 60% compared to the present use. Alongside an increased exploitation of hydroenergy and

[130] Additional scenarios are presented separately due to difference in the level of analysis and treatment of these scenarios.

biomass, intensive incentives will provide for significant changes in the use of other RES that, together, represent together a 4% share among RES, while by 2030, this share will be increased to over 35%;

- **improvement of strategic and operational security of supply:** reduction of dependence on imports in all scenarios; maintenance of diversification of energy-supply resources and for electricity generation; and increased share of electricity production in the Republic of Slovenia; improvement of all indicators of operational reliability of electricity supply; increase of production and reserve capacities in the state;
- **competitiveness:** reduction of energy intensity; change in the structure of energy costs – increase of the share of investments and reduction of costs for fuels and emissions; maintenance of competitiveness of electricity generation.

Selection of the strategy of EUE stimulation and of local energy supply

The intensive and reference strategy do not differ significantly by 2020; however, the intensive strategy provides for better environmental indicators and greater robustness in attaining the objectives: of the climate energy package – particularly a 25% share of RES in gross overall energy use – and the Kyoto protocol. Regarding the reference strategy, the intensive strategy indicates advantages after 2020: reduction of the use of energy and control of growth of electricity use; by 2030, a 31% share of RES in gross overall energy use and 53% share in gross electricity use is reached (in the reference strategy, only 27% share of RES in the overall use and a 44% share in electricity use), better transformation efficiency with a higher share of CHE and RES in electricity generation; decreased net import and reduction of dependence on imports; increased improvement of energy intensity; all other indicators of energy supply reliability are better; greater reduction of GHG emissions; a weakness of intensive strategy are somewhat higher emissions of nitrogen oxides and dusty particles on account of greater use of wood biomass. The intensive strategy also represents a better development basis for long-term transition to a low-carbon society. Additional investment costs in the intensive strategy for EUE are covered from the financial point of view by reduced costs for fuels and energy; additional costs for the stimulation of RES require additional incentives of EUR 650 million within a 20-year period.

Therefore, the Intensive Strategy for Stimulating Sustainable Use and Local Energy Supply is selected and proposed for the NEP.

Selection of strategy of electricity supply development

Energy supply scenarios do not differ significantly by 2020 – the main challenges are the following: construction of new hydroelectric power plants, replacing of key existing thermal power plants and directed use of fossil fuels (effective use of domestic coal and use of natural gas in CHE). In 2030, the scenarios differ: the nuclear and gas scenario indicates advantages over the basic scenario in energy indicators and in the indicators of operational reliability of energy supply. In the nuclear scenario, a significant improvement relates to general state dependence on imports[131]. In both scenarios (nuclear and gas) a part of electricity is intended for export. The gas scenario represents an acceptable alternative from all aspects; however, it does not show any advantage over other scenarios. Electricity generation is more expensive than in the other two scenarios, it involves greater GHG and NO_x emissions, greater dependence on imports and sensitivity to energy prices in

[131] According to international standards, nuclear fuel is considered to be a domestic, OECD energy source.

international markets. Despite higher supply costs, it involves smaller investments than the nuclear scenario.

Due to lower supply costs and smaller emissions, two electricity supply scenarios are recommended as particularly appropriate for the NEP: the basic and the nuclear scenarios. The basic scenario covers the needs of the Republic of Slovenia by 2030, while the nuclear scenario has a long-term orientation and provides further long-term exploitation of nuclear power in the Republic of Slovenia. Due to the complexity of the implementation of the project, a certain period of overlapping of the NPPK2 and NPPK operation is necessary from the point of view of reliability and competitiveness. In the efficiency assessment, we consider the year 2022 as the first possible operational year of the facility, while in reality, the year of the facility construction will be the subject of entrepreneurial optimization, and implementation will also depend on the project's social acceptability. The basic scenario of the NPPK2 construction is the same as for the nuclear scenario; it provides information about the course of activities in the nuclear scenario in the case of the postponed construction of NPPK2 .

Verification of the proposal by means of additional scenarios

The selected electricity supply strategy was compared with another two strategies that represent the suspension of ongoing investments in block 6 in TPPŠ. The results of the comparison are the following:

- the key advantage of additional scenarios is a greater reduction of GHG by 2030; also, the indicators of emissions of harmful substances into the atmosphere are better;
- the level of operational reliability corresponds to the criteria set;
- after the closing down of the VCM, strategic reliability is lower, while dependence on imports is greater; diversification of resources and locations for electricity supply is also smaller;
- in additional scenarios, the electricity supply is partly, but to a smaller extent, intended for export;
- in the gas scenario without block 6 in the TPPŠ, energy intensity is the lowest, while it is the highest in the nuclear scenario with block 6 in the TPPŠ;
- during the period 2010-2030, the total cost of investments is the lowest in the gas scenario without block 6 in the TPPŠ and the highest in the nuclear scenario with block 6 in the TPPŠ;
- the cost price of electricity generation in all scenarios without block 6 in the TPPŠ is somewhat higher than the cost price in scenarios with block 6 in the TPPŠ, whereby in scenarios without block 6 in the TPPŠ, the cost price does not include the cost of termination of the agreement on the ongoing investment and costs for closing down the Velenje coalmine;
- scenarios without block 6 in the TPPŠ are less robust regarding the changes of circumstances in international energy markets, particularly the additional gas scenario.

Advantages of scenarios without block 6 in the TPPŠ involve the environment and are somewhat less demanding from an investment point of view; advantages of scenarios with block 6 in the TPPŠ are a greater strategic security of supply, lower expected energy price and smaller sensitivity to the changes of prices in international energy markets. All scenarios provide for the fulfilment of international obligations of the state; we expect that, in all scenarios, electricity price will be competitive in international markets. In the selection of a scenario, consideration is given particularly to long-term advantages for the environment with strategic security of supply and somewhat lower electricity prices. An additional selection criterion is the fact that investment in

the block 6 is already taking place and, consequently, scenarios without block 6 in the TPPŠ are burdened by the costs of termination of agreements and activities related to the investment.

Table 12: Comparison of scenarios in 2020 and 2030

	Reliability indicators					Environmental indicators					Competitiveness indicators			
	Diversification of resources	**Dependence on imports**	**Share of electricity generation from domestic resources with regard to total electricity generation**	**Operational reliability**	**Electricity export**	**CO_2 emissions**	**CO_2 emissions outside ETS**	**NO_X emissions**	**SO_2 emissions**	**Emissions of dust particles**	**Indicative amount of investments 2010- 2020 or 2030[132]**	**Specific cost for electricity generation from new units[133]**	**Public funds for electricity supply[134]**	**Energy intensity [toe/EUR]**
		[%]	[%]		[TWh]	[Mt $CO_{2\ ekv}$]	[Mt $CO_{2\ ekv}$]	[kt]	[kt]	[kt]	[million EUR_{2008}]	[EUR_{2008}/MWh]	[mio EUR_{2008}]	[toe/EUR_{2008}]
Situation in 2008	HPP, NS, LIG	56,0		-	-1,4	16,9	9,1	58,8	11,9	6,3				176,2
Scenario 2020		**2020**												
BS INT	HPP, NS, LIG	46,2		OK	1,5	14,3	7,2	27,5	8,2	5,2	2.360	72 (74)		182,9
NS INT											5.949			
GAS INT											2.640			
AS NS	HPP, NS, LIG	49,6		OK	2,1	14,5		27,9	6,6	5,2	5.562	81 (82)		185,6
AS GAS											1.974			
Scenario 2030		**2030**												
BS INT	HPP, NS, LIG	45,2	71	OK	2,6	12,7	7,1	20,9	5,7	4,4	3.396	78 (81)		137,5
NS INT	HPP, NS, LIG	30,5	79	OK	10,2	12,7		20,9	5,7	4,4	7.383	72 (77)		163,2
GAS INT	HPP, NS, LIG, NG	47,5	58	OK	7,5	14,4		23,1	5,7	4,4	3.956	83 (85)		142,8
AS NS	HPP, NS, NG	37,4	64	OK	8,3	10,2		19,34	1,0	4,3	6.997	72 (77)	not assessed	157,3
AS GAS	HPP, NS, NG	55,2	49	OK	3,8	11,3		20,7	1,0	4,3	3.290	84 (85)	not assessed[135]	136

[132] Only investments in electricity generation on the transmission network are presented, including HPP over 10 MW and big CHE units.

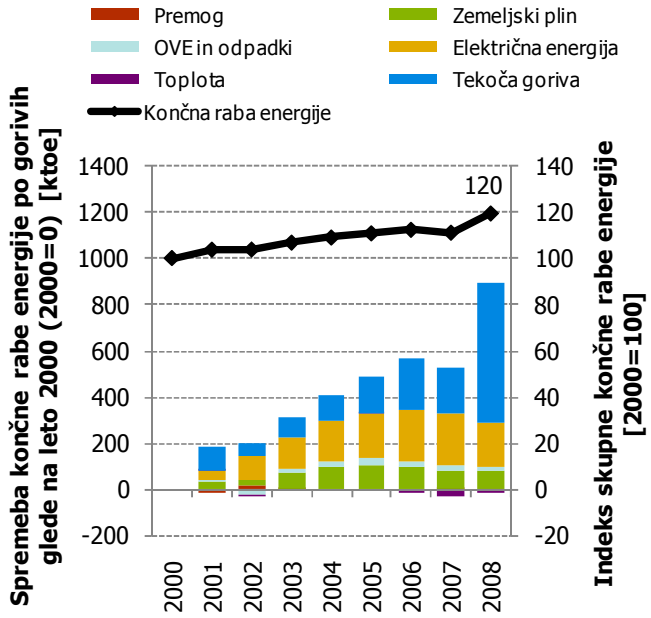
[133] Cost price of electricity generation in new units from the system point of view. The cost price does not include costs for termination of agreement.
The ratio between products (zone, trapezium that reaches different prices in the market) is somewhat different between scenarios.
The cost price is indicated in brackets, by consideringa a 7% discount rate for investments in electricity generation from renewable energy sources and a 9% discount rate for electricity generation from other energy sources.

[134] Only differences between scenarios are presented.

[135] According to the HSE assessment, the costs for closing down the VCM amount to EUR 173 million: These costs are not included in the cost price presented.

2 Energy balance

Final energy use



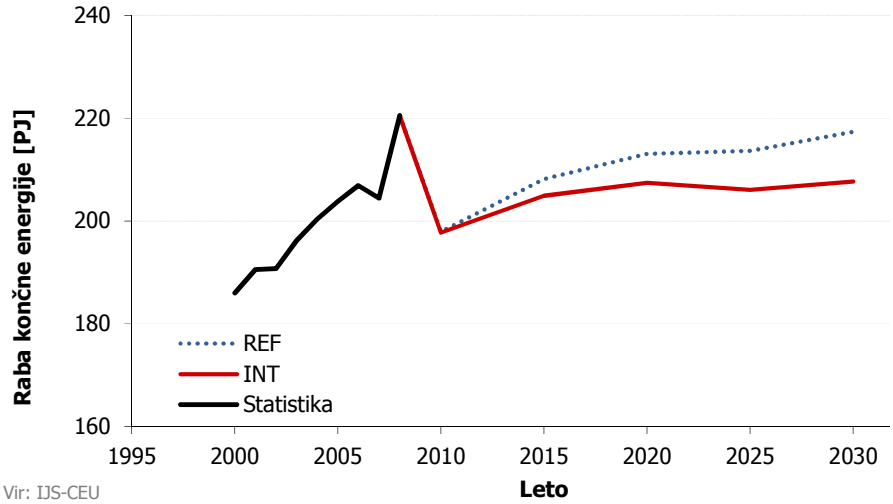
Vir: SURS, IJS

After the decrease in 2007, in 2008 the final energy use significantly increased; in 2008, it was more than 19% higher than in 2000. From 2007, the use rose every year, on average by 1.4% per year; in 2008, it increased by almost 8%. In 2009, it decreased to 196 PJ or by 11% compared to the year before that.

In the period from 2000, the use of liquid fuels increased the most, by 26%, followed by electricity by 22% (in 2008, the growth stopped). In 2008, the use of gas fuels was higher by 13% than in 2000. The use of RES increased minimally.

In NEP projections, use will continue increasing until 2020, then it will be stabilised in the selected NEP strategy. According to projections, the structure of final energy use significantly changes by fuels and sectors. Compared to 2010, the use of liquid fuels will be decreased by 16%. The use of RES will increase by 71%, natural gas by 16%, electricity by 22% and district heating by 17%.

According to NEP projections, the final energy use in other use and households will decrease in the period 2010-2030, while it will increase in processing activities and building sector with a 1.1% average annual growth, and in transport with a 0.7% average annual growth in the period 2010-2030.



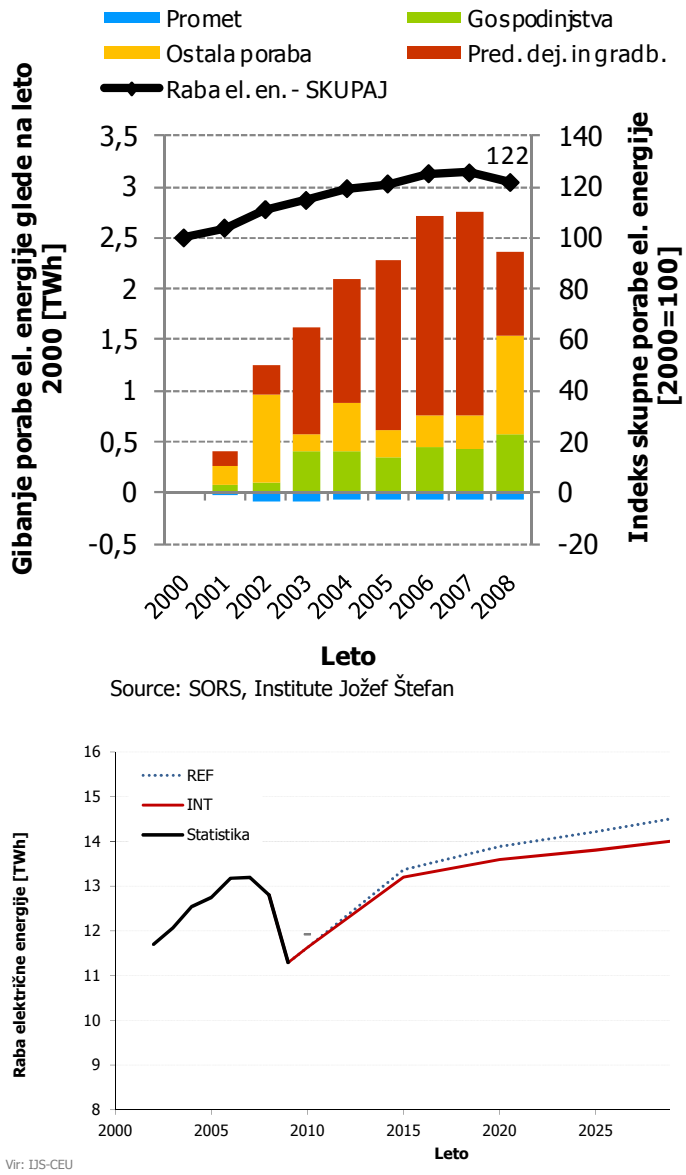
Vir: IJS-CEU

Final energy use

Year

Image 2: Projection of the total final energy use by 2030 in the selected strategy (INT) in comparison with the reference strategy (REF), and the course in the period 2000-2008

Electricity use



Electricity use (TWh)

Year

Image 3: Projection of electricity use by 2030 in the selected INT strategy in comparison with the REF strategy, and the course in the period 2000-2008

In 2008, electricity use decreased for the first time since 2000. Such a decrease in electricity use continued in 2009, particularly due to the critical economic situation; in 2010, it somewhat increased.

During the period 2000-2007, electricity use increased particularly in the processing industry, partly as a consequence of the new electrolysis in Talum, in households and for other uses. In 2008, it decreased significantly in processing activities and the building sector (industry).

In NEP projections, by 2015 electricity use will increase up to the level from 2007, when it was highest in the Republic of Slovenia, with 13.2 TWh. After that, it decreased significantly. During the period 2010-2020, a 1.6% average growth is expected and only 0.3% during the period 2020-2030. By 2030, electricity use will amount to 14.1 TWh and will be 10% higher than in 2008.

