

THE REPUBLIC OF CROATIA

MINISTRY OF ECONOMY, LABOUR AND ENTREPRENEURSHIP

ENERGY STRATEGY OF THE REPUBLIC OF CROATIA

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FOREWORD

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1 INTRODUCTION

1.1 PURPOSE AND GOALS OF THE UPDATED STRATEGY

The Energy Strategy was adopted by the Croatian Parliament pursuant to Article 80 of the Constitution of the Republic of Croatia and Article 5, Section 3 of the Energy Act ("Official Gazette" No. 68/01, 177/04, 76/07, 152/08).

Taking into consideration that since the Strategy was adopted in 2002

- Croatia has become a candidate country for full membership in the European Union (EU);

taking into consideration that since the Strategy was adopted in 2002

- Croatia has signed and ratified the Energy Community Treaty;

taking into consideration that since the Strategy was adopted in 2002

- Croatia has signed and ratified the Kyoto Protocol along with the United Nations Framework Convention on Climate Change;

and taking into consideration that

- Croatia is faced with a serious instability of energy prices on global market;

Government of the Republic of Croatia suggests to the Croatian Parliament to adopt a new Energy Strategy even before the expiry of 10-years period prescribed by the Energy Act.

The Energy Strategy is adopted for the period until 2020 in order to harmonize with goals and time framework of strategic documents of the European Union.

The Energy Strategy, as a policy document and within the framework of the document Strategic framework for development from 2006 to 2013, has a purpose to

- define the development of Croatian Energy sector by 2020

and a goal to

- build, under the conditions of uncertainty in the global energy market and scarce local energy resources, a sustainable energy system.

Therefore, the goal of the Strategy is to build a sustainable energy system that makes a balanced contribution to security of energy supply, competitiveness and environmental protection and provides for security and availability of energy supply to the Croatian citizens and business sector. Such energy supply is a prerequisite for economy and social development.

Croatia conducts the negotiations for full membership in the European Union. Signing the Stabilization and Association Agreement on 29 October 2001 which has come into effect on 1 February 2005, Croatia has taken the commitments in Energy sector as well. These commitments are particularly related to taking over the Acquis Communautaire of the European Union in Energy sector, opening and developing the energy market and integration into the European Union's internal energy market.

In October 2005 the European Union and nine countries of Southeast Europe, including Croatia, signed the Energy Community Treaty, which came into force on 1 July 2006. The basic task of the Energy Community is to establish the cooperation between member states and to create stable regulatory and market framework attractive to new investments in transit and transport gas and energy infrastructure, as well as in energy generation.

Within the Energy Community and the European Union's internal market,

- Croatia harmonizes its Energy Strategy to newly developed conditions;
- Croatia recognizes its favourable geo-political position and transit potential;
- Croatia declares itself for active role in regional Energy sector.

In April 2007 Croatia ratified the Kyoto Protocol and took over the commitment to reduce the greenhouse gas emissions by 5% within the period from 2008 to 2012. Within the United Nations Framework Convention on Climate Change, the negotiations on commitments after 2012 are in progress in order to adopt a new international agreement as a follower of the Kyoto Protocol.

- Croatia declares itself for development which takes into consideration a principle of common yet divided responsibility for climate change.

While adopting the Strategy in 2002, the oil prices were between 20 and 25 \$/bbl and expecting the market stability and stability of main world currencies. Growth and instability of prices of fossil fuels indicate that it is impossible to

predict the oil price reliably. The oil is a basis of global energy industry and it will remain so in a time framework of the Strategy. Dependence of Croatia on oil import shall be increased due to the consumption increasing and reducing its own reserves.

- Energy Strategy is faced with unpredictability of levels and price parity on global energy market.
- In order to increase the security and supply competitiveness Croatia is decided for elastic energy system with various resources and energy supply courses and improvement of energy efficiency.

1.2 THE APPROACH IN UPDATING THE ENERGY STRATEGY – BASIC PRINCIPLES

The Croatian Energy Strategy has three basic energy objectives:

- Security of energy supply;
- Competitive energy system;
- Sustainable Energy sector development.

Security of energy supply of Croatia should be immediately improved. Dependence on oil import, insufficient security of natural gas supply and high import dependence on electricity supply represent the challenges to which the special attention should be focused on. The question of security of energy supply is common in all European countries. Although each country is responsible for its own security of supply, only through jointly directed activities the consequences of the dependency on import could be mitigated. Therefore, the Republic of Croatia will act with the goal to increase the security of supply and taking into account the attitude of the European Union that the question of the security of supply is common concern of all the members of the European Union. Efficient bias of the market disturbances through creation of compulsory reserves, building the storage capacities, diversification of the supply resources and routes as well as solidarity acting in the conditions of crisis are the decisions of this Strategy.

Competitiveness of the Croatian Energy sector will be evaluated within the unitary European market. Competitiveness of Croatian energy system is quite satisfying due to diverse energy structure of electricity generation and relatively high share of local natural gas generation. Energy market development, country openness, risk sharing at investments, development and technological improvement, promoting larger participation of local generation and services at

building and exploitation of power generation plants represent mechanisms for retaining and increasing the competitive energy system.

Sustainable Energy sector represents the challenge of modern development. Energy sectors participate with approximately 75% in total greenhouse gas emissions caused by human activity in Croatia. If present energy consumption development continues and investments in energy efficiency omit, as well as investments in renewable energy resources and technologies with less greenhouse gas emissions, Croatia would have a serious problem to take over objectives and commitments of Kyoto protocol as well as the future international agreement on greenhouse gas emissions.

Coherent energy development consists of steering and stimulating the technology development in Energy sector and domestic production of equipment especially for those energy resources which decrease the import dependency.

Above mentioned objectives are elaborated in the Strategy respecting specific situation in Croatia and its national interests. The Strategy is based on the following fundamental principles:

- Energy Strategy addresses the government's role in Energy sector.

The Strategy defines the government's responsibilities in securing and exploitation of energy sources, competitiveness and environmental protection. The government is to actively support security of energy supply in political and regulatory purposes as a component contributing to the Croatian economic growth. The main instruments of the government energy policy include building the legislative and regulatory framework, consumer protection, promoting energy efficiency, internalization of external costs into the price of energy, planning in Energy sector and taking timely actions to encourage investments.

- The Croatian energy system is an open system.

The Croatian energy system is completely integrated with the energy system of EU and regional energy system of Southeast Europe. Such open system enables developing of energy market and increasing the competitiveness, attracting local and foreign investments into market-oriented activities and Energy sector, harmonizing development of future strategic energy projects and establishing economic cooperation with neighbouring countries. The Government of the Republic of Croatia shall conduct an active policy since the Energy sector offers special opportunities for those stakeholders who clearly define their position and interests and perform them without delay. Due to increasing the security of energy supply and positive external impacts of investments to economic growth

and development, the investments into the power generation plants on the Croatian territory shall be preferred.

- Energy sector in Croatia shall be based on market principles.

Croatia shall intervene into market processes only when the stakeholders are affected by disturbed security of supply, quality of the environment and monopoly.

- Energy sector is infrastructural yet entrepreneurial and possibly export-oriented.

Croatia declares itself for changing the existing paradigm according to which the energy industry is only an infrastructural sector. Croatia shall view the energy industry as an entrepreneurial activity open for private investments. The goal is that energy product becomes export competitive.

Croatia shall continuously harmonize legislative, regulatory, institutional and administrative framework with Acquis Communautaire of the European Union.

Croatia shall pay attention to its particularities and interests while harmonizing with Acquis Communautaire of the European Union.

- Croatia declares itself for increasing the energy efficiency.

Croatia shall encourage the increasing of energy efficiency in all segments of the Energy sector, especially in the final energy demand. Energy efficiency is considered as an additional source of energy and as a basic permanent, long-term principle applying to the functioning and development of the energy system.

- Croatia shall aim at Energy sector diversification.

The Croatian Energy sector development shall be based on energy-related, economic and environmental assessment of all available energy options.

- Croatia shall value its specific geographic position.

Croatia is located on energy pathways and it is a country with excellent potential sites for construction of power generation plants. Using such advantages, Croatia shall develop suitable climate for investments in energy industry, contributing to economic growth and increasing the security of energy supply. Coordination between the Energy Strategy, Physical Planning Strategy, Physical Planning Programme and land use plans is of utmost importance.

- Croatia shall level the energy supply conditions on its territory.

The goal is to enable an equal quality of energy supply on the Croatian territory. It is specially related to availability of networked energy forms, i.e. electricity and natural gas, as well as liquefied petroleum gas in remote areas where it is not economically justified to network the gas system, such as islands and dislocated rural areas.

- Energy Strategy shall integrate environmental goals and measures with national policies to mitigate climate change.

Croatia supports the efforts of international community to mitigate climate change, and it shall be internationally active in creating policies and measures to mitigate climate change and shall fulfil the related commitments in an effective manner. Other problems related to the environmental impact shall be solved at the local level using adequate technical concepts for power generation facilities and building energy structure that would enable sustainable development. By ratifying the Aarhus Convention, Croatia adopted public right of access to information, public participation in decision-making and access to justice in environmental matters.

1.3 STRUCTURE AND TIME FRAMEWORK OF THE ENERGY STRATEGY

The Energy Strategy of the Republic of Croatia is focused on the period until 2020 that corresponds with the period covered by all adopted EU energy strategies. This facilitates the comparison between national goals and EU goals. Due to long-term preparation, construction and exploitation of power generation facilities, decisions made based on the Strategy will influence on the period after 2020 as well. Therefore, the Strategy offers a “glimpse into future” until 2030.

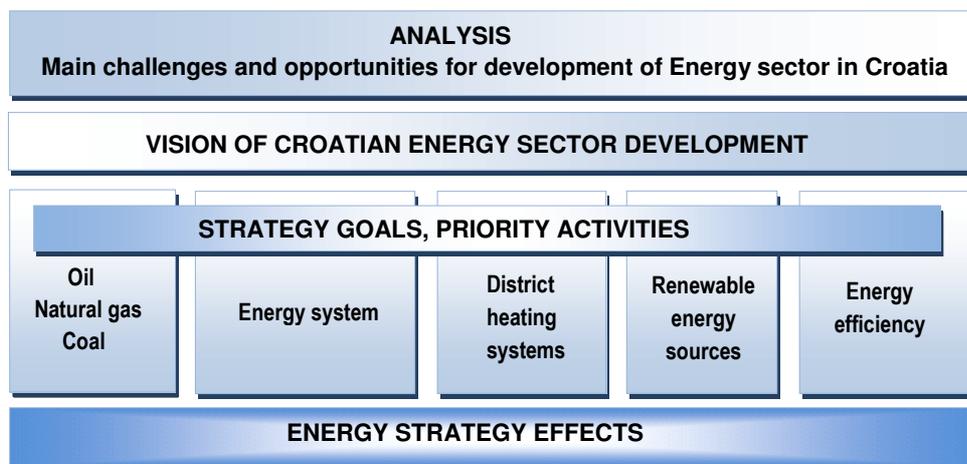


FIGURE 1-1: CONTENT OF THE ENERGY STRATEGY OF THE REPUBLIC OF CROATIA

2 CHALLENGES AND OPPORTUNITIES FOR CROATIAN ENERGY SECTOR DEVELOPMENT

2.1 GLOBAL GEO-POLITICAL CONTEXT AND SECURITY OF ENERGY SUPPLY

Croatia is becoming ever more dependant on energy imports. Croatia is currently importing about 50% of its energy demand. In today's balance of primary energy supply in Croatia, oil and oil products are represented with 50% and natural gas with 25%. Consumption of these fuels shall grow in the future, while local oil and natural gas production is going to decrease due to exhaustion of deposits.

Projections show a global increasing of the energy consumption for about 50% until 2030. According to the report prepared by the International Energy Agency (IEA) oil and natural gas reserves are sufficient to meet the demand in the period covered by this Strategy. However, these sources are concentrated on several locations in the world: 60% of world's oil reserves are located in the Middle East, while 60% of natural gas reserves are located in just three countries (Russia, Iran and Qatar). The third fossil fuel, coal, is uniformly distributed around the world. Reserves are huge, so the coal is probably going to remain a backbone of power systems in most countries of the developed world.

Croatia is therefore facing many challenges to the security of energy supply:

- Majority of world's oil and natural gas sources is concentrated in only several countries
- Unpredictable events, such as accidents, natural disasters and others, can disturb energy supply, increase the price and influence on new investments;
- Share of locally produced oil and natural gas covering the demand shall decrease, while the dependence on imports shall increase.
- Share of imports in covering the overall energy demand is going to increase as well.

Croatia, therefore, must strive towards alleviating its dependence on energy imports by building the energy structure which will prove competitive and

guarantee the security of supply even under uncertain conditions. This would be achieved by using own resources and potentials, effective use of energy, diversification of types of energy and technologies, diversification of supply routes and energy sources, and use of renewable energy sources.

2.2 CLIMATE CHANGE AND OTHER ENVIRONMENTAL ISSUES

Climate change and greenhouse gas emissions have become a priority development issue. The main challenge is a long-term development of economy with decreased emission of carbon dioxide. General trend is a more effective use of energy, use of renewable energy sources, use of energy sources that do not produce greenhouse gases, more efficient transport system with greater use of CO₂ neutral fuels and internalization of external costs of environmental pollution by establishing a price of carbon dioxide emission.