Table 13: Energy balance of the selected NEP scenarios: basic and nuclear scenario

Energetska bilanca				INTENZIVNA strategija - OSNOVNI scenarij						- JEDRSKI scenarij	
	2000	2005	2008	2010	2015	2020	2030	2020/2010	2030/2020	2030	2030/2020
								%/a	%/a	enota	%/a
Domača proizvodnja [Mtoe]	**3,151**	**3,487**	**3,672**	**3,536**	**3,711**	**3,881**	**3,935**	**0,9%**	**0,1%**	**5,917**	**4,3%**
Trdna goriva	1,115	1,173	1,185	1,148	1,030	1,030	0,741	-1,1%	-3,2%	0,741	-3,2%
Nafta	0,001	0,000	0,000	0,000	0,000	0,000	0,000			0,000	0,0%
Zemeljski plin	0,006	0,004	0,002	0,002	0,002	0,002	0,002	0,0%	0,0%	0,002	0,0%
Jedrska energija	1,241	1,533	1,634	1,461	1,507	1,507	1,507	0,3%	0,0%	3,489	8,8%
Vodna in vetrna energija	0,330	0,298	0,345	0,367	0,411	0,467	0,607	2,4%	2,7%	0,607	2,7%
Geotermalna energija	0,000	0,003	0,000	0,000	0,000	0,000	0,111			0,111	0,0%
Drugi obnovljivi viri	0,458	0,476	0,490	0,542	0,741	0,821	0,905	4,3%	1,0%	0,905	1,0%
Odpadki	0,000	0,013	0,015	0,016	0,021	0,054	0,063	13,0%	1,5%	0,063	1,5%
Neto uvoz [Mtoe]	**3,368**	**3,844**	**4,287**	**3,432**	**3,374**	**3,337**	**3,241**	**-0,3%**	**-0,3%**	**2,598**	**-2,5%**
Trdna goriva	0,273	0,339	0,439	0,295	0,161	0,059	0,054	-14,8%	-0,9%	0,054	-0,9%
Tekoča goriva	**2,298**	**2,502**	**2,995**	**2,473**	**2,272**	**2,120**	**2,060**	**-1,5%**	**-0,3%**	**2,060**	**-0,3%**
Surova nafta	0,101	0,000	0,000	0,000	0,000	0,000	0,000			0,000	0,0%
Naftni proizvodi	2,197	2,503	2,995	2,473	2,272	2,120	2,060	-1,5%	-0,3%	2,060	-0,3%
Zemeljski plin	0,911	1,028	0,974	0,865	1,168	1,334	1,393	4,4%	0,4%	1,393	0,4%
Obnovljivi viri	0,000	0,002	0,017	0,027	0,068	0,199	0,208	22,2%	0,5%	0,208	0,5%
Električna energija	-0,114	-0,028	-0,138	-0,229	-0,295	-0,374	-0,474	5,0%	2,4%	-1,117	11,6%
Skupna raba primarne energije [Mtoe]	**6,455**	**7,320**	**7,650**	**6,968**	**7,085**	**7,218**	**7,176**	**0,4%**	**-0,1%**	**8,515**	**1,7%**
Trdna goriva	1,382	1,542	1,529	1,443	1,190	1,089	0,795	-2,8%	-3,1%	0,795	-3,1%
Nafta in derivati	2,241	2,452	2,879	2,473	2,272	2,120	2,060	-1,5%	-0,3%	2,060	-0,3%
Zemeljski plin	0,917	1,032	0,878	0,867	1,170	1,336	1,395	4,4%	0,4%	1,395	0,4%
Ostalo [1]	**1,916**	**2,297**	**2,364**	**2,184**	**2,453**	**2,674**	**2,927**	**2,0%**	**0,9%**	**4,265**	**4,8%**
Jedrska energija	1,241	1,533	1,634	1,461	1,507	1,507	1,507	0,3%	0,0%	3,489	8,8%
Obnovljivi viri energije	0,788	0,779	0,853	0,935	1,220	1,487	1,831	4,7%	2,1%	1,831	2,1%
Drugi energetski viri	0,000	0,013	0,015	0,016	0,021	0,054	0,063	13,0%	1,5%	0,063	1,5%
Neto uvoz električne energije	-0,113	-0,028	-0,137	-0,229	-0,295	-0,374	-0,474	5,0%	2,4%	-1,117	11,6%
Proizvodnja električne energije [TWh] [2]	**13,624**	**15,117**	**16,398**	**16,231**	**18,665**	**20,223**	**21,823**	**2,2%**	**0,8%**	**29,655**	**3,9%**
Jedrske elektrarne	4,761	5,884	6,273	5,609	5,783	5,783	5,783	0,3%	0,0%	13,615	8,9%
Hidro in vetrne elektrarne	3,834	3,461	4,018	4,261	4,775	5,420	7,049	2,4%	2,7%	7,049	2,7%
Termo elektrarne (tudi na OVE)	**5,029**	**5,772**	**6,107**	**6,361**	**8,107**	**9,020**	**8,990**	**3,6%**	**0,0%**	**8,990**	**0,0%**
OVE		0,120	0,292	0,342	0,749	1,021	1,724	11,6%	5,4%	1,724	5,4%
Premog		5,275	5,323	5,301	5,377	5,168	3,848	-0,3%	-2,9%	3,848	-2,9%
Tekoča goriva		0,037	0,017	0,017	0,032	0,026	0,020	4,2%	-2,5%	0,020	-2,5%
Zemeljski plin		0,340	0,475	0,691	1,939	2,772	3,366	14,9%	2,0%	3,366	2,0%
Odpadki (neOVE)		0,000	0,000	0,010	0,010	0,033	0,033	12,4%	0,0%	0,033	0,0%
Proizvodne kapacitete [MW_e] [6]	**2631**	**2991**	**2990**	**3348**	**4220**	**5192**	**6400**	**4,5%**	**2,1%**	**7485**	**3,7%**
Jedrske elektrarne	656	656	666	696	696	696	696	0,0%	0,0%	1781	9,9%
Hidro, vetrne, sončne in črpalne elektrarne	860	979	1028	1269	1569	2425	3855	6,7%	4,7%	3855	4,7%
Termo elektrarne	1115	1356	1296	1383	1954	2071	1849	4,1%	-1,1%	1849	-1,1%
Povprečni faktor obremenitve [%] [3]	**59,1%**	**57,7%**	**62,6%**	**55,3%**	**50,5%**	**44,5%**	**38,9%**	**-2,2%**	**-1,3%**	**45,2%**	**0,2%**
Poraba goriv v termoelektrarnah [Mtoe] [4]	**1,297**	**1,510**	**1,615**	**1,622**	**1,667**	**1,740**	**1,649**	**0,7%**	**-0,5%**	**1,649**	**-0,5%**
Premog	1,201	1,411	1,429	1,372	1,117	1,030	0,741	-2,8%	-3,2%	0,741	-3,2%
Tekoča goriva	0,012	0,008	0,004	0,004	0,008	0,006	0,005	4,0%	-2,7%	0,005	-2,7%
Zemeljski plin	0,069	0,065	0,106	0,157	0,379	0,533	0,613	13,0%	1,4%	0,613	1,4%
Geotermalna energija	0,000	0,000	0,000	0,000	0,000	0,000	0,111			0,111	0,0%
Biomasa	0,015	0,026	0,076	0,090	0,163	0,172	0,180	6,7%	0,5%	0,180	0,5%
Neenergetska raba energije [Mtoe]	**0,111**	**0,224**	**0,163**	**0,146**	**0,156**	**0,161**	**0,169**	**1,0%**	**0,5%**	**0,169**	**0,5%**
Skupna raba končne energije [Mtoe] [5]	**4,441**	**4,867**	**5,266**	**4,721**	**4,893**	**4,952**	**4,960**	**0,5%**	**0,0%**	**4,960**	**0,0%**
Premog	0,103	0,080	0,081	0,067	0,068	0,054	0,048	-2,2%	-1,1%	0,048	-1,1%
Tekoča goriva	2,236	2,377	2,820	2,421	2,210	2,058	1,999	-1,6%	-0,3%	1,999	-0,3%
Zemeljski plin	0,569	0,665	0,640	0,576	0,664	0,686	0,671	1,8%	-0,2%	0,671	-0,2%
Električna energija	0,905	1,096	1,101	0,995	1,135	1,169	1,209	1,6%	0,3%	1,209	0,3%
Toplota	0,195	0,196	0,184	0,180	0,193	0,200	0,211	1,0%	0,6%	0,211	0,6%
Obnovljivi viri energije in odpadki	0,434	0,453	0,440	0,481	0,623	0,785	0,821	5,0%	0,5%	0,821	0,5%
Emisije CO_2 [Mt CO_2]	**14,284**	**15,601**	**16,878**	**15,276**	**14,295**	**13,912**	**12,572**	**-0,9%**	**-1,0%**	**12,572**	**-1,0%**
Emisije CO_2 ETS [Mt CO_2]		7,956	7,993	**7,410**	**6,873**	**6,741**	**5,486**	**-0,9%**	**-2,0%**	**5,486**	**-2,0%**
Centralna in lokalna oskrba		6,330	6,449	6,100	5,300	5,119	3,741	-1,7%	-3,1%	3,741	-3,1%
Predelovalne dejavnosti in gradbeništvo		1,626	1,544	1,310	1,573	1,623	1,745	2,2%	0,7%	1,745	0,7%
Emisije CO_2 Non ETS [Mt CO_2]		7,645	8,885	**7,866**	**7,423**	**7,170**	**7,086**	**-0,9%**	**-0,1%**	**7,086**	**-0,1%**
Kazalci											
Prebivalstvo [milijon]	1,990	2,003	2,032	2,034	2,053	2,058	2,023	0,1%	-0,2%	2,023	-0,2%
BDP [milijard EUR 2008]	26,625	31,901	37,305	34,871	41,130	48,350	63,722	3,3%	2,8%	63,722	2,8%
Dodana vrednost [milijard EUR 2008]	23,034	27,960	26,677	30,693	36,298	42,889	57,112	3,4%	2,9%	57,112	2,9%
Intenzivnost rabe prim. en. [toe/mioEUR 2008]	242,5	229,5	256,0	199,8	172,3	149,3	112,6	-2,9%	-2,8%	133,6	-1,1%
Raba prim. en./prebivalca [kgoe/preb.]	3.244	3.654	3.777	3.425	3.451	3.507	3.548	0,2%	0,1%	4.209	1,8%
Proizvodnja električne en./prebivalca [kWh/preb.]	5.287	6.361	8.068	5.691	6.429	6.608	6.951	1,5%	0,5%	6.951	0,5%
Emisije CO_2/prebivalca [kg CO_2/preb.]	7.187	7.834	8.305	7.510	6.963	6.760	6.215	-1,0%	-0,8%	6.215	-0,8%
Uvozna odvisnost [%]	52,2%	52,5%	56,0%	49,2%	47,6%	46,2%	45,2%	-0,6%	-0,2%	30,5%	-4,1%

[1] *Jedrska energija, vodna in veterna energija, neto uvoz električne energije in ostali energetski viri.*

[2] *Proizvodnja na generatorju (manjše enote na pragu)*

[3] *Proizvodnja električne energije / (Proizvodne kapacitete * 8760 h)*

[4] *Vsa poraba goriva v termoelektrarnah vključno s porabo goriv za proizvodnjo toplote za prodajo v termoelektrarnah-toplarnah in v enotah soproizvodnje*

[5] *Brez neenergetske rabe in goriv za transformacije (gorivo za proizvodnjo električne energije in prodane toplote v soproizvodnji v ind. In ostalih sektorjih)*

[6] *Dejanska moč*

Energy balance

INTENSIVE strategy – BASIC scenario

NUCLEAR scenario

Domestic production (Mtoe)

Solid fuels

Oil
Natural gas
Nuclear power
Water and wind energy
Geothermal energy
Other renewable sources
Waste

Net import (Mtoe)
Solid fuels
Liquid fuels
Crude oil
Oil products
Natural gas
Renewable sources
Electricity

Total use of primary energy (Mtoe)
Solid fuels
Oil and oil products
Natural gas
Other[1]
Nuclear energy
Renewable energy sources
Other energy sources
Net electricity import

Electricity generation (TWh)[2]
Nuclear power plants
Hydro and wind farms
Thermal power plants (also on RES)
OVE
Coil
Liquid fuels
Natural gas
Waste (not RES)

Production capacities (MWe)[6]
Nuclear power plants
Hydro, wind, solar and pumped, storage power stations
Thermal power plants

Average load factor (%)[3]

Fuel consumption in thermal power plants (Mtoe)[4]
Coil
Liquid fuels
Natural gas
Geothermal energy
Biomass

Non-energy use of energy (Mtoe)

Total use of final energy (Mtoe)[5]
Coil
Liquid fuels
Natural gas
Electricity

Heat
Renewable energy sources and waste

CO_2 emissions (Mt CO_2)
CO_2 emissions ETS (Mt CO_2)
Central and local supply
Processing activities and building sector
CO_2 emissions Non ETS (Mt CO_2)

Indicators
Population (million)
GDP (EUR billion 2008)
Value added (EUR billion 2008)
Intensity of use of primary energy (toe/million EUR 2008)
Use of primary energy/inhabitant (kgoe/inh.)
Electricity generation/inhabitant (kWh/inh.)
CO_2 emissions/inhabitant (kg CO_2/inh.)
Dependence on imports (%)

(1) *Nuclear energy, water and wind energy, net electricity import and other energy sources*
(2) *Production on generator (smaller units on threshold)*
(3) *Electricity generation (Production capacities * 8760 h)*
(4) *Total use of fuel in thermal power plants, including the use of fuels for production of heat for sale in thermal power plants – heating plants and in co-production units*
(5) *Without non-energy use of fuels for transformations (fuel for the production of electricity and sold heat in co-production in industry and other sectors)*
(6) *Actual power*

Table 14: Main indicators of the selected NEP scenarios: basic and nuclear energy supply scenario

Glavni kazalci	INTENZIVNA strategija - OSNOVNI scenarij									- JEDRSKI scenarij	
	2000	2005	2008	2010	2015	2020	2030	2020/10	2030/20	2030	2030/2020
								%/a	%/a		%/a
Skupna raba energije [Mtoe]	**6,455**	**7,320**	**7,748**	**6,968**	**7,085**	**7,218**	**7,176**	**0,4%**	**-0,1%**	**8,515**	**1,7%**
Javne elektrarne	2,439	3,261	3,522	3,373	3,349	3,442	3,268	0,2%	-0,5%	5,251	4,3%
Elektrarne samoproizvajalcev	0,098	0,066	0,058	0,085	0,249	0,336	0,608	14,8%	6,1%	0,608	6,1%
Ostala energetika	0,195	0,098	0,059	0,045	0,057	0,066	0,062	4,1%	-0,7%	0,062	-0,7%
Končna raba energije (KE)	**4,505**	**4,941**	**5,337**	**4,721**	**4,893**	**4,952**	**4,960**	**0,5%**	**0,0%**	**4,960**	**0,0%**
Predelovalne dejavnosti in gradbeništvo (1)	1,471	1,707	1,543	1,233	1,421	1,481	1,578	1,8%	0,6%	1,578	0,6%
Promet	1,308	1,541	2,148	1,757	1,854	1,959	2,018	1,1%	0,3%	2,018	0,3%
Gospodinjstva	1,126	1,197	1,126	1,120	1,045	0,976	0,863	-1,4%	-1,2%	0,863	-1,2%
Ostala raba	0,599	0,496	0,520	0,611	0,572	0,535	0,500	-1,3%	-0,7%	0,500	-0,7%
Energetska intenzivnost oskrbe [toe/mioEUR 2008]	**242,5**	**229,5**	**205,8**	**199,8**	**172,3**	**149,3**	**112,6**	**-2,9%**	**-2,8%**	**133,6**	**-1,1%**
Energetska intenzivnost končne rabe [toe/mioEUR 2008]	**169,2**	**154,9**	**176,2**	**135,4**	**119,0**	**102,4**	**77,8**	-2,8%	-2,7%	**77,8**	-2,7%
Predelovalne dejavnosti in gradbeništvo (1)	55,2	53,5	50,8	35,4	34,5	30,6	24,8	-1,4%	-2,1%	24,8	-2,1%
Promet	49,1	48,3	71,1	50,4	45,1	40,5	31,7	-2,2%	-2,4%	31,7	-2,4%
Storitve in gospodinjstva	64,8	53,1	54,3	49,6	39,3	31,3	21,4	-4,5%	-3,7%	21,4	-3,7%
Končna raba električne en. na preb [kWh/preb.]	**5.287**	**6.361**	**6.301**	**5.691**	**6.429**	**6.608**	**6.951**	**1,5%**	**0,5%**	**6.951**	**0,5%**
Raba električne en. sektorsko [TWh]	**10,665**	**12,874**	**12,956**	**11,718**	**13,355**	**13,758**	**14,230**	**1,6%**	**0,3%**	**14,230**	**0,3%**
Predelovalne dejavnosti in gradbeništvo (1)	5,489	7,176	6,315	4,904	6,256	6,585	7,126	3,0%	0,8%	7,126	0,8%
Gospodinjstva	2,605	2,954	3,187	3,312	3,506	3,456	3,219	0,4%	-0,7%	3,219	-0,7%
Promet	0,267	0,198	0,198	0,206	0,258	0,415	0,704	7,2%	5,4%	0,704	5,4%
Ostala raba	2,163	2,419	3,117	3,153	3,179	3,144	3,011	0,0%	-0,4%	3,011	-0,4%
Energetski sektor	0,140	0,128	0,140	0,143	0,156	0,160	0,169	1,1%	0,6%	0,169	0,6%
Delež električne energije v skupni rabi končne en. [%]	**20,3%**	**22,2%**	**20,5%**	**21,1%**	**23,2%**	**23,6%**	**24,4%**	**1,1%**	**0,3%**	**24,4%**	**0,3%**
Predelovalne dejavnosti in gradbeništvo (1)	32,9%	36,2%	34,9%	34,2%	37,9%	38,2%	38,8%	1,1%	0,2%	38,8%	0,2%
Promet	1,8%	1,1%	0,8%	1,0%	1,2%	1,8%	3,0%	6,1%	5,1%	3,0%	5,1%
Storitve in gospodinjstva	23,5%	27,3%	24,3%	32,1%	35,5%	37,5%	39,3%	1,6%	0,5%	39,3%	0,5%
Skupna raba OVE [Mtoe]	**0,760**	**0,772**	**0,844**	**0,935**	**1,220**	**1,487**	**1,831**	**4,7%**	**2,1%**	**1,831**	**2,1%**
Hidroenergija	0,330	0,298	0,345	0,367	0,411	0,467	0,607	2,4%	2,7%	0,607	2,7%
Biomasa	0,429	0,467	0,469	0,459	0,549	0,571	0,549	2,2%	-0,4%	0,549	-0,4%
Ostali obnovljivi viri	0,001	0,007	0,030	0,110	0,260	0,449	0,675	15,1%	4,2%	0,675	4,2%
Intenzivnost izrabe OVE [koe/mioEUR 2008]	28,5	24,2	27,9	26,8	29,7	30,7	28,7	1,4%	-0,7%	28,7	-0,7%
Poraba OVE na prebivalca [koe/preb.]	381,8	385,3	415,4	459,6	594,1	722,3	904,9	4,6%	2,3%	904,9	2,3%
Delež OVE v bruto končni rabi energije		**15,9%**	**14,9%**	**17,9%**	**21,9%**	**26,4%**	**31,2%**	**4,0%**	**1,7%**	**31,0%**	**1,6%**
Sektorski deleži OVE											
Električna energija		28,4%	29,7%	33,6%	35,7%	39,9%	52,9%	1,8%	2,9%	51,8%	2,6%
Ogrevanje in hlajenje		19,6%	20,0%	22,1%	29,0%	33,5%	37,4%	4,2%	1,1%	37,4%	1,1%
Promet		0,3%	1,3%	2,3%	4,3%	9,7%	9,6%	15,4%	-0,1%	9,6%	-0,1%
Emisije CO_2 [Mt CO_2]	**14,284**	**15,601**	**16,878**	**15,276**	**14,295**	**13,912**	**12,572**	**-0,9%**	**-1,0%**	**12,572**	**-1,0%**
Termoelektrarne, TE-TO in toplarne	5,510	6,379	6,444	6,291	5,487	5,412	4,001	-1,5%	-3,0%	4,001	-3,0%
Predelovalne dejavnosti in gradbeništvo (2)	2,240	2,450	2,269	1,934	2,259	2,369	2,634	2,1%	1,1%	2,634	1,1%
Promet	3,646	4,342	6,048	5,072	5,229	5,160	5,211	0,2%	0,1%	5,211	0,1%
Storitve in gospodinjstva	2,887	2,430	2,118	1,980	1,320	0,971	0,726	-6,9%	-2,9%	0,726	-2,9%
CO_2 intenzivnost [t CO_2/toe]	**2,216**	**2,144**	**2,179**	**2,192**	**2,018**	**1,927**	**1,752**	**-1,3%**	**-1,0%**	**1,476**	**-2,6%**
Javne termoelektrarne, TE-TO in toplarne	2,170	1,916	1,830	1,865	1,638	1,572	1,224	-1,7%	-2,5%	0,762	-7,0%
Predelovalne dejavnosti in gradbeništvo (1),(2)	1,546	1,440	1,470	1,568	1,590	1,599	1,669	0,2%	0,4%	1,669	0,4%
Promet	2,793	2,834	2,816	2,886	2,820	2,634	2,582	-0,9%	-0,2%	2,582	-0,2%
Storitve in gospodinjstva	1,672	1,436	1,287	1,144	0,816	0,642	0,532	-5,6%	-1,9%	0,532	-1,9%
Emisije CO_2 na prebivalca [kg CO_2 /preb.]	**7.187**	**7.834**	**8.305**	**7.510**	**6.963**	**6.760**	**6.215**	**-1,0%**	**-0,8%**	**6.215**	**-0,8%**
Predelovalne dejavnosti in gradbeništvo (2)	1.142	1.227	1.116	951	1.101	1.151	1.302	1,9%	1,2%	1.302	1,2%
Promet	1.836	2.180	2.976	2.493	2.547	2.507	2.576	0,1%	0,3%	2.576	0,3%
Storitve in gospodinjstva	1.450	1.214	1.042	973	643	472	359	-7,0%	-2,7%	359	-2,7%
CO_2 na enoto BDP [t CO_2/MEUR 2008]	**536,5**	**489,0**	**452,4**	**438,1**	**347,6**	**287,7**	**197,3**	**-4,1%**	**-3,7%**	**197,3**	**-3,7%**
Javne termoelektrarne, TE-TO in toplarne	207,0	200,0	172,7	180,4	133,4	111,9	62,8	-4,7%	-5,6%	62,8	-5,6%
Predelovalne dejavnosti in gradbeništvo (2)	105,2	95,0	60,8	55,5	54,9	49,0	41,3	-1,2%	-1,7%	41,3	-1,7%
Promet	169,1	168,7	162,1	145,4	127,1	106,7	81,8	-3,0%	-2,6%	81,8	-2,6%
Storitve in gospodinjstva	133,6	93,9	56,8	56,8	32,1	20,1	11,4	-9,9%	-5,5%	11,4	-5,5%
Emisije TGP [Mt $CO_{2\,ekv}$]	**14,579**	**15,824**	**17,107**	**15,576**	**14,607**	**14,231**	**12,879**	**-0,9%**	**-1,0%**	**12,879**	**-1,0%**
Termoelektrarne, TE-TO in toplarne	5,498	6,325	6,388	6,322	5,517	5,444	4,028	-1,5%	-3,0%	4,028	-3,0%
Predelovalne dejavnosti in gradbeništvo (2)	2,269	2,486	2,305	1,965	2,297	2,411	2,684	2,1%	1,1%	2,684	1,1%
Promet	3,763	4,442	6,156	5,179	5,339	5,278	5,332	0,2%	0,1%	5,332	0,1%
Storitve in gospodinjstva	3,050	2,571	2,259	2,110	1,455	1,098	0,836	-6,3%	-2,7%	0,836	-2,7%
Emisije SO_2 [kt]	**96,597**	**38,906**	**12,922**	**11,450**	**8,610**	**8,168**	**5,698**	**-3,3%**	**-3,5%**	**5,698**	**-3,5%**
Termoelektrarne, TE-TO in toplarne	83,782	32,359	7,256	9,564	7,229	6,955	4,669	-3,1%	-3,9%	4,669	-3,9%
Predelovalne dejavnosti in gradbeništvo (2)	6,271	4,093	3,629	1,020	1,037	1,071	1,001	0,5%	-0,7%	1,001	-0,7%
Promet	2,581	0,212	0,282	0,022	0,023	0,024	0,025	1,1%	0,5%	0,025	0,5%
Storitve in gospodinjstva	3,964	2,242	1,755	0,845	0,321	0,118	0,002	-17,9%	-33,4%	0,002	-33,4%
Emisije NOx [kt]	**49,913**	**45,504**	**47,152**	**46,735**	**37,096**	**29,152**	**21,825**	**-4,6%**	**-2,9%**	**21,825**	**-2,9%**
Termoelektrarne, TE-TO in toplarne	15,243	13,770	12,186	11,764	7,903	6,252	5,297	-6,1%	-1,6%	5,297	-1,6%
Predelovalne dejavnosti in gradbeništvo (2)	5,549	6,159	6,649	5,853	6,543	6,268	6,537	0,7%	0,4%	6,537	0,4%
Promet	21,354	18,560	21,629	23,392	17,519	11,906	5,584	-6,5%	-7,3%	5,584	-7,3%
Storitve in gospodinjstva	7,766	7,014	6,689	5,727	5,131	4,727	4,408	-1,9%	-0,7%	4,408	-0,7%

(1) *Panoge C, D, E, F; brez neenergetske rabe*

(2) *Celotne emisije ind. SPTE upoštevane v industriji*

Main indicators
INTENSIVE strategy – BASIC scenario
NUCLEAR scenario

Total energy use (Mtoe)
Public power plants
Power plants of autoproducers
Other energy industry
Final energy use (KE)
Processing activities and building sector (1)
Transport
Households
Other use

Energy intensity of supply (toe/million EUR 2008)

Energy intensity of final use (toe/million EUR 2008)
Processing activities and building sector (1)
Transport
Services and households

Final electricity use per inh. (kWh/inh.)

Electricity use by sectors (TWh)
Processing activities and building sector(1)
Households
Transport
Other use
Energy sector

Electricity share in total use of final energy (%)
Processing activities and building sector(1)
Transport
Services and households

Total use of RES (Mtoe)
Hydroenergy
Biomass
Other renewable sources
Intensity of RES exploitation (koe/million EUR 2008)
Consumption of RES per inhabitant (koe/inh.)

Share of RES in gross final energy consumption
Shares of RES by sectors
Electricity
Heating and cooling
Transport

CO2 emissions (Mt Co2)
Thermal power plants, TE-to and heating plants
Processing activities and building sector (2)
Transport
Services and households

CO_2 intensity (t CO_2/toe)
Public thermal power plants, TE-TO and heating plants
Processing activities and building sector (1),(2)
Transport
Services and households

CO_2 emissions per inhabitant (kg CO_2/inh.)

Processing activities and building sector (2)
Transport
Services and households

CO_2 per GDP unit (t CO_2/MEUR 2008)
Public thermal power plants, TE-TO and heating plants
Processing activities and building sector (2)
Transport
Services and households

GHG emissions (Mt $CO_{2\ ekv}$)
Thermal power plants, TE-to and heating plants
Processing activities and building sector (2)
Transport
Services and households

SO_2 emissions (kt)
Thermal power plants, TE-to and heating plants
Processing activities and building sector (2)
Transport
Services and households

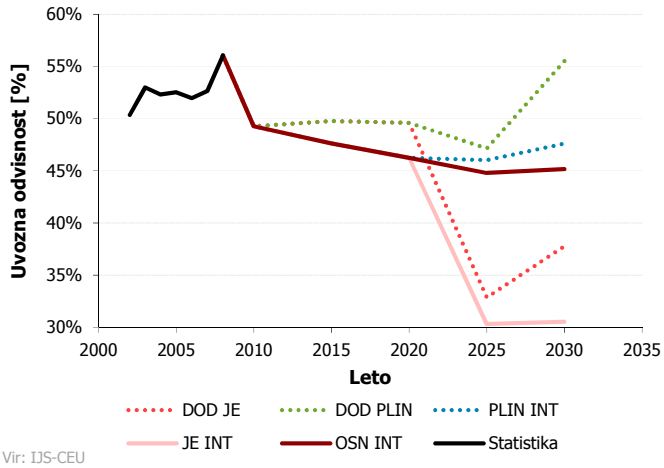
NO_x emissions (kt)
Thermal power plants, TE-to and heating plants
Processing activities and building sector (2)
Transport
Services and households

(1) *Industries C, D, E, F; without non-energy use*
(2) *Total emissions of ind. CHE considered in industry*

3 Meeting NEP objectives for the selected scenarios

In all scenarios, improvement of the main indicators and meeting the set NEP objectives is expected, which is represented in this chapter for the proposed selected NEP scenarios in comparison with other analysed scenarios; past trends are also highlighted.

Security of supply



Vir: IJS-CEU

Dependence on imports (%)

Year

AS NS

AS GAS

GAS INT

NS INT

BS INT

Statistics

Image 4: Dependence on imports – comparison of scenarios (100% NPPK)

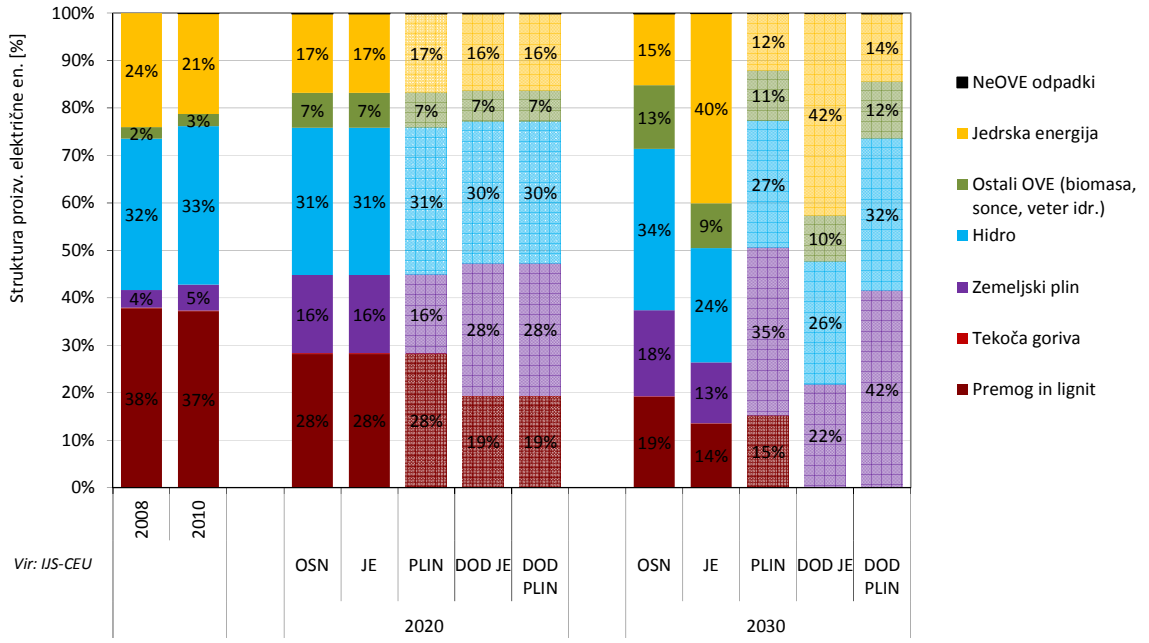
Dependency of the Republic of Slovenia on energy import. In 2008, the import dependency was 55.3% and higher by almost 4 percentage points than in 2000; in 2009 it decreased to 49% due to reduced energy consumption, which was the lowest in the last ten years. Increased import dependency in the past was primarilly the result of quick increase in the use of liquid fuels that the Republic of Slovenia wholly imports. It imports almost the total quantity of natural gas, while almost 29% of solid fuels are imported.

In NEP projections, the import dependency for the selected scenarios is decreasing. It will be decreased substantially with the construction of NPPK2[136].

[136] According to the EUROSTAT/OECD methodology, nuclear energy is considered to be a domestic energy source.

Diversification of sources. The Energy Act with the energy policy objectives also provides for the direction of the planned diversification of the use of natural resources. Today, electricity supply of the Republic of Slovenia consists of a well-balanced mixture of three energy sources.

Both proposed scenarios BS INT and NS INT change the energy mixture in the electricity supply; however, the variability of sources is better. The production in hydroelectric power plants gains in importance; the share of electricity from other RES increases considerably; the share of electricity generation from fossil fuels decreases; besides electricity generation from lignite, electricity generation from natural gas increases, namely in high-efficiency CHE; in the basic scenario it is preserved, while in the nuclear scenario the electricity generation in nuclear power plants increases. Both proposed scenarios BS INT and NS INT improve the situation. In 2008, the share of electricity generation from domestic energy sources with regard to consumption amounted to 82%; in both proposed scenarios, this share will improve during the entire period until 2030.



Structure of electricity generation (%)

BS

NS

GAS

AS NS

AS GAS

BS

NS

GAS

AS NS

AS GAS

Non-RES waste

Nuclear energy

Other RES (biomass, sun, wind, etc.)

Hydro

Natural gas

Liquid fuels

Coal and lignite

Image 5: Structure of electricity generation by fuels – comparison of scenarios (50% NPPK)

In the heat supply, diversification of sources increases in all proposed scenarios with the increase of the share of RES. In transport, the process of diversification of sources has just started in the period 2010-2030 by the introduction of new and alternative sources.