Croatia is facing difficult tasks which will have major impact on building the energy system and economy. These challenges are at the same time development opportunities, with a special emphasis on the following:

- Meeting the Kyoto Protocol commitments;
- International environmental commitments beyond 2012;
- Integration into the European Union emission trading scheme and burden-sharing agreement between EU member states;
- Competitiveness in the region;
- Pressure from fast-growing sectors;
- Development and application of renewable energy sources;
- Development and application of technology for carbon dioxide capture and storage;
- Nuclear power use;
- Resistance to construction at local level, so called NIMBY syndrome (*Not-in-my-backyard*).

Decrease in emissions by 5% in the period 2008-2012 is a short-term objective for the implementation of which a series of measures and instruments had been adopted based on EU Acquis Communautaire. During that period Croatia shall establish an emission trading mechanism which would involve participation of all

large emission sources from the Energy sector in line with the European Union emission trade scheme (EU ETS).

Parties to the United Nations Framework Convention on Climate Change continue with negotiations on obligations beyond 2012 which shall result in a new international agreement. In negotiations, Croatia advocates the principle of shared but distributed responsibility in alignment with Croatian economic capacities and development needs.

At this moment European Union is entering the negotiations with a proposed emission reduction of 20% by 2020 in comparison with 1990. Such goal could be increased to 30% in case of developing countries. EU shall distribute goal to two groups: one group made of large emission sources (ETS sector), and the other group made of all other sectors and activities (non-ETS sector).

The goal is to decrease emissions for 21% until 2020 in comparison with 2005, based on a single European allocation plan and obligation to purchase overall quotas per auctioning model in which the existing and new participants can equally participate. In other sectors, decrease in emissions by 10% is envisaged, but in the countries in which GDP per capita is below EU average, increase in emissions is allowed. Croatia, as EU member state, shall take over the commitments and achieve transposed EU objective according to the principle of distribution of commitments among member states, but use a position of country with low GDP as well.

Most countries in the Southeast Europe did not take a commitment to reduce greenhouse gas emissions. Since these countries have signed the Energy Community Treaty, Croatia is in a less favourable position in the power sector and in other energy-intensive sectors. Croatia expects of these countries to take commitment under the UN Convention on Climate Change, which would then remove the above-mentioned threat.

Fast-growing sectors in Croatia include energy-intensive activities like power generation industry, oil processing and production of mineral products (cement, lime, glass). These sectors shall be included in the emission trading mechanism and burdened with the price of carbon dioxide. Furthermore, due to increased mobility and extreme inelasticity of prices, there is large increase in emissions from road transport. Emissions from this sector shall be decreased through development of sustainable transport, technological development and application of CO₂ neutral fuels.

Development and application of renewable energy sources is a measure that contributes to decreasing the greenhouse gas emissions, but at the same time increasing the supply security using local energy sources. Therefore, it represents an encouragement to local economy development.

Development and application of technology for carbon dioxide capture and storage (CCS) is a long-term measure for emission decrease, especially emissions from coal-fired power generation facilities. The CCS is expected to become commercially viable in some ten years.

Of all the observed measures, nuclear power use is a measure with the greatest potential in decreasing the greenhouse gas emissions. Without increased use of nuclear power, objectives considering decrease of greenhouse gas emissions could not be achieved. Public disputes related to the environmental impact, especially with regard to decommissioning and radioactive waste disposal should be coordinated among stakeholders in order to enable greater use of nuclear power.

The problem of choosing a location and building new power generation facilities is also linked to the acceptability of these facilities to the local community. Timely and open communication with the public, especially with the so called stakeholders and local community, and consistency in following the principle which enables public to participate in the decision-making on the environmental protection issues is a democratic principle of the utmost importance (pursuant to the provisions of the Croatian Act on the Right of Access to Information ("Official Gazette" No. 172/03) and the Environmental Protection Act ("Official Gazette" No. 110/07), which incorporate the provisions of the Aarhus Convention).

2.3 ENERGY GEO-STRATEGIC POSITION AND SPATIAL OPPORTUNITIES OF THE REPUBLIC OF CROATIA

Geographic position of Croatia is its strength and opportunity for sustainable Energy sector development:

- Geopolitical position of potentially transit country for oil, natural gas and electricity;
- Physical advantages of maritime country and country with good sites for construction of power generation facilities.

Croatia has favourable conditions for construction of underground gas storages, underground CO₂ storages, hydropower plants, wind parks and other renewable energy sources, oil and liquefied natural gas terminals, thermal power plants firing imported hard coal, nuclear power plant, LL and IL radioactive waste repository and other power generation facilities.

Croatia will mainly be supplied with oil and natural gas from domestic production from the remaining reserves, Northern Africa, Middle East, Russian

Federation, and Caspian region. Energy sector development shall be based on development of energy markets, but also on geopolitical planning and negotiations on participation in strategic projects that could bring Croatia increased security of supply and direct economic benefits.

With regard to oil and natural gas supply, international political activity and proactive economic policy shall be directed towards using the geopolitical position of Croatia and establishing Croatia as regional energy hub.

Croatia recognizes the importance of political activity in order to achieve strategic projects such as: Pan-European Oil Pipeline – PEO and Družba-Adria, Interstate connecting gas pipeline of the Croatian and Hungarian transmission system and double 400 kV power line between Hungary and Croatia, liquefied natural gas terminal (LNG terminal), as well as other announced projects which shall connect its systems into regional and international systems and intensify its transit position.

2.4 EU ENERGY POLICY “TOWARDS COMMON ENERGY MARKET”

Taking into account the matter of security and sustainability of supply as common concern the European Union has adopted a common energy and climate change mitigation policy, which would make Europe an economy with low greenhouse gas emissions, i.e. a global leader in combating climate change.

European Union has proposed a five-point European Union Energy Security and Solidarity Action Plan:

- More effective support is needed for projects to build the required infrastructure;
- More attention needs to be paid to external energy relations with other countries;
- More attention has to be paid to solidarity, including EU crisis mechanisms, oil stocks and a variety of mechanisms to respond to possible gas disruption;
- Additional and more urgent efforts have to be made to improve energy efficiency;
- The EU has to make better use of its indigenous energy resources, both renewable and fossil.

Goals of this single policy are as follows:

- 20% decrease in greenhouse gas emissions by 2020 in comparison to 1990, or 30% decrease in the case that developing countries should accept commitments in alignment with their economic capacities;
- 20% of renewable energy sources in gross final energy consumption¹ in 2020;
- 10% shall be a share of renewable energy sources in 2020 used in all types of transport in comparison with final gasoline and diesel fuel, biofuel consumption in road and railway transport and total electricity consumption in transport;
- 9% decrease of final energy consumption in a period by 2016 applying energy efficiency measures;
- 20% decrease of overall energy consumption in comparison with basic projection in 2020 (that goal has been proclaimed, but not yet elaborated by EU).