Operational reliability and quality of supply. The NEP proposal includes measures that improve operational reliability and quality of electricity supply. All scenarios treated meet the criteria with regard to the provision of system services. All electricity supply scenarios provide for adequate capacities for electricity generation[137]. In all scenarios the risk to the construction of bigger production facilities is indicated, the critical period being until 2015.

Objectives of the climate and energy package

Reduction of greenhouse gas emissions. Quantitative objectives of GHG emission limitations are determined on the basis of the following documents:

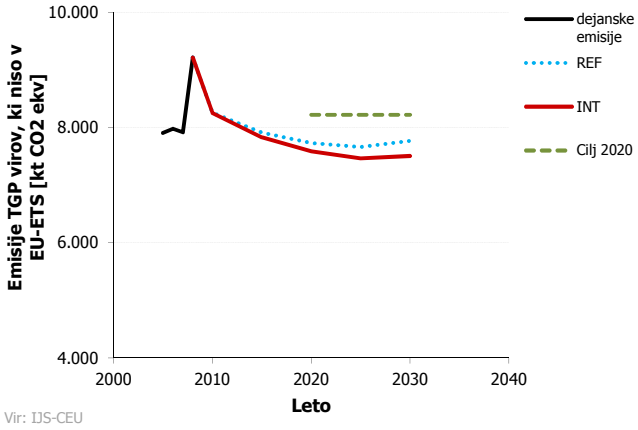
- 2012 – Kyoto Protocol;
- 2020 – Decision 406/2009/EC – national objectives;
- 2020 – Directive 2009/29/EC – trade in emissions;
- 2050 – objectives determined in the EU Council Conclusions and COM(2010) 265.

The Climate Changes Act of the Republic of Slovenia that will provide for long-term objectives of the Republic of Slovenia by 2050 and the climate strategy, which will determine sectoral framework, are under preparation. The National Assembly Declaration on the active role of the Republic of Slovenia in the development of the new global climate changes policy provides direction towards GHG emission limitations for the Republic of Slovenia by 80% or obliges policy-makers to study such objectives. Transition to more rigorous objectives of reduction by 2020 are discussed at the EU level, which will be implemented by the EU during negotiations for a new international agreement of the UN Framework Convention on climate changes.

During the period 1991-2008, GHG emissions increased in the Republic of Slovenia. In 2008, total emissions amounted to 21.3 Mt $CO_{2\,ekv}$, while in 2009 they were 9% lower. The share of combustion of fuels in the total GHG emissions is 80%; this is contributed by energy transformations by 30%, transport by 29% and final energy use in industry and wider use by about 11%. Emissions from other sectors (agriculture, process emissions and waste management) amount to 20%.

Emissions that are subject to the adopted national objectives under the Decisions 406/2009/EC, amount to 11.5 million t, of which combustion of fuels 7.5 million t and transport 6.3 million t. According to the decision, the Republic of Slovenia can increase these emissions by 4% until 2020, considering the level from 2005 (to 10.4 million t in 2020). In all NEP scenarios, the 2020 objective will be attained. Obligations provided for by the Kyoto Protocol[145] have also been fulfilled in the period 2008-2012.

[137] See Long-term energy balances for the NEP for the period 2010-2030 – Starting points and Results



Vir: IJS-CEU

Emissions of GHG sources that are not in EU – ETS (kt CO_2 eqv)

Year

Actual emissions

REF

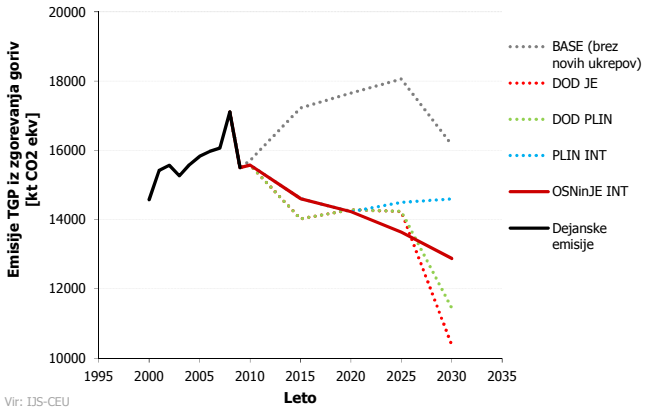
INT

2020 objective

Image 6: GHG emissions from combustion of fuels, sources that are not included in the ETS, in the period 2005-2008, and in the reference and intensive strategy until 2030, with the objectives under Decision 406/2009/EC

For emissions that are in the ETS sector, Member States pursue the same objective for the entire EU and not for individual countries, which is the reduction of emissions by 21% by 2020. Energy activities will have to obtain authorisations at auctions for all GHG emissions that will affect profitability of business entities; the NEP treats this in the assessments of competitiveness. Participants in the emissions market have no formal obligation to reduce emissions, nor has the state.

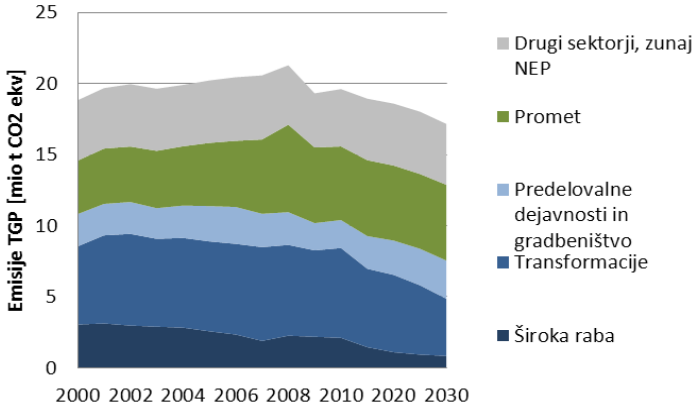
Objectives within the scope of the climate act and climate strategy in the Republic of Slovenia under preparation refer, unlike the objective on the EU level, to all GHG emissions. Total GHG emissions from the combustion of fuels are to decrease by 2020 with regard to 2005 by 8%, emissions from the combustion of fuels (those that are not affected by NEP measures) by 10%, and emissions from the combustion of fuels without transport by 21%. During this period, emissions from transport will increase by 20%. According to the proposed NEP scenarios, in 2030, emissions from the combustion of fuels will be 2.5 kt higher than emissions in the nuclear scenario without the TPPŠ6, while in 2020, they will be somewhat lower.



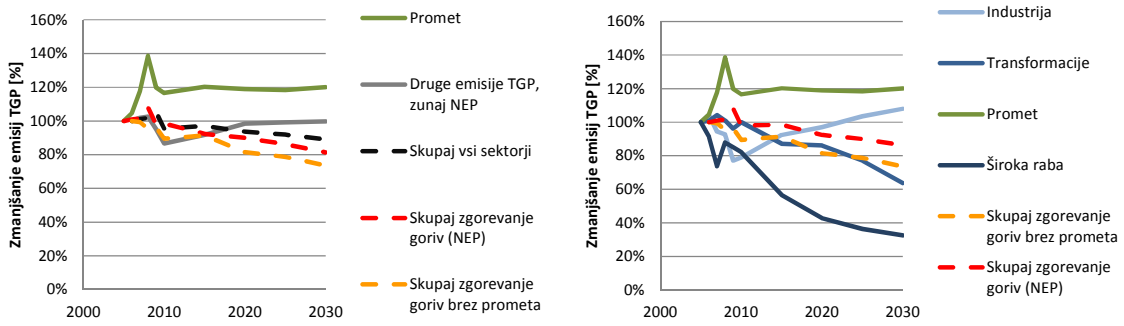
GHG emissions from combustion of fuels (kt CO_2 eqv)
Year

BS (without new measures)
AS NS
AS GAS
GAS INT
BS and NS INT
Actual emissions

Image 7: GHG emissions from combustion of fuels in the period 2005-2008 and by scenarios until 2030



GHG emissions (million t CO2 eqv)
Other sectors outside the NEP
Transport
Processing activities and building sector
Transformations
Wide use



Reduction of GHG emissions (%)
Transport
Other GHG emissions outside the NEP
Total all sectors
Total combustion of fuels (NEP)
Total combustion of fuels without transport

Reduction of GHG emissions (%)
Industry
Transformations
Transport
Wider use
Total combustion of fuels without transport
Total combustion of fuels (NEP)

Image 8: Reduction of GHG emissions by sectors with regard to inclusion of sectors in the NEP, and by individual sectors that are the subject of the NEP

The target 25% share of RES in the gross final energy consumption by 2020 is a binding and demanding objective of the Republic of Slovenia from the climate and energy package, enforced in Directive 2009/28/EC. We expect long-term tightening of the objective by 2050, with an interim objective in 2030, due to the already adopted EU decisions for transition to a low-carbon society. The Slovenian target share of RES and starting point are among the highest in the EU.

In 2008, the share of RES in the gross final energy consumption amounted to 14.9%. In 2005, it was 1% higher, while the indicator worsened, as the growth of the gross final energy consumption was lower than the final use of RES[138]. In 2008, the Republic of Slovenia was 10.1 percentage points away from the objective (15% in 2020), which means that in order to reach the objective, in 12 years the share will have to be increased each year by almost 0.8 percentage points. The share of RES in heating and cooling production was 20%, 29.7% in electricity generation and 1.3% in transport, with regard to the gross final energy consumption in these segments of use.

The efficient use of final energy measures will provide for the decrease in the gross final energy consumption by 6% from 2008 to 2030.

The share of RES in transport will increase to a compulsory 10% by 2020, while afterwards it will not increase. The share above 10% is not feasible due to food security objectives. Since the share of transport in the final use of energy is extremely high considering the low share of RES in this sector, ambitions should be higher in the two segments of use.

[138] Electricity generation in HPP is normalised

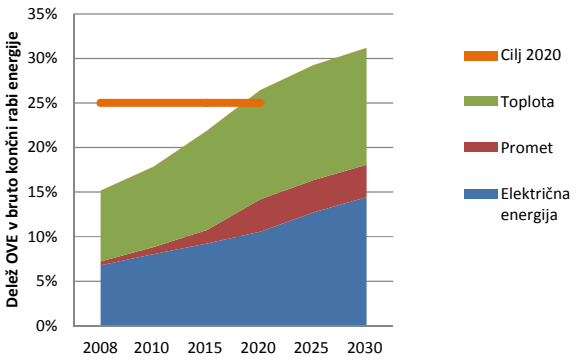


Image 9: Share of RES in the gross final energy consumption; role of electricity, heat and transport in the total share of RES for the NEP scenario

Table 15: Use of RES for the NEP scenario by sources and intended use

[PJ]	INT						indeks	%/a	indeks	%/a	indeks	%/a
	2008	2010	2015	2020	2025	2030	2030/08	2030/08	2020/10	2020/10	2030/20	2030/20
Bruto končna raba energije	**230,44**	**206,84**	**214,08**	**217,39**	**215,61**	**217,48**	**94**	**-0,3%**	**105**	**0,5%**	**100**	**0,0%**
Električna energija	53,48	49,35	55,26	57,56	58,08	59,31	111	0,5%	117	1,6%	103	0,3%
Promet	86,00	72,80	76,69	80,52	80,45	81,95	95	-0,2%	111	1,0%	102	0,2%
Toplota	90,96	84,69	82,13	79,30	77,07	76,22	84	-0,8%	94	-0,7%	96	-0,4%
Raba OVE	**34,95**	**36,92**	**46,80**	**57,43**	**63,06**	**67,79**	**194**	**3,1%**	**156**	**4,5%**	**118**	**1,7%**
Električna energija	**15,64**	**16,61**	**19,74**	**22,98**	**27,45**	**31,39**	**201**	**3,2%**	**138**	**3,3%**	**137**	**3,2%**
Hidro energija	14,46	15,34	16,67	18,75	20,67	22,70	157	2,1%	122	2,0%	121	1,9%
Geotermalna energija	0,00	0,00	0,00	0,00	0,65	0,65	/	/	/	/	/	/
Sončna energija	0,01	0,04	0,34	1,26	2,20	3,30	48.919	32,5%	2.820	39,6%	262	10,1%
Vetrna energija	0,00	0,01	0,54	0,79	1,67	2,71	/	/	12.050	61,5%	344	13,2%
Les in druga trdna bioma	0,85	0,69	1,12	1,14	1,31	1,14	134	1,3%	164	5,1%	100	0,0%
Bioplin	0,32	0,52	1,29	1,34	1,32	1,30	403	6,5%	258	9,9%	97	-0,4%
Promet	**1,03**	**1,69**	**3,28**	**7,85**	**7,79**	**7,89**	**765**	**9,7%**	**465**	**16,6%**	**101**	**0,1%**
Biodizel in bioetanol	1,03	1,69	3,28	7,85	7,79	7,89	765	9,7%	465	16,6%	101	0,1%
Toplota	**18,27**	**18,63**	**23,78**	**26,60**	**27,82**	**28,50**	**156**	**2,0%**	**143**	**3,6%**	**107**	**0,7%**
Neposredna raba	**17,84**	**17,92**	**22,16**	**24,21**	**24,87**	**25,32**	**142**	**1,6%**	**135**	**3,1%**	**105**	**0,4%**
Lesna biomasa	16,64	16,53	18,35	18,12	17,24	16,33	98	-0,1%	110	0,9%	90	-1,0%
Industrija	*2,99*	*3,03*	*3,95*	*4,73*	*5,18*	*5,51*	*184*	*2,8%*	*156*	*4,6%*	*116*	*1,5%*
Gospodinjstva	*13,57*	*13,35*	*13,61*	*12,38*	*10,70*	*9,31*	*69*	*-1,7%*	*93*	*-0,7%*	*75*	*-2,8%*
Storitve	*0,03*	*0,10*	*0,74*	*0,94*	*1,28*	*1,43*	*4.137*	*18,4%*	*898*	*24,6%*	*152*	*4,3%*
Kmetijstvo	*0,05*	*0,05*	*0,06*	*0,07*	*0,08*	*0,09*	*193*	*3,0%*	*139*	*3,4%*	*133*	*2,9%*
Ostali OVE	1,19	1,39	3,81	6,09	7,63	8,99	754	9,6%	438	15,9%	147	4,0%
Industrija	*0,12*	*0,10*	*0,33*	*0,56*	*0,80*	*1,07*	*870*	*10,3%*	*561*	*18,8%*	*190*	*6,6%*
Gospodinjstva	*0,33*	*0,51*	*1,77*	*2,84*	*3,74*	*4,52*	*1.355*	*12,6%*	*558*	*18,8%*	*159*	*4,7%*
Storitve	*0,71*	*0,75*	*1,20*	*1,47*	*1,81*	*2,06*	*291*	*5,0%*	*196*	*6,9%*	*140*	*3,4%*
Kmetijstvo	*0,03*	*0,03*	*0,51*	*1,21*	*1,27*	*1,34*	*4.531*	*18,9%*	*4.161*	*45,2%*	*110*	*1,0%*
Proizvodnja toplote v DO	**0,43**	**0,71**	**1,62**	**2,38**	**2,95**	**3,19**	**732**	**9,5%**	**338**	**12,9%**	**134**	**2,9%**

INT
index

Gross final energy consumption
Electricity
Transport
Heat

Use of RES
Electricity
Hydro energy
Geothermal energy
Solar energy
Wind energy
Wood and other solid biomass

Biogas

Transport
Biodiesel and bioethanol

Heat
Direct use
Wood biomass
- Industry
- Households
- Services
- Agriculture

Other RES
- Industry
- Households
- Services
- Agriculture

Heat generation in DH

Table 16: Shares of RES for the NEP scenario by sources and intended use

	2008	2010	2015	2020	2025	2030	2008	2010	2015	2020	2025	2030
Delež OVE	**15,2%**	**17,9%**	**21,9%**	**26,4%**	**29,2%**	**31,2%**						
Sektorski deleži OVE												
Električna energija	29,3%	33,6%	35,7%	39,9%	47,3%	52,9%						
Promet	1,2%	2,3%	4,3%	9,7%	9,7%	9,6%						
Toplota	20,1%	22,0%	29,0%	33,5%	36,1%	37,4%						
Delež posameznih virov									[PJ]			
Hidro energija	41,4%	41,6%	35,6%	32,6%	32,8%	33,5%	14,46	15,34	16,67	18,75	20,67	22,70
Geotermalna energija	2,6%	3,0%	5,3%	6,0%	7,5%	7,7%	0,92	1,11	2,48	3,42	4,74	5,21
Sončna energija	0,4%	0,7%	2,0%	4,1%	6,2%	8,3%	0,15	0,24	0,94	2,33	3,89	5,62
Vetrna energija	0,0%	0,0%	1,2%	1,4%	2,6%	4,0%	0,00	0,01	0,54	0,79	1,67	2,71
Les in druga trdna biomasa	51,3%	48,4%	44,6%	37,2%	33,5%	29,9%	17,93	17,89	20,88	21,35	21,15	20,25
Bioplin	0,9%	1,4%	2,8%	2,3%	2,1%	1,9%	0,32	0,52	1,29	1,34	1,32	1,30
Biogoriva	3,3%	4,9%	8,6%	16,5%	15,3%	14,7%	1,15	1,81	4,02	9,45	9,63	9,99
SKUPAJ	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**34,95**	**36,92**	**46,80**	**57,43**	**63,06**	**67,79**