Croatia, as future EU member state, accepts such common European policy and is harmonizing its own goals with such policy. Fundamental “platform” for accomplishing these goals is a completely open and competitive European energy market. According to this,

- Croatia shall permanently harmonize its legislative and regulatory framework with EU Acquis Communautaire;
- Croatia shall create conditions for functioning of open energy market, based on transparent, stable and non-discriminatory rules and effective market regulation.

2.5 COOPERATION IN SOUTHEAST EUROPE AND WITH NEIGHBOURING COUNTRIES

Energy region and regional energy market, which include the Republic of Croatia, are defined by following content considering the Strategy: countries of Southeast Europe (contractual parties from the Energy Community Treaty) and neighbouring EU member states (contractual parties from the Energy Community Treaty).

¹ Gross final energy consumption is final energy consumption increased by own electricity and heat demand in sector of electricity and heat generation and by electricity and heat losses in distribution and transmission.

With the Energy Community Treaty, countries of Southeast Europe have adopted a common binding strategy for creating regional electricity and natural gas market based on common interests and solidarity and for the purpose of its final integration into single European market. With regard to the region, the specific tasks of the Energy Community are as follows:

- Establishment of conditions for energy market development in a single regulatory space;
- Improvement of environmental state by increasing the energy efficiency and greater usage of renewable energy sources;
- Increasing the security of energy supply in a region by connecting with Caspian, North African and Middle East gas reserves, and using natural gas, coal and hydropower reserves in region.

Harmonization of the Aquis Communautaire regarding environmental protection and social issues related to energy supply are an important aspect of the Energy Community. Regarding environmental protection it is required the enforcement of European regulations which regulate the questions like pollution prevention and control, environmental impact assessment, fuel quality, waste management and wild birds' protection. Memorandum of Understanding on Social Issues obliges members of the Energy Community to include social dimension into their energy policy. In the process of liberalization, tariff systems and ways to determine prices of energy are changing significantly. Croatia shall promote its social orientation in such issues through adequate measures of social policy.

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3 SUSTAINABLE AND SECURE ENERGY SECTOR

3.1 VISION

- Croatia shall have a reliable and sustainable Energy sector, development of which shall be based on using all energy options in order to meet own energy demand and to create added value for Croatian citizens, in alignment with principles of environmental, economic and social responsibility.

The Strategy offers guidelines for the implementation of activities that should provide for reliable, flexible and sustainable energy system through strategic leadership, using the market to achieve secure and affordable energy supply, restraining the increase of greenhouse gas emissions from the Energy sector, more effective use of energy, as well as stimulating the research, development and application of environmentally sustainable energy technologies.

3.2 STRATEGIC LEADERSHIP

Security of energy supply demands for continuous development of energy system and timely and efficient investments. Croatia shall provide stimulating conditions for investments into energy structure decreasing the risks for investors. Strategic framework of the Croatian energy policy is as follows:

- Openness to all energy options, without banning or giving preferential treatment to any energy technologies;
- Creating a stimulating legislative and regulatory framework for new investments into Energy sector, accelerating and simplification of administrative procedures for obtaining permits and timely harmonization of physical planning documents;
- Taking advantage of favourable geopolitical position of Croatia for its position as a regional energy hub;
- Active participation in regional initiatives for enhancing the security of supply through bilateral agreements and joint investments;

- Encouraging legal and physical persons for efficient energy and renewable energy sources use.

3.3 USING THE MARKET TO ACHIEVE SECURE AND AFFORDABLE ENERGY SUPPLY

The main principle of the Strategy is to accomplish a completely open, independently regulated and competitive energy market in Croatia as a part of single regional and European energy market. There are several elementary starting points for achieving of this goal:

- Independent regulation of the Energy sector;
- Government's role in securing market functioning;
- Securing mandatory oil and natural gas reserves;
- Using energy transit possibilities.

The first starting point is an independent regulation of Energy sector. Energy sector should function on obvious principles with strong and independent regulatory body. Creating strong and independent national regulatory agencies is one of the main priorities of the EU energy policy, as well as of Croatia.

The prices of energy should be determined by open market. However, the market can only function when supply is sufficient. Energy market has external impacts, such as supply security and environmental impact. The market itself cannot satisfy those demands, so the Government shall take over an active role in corrective policy. The Government should secure market functioning and maintain necessary level of security of energy supply by planning and timely undertaking of activities. In the case of natural gas, in the period until LNG terminal is built, the Government shall provide necessary support: to extending of current agreement for supply of natural gas from Russia, securing local production of natural gas using measures related to research and exploitation of mineral products and construction of underground storage of natural gas. In the area of electricity it shall be referred to encouraging the investors by removing the obstacles and reducing the risk of preparation and construction of power plants.

Oil shall have a major share in overall and final energy consumption in future as well, and the growth of natural gas consumption is expected too. Therefore, the Government shall secure mandatory oil and natural gas reserves, new supply routes and underground storages of natural gas.

In the area of electricity, natural gas and oil, it is necessary to take advantage of the transmission potentials and to direct development towards creating conditions for energy transit, which would contribute to more intensive connecting into energy network and EU market.

3.4 COMBATING THE GREENHOUSE GAS EMISSIONS FROM THE ENERGY SECTOR

In order to achieve greenhouse gases reduction goals,

- Croatia shall join the European Union emission trading scheme.

Such market mechanism shall contribute towards transformation of the whole economy, not just Energy sector, towards the environmentally acceptable technological solutions. The prices of emission units shall have a significant impact on decision-making in the area of investments in the Energy sector, but enable optimization of investments into power generation facilities on a single European space. Special efforts shall be made by the Government in the Transport sector in order to increase the share of environmentally favourable energy sources for running vehicles, such as biofuels, compressed natural gas and electricity.

3.5 MORE EFFICIENT USE OF ENERGY

Croatia is using energy in a less effective manner than most countries of Western Europe. At this moment we use 16.5% more primary energy per GDP unit than on the average in EU-27.

Croatia shall, through its energy efficiency policy and in accordance with EU goals, decrease in final energy consumption by 9% until 2016, in relation to average final energy consumption for the period 2001-2005.

- Croatia has set for a goal to decrease final energy consumption by 10% until 2020, in relation to average consumption for the period 2001-2005

The Government shall stimulate the changes in the structure of energy use. The Strategy sets as a goal for electricity used for heating and domestic hot water to be replaced by other energy sources: solar energy, biomass, natural gas and liquefied petroleum gas (in the areas remote from natural gas network). This goal does not refer to the use of electricity for heating and domestic hot water from heat pumps. In transport, the forms decreasing the energy intensity shall be stimulated.

Energy savings can also be observed as a new source of energy; therefore, cost-effective measures should be used to stimulate energy efficiency, not only market prices of energy.

3.6 RENEWABLE ENERGY SOURCES

Croatia has good natural possibilities for the use of renewable energy sources. Renewable energy sources are local energy sources and their utilization is a mean of enhancing the security of energy supply, stimulation to the development of local production of energy equipment and services, and also a manner for accomplishing the environmental protection goals.

Croatia shall stimulate renewable energy sources to the utmost, along with acceptable social costs of their usage. Therefore, following strategic goals have been set up:

- Croatia shall fulfil the commitments according to the EU Directive on the promotion of the use of energy from renewable sources on the share of renewable energy sources, including large hydropower plants, in final energy consumption of 20%;
- Croatia shall fulfil the commitments according to the EU Directive on the promotion of the use of biofuels for transport, on a share of biofuels, in final energy consumption of 10% until 2020;
- Croatia sets up a goal to maintain the level of 35% of a share of electricity generation from renewable energy sources, including large hydropower plants, in overall electricity consumption until 2020.

3.7 STIMULATING RESEARCH, DEVELOPMENT AND APPLICATION OF ENVIRONMENTALLY SUSTAINABLE ENERGY TECHNOLOGIES

Energy and transport technologies are developing quickly in the world. Croatia has to secure its own capacity to apply such technologies as soon as they are economically sound. According to possibilities:

- Croatia shall increase investments into education and scientific and research projects and systematically encourage international cooperation in the area of sustainable energy technologies.

The goal of that measure is to develop and increase the capabilities of local industry and services, directed towards high-tech solutions. The Government

shall provide connections between energy policy, industry policy and higher education and science policy.

Croatia's energy development should be based on best available technologies.

Investing into education of highly educated professionals, as well as staff on all education levels is necessary for acceptance of the best technologies and practice of other research institutions. Furthermore, the development of Energy sector requires specialists of different profiles trained and qualified to work with new technologies. Therefore, the Government shall support a development of Energy sector professional programs and provide life-long learning programs related to different aspects of energy system.

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4 ENERGY END-USE EFFICIENCY

4.1 DEVELOPMENT GUIDELINES AND GOALS OF THE REPUBLIC OF CROATIA

Improving energy efficiency in all segments of the energy system is a guideline as well as one of main objectives of this Strategy.

Energy end-use efficiency in production, transmission and final consumption is a base of development guidelines of all the sectors of energy system. In a sector of oil, oil products and natural gas production energy efficiency is represented in modernization of refineries and usage of improved technologies for utilization of oil and gas fields. In Energy sector, the efficiency is represented in application of more effective technologies of energy conversion, such as: improved technologies of coal combustion, gas power plants of high level of activity and cogeneration of heat power and electricity, as well as reduction of losses in transmission and distribution network, suitable construction considering the location and stimulating electricity distributed generation. In a case of heat energy, district heating system development is directed towards increasing the energy conversion efficiency, application of cogeneration units and decreasing the heat distribution losses, distributed energy generation and usage of renewable energy sources.

However, special attention shall be paid to efficient energy use in final energy consumption. Measures of energy efficiency reduce the increase in energy consumption, thus reducing the need to produce the respective quantity of energy, the need to build new capacities and import energy, and improving the security of supply.

- The Strategy is based on a paradigm that efficient use of energy is observed as a “new source of energy” («negajoules» concept);
- The goal of the Strategy is to reduce the energy consumption by implementing cost-effective measures of energy efficiency.

The goals considering the energy efficiency in Croatia shall be fulfilled by the Energy Efficiency Program. The Program shall cover the period between 2009 and 2016 in which the energy savings of about 20 PJ should be achieved.

That goal will be achieved through the implementation of measures of energy efficiency in industry, transport, households and services.

It is assumed that most energy savings will be achieved by 2016. Significant energy savings are especially expected in the initial period when the potential of the low-cost measures is used. The Government shall make assumptions that, in the period beyond 2016, fully functional energy efficiency market would be established. It will enable the energy efficiency increase trend to be continued, due to higher public awareness and efficient energy use technologies.

Attaining the goals of more efficient energy use is far more complex than fulfilling the goals on the energy production side. Croatia recognizes a task of strong involvement due to the goal achievement.

- The development of energy markets and market-driven energy pricing shall be enabled;
- Legislative and regulatory framework aimed at encouraging energy efficiency shall be finished;
- An institutional framework for the implementation, monitoring and evaluation of the energy efficiency policy on national level shall be created;
- Single system of data collecting, processing and storing for calculation and monitoring of energy efficiency indicators in accordance with the methodology accepted in EU;
- Campaigns aimed at the general public and specific target groups shall be continuously implemented;
- Financial support for the implementation of energy efficiency measures shall be ensured and incentives to innovative ways of financing shall be provided.

4.2 GOALS AND ACTIVITIES IN THE PERIOD UNTIL 2020

Priority activities implemented in some sectors of final energy consumption shall be presented in detail in the Energy Efficiency Master Plan. It shall contain professional basis according to which the Energy Efficiency Action Plan shall be adopted. Implementing these documents and goals, Croatia shall take over the commitment to reduce final energy consumption through measures of energy

efficiency according to the goals defined by the guidelines and strategic documents of the EU energy policy.

4.2.1 INDUSTRY

The Industrial sector's share in the overall final energy consumption is slightly above 20%. The Energy Efficiency Master Plan includes energy efficiency measures in industrial capacities which shall not be involved in the emission unit trading scheme, for it is considered that the emission unit trading obligation is sufficient pressure to ETS sector. The energy efficiency package for the Industrial sector includes:

- Creation of a functional industrial energy efficiency network (IEEN);

The IEEN Program shall provide industrial companies with support in implementing energy audit and establishing energy management systems, conducting comparative analysis (benchmarking) of their energy-related characteristics and characteristics of other companies in the same industry and implementing selected energy efficiency programs. Educational and training programs shall also be launched for employees in the respective industry;

- Establishing an energy audit scheme for the industry;

Mandatory energy audit shall be established for energy-intensive industries; a scheme of voluntary energy audits financially assisted by the Environmental Protection and Energy Efficiency Fund shall be established for other industries. It is necessary to define a system of auditor certification and standardize procedures of energy audit and reporting;

- Stimulating heat and power cogeneration in industry;

Current system of supports through guaranteed purchase prices for electricity generated in such plants shall be analyzed, especially in case of highly efficient cogeneration, and more attractive system related to the market shall be established as well;

- Improving the CO₂ emission taxation system;

Individual CO₂ emission tax in the period 2007-2009 is relatively low and it is not expected to directly affect the CO₂ emission level or improve energy efficiency. The system of emission taxation should be improved with regard to the marginal cost of measure implementation and establishment of the emission trading system with the goal of providing industries with incentives for the

implementation of energy efficiency in order to stimulate implementation of measures for CO₂ reduction in stead of emission tax payment.

4.2.2 TRANSPORT SECTOR

The Transport sector represents about 30% of the total final energy consumption, with a very high growth rate (more than 5% annually over the past five years). With over 90%, road transport accounts for the largest share of energy consumption in this sector. Due to the increase in number of cars, a longer average distance covered by car and fewer individuals travelling in each of the vehicles, this trend is expected to continue in the future. Road transport is therefore the focal point of energy efficiency policy in the Transport sector.