Share of RES

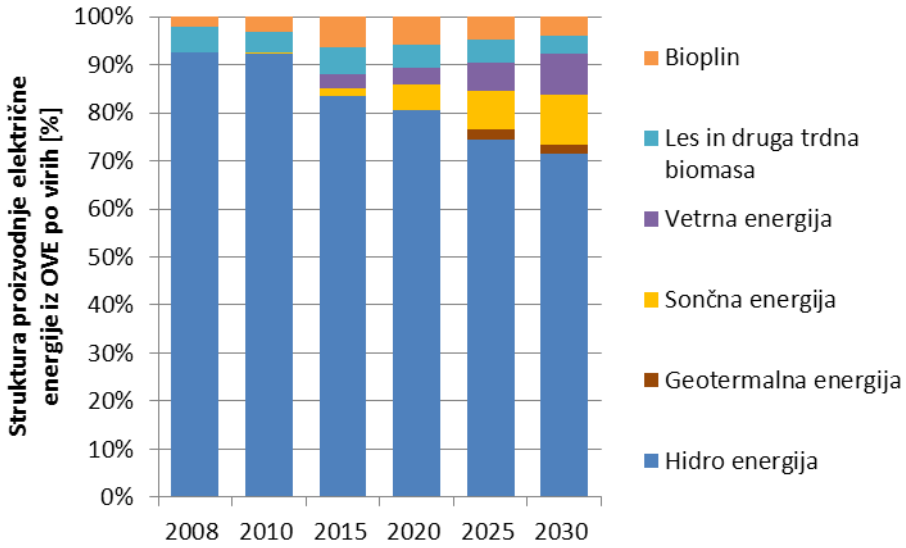
Sector shares of RES
Electricity
Transport
Heat

Share of sources
Hydro energy
Geothermal energy
Solar energy
Wind energy
Wood and other solid biomass
Biogas
Biofuels

In the period 2008-2030, the share of heat generation from RES will increase considerably, from 20.1% to 37.4%. Wood biomass will also be predominant in the future, while geothermal and solar energy will be gaining importance. The total heat use will decrease by 16% until 2030, in wider use (households and services) by 40%, and will be stabilised in the processing industry. Although

reduction in heat use positively contributes to the improvement of the RES share, it also results in the decrease of the upper limit for absolute RES values in this sector. In households, the share of use of heat from RES will increase from the current 40% to almost 60% in 2030, and in wider use from the current 6% to 36% by 2030. In order to achieve a higher share of RES in buildings, the annual share of renovation of buildings should be significantly higher and more financially demanding measures should be carried out in buildings and settlements with physical limitations to the use of RES. In processing activities, the share of RES in the use of heat will double by 2030 and reach 16% in the gross use of heat in industry. The share of RES in industry in the use of low-temperature heat will increase significantly to about 50% by 2030 (particularly exploitation of wood biomass, geothermal and solar energy and RES from waste). In other segments of the use of heat in industry, an extensive breakthrough of RES will be feasible on a long-term basis indirectly through greater electricity use or other generation of biofuels.

By 2030, the share of RES in the gross final electricity consumption is increased to almost 53%, by means of construction of big HPP, exploitation of wood biomass in co-incineration with fossil fuels and construction of dispersed small production units for the exploitation of solar, wind and water energy (small HPP), wood biomass in high-efficiency CHE (district heating and other sectors), biogases and geothermal energy. During the period 2008-2030, the structure of electricity generation from RES will be changed significantly: the share of generation from hydro electric power plants will decrease from 92% to 71.4%, from solar energy it will increase from less than 1% to 10.4%, from wind energy to 8.5%; electricity production in co-incineration with fossil fuels will decrease on account of a gradual decrease of the use of solid fossil fuels; CHE in biomass in industry and in district heating systems will increase, with the total share of about 10% in 2020 and 7.7% in 2030.



Structure of electricity generation from RES by sources (%)

Biogas
Wood and other solid biomass
Wind energy
Solar energy
Geothermal energy
Hydro energy

Image 10: Share of RES in the gross final energy consumption; role of electricity, heat and transport in the total share of RES for the NEP scenario

Improvement of energy efficiency. All NEP scenarios attain the objective of the climate and energy package – reduction in energy use by 20% by 2020 with regard to the PRIMES 2007 basic scenario for the Republic of Slovenia[139].

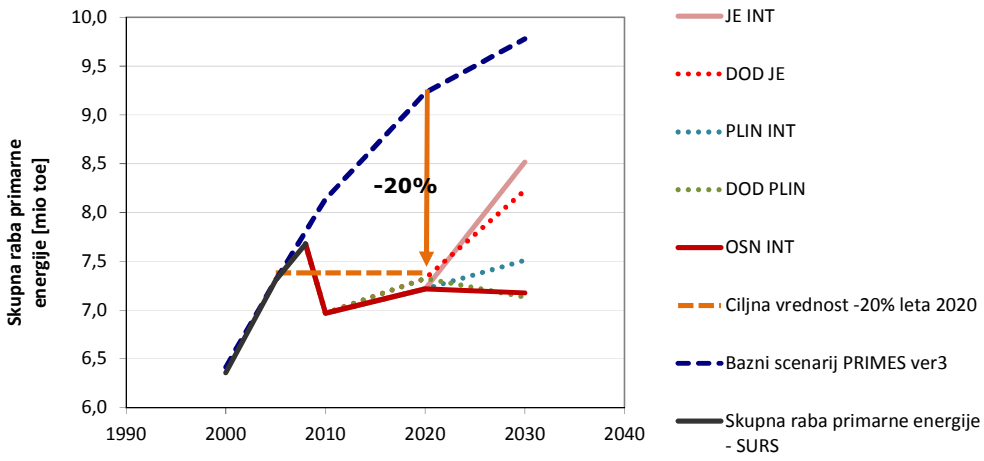


Image 11: **Comparison of NEP scenarios in attaining 20% saving of primary energy in 2020 with regard to the PRIMES basic scenario**[140]

Total use of primary energy (million toe)

NS INT
AS NS
GAS INT
AS GAS
BS INT
Target value – 20% by 2020
PRIMES ver3 basic scenario
Total use of primary energy - SORS

The following is essential for attaining the objective: increase in the efficiency in transformation of energy with the exploitation of RES with high-efficiency CHE, considerable improvement of efficiency of classic thermal power plants and EUE measures in all segments of use. Similarly as for all other objectives of the climate and energy package, the improvement of energy efficiency is also essentially influenced by future trends in transport[141]
Objectives and strategies in the EUE field are also determined by the National Energy Efficiency Action Plan 2008-2016 (AN-URE), which was adopted in accordance with Directive 2006/32/EC on energy end-use efficiency and energy services (ECD directive) in the beginning of 2008. The objective in all Member States is to attain at least 9% energy saving in the period 2008-2016, which

[139] The EU decided on its objective for the improvement of energy efficiency in decisions in March 2007. Binding objectives of Member States have not been adopted yet. Methodology or criterion of the objective will be determined along with the objectives. The discussion includes a suggestion that objectives are to be developed at the primary energy level.

[140] Objectives of the climate and energy package are planned to be laid down in the directive on energy efficiency and energy savings, which is under preparation and foreseen to be adopted in 2011. They are classified among 2020 strategy objectives.

[141] Only certain measures that influence the use of energy in transport are the subject of the energy policy (these are primarily measures for stimulating efficiency of vehicles, driving and exchange of energy product); other measures that have a significant impact on the scope of transport work and/or selection of the transport method and thus the use of energy are the subject of transport, tax, spatial and other policies;, namely, the integrated sustainable transport policy.

is 4,261 GWh for the Republic of Slovenia, with measures implemented by 2016. The selected NEP strategy provides such savings.

Competitiveness

Energy intensity. Energy intensity of the use of primary energy is improving (the GDP growth is faster that the growth of the use of energy); since 2000, on average by 2.3 percentage points per year. Improvement is greater than the EU 27 average. In 2008, the indicator worsened due to high increases in transport; in 2009, it improved in spite of the economic crisis, as the production and use of energy decreased in energy-intensive activities.

In all NEP scenarios, energy intensity will improve considerably by 2030; according to the BS INT scenario, it will improve during the entire period until 2030; under the NS INT scenario, the indicator will somewhat worsen at the time of beginning of the new NPPK2 production.

The dynamic of improvement is similar for energy intensity of final energy use[142].

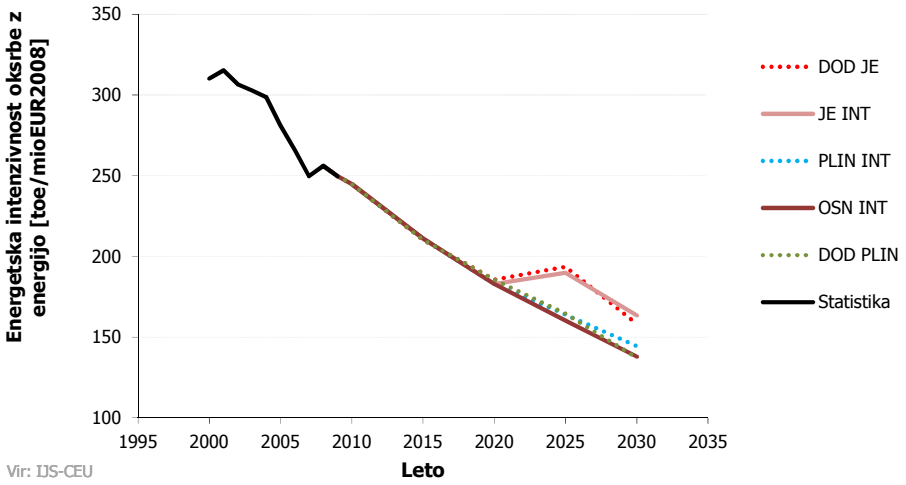


Image 4: Energy intensity: trend from 2000 to 2009 and projection by scenarios

Energy intensity of energy supply (toe/million EUR 2008)
Year

AS NS
NS INT
GAS INT
BS INT
AS GAS
Statistics

Energy supply costs. The current value of total energy costs[143] in the period does not differ considerably. Greater differences in scenarios are related to the structure of costs, ratios between the costs for fuel and costs for investments.

[142] Energy intensity of energy supply is the EU structural indicator and indicator for monitoring the Strategy 2020.

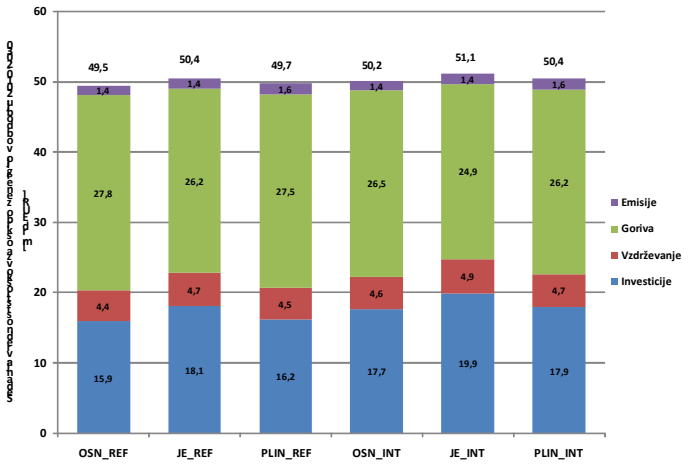


Image 13: Comparison of costs for energy supply in various scenarios in the period 2010-2030

Current value of costs for energy supply in the period 2010-2030 (billion EUR)

BS REF
NS REF
GAS REF
BS INT
NS INT
GAS INT

Emissions
Fuels
Maintenance
Investments

The cost price of electricity generation from new or renewed units. Electricity generation from new units will be competitive in all scenarios. The selected BS INT and NS INT scenarios reach a lower electricity price than other scenarios[144]. In the assessment, another fact that must be considered is that scenarios differ with regard to ratios between the production in zone and trapezium and thus the value of expected incomes on the market.

The electricity cost price is somewhat higher than the international price of zone energy and lower than the international price of surface energy. Risk for the development of international electricity prices to be different than expected is similar for all scenarios. Considering the assumed direction of development of international electricity prices, the period 2015-2020 will be the most critical as to the operational success of new or renewed units, while after 2020, the cost price for all scenarios will be lower than the expected electricity price on foreign markets for zone and surface energy. In comparison to other scenarios, the selected scenarios are less sensitive to risks related to the prices of natural gas in international markets and more sensitive than additional scenarios due to different development of the price on the emission credit market.

[143] Investments are presented as the annual capital cost. The value of electricity export is deducted from the cost of fuel.

[144] The cost price of electricity generation is used for verifying the competitiveness of new production units. In the calculation, the economic life of projects is considered (25 years), which gives a better estimate of the price that covers all operational costs (including payments of loans).

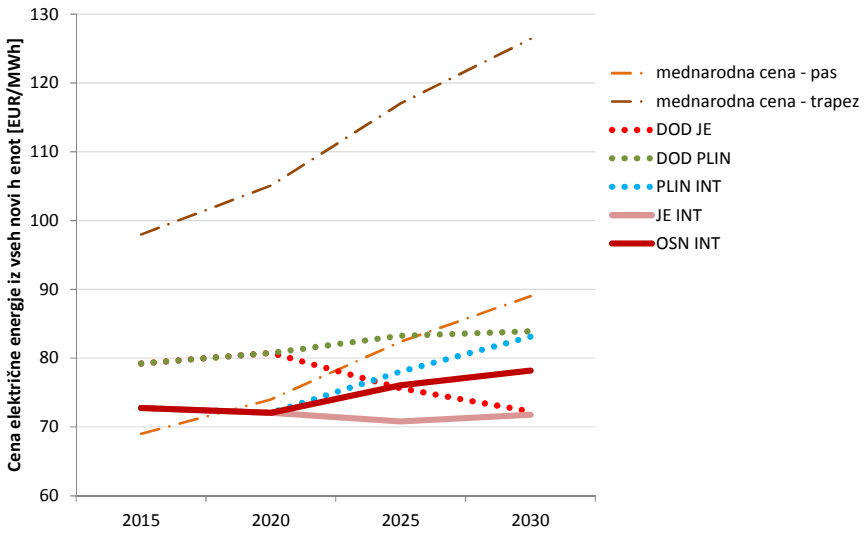


Image 14: Cost price of production in new electric power plants in the period 2015-2020 under scenarios

Electricity price from all new units (EURMWh)

international price – zone
international price – trapezium
AS NS
AS GAS
GAS INT
NS INT
BS INT

Investments. The selected scenarios differ considerably in the scope of investments in electricity generation.

Table 17: Investments by NEP sub-programmes in the period 2010-2030

Value of investments [million EUR]					
	BS INT	**NS INT**	**GAS INT**	**AS NS**	**AS GAS**
EUE	3.470	3.470	3.470	3.470	3.470
Use of energy in transport	2.950	2.950	2.950	2.950	2.950
RES electricity (dispersed sources)	2.400	2.400	2.400	2.400	2.400
Local supply and RES heat	4.960	4.960	4.960	4.960	4.960
CHE	540	540	540	540	540
Electricity generation	3.400	7.380	3.960	7.000	3.290
Electricity transmission	670	670	670	670	670
Electricity distribution	4.880	4.880	4.880	4.880	4.880
Natural gas supply	1.520	1.520	1.520	1.520	1.520
Nuclear energy	106	106	106	106	106
Coal	94	94	94	94	94
Investments total	**24.990**	**28.970**	**25.550**	**28.590**	**24.880**

Public funds for stimulating EUE and RES measures. The major share of support is dedicated to household consumers, followed by the service and public sector; the share of support for a more efficient vehicle fleet and district heating systems is increasing. See also the chapter Financing and annexes.

4 Meeting international obligations - summary

All analysed scenarios provide for the meeting of the adopted international obligations of the Republic of Slovenia.

Obligations of the Kyoto Protocol are met in all scenarios[145]. Meeting this obligation is the most sensitive to development in the transport sector, since this sector represents 44% of all GHG emissions or 66% of all emissions from combustion of fuels, sources that are outside the ETS. The future development of the sector is very uncertain and depends on transit transport or the ratio between prices of energy products in the Republic of Slovenia and in neighbouring countries. **The obligation of reduction of GHG emissions from the climate and energy package, under Decision 406/2009/EC, to retain the growth of emissions under 4% from 2005 to 2020, is met in all scenarios analysed.** Within the period 2005-2020, emissions from combustion of fuels from sources that are outside the scheme of trade in GHG emissions are decreased in the reference strategy by 3% and in the intensive by 5%.

The compulsory 25% share of renewable energy sources in the gross final energy consumption by 2020 from the climate energy package under Directive 2009/28/EC is reached in all strategies. Increased exploitation of RES and stabilisation of the use of final energy are of key importance for attaining the objective. In the reference strategy, we reach the 25% share of RES in the gross final energy consumption, while in the intensive strategy, this share amounts to 26.5%. Intensive strategy is significantly more robust in attaining this objective. **The compulsory 10% share of RES in transport by 2020 under Directive 2009/28/EC.** All NEP scenarios fulfil this objective[146].

The target 9% savings of the final use of energy under Directive 2006/32/EC during the period 2008-2016 are reached on the basis of the NEP suggestion. The NEP includes all measures of the National Energy Efficiency Action Plan 2008-2016 (AN-URE) and additional measures for their more efficient implementation.

In 2010, the target **NO_x emissions were exceeded by 4%.** 2020 objectives have not been negotiated yet within the framework of the international agreement (revision of the Gothenburg Protocol) nor have they at the EU level (revision of the NEC Directive 2001/81/EC). In all scenarios and strategies, nitrogen oxide emissions are reduced considerably, particularly emissions from transport and in transformations; however, the reduction is not sufficient for attaining the indicative 2020 objective for Slovenia that was calculated in expert groundwork for the revision of the directive. **The objective to reduce sulphur dioxide emissions** by 2010 will be fulfilled; emissions will be further reduced in all scenarios and in 2020 they will be significantly lower than the indicative objective.

ENTSO-E requirements regarding the provision of systemic services are fulfilled in all scenarios. Compulsory reserves of oil derivatives under Directives 68/414/EEC and 98/93/EC are provided in all scenarios.

[145] Fulfilment of the Kyoto Protocol depends on emissions that are outside the scheme of trade in GHG emissions. Rights to devices, that are in the scheme of trade in emissions, have already been granted within the framework of the national allocation plan, while eventual shortcomings or surpluses are regulated by such devices through purchase and sale of emission rights in the European market.

[146] The sectoral share of RES in transport includes the use of electricity from RES for road transport; it is considered with the factor 2.5. The shares of RES in the transport sector, presented in NEP energy balances, do not consider the use of electricity from RES.

Implementation and monitoring of the programme

1 Financing

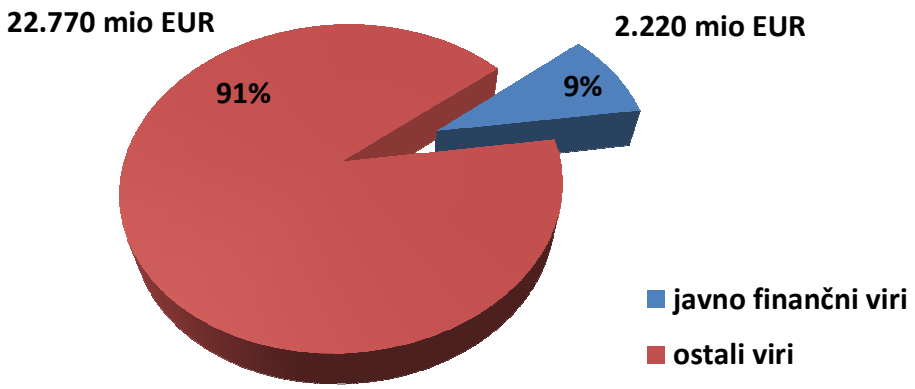
NEP will be implemented through detailed sub-programmes with clearly specified tasks and defined financial resources. The required funds and the main financial sources for implementing NEP are defined in detail by particular sub-programmes.

Cost estimate of NEP for 2010–2030. In the period between 2010 and 2030, EUR 24,990 million will be required for the investments for a comprehensive implementation of NEP.

For stimulating investment and financing other tasks, public financial funds amounting to EUR 4,190 million will be required, of which EUR 270 million will be provided from the budget. The income from other guaranteed public funds was estimated to EUR 2,840 million. The missing public funds amount to EUR 1,080 million.

Most of public financial funds (44%) are intended for financing the projects and implementing the tasks of the *Renewable energy sources* sub-programme, and 25% and 24% for implementing the sub-programmes *Efficient use of energy* and *Cogeneration of heat and electricity*.

Financing of investments. The total value of investments of the programme in 2020–2030 is EUR 24,990 million. At an annual level, EUR 1.2 billion of investments on average are required, which is around 3% of the Slovenian GDP in 2009. Almost 91% (EUR 22.7 billion) of all funds for investments will be provided by companies and natural persons with own personal capital (domestic and foreign) and loan capital (loans of commercial banks, Eco Fund, European Investment Bank, etc.), while 9% of the value of investments (EUR 2.2 billion) will be financed from public financial sources.



EUR 22,770 million – 91% - public financial sources
EUR 2,220 million – 9% - other sources

Figure 18: The structure of required investment funds in 2010–2030 by financing sources

In the entire period of NEP implementation, most of investments (EUR 7,360 million) are foreseen for the *Renewable energy sources* sub-programme, which is 29% of all NEP investments. The *Electricity distribution network* sub-programme foresees the implementation of investments amounting to EUR 4,880 million, the *Efficient use of energy* sub-programme EUR 3,470 million, and the *Electricity generation* sub-programme EUR 3,400 million. For implementing the investments of other sub-programmes, another EUR 5,880 million will have to be provided for.

Table 63: NEP investments by sub-programmes in 2010–2030

	Sub-programme	Investments - total	Public financial funds for investment incentives[147]
		[EUR million]	
1	Efficient use of energy	3,474	1,059
2	Use of energy in transport	2,946	87
3	Renewable energy sources	7,358	869
4	Local supply of energy		
5	Cogeneration of heat and electricity	536	
6	Development of electricity market		
7	Electricity generation*[148]	3,396	
8	Electricity transmission	671	
9	Electricity distribution	4,884	
10	Natural gas market		
11	Natural gas supply	1,515	
12	Liquid fuels		
13	Coal	94	94
14	Nuclear energy	107	107
15	Taxes and regulated prices		
16	Education, training		
17	Research and development		
18	Spatial planning		
	Total	**24,990**	**2,216**

Public financial sources for NEP implementation. The total value of public financial funds required for NEP implementation (for the promotion of investments and other costs of NEP implementation) in 2010–2030 is EUR 4,190 million. At an annual level, on average EUR 200 million of public financial funds are required. The amount of public funds guaranteed for 2010–2015 and intended for implementing particular measures and some activities of competent authorities is 7% of the total required public financial funds for NEP implementation. The share of other public financial funds guaranteed by law is 68% of the total required public funds. However, 26% of public financial funds (EUR 1,080 million) will have to be obtained from the planned sources.

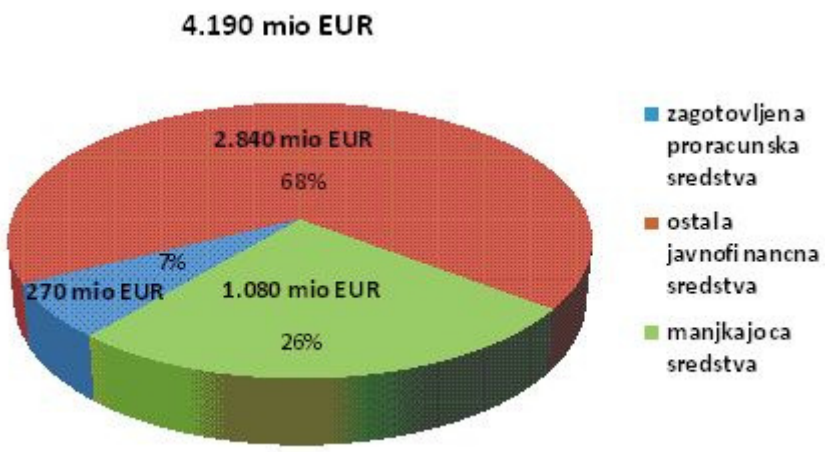
Table 64: Public funds and NEP investments by sub-programmes in 2010–2030

	Sub-programme	Required public financial funds	Budgetary funds - guaranteed	Other public financial funds	Missing funds
		[EUR million]			
1	Efficient use of energy	1,059	119	603	337
2	Use of energy in transport	87			87
3	Renewable energy sources	1,852	61	1,135	656
4	Local supply of energy				

[147] In addition to these investment subsidies, further operating funds for electricity generation from RES and high-efficiency CHE are planned for promoting investments. An overview of all funds provided from public resources in 2010–2020 is included in the next chapter in Table 64.

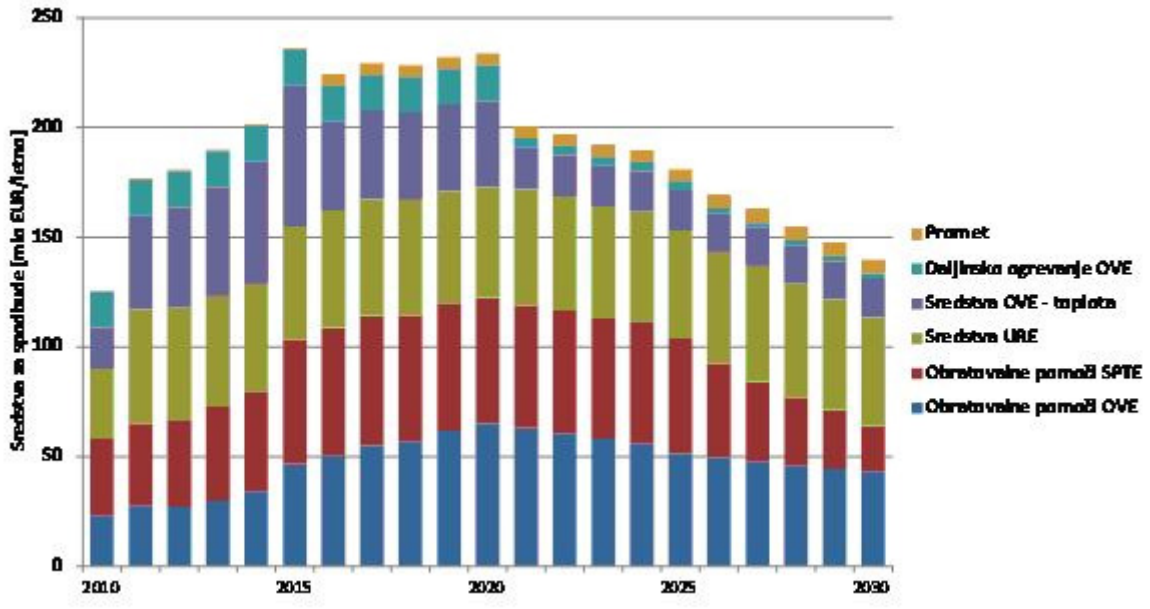
[148] Data for the scenario BS INT. For other scenarios, see the *NEP impact assessment* sub-programme (Table 62).

	Sub-programme	Required public financial funds	Budgetary funds - guaranteed	Other public financial funds	Missing funds
5	Cogeneration of heat and electricity	996		996	
6	Development of electricity market				
7	Electricity generation				
8	Electricity transmission				
9	Electricity distribution				
10	Natural gas market				
11	Natural gas supply				
12	Liquid fuels				
13	Coal	94	94		
14	Nuclear energy	107		107	
15	Taxes and regulated prices				
16	Education, training				
17	Research and development				
18	Spatial planning				
	Total	**4,190**	**270**	**2,840**	**1,080**



EUR 4,190 million, EUR 2,840 million – 68%, EUR 270 million – 7%, EUR 1,080 million – 26%
- guaranteed budgetary funds
- other public funds
- missing funds

Figure 19: The structure of public financial funds in 2010–2030



Funds for incentives [EUR million/year]

- transport
- RES district heating
- RES funds – heat
- EUE funds
- CHE operating aid
- RES operating aid

Figure 20: Public financial funds for stimulating sustainable use and local supply

Financing sources:

For sustainable use and local supply of energy, the guaranteed sources are as follows:

- contribution for EUE;
- contribution for ensuring support in electricity generation from high-efficiency CHE and RES;
- EU funds from the financial perspective 2007–2013:
  - OP ETID, priority task of sustainable energy;
  - rural development programme;
- own funds of companies for heat supply;

and the planned sources:

- funds from the European Regional Development Fund (ERDF) up to 4% of the total amount may be used for energy efficiency renovation of the housing sector as an aid to vulnerable population groups;
- European fund of the European Energy Programme for Recovery – in preparation;
- EU funds from the financial perspective 2014–2020;
- budgetary resources:
- support for EUE and RES;
- support scheme for heat supply from RES;
- revenue from auctions within the European Union Emissions Trading Scheme (ETS) from 2013.

For electricity supply, the existing financial sources are as follows:

- own funds of energy companies;
- (especially income from the their activity: the network charges for the use of the electricity transmission network, the network charges for the electricity distribution network, transit service, provision of system services, energy supply);
- contribution for ensuring support in electricity generation in CHE and from RES;
- budgetary resources for implementing the arrangement of the water infrastructure and the national and local infrastructure for constructing a HPP on the middle Sava River in accordance with the Act Governing the Conditions of the Concession for the Exploitation of Energy Potential of the Lower Sava River (ZPKEPS), Official Gazette of RS, No. 20/82004-UPB1, 91/2007;

and the planned sources:

- revenue from auctions within the European Union Emissions Trading Scheme (ETS) from 2013;
- funds from the European Energy Programme for Recovery;
- loans.

Fuel supply:

- own funds of energy companies: (the main financial source for covering the eligible costs and regulated return are the network charges for the transmission and distribution of electricity and natural gas);
- funds from the European Energy Programme for Recovery (EUR 40 million);
- loans;
- strategic investors;
- budgetary resources for the closure of THM in accordance with the Regulating the Gradual Closure of the Trbovlje-Hrastnik Mine and Development Restructuring of the Region Act (ZPZRTH), Official Gazette of RS, No. 26/2005-UPB2, 43/2010, 49/2010;
- funds of special compensation for implementing the public utility service of creating the compulsory reserves of oil and its products;
- funds from the Fund for Financing Decommissioning of NPPK and Disposal of Radioactive Waste from NPPK.

2 Monitoring the programme implementation

The authorities responsible for monitoring programme implementation are as follows:

- ME that promptly monitors NEP implementation within NEP management;
- once a year, the Slovenian Government shall report to the National Assembly on the implementation and effects of the programme [the time limit for the Annual Report **will be selected with regard to the time limits for preparing the development budget and annual publications of energy statistics**].

The Annual Report on NEP Implementation shall include:

1. Assessment of programme implementation
   1.1. Meeting of the time schedule
   1.2. Financial report (provision of funds, utilisation of funds)
   1.3. Development of actors and human resources
   1.4. Effects of the programme and achievement of objectives
2. Analysis of programme implementation:
   2.1. External circumstances
   2.2. Report on obstacles in administrative procedures
   2.3. Political science analysis of obstacles
3. Recommendations for improving NEP implementation
4. Short summary of strategic studies and analyses of the situation in the energy sector, financed from public funds (the state budget, public companies)
5. Summary of comments from the public discussion of the draft report

For assessing the achievement of objectives and effects of the programme, key indicators will be applied in accordance with the international methodology prescribed for reporting in international agreements or at the EU level. The compulsory main indicators for monitoring NEP implementation are as follows:

Table 65: Main indicators for monitoring NEP objectives

Objective	Indicator	Unit
achievement of 9% energy saving by 2016	energy saving (prescribed methodology for monitoring AN-URE)	[GWh]
achievement of 20% improvement of energy efficiency	improved efficiency of energy use, improved efficiency of electricity use	[%] [%]
achievement of 25% share of RES by 2020	share of RES in gross final electricity consumption [also by the sectors: electricity, heat, transport]	[%]
reduction of GHG emissions from devices not included in the emission trading scheme	reduction of GHG emissions from fuel combustion for devices not included in the ETS compared to 2005 (including the emissions in sub-sectors)	[%]
objectives of reducing the emissions of NO_X, SO_2 and dust particles	emissions of NO_X, SO_2 and dust particles from fuel combustion	[%]
improvement of strategic security of supply – increase of independence	import dependency (also by sources and purpose of use)	[%]
improvement of strategic security of supply – planned diversification of various primary sources of electricity	the predominant share of the most frequent sources by purpose of use the structure of supply routes, sources, suppliers	[%]
improvement of efficiency and general competitiveness of the economy regarding energy use and supply	energy intensity of electricity supply	[toe/EUR]
bringing the markets closer	the difference in the price of electricity and natural gas in Slovenia and EU 27 for industry and households	[%]

Objective	Indicator	Unit
monitoring the implementation of projects defined in NEP	annual monitoring of effective preparation and implementation of measures and projects planned in NEP	descriptively
total funds for promoting EUE, RES, and local supply and efficiency of utilisation of funds	granted State aid for EUE and RES together leverage specific costs relating to saving, production, reduction of GHG emissions	[EUR million] [1] [EUR/unit]

If necessary, the compulsory indicators will be supplemented with additional indicators.