From the energy efficiency point of view, the Transport sector is the one in which desired results will be hardest to achieve. This is due to its dependence on liquid fuels (oil products), as well as because of mobility that is so characteristic for the modern way of living and globalised economy. A package of energy efficiency measures shall be adopted by the Government in order to reduce the energy consumption in transport, including:

- Setting higher standards for new vehicles;

Croatia shall follow and quickly adopt technical standards for vehicles that have already been adopted by the EU and thus assure that only the most efficient products reach the Croatian market;

- Implementation of awareness raising campaigns on energy efficient behaviour in transport;

The campaign shall promote efficient driving, as well as alternative means of transportation (public transportation, bicycles, carpooling etc.);

- Planning and implementing more efficient transport systems;

The Government shall, along with local and regional self-government, improve transport planning in cities, including building the infrastructure for alternative means of transport, improving public transport, introducing efficient vehicles and alternative fuel in public transport (vehicle identification), mandating energy audit in public transport companies and obligatory cost-effective energy efficiency measures, implementation of parallel analysis of Croatian and European transport companies, introducing congestion fees in cities, etc.;

- Facilitate a more energy efficient and cleaner operating transportation fleet;

Various measures shall stimulate application of vehicles with emissions below 120 g CO₂/km, electric vehicles, hybrid vehicles - for legal and physical persons through investment subsidies and by providing free parking, right to use yellow lanes, etc. Furthermore, it is necessary to introduce measures for dissimulating the exceeding of emission limit values (ELV).

4.2.3 RESIDENTIAL SECTOR

Households are the largest individual energy consumers in Croatia, about 30% of total final energy consumption, and the largest users of electricity, over 40% of total final electricity consumption. Energy efficiency policy in the Residential sector shall be based on raising public awareness on possible savings and incentives to plan and build residential buildings in harmony with the principles of energy efficiency. This energy efficiency package includes:

- Adoption and implementation of all by-laws based on the Physical Planning and Building Act ("Official Gazette" No., 76/07);

These acts fully incorporate the provisions of the EU Directive 2002/91/EC on the energy performance of buildings. That will enable reduction of energy consumption rates by setting up minimal requirements for energy performance of buildings, and improve public awareness on energy efficiency by implementing obligatory building certification.

- Continuous implementation of awareness raising campaigns;

The campaigns shall provide raising the public awareness by establishing a network of information centres throughout Croatia. In those centres, citizens will be given free advice about the options for improvement of energy efficiency in their homes.

- Labelling energy characteristics of appliances and adopting minimal standards for appliances;

This measure shall stimulate the most energy-efficient appliances and solutions to enter the market.

- Individual energy metering;

Special measures shall stimulate implementation of individual energy metering particularly for heat supplied from DHS, using intelligent automatic meters combined with controllable devices.

- Financial incentives to physical persons for implementation of energy efficiency measures through the Environmental Protection and Energy Efficiency Fund.

The possibilities and means of financing the energy efficiency projects will be defined in the Strategy Implementation Programme.

4.2.4 COMMERCIAL/INSTITUTIONAL SECTOR

The Commercial/Institutional sector participates in the total final energy consumption with over 10%. Electricity is the dominant transformed energy form with the share of over 60%, followed by liquid fuels and natural gas. The use of electricity for heating in the coastal region shall be replaced with natural gas, liquefied natural gas and renewable energy sources, especially solar heating systems. Tourist facilities are particularly appropriate for this purpose, as their hot water demand coincides with the highest insolation period, but also the highest energy system loading due to the concurrent increased need for space cooling.

Energy intensity, electricity consumption intensity, and unit electricity consumption per employee in Commercial/Institutional sector are increasing constantly. This indicates inefficient energy use in this sector. The Government recognizes that the energy efficiency policy should be implemented first in the public sector. The activities shall be focused on measures with low implementation costs, such as encouraging changes in the employees' behaviour through educational and awareness raising campaigns.

The energy efficiency measures package shall include following measures:

- Creation and implementation of building regulations;

Gradually, the focus shall be on the standards of low-energy buildings, particularly in new or reconstructed buildings owned by national, regional and local governments, as well as in subsidized housing construction.

- Regular control of boilers and ventilation systems in buildings

This measure shall improve the maintenance of the respective systems and assure their better performance.

- Continuous awareness raising campaigns targeting at employees in public administration;

This measure shall raise the awareness at employees in public administration on importance of energy efficiency, as well as their positive acting in environment.

- Implementation of the program “Systematic Energy Management (SEM) in Cities and Counties”

The program “Systematic Energy Management (SEM) in Cities and Counties” has been implemented by the Government. Based on the signed Energy Charter, cities and counties shall try to reduce the energy consumption in their buildings applying the measures of conscientious behaviour, energy efficiency improvement, and monitoring and supervising the energy consumption. In such way, local communities will bring the citizens’ attention to the importance of energy efficiency.

- Implementation of the national “House in Order Programme”;

The Government, in good master’s manner, implements the “House in Order Programme” to reduce energy demand and improve energy efficiency in their buildings.

- Introduction of systematic energy management in commercial buildings in line with the program “SEM in Cities and Counties”;

Introduction of systematic energy management provides the possibility of permanent monitoring of achieved savings and energy efficiency growth.

- Introducing “green” public procurement;

The purpose of this measure is to incorporate energy efficiency and environmental protection criteria in public procurement procedures, and to adopt project evaluation based on cost analysis for the project lifetime instead of on the investment costs only. It will enable the transformation of the market and its orientation towards more efficient products and projects.

- Financial incentives for the implementation of energy efficiency measures through the Environmental Protection and Energy Efficiency Fund, and application of innovative ways of financing, such as the third-party financing or public-private partnership;

The possibilities of energy efficiency project financing will be defined by implementation acts.

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5 FINAL ENERGY CONSUMPTION

5.1 BUSINESS-AS-USUAL PROJECTION OF FINAL ENERGY CONSUMPTION

Final energy consumption represents the energy submitted to end users in industry, transport and general consumption. General consumption includes households, services, construction and agriculture.

The business-as-usual projection of final energy consumption assumes a development of consumption in line with market trends and consumers' habits, without government interventions, providing new, technologically more sophisticated products that reach the market.

TABLE 5-1 BUSINESS-AS-USUAL PROJECTION OF FINAL ENERGY CONSUMPTION

PJ	2006	2015	2020	Growth rate 2006-2020, %	2030
Industry	58.86	75.82	84.43	2.6	103.09
Transport	85.63	124.51	135.22	3.3	152.59
Other Sectors	123.40	162.42	189.95	3.1	245.16
Total	267.89	362.75	409.60	3.1	500.84

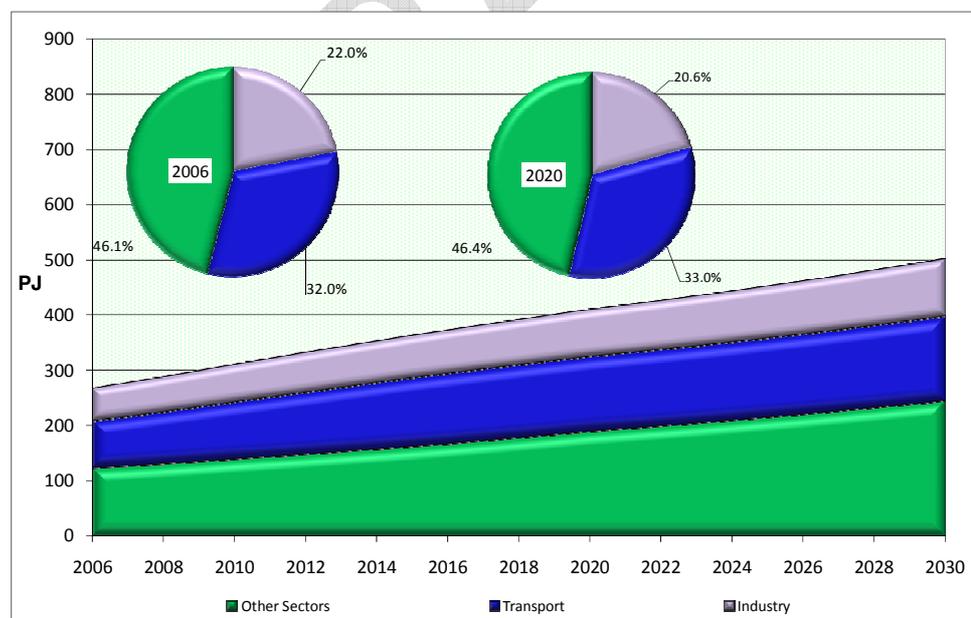


FIGURE 5-1 BUSINESS-AS-USUAL PROJECTION OF FINAL ENERGY CONSUMPTION

5.2 SUSTAINABLE DEVELOPMENT SCENARIO FOR FINAL ENERGY CONSUMPTION

Sustainable development scenario for final energy consumption is a scenario used to achieve goals of this Energy Strategy. It ensues from the energy policy measures proposed in this Strategy (implemented as government intervention unlike the business-as-usual scenario for final energy consumption). The sustainable development scenario is, therefore, a desired derivative of the business-as-usual projection of the final energy consumption, following the implementation of respective measures:

- increase in energy efficiency in final energy consumption
- increase in shares of renewable energy sources and other encouraged structural changes of the business-as-usual projection of used forms of energy
- use of distributed energy sources.

5.2.1 INCREASE IN ENERGY EFFICIENCY

The Government's goal is increasing the energy efficiency, which shall result in reducing final energy consumption by 19.77 PJ in 2016 and 22.76 PJ in 2020.

TABLE 5-2 COMPARISON OF FINAL ENERGY CONSUMPTION ACCORDING TO THE BUSINESS-AS-USUAL PROJECTION WITH THE FINAL ENERGY CONSUMPTION AFTER THE IMPLEMENTATION OF ENERGY EFFICIENCY MEASURES

PJ	2006	2015	2020	Growth rate 2006 - 2020	2030
Consumption according to Business as usual scenario	267.89	362.75	409.60	3.1 %	500.83
Consumption after implementation of energy efficiency measures	267.89	345.18	386.84	2.7 %	470.60
Reduction in final energy consumption	0.00	17.57	22.76	/	30.24

5.2.2 USE OF RENEWABLE ENERGY SOURCES AND ENCOURAGED CHANGE IN ENERGY MIX STRUCTURE IN RELATION TO BUSINESS-AS-USUAL PROJECTION

Equally important, besides energy efficiency measures, the sustainable scenario takes into consideration the increased use of renewable energy sources in final energy consumption, as a result of the Government's measures. This is particularly the case with the use of solar heating systems used for domestic hot

water and use of biomass for heating (pellets and briquettes). Solar thermal heating systems will replace electricity, liquid fuels, natural gas and liquefied petroleum gas (LPG) used for general consumption, especially for domestic hot water production. Use of pellets and briquettes in households will substitute for use of liquid fuels for heating in households and commercial/institutional buildings.

Natural gas is a competitive substitute for liquid fuels, and the Government will provide incentives for the replacement of liquid fuels by renewable energy sources. Liquid fuels will continue to be used in households. The liquefied petroleum gas, as well as fuel oil will be used for peak shaving of natural gas supply loads, providing in this way the balance in the natural gas supply system.

Additionally, the scenario includes an increase in biofuels consumption and other renewable energy sources in transport according to the EU policy (biomethane, electricity from the renewable energy sources). By 2020 the share of renewable energy sources in transport will be 10% share of the total consumption for the respective year.

- Croatia shall stimulate the use of compressed natural gas (CNG) in transport.

Due to positive impacts on reducing the emissions, Croatia shall stimulate the use of compressed natural gas (CNG) in transport. It is used on truck highways (so called “Blue Highways”) and city buses, as well as cars. It is important to note the use of compressed natural gas in transport provides the opportunity for the use of compressed biomethane which will be particularly supported, as it facilitates the obligation to use renewable energy sources in transport.

The policy of incentives should not make CNG push biofuels out of use because of the obligations regarding the use of renewable energy sources Croatia has as a future EU member.

- Croatia shall stimulate the use of biogas in the Agricultural sector

Croatia shall stimulate the use of biogas in the Agricultural sector as well. Along the existing incentives for electricity generation, this use will be stimulated in heat production, too.

5.2.3 DISTRIBUTED ENERGY RESOURCES USE

Distributed energy resources use takes place at the side of the end consumer; they are therefore balanced in the final consumption sustainable scenario, additionally changing the business-as-usual projection of final consumption. In

order to improve the efficiency of energy conversion and CO₂ emission reduction, the use of micro and small cogenerations and heat pumps will be stimulated.

Cogeneration units (CHP) are used for heating, cooling and electricity generation. They reduce electricity consumption in the sustainable scenario and increase the consumption of natural gas. It is estimated that 100 MW of micro and small cogeneration units would be installed by 2020.

Using the heat pumps, due to the enhanced energy conversion efficiency, i.e. use of renewable, interior energy of surrounding air, soil or water, the final energy consumption in the sustainable scenario will be reduced. It is estimated that by 2020 the natural gas consumption will be reduced by 130 million m³, electricity consumption will be increased by 0.2 TWh and renewable, interior energy of surrounding air, soil or water will be used in amount of 4.9 PJ.

5.2.4 SUSTAINABLE SCENARIO OF FINAL ENERGY CONSUMPTION AND GROSS FINAL ENERGY CONSUMPTION

Sustainable scenario of final energy consumption is given in Table 5-3 and Figure 5-4. The table also includes gross final energy consumption in sustainable scenario. Gross final energy consumption is a final consumption increased by own electricity and heat consumption in production sector, as well as by the electricity and heat losses in distribution and transmission.