The report on NEP implementation shall meaningfully connect the other reporting obligations in this field. The indicators significant for the development of the energy sector in the fields below are monitored by:

- operational reliability: ELES;
- market regulation: AGEN-RS;
- development of the energy sector from the position of the State's role as the owner: AUKN;
- nuclear safety: SNSA;
- environmental impact of the energy sector: ARSO.

For quality monitoring of NEP, the national statistics has to be amended.

Actors

General Assembly – monitoring of NEP implementation;
Slovenian Government, ME – management of NEP implementation and reporting on NEP implementation;
SORS – energy statistics;
AGEN-RS, ELES, AUKN, SNSA, ARSO, etc. – reporting on the development of the energy sector by particular fields;

ENCLOSURES

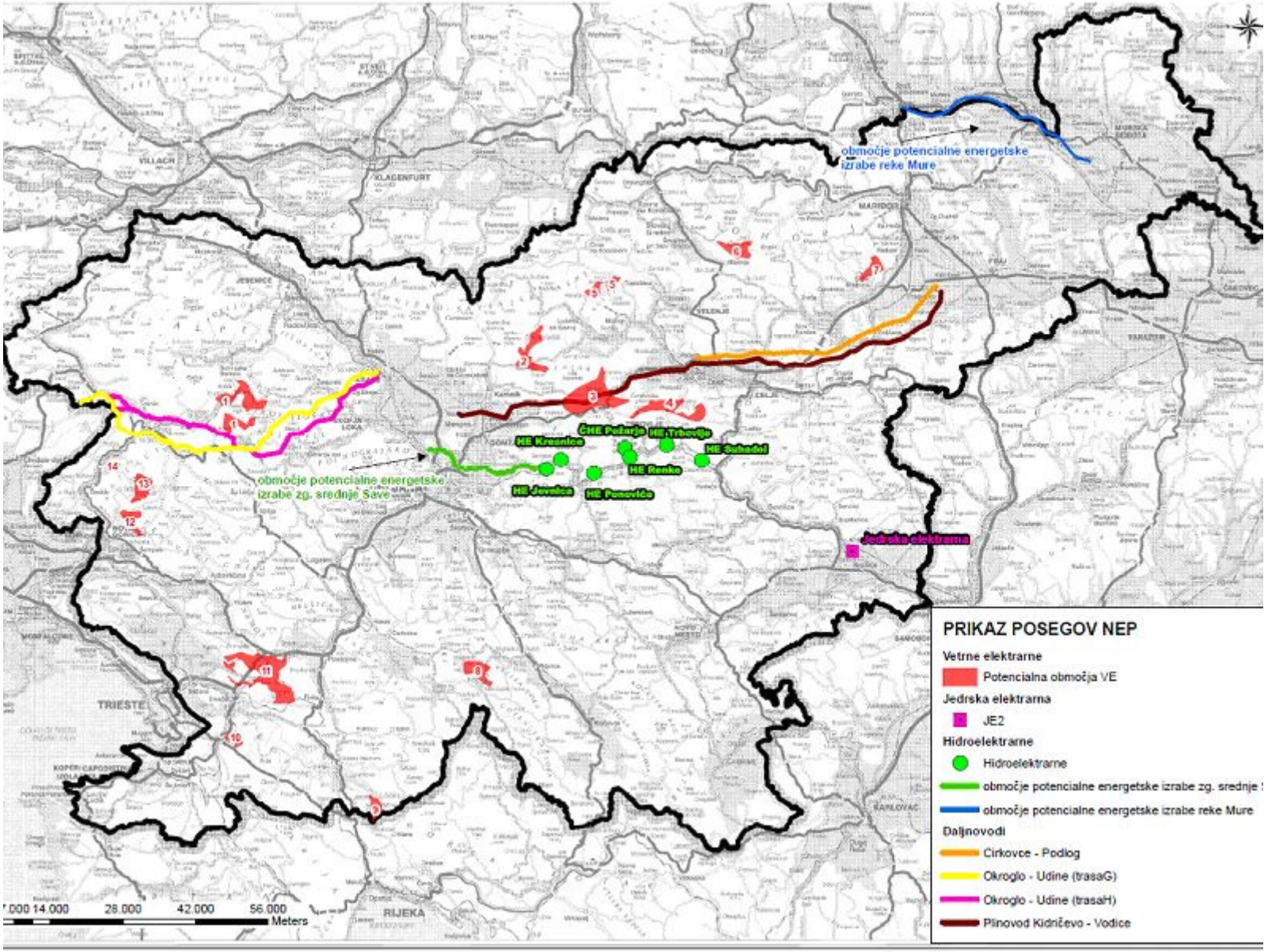
A. Graphic enclosure: spatial presentation of NEP measures

Presented are:

A.1 NEP measures, for which the comprehensive assessment procedures have not yet begun
A.2 The existing and planned electricity transmission network
A.3 The existing and planned gas transmission network

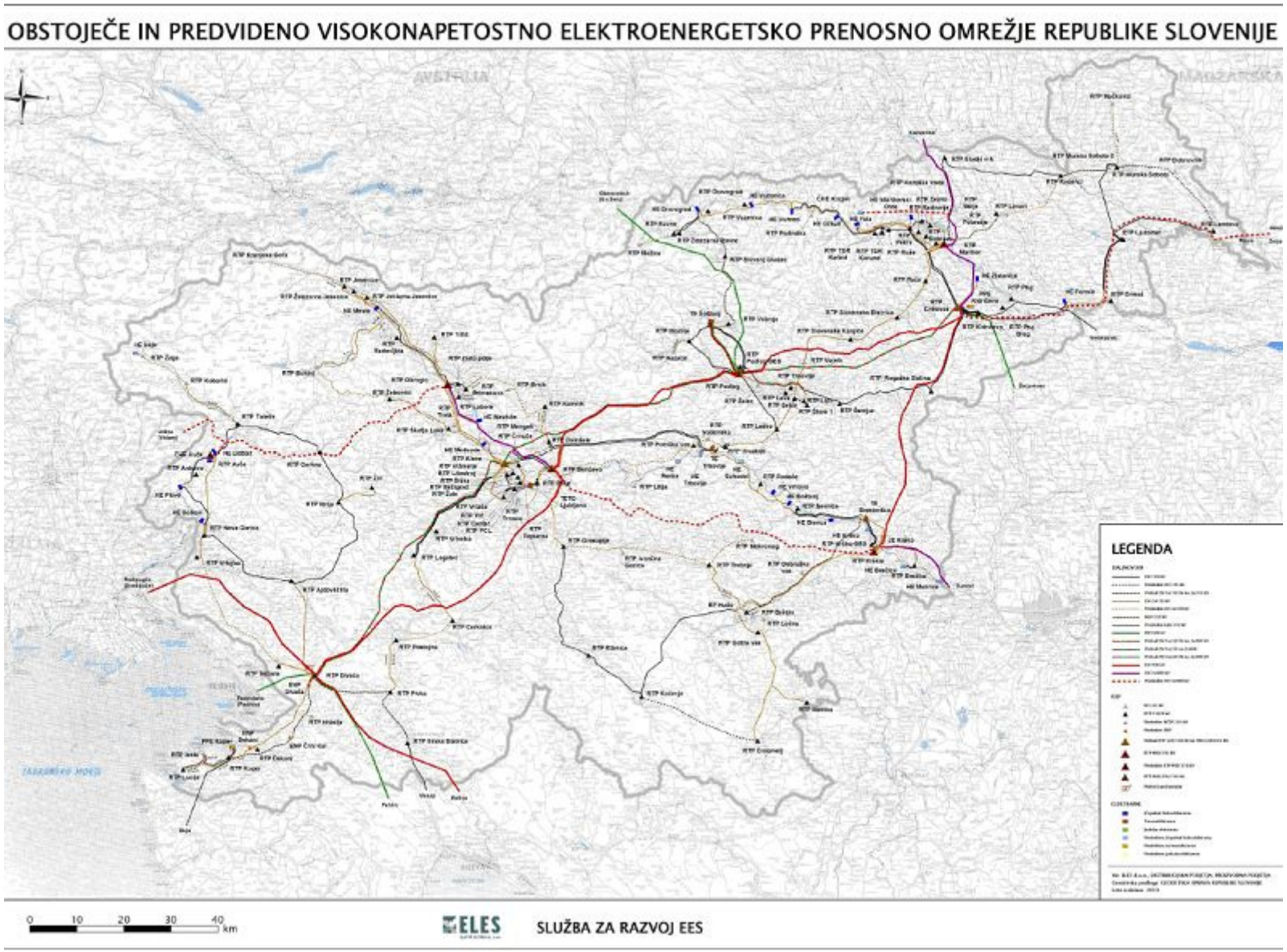
The list of NEP facilities, for which the CEIA process is not in progress yet and which have been defined with regard to the exact location (Figure A1):

- **potential locations for wind farms over 10 MW:**
    1. Porezen
    2. Rogatec - Črnivec - Ojstri vrh
    3. Špitalič - Trojane - Motnik
    4. Knezdol - Mrzlica
    5. Golte
    6. Črni vrh - Zaloška planina
    7. Slivniško Pohorje
    8. Velika gora
    9. Novokrajski vrhi
    10. Hrpelje - Slope
    11. Senožeška brda - Vremščica - Čebulovica - Selivec
    12. Grgar - Trnovo
    13. Banjšice – Lokovec
    14. Avče
- **HPP chain on the middle Sava River:**
    - HPP chain on the middle Sava River, phase I: HPP Suhadol, HPP Trbovlje, HPP Renke, HPP Ponoviče, HPP Kresnice, HPP Jevnica
    - the area of potential energy utilisation of the Mura River – the border section with Austria to the motorway bridge at Vučja vas on the inner Mura (total power from 1.5 MW to 55 MW depending on the environmental acceptability) by 2030
- **the area of potential energy utilisation of the Mura River** – the border section with Austria to the motorway bridge at Vučja vas on the inner Mura (total power from 1.5 MW to 55 MW depending on the environmental acceptability) by 2030
- **nuclear power plant**, block 2 in Krško
- **overhead power line** 2 x 400 kV Crikovce – Podlog
- **overhead power line** 2 x 400 kV Okroglo – Udine
- **gas pipeline** M9b Kidričevo – Vodice


območje potencialne energetske izrabe reke Mure
območje potencialne energetske izrabe zg. srednje Save
ČHE Pošarje
HE Trbovlje
HE Kreanice
HE Suhadol
HE Renke
HE Javorje
HE Ponovica
Jedrska elektrarna
PRIKAZ POSEGOV NEP
Vetrne elektrarne
Potencialna območja VE
Jedrska elektrarna
JE2
Hidroelektrarne
Hidroelektrarne
območje potencialne energetske izrabe zg. srednje
območje potencialne energetske izrabe reke Mure
Daljnovodi
Cirkovce - Podlog
Okroglo - Udine (trasaG)
Okroglo - Udine (trasaH)
Plinovod Kidričevo - Vodice
28.000
42.000
56.000
Meters

PRESENTATION OF NEP ACTIVITIES
wind farms
- potential locations of wind farms
nuclear power plant
- NPP2
hydroelectric power plants
- hydroelectric power plants
- the area of potential energy exploitation of the upper middle Sava River
- the area of potential energy exploitation of the Mura River
overhead power lines
- Cirkovce–Podlog
- Okroglo–Udine (route G)
- Okroglo–Udine (route H)
- Kidričevo–Vodice gas pipeline

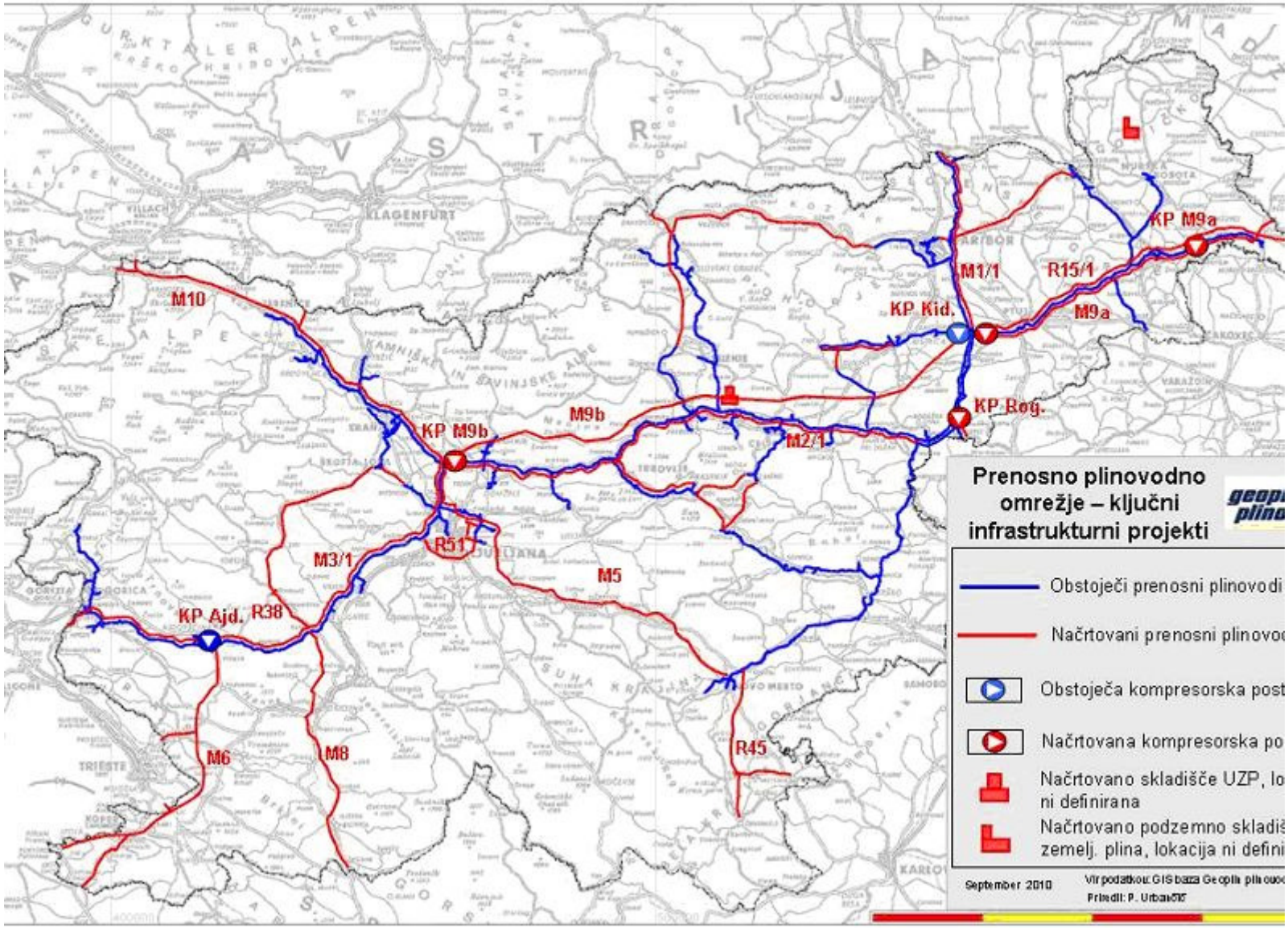
Figure A.1: NEP measures, for which the comprehensive assessment procedures have not yet begun



THE EXISTING AND PLANNED HIGH-VOLTAGE ELECTRICITY TRANSMISSION NETWORK OF THE REPUBLIC OF SLOVENIA

LEGEND

Figure A.2: The existing and planned electricity transmission network



Gas transmission network – key infrastructure projects (geoplin plinovodi)

- existing gas transmission pipelines
- planned gas transmission pipelines
- existing compression station
- planned compression station
- planned LNG storage, location not defined
- planned natural gas underground storage, location not defined

Figure A.3: The existing and planned natural gas transmission network

B.Detailed overview of financial resources for NEP implementation

Public funds:

Table 66: Public financial funds by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		[EUR million]										
1	Efficient use of energy	32.0	51.9	51.1	50.4	48.8	51.4	53.6	53.4	52.4	51.4	50.5
2	Use of energy in transport	0.06	0.67	0.67	0.67	0.67	0.67	5.27	5.27	5.27	5.27	5.27
3	Renewable energy sources	70.5	96.6	101.8	109.1	118.0	137.7	115.4	115.7	114.1	113.8	112.7
4	Local supply of energy											
5	Cogeneration of heat and electricity	22.9	27.6	27.1	29.8	33.9	46.5	50.1	55.0	56.8	61.7	65.3
6	Development of electricity market											
7	Electricity generation											
8	Electricity transmission											
9	Electricity distribution network											
10	Natural gas market											
11	Natural gas supply											
12	Liquid fuels											
13	Coal	15.0	32.0	15.4	12.8	10.2	8.6					
14	Nuclear energy	9.1	6.4	7.8	17.8	19.7	17.5	12.5	3.6			
15	Taxes and regulated prices											
16	Education and training											
17	Research and development											
18	Spatial planning											
	Total	**149.5**	**215.2**	**203.8**	**220.6**	**231.4**	**262.3**	**236.8**	**233.0**	**228.5**	**232.2**	**233.7**

Table 67: Guaranteed budgetary funds by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015
		[EUR million]					
1	Efficient use of energy	17.3	18.0	18.3	18.4	18.2	28.5
2	Use of energy in transport						
3	Renewable energy sources	8.86	9.20	9.39	9.43	9.34	14.61
4	Local supply of energy						
5	Cogeneration of heat and electricity						
6	Development of electricity market						
7	Electricity generation						
8	Electricity transmission						
9	Electricity distribution network						
10	Natural gas market						
11	Natural gas supply						
12	Liquid fuels						
13	Coal	15	32	15	13	10	9
14	Nuclear energy						
15	Taxes and regulated prices						
16	Education and training						
17	Research and development						
18	Spatial planning						
	Total	**41.1**	**59.1**	**43.1**	**40.7**	**37.8**	**51.7**

Table 68: Other guaranteed public financial funds by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		[EUR million]										
1	Efficient use of energy	20.3	22.8	25.4	24.9	27.1	29.4	30.1	30.7	31.4	32.1	32.8
2	Use of energy in transport											
3	Renewable energy sources	38.1	40.9	43.2	49.8	53.1	64.9	66.5	67.2	66.2	66.5	65.8
4	Local supply of energy											
5	Cogeneration of heat and electricity	22.9	27.6	27.1	29.8	33.9	46.5	50.1	55.0	56.8	61.7	65.3
6	Development of electricity market											
7	Electricity generation											
8	Electricity transmission											
9	Electricity distribution network											
10	Natural gas market											
11	Natural gas supply											
12	Liquid fuels											
13	Coal											
14	Nuclear energy	9	6	8	18	20	17	12	4	0	0	0
15	Taxes and regulated prices											
16	Education and training											
17	Research and development											
18	Spatial planning											
	Total	**90.4**	**97.7**	**103.4**	**122.3**	**133.8**	**158.2**	**159.2**	**156.6**	**154.4**	**160.4**	**163.9**

Table 69: Missing public financial funds by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		[EUR million]										
1	Efficient use of energy	-5.6	11.1	7.5	7.1	3.5	-6.5	23.5	22.7	21.0	19.3	17.7
2	Use of energy in transport	0.1	0.7	0.7	0.7	0.7	0.7	5.3	5.3	5.3	5.3	5.3
3	Renewable energy sources	23.5	46.5	49.2	49.9	55.5	58.2	48.8	48.5	47.9	47.3	46.8
4	Local supply of energy											
5	Cogeneration of heat and electricity											
6	Development of electricity market											
7	Electricity generation											
8	Electricity transmission											
9	Electricity distribution network											
10	Natural gas market											
11	Natural gas supply											
12	Liquid fuels											
13	Coal											
14	Nuclear energy											
15	Taxes and regulated prices											
16	Education and training											
17	Research and development											
18	Spatial planning											
	Total	**18.0**	**58.3**	**57.3**	**57.7**	**59.7**	**52.4**	**77.6**	**76.4**	**74.1**	**71.8**	**69.8**

Table 70: Missing public financial funds by NEP sub-programmes 2020-2030

		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
		[EUR million]									
1	**Efficient use of energy**	20.7	20.4	20.1	19.8	19.5	21.3	24.1	23.6	23.2	22.8
2	**Use of energy in transport**	5.3	5.3	5.3	5.3	5.3	6.2	6.2	6.2	6.2	6.2
3	**Renewable energy sources**	14.6	14.6	14.5	14.4	14.4	12.1	12.1	12.1	12.3	12.6
4	**Local supply of energy**										
5	**Cogeneration of heat and electricity**										
6	**Development of electricity market**										
7	**Electricity generation**										
8	**Electricity transmission**										
9	**Electricity distribution network**										
10	**Natural gas market**										
11	**Natural gas supply**										
12	**Liquid fuels**										
13	**Coal**										
14	**Nuclear energy**										
15	**Taxes and regulated prices**										
16	**Education and training**										
17	**Research and development**										
18	**Spatial planning**										
	Total	**40.6**	**40.3**	**39.9**	**39.5**	**39.2**	**39.6**	**42.5**	**42.0**	**41.7**	**41.6**

Investments and financing of investments

Table 71: Investments by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		[EUR million]										
1	Efficient use of energy	90.2	148.2	146.3	145.1	144.9	145.1	174.1	170.8	167.2	163.7	160.6
2	Use of energy in transport	3.0	24.5	31.1	25.1	25.1	26.2	180.0	180.0	180.0	180.0	175.5
3	Renewable energy sources	195.8	289.3	318.4	354.8	394.7	551.8	318.7	365.5	349.1	409.5	393.6
4	Local supply of energy											
5	Cogeneration of heat and electricity	5.0	24.6	24.6	24.6	24.6	24.6	24.9	24.9	24.9	24.9	24.9
6	Development of electricity market											
7	Electricity generation	8.3	88.0	232.7	450.7	448.7	356.5	145.5	270.3	244.1	47.9	67.8
8	Electricity transmission	47.9	63.9	99.3	115.4	117.2	94.6	47.7	23.4	30.9	14.1	16.5
9	Electricity distribution network	179.5	189.4	189.3	179.1	158.5	464.4	149.2	147.0	146.4	165.1	665.1
10	Natural gas market											
11	Natural gas supply	68.4	66.2	215.6	39.2	72.0	12.4	0.0	0.0	1040.9	0.0	
12	Liquid fuels											
13	Coal	15.0	32.0	15.4	12.8	10.2	8.6					
14	Nuclear energy	9.1	6.4	7.8	17.8	19.7	17.5	12.5	3.6	0.0	0.0	0.0
15	Taxes and regulated prices											
16	Education and training											
17	Research and development											
18	Spatial planning											
	Total	**622.3**	**932.7**	**1280.5**	**1364.7**	**1415.7**	**1701.7**	**1052.7**	**1185.6**	**2183.6**	**1005.3**	**1504.0**

Table 72: Investments by NEP sub-programmes 2020-2030

		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
		[EUR million]									
1	Efficient use of energy	189.3	185.3	181.2	177.3	173.6	185.5	188.7	183.7	178.8	174.2
2	Use of energy in transport	176.1	176.1	176.1	176.1	176.1	207.0	207.0	207.0	207.0	207.0
3	Renewable energy sources	386.0	381.3	375.7	370.9	367.6	320.9	306.6	302.9	301.4	303.7
4	Local supply of energy										
5	Cogeneration of heat and electricity	32.7	32.7	32.7	32.7	32.7	24.0	24.0	24.0	24.0	24.0
6	Development of electricity market										
7	Electricity generation	97.3	124.4	109.3	127.0	86.1	121.4	159.5	131.6	42.4	37.1
8	Electricity transmission	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Electricity distribution network	165.1	165.1	165.1	165.1	465.1	165.1	165.1	165.1	165.1	465.1
10	Natural gas market										
11	Natural gas supply										
12	Liquid fuels										
13	Coal										
14	Nuclear energy	0.7	5.7	6.1							
15	Taxes and regulated prices										
16	Education and training										
17	Research and development										
18	Spatial planning										
	Total	**1047.1**	**1070.6**	**1046.2**	**1049.1**	**1301.3**	**1023.8**	**1050.8**	**1014.3**	**918.7**	**1211.1**

Table 73: Public financial funds for investments by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		[EUR million]										
1	Efficient use of energy	32.0	51.9	51.1	50.4	48.8	51.4	53.6	53.4	52.4	51.4	50.5
2	Use of energy in transport	0.1	0.7	0.7	0.7	0.7	0.7	5.3	5.3	5.3	5.3	5.3
3	Renewable energy sources	35.2	58.9	62.0	66.1	72.2	80.7	56.9	56.7	56.2	55.8	55.6
4	Local supply of energy											
5	Cogeneration of heat and electricity											
6	Development of electricity market											
7	Electricity generation											
8	Electricity transmission											
9	Electricity distribution network											
10	Natural gas market											
11	Natural gas supply											
12	Liquid fuels											
13	Coal	15.0	32.0	15.4	12.8	10.2	8.6					
14	Nuclear energy	9.1	6.4	7.8	17.8	19.7	17.5	12.5	3.6			
15	Taxes and regulated prices											
16	Education and training											
17	Research and development											
18	Spatial planning											
	Total	91.4	149.9	136.9	147.8	151.6	158.7	128.2	119.0	113.9	112.5	111.3

Table 74: Other financing sources of investments by NEP sub-programmes 2010–2020

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
		[EUR million]										
1	**Efficient use of energy**	58.2	96.3	95.2	94.7	96.1	93.7	120.5	117.4	114.8	112.3	110.1
	- loans from Eco Fund	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*	*25.6*
2	**Use of energy in transport**	3.0	23.8	30.4	24.4	24.4	25.5	174.8	174.8	174.8	174.8	170.2
3	**Renewable energy sources**	160.6	230.4	256.4	288.8	322.5	471.1	261.8	308.8	292.9	353.7	338.1
	- loans from Eco Fund	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*	*6.4*
4	**Local supply of energy**											
5	**Cogeneration of heat and electricity**	5.0	24.6	24.6	24.6	24.6	24.6	24.9	24.9	24.9	24.9	24.9
6	**Development of electricity market**											
7	**Electricity generation**	8.3	88.0	232.7	450.7	448.7	356.5	145.5	270.3	244.1	47.9	67.8
8	**Electricity transmission**	47.9	63.9	99.3	115.4	117.2	94.6	47.7	23.4	30.9	14.1	16.5
9	**Electricity distribution network**	179.5	189.4	189.3	179.1	158.5	464.4	149.2	147.0	146.4	165.1	665.1
10	**Natural gas market**											
11	**Natural gas supply**	68.4	66.2	215.6	39.2	72.0	12.4	0.0	0.0	1040.9	0.0	0.0
12	**Liquid fuels**											
13	**Coal**											
14	**Nuclear energy**											
15	**Taxes and regulated prices**											
16	**Education and training**											
17	**Research and development**											
18	**Spatial planning**											
	Total	**530.9**	**782.8**	**1143.6**	**1217.0**	**1264.0**	**1542.9**	**924.5**	**1066.6**	**2069.7**	**892.8**	**1392.7**

C. List of Abbreviations

D.

E.

AGEN-RS	–	Energy Agency of the Republic of Slovenia
AN-URE	–	National efficiency energy action plan for the period 2008–2016
AN ZeJN	–	Action plan for green public procurement for the period 2009–2012
ARAO	–	Radioactive Waste Management Agency
ARSO	–	Environmental Agency of the Republic of Slovenia
AUKN	–	Agency for the Governance of Capital Investments of the Republic of Slovenia
BAT	–	Best Available Technology
GDP	–	gross domestic product
BSP		BSP Regional Energy Exchange
CCS	–	carbon capture and storage
CEIA	–	comprehensive environmental impact assessment
PHPP	–	pumped-storage hydroelectric power plant
DEM	–	Dravske elektrarne Maribor
MVT	–	motor vehicle tax
DH	–	district heating
AS	–	additional scenario
NSP	–	National Spatial Plan
DSM	–	Demand Side Management
NA	–	National Assembly
ELES	–	Elektro-Slovenija
ELFO	–	extra light fuel oil
ENSVET	–	energy consulting
ENTSO-E	–	European Network of Transmission System Operators for Electricity
ENTSO-G	–	European Network of Transmission System Operators for Gas
ECD	–	Directive 2006/32/EC on energy end-use efficiency and energy services
ERDF	–	European Regional Development Fund
ETS	–	Emission Trading Scheme
EU	–	European Union
EUROSTAT	–	Statistical Office of the European Communities
EA	–	Energy Act
PUS	–	public utility service
HPP	–	hydroelectric power plants
HPPSS	–	hydroelectric power plants Srednja Sava
HHI	–	Herfindahl-Hirschman Index of market concentration
HSE	–	Holding Slovenske Elektrarne
HVDC	–	high voltage direct current
IEA	–	International Energy Agency
INT	–	intensive strategy
IPCC	–	Intergovernmental Panel on Climate Change
PAEFI	–	Public Agency of the RS for Entrepreneurship and Foreign Investments
NS	–	nuclear scenario
NPPK2	–	Nuclear Power Plant Krško (second block)
COM	–	the Commission
WBM	–	wood biomass
LCC	–	life cycle cost
LEC	–	local energy concepts
LNG	–	liquefied natural gas
LOLE	–	loss of load expectation
MLFSA	–	Ministry of Labour, Family and Social Affairs
MESAP	–	Modular Energy System Analysis and Planning
MF	–	Ministry of Finance
sHPP	–	small hydroelectric power plants
MPA	–	Ministry of Public Administration
MESP	–	Ministry of the Environment and Spatial Planning
MES	–	Ministry of Education and Sport
MHEST	–	Ministry of Higher Education, Science and Technology
MFA	–	Ministry of Foreign Affairs
NEC Directive	–	Directive on national emission ceilings for certain atmospheric pollutants

NPPK	–	Nuclear Power Plant Krško
NEP	–	National Energy Programme
NHO	–	non-profit housing organisations
LILW	–	low- and intermediate-level radioactive waste
WMP	–	water management plans
OECD	–	Organisation of Economic Cooperation and Development
UNFCCC	–	United Nations Framework Convention on Climate Change
ER NEP	–	Environmental Report NEP
OP ETID	–	Operational Programme of Environment and Transport Infrastructure Development for 2007-2013
OP GHG	–	Operational Programme for Limiting Greenhouse Gas Emissions until 2012
BS	–	basic scenario
RES	–	renewable energy sources
PID	–	preinvestment design
GAS	–	gas scenario
GSPP	–	gas and steam power plant
PURES	–	Rules on efficient use of energy in buildings
VCM	–	Velenje Coal Mine
EIA	–	environmental impact assessment
REF	–	reference strategy
ReNEP	–	Resolution on the National Energy Programme
ReNPVO	–	Resolution on National Environmental Action Plan
THM	–	Trbovlje-Hrastnik Mine
TS	–	transformer station
ŽVUM	–	Žirovski vrh Uranium Mine
SEL	–	Savske elektrarne Ljubljana
SIST	–	Slovenian Institute for Standardisation
SME	–	small and medium-sized enterprise
MV/HV	–	medium-voltage/high-voltage
SODO	–	system operator of distribution network
SONDO	–	System operating instructions for electricity distribution network
SOPO	–	system operator of transmission network
SPSS	–	Spatial Planning Strategy of Slovenia
CHE	–	cogeneration of heat and electricity
SDS	–	Slovenia's Development Strategy
SORS	–	Statistical Office of the Republic of Slovenia
GOLR	–	Government Office for Local Self-Government and Regional Policy
GOCC	–	Government Office for Climate Change
GODEA	–	Government Office for Development and European Affairs
CNG	–	compressed natural gas
TPP	–	thermal power plant
TPPB	–	Thermal Power Plant Brestanica
TPPŠ	–	Thermal Power Plant Šoštanj
TPPT	–	Thermal Power Plant Trbovlje
TE-TOL	–	Termoelektrarna Toplarna Ljubljana (Thermal Power Plant and District Heating Plant Ljubljana)
GHG	–	greenhouse gases
UNF	–	used nuclear fuel
IMAD	–	Institute of Macroeconomic Analysis and Development
UNFCCC	–	United Nations Framework Convention on Climate Change
LPG	–	liquefied petroleum gas
EUE	–	efficient use of energy
SNSA	–	Slovenian Nuclear Safety Administration
LNG	–	liquefied natural gas
HLW	–	high-level radioactive waste
WEO10	–	World Energy Outlook 2010
GPP	–	green public procurement
ZGO	–	Construction Act
AEC PI	–	Aggregate Economic Cadastre of Public Infrastructure
UN	–	United Nations
NG	–	natural gas
ZPKEPS	–	Act Governing the Conditions of the Concession for the Exploitation of Energy Potential of the Lower Sava River

ZPZRTH	–	Regulating the Gradual Closure of the Trbovlje-Hrastnik Mine and Development Restructuring of the Region Act
ZTRO	–	Excise Duty Act
ZVO	–	Environmental Protection Act