TABLE 5-3 SUSTAINABLE SCENARIO OF FINAL ENERGY CONSUMPTION AND GROSS FINAL ENERGY CONSUMPTION

PJ	2006	2015	2020	Growth rate 2006 - 2020,%	2030
Industry	58.86	72.83	80.32	2.2	97.11
Transport	85.36	119.24	128.54	2.9	144.04
Other Sectors	123.40	153.94	180.32	2.7	232.93
Total final energy consumption	267.89	346.01	389.18	2.7	474.08
Gross final energy consumption	278.40	358.97	404.30	2.7	492.50

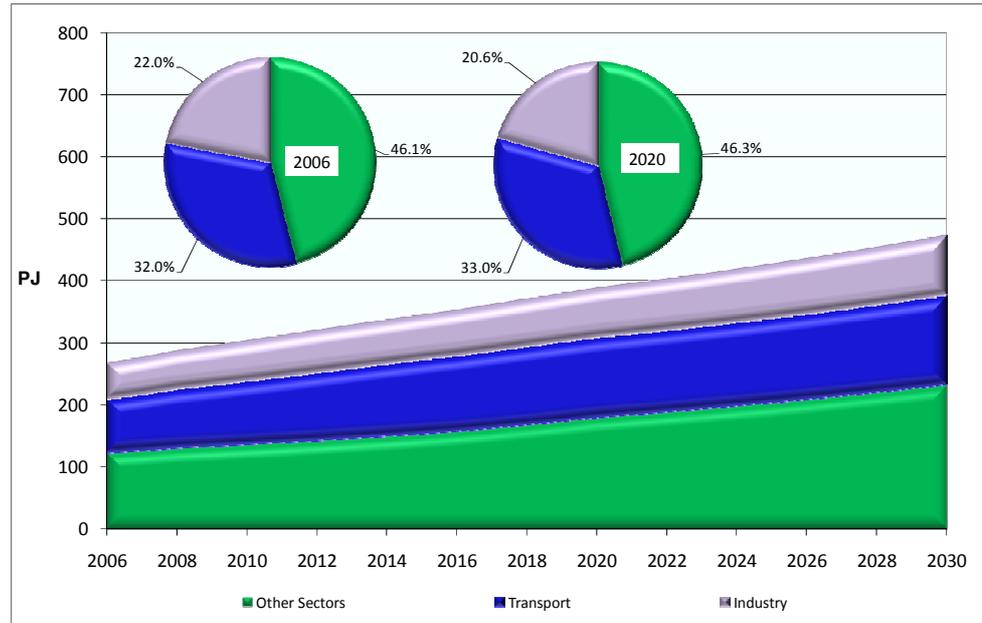


FIGURE 5-4 SUSTAINABLE SCENARIO OF FINAL ENERGY CONSUMPTION

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6 ENERGY SECTOR

6.1 FUTURE ELECTRICITY DEMAND

In the period from 2000 to 2006 the annual growth rate of final electricity consumption was 4.1%.

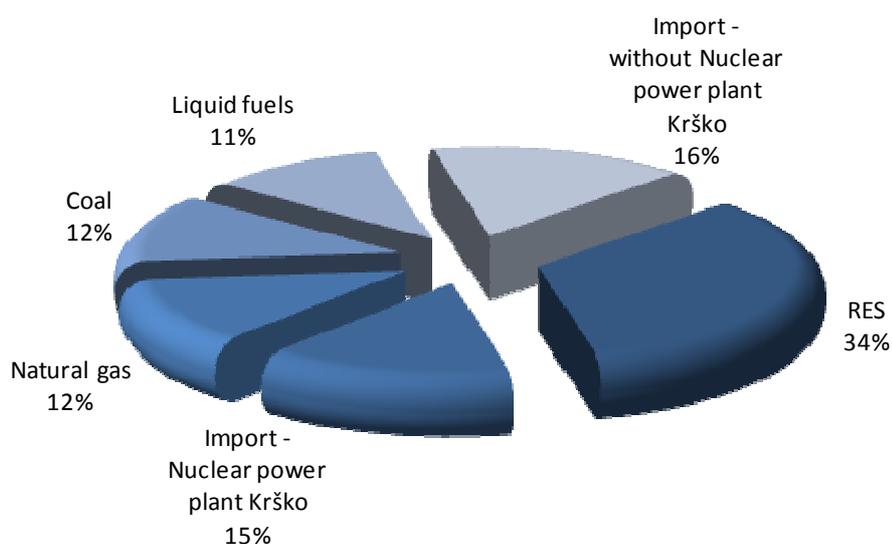


FIGURE 6-1 ELECTRICITY GENERATION STRUCTURE IN 2006 (%)

Despite of energy efficiency measures as well as replacing electricity as the energy source for heating with other energy sources, particularly natural gas and renewable energy sources, it is estimated that the average annual growth of final electricity consumption will be of about 3.7% by 2020. In such case, the average electricity consumption per capita in Croatia will reach current average electricity consumption in EU27.

TABLE 6-1 FINAL ELECTRICITY CONSUMPTION AND TOTAL ELECTRICITY CONSUMPTION IN SUSTAINABLE SCENARIO

Year	2006	2015	2020	Growth rate of energy consumption 2006-2020	2030
Final energy consumption according to business as usual projections [TWh]	15.0	22.0	27.0	4.3	36.9
Final energy consumption according to sustainable scenario [TWh]	15.0	21.0	25.0	3.7	33.0
Total electricity consumption according to sustainable scenario	17.3	23.7	28.0	3.5	36.8

It is estimated that the average annual growth of total electricity consumption will be of about 3.5% by 2020, i.e. total electricity consumption, without the Energy sector own use, will be 28 TWh by 2020. It is assumed that the peak load of the Croatian Energy sector could reach the amount of 4,600 MW by 2020.

6.2 DEVELOPMENT GUIDELINES

The fundamental objective of the Energy Strategy with regard to the Energy sector is security of energy supply at competitive prices determined on the open market. In order to achieve the objective, Croatia defines following development guidelines for the Energy sector:

- Establishing a favourable legislative – regulatory framework for efficient functioning of an open electricity market and attracting investments;
- Electricity generation as an economic sector that contributes to the national GDP and increase of employment;
- Implementation of economically cost-effective measures for effective use of electricity and consumption management;
- Constructing various, regionally competitive power plants to satisfy growing domestic electricity demand and replacing existing deteriorated;
- Use of renewable energy sources in the electricity generation and encourage distributed production;
- Developing transmission network that will provide secure electricity supply of the whole Croatia, as well as its successful integration on common electricity market of the European Union and Energy Community;
- Revitalization, modernization and development of the distribution network.

6.3 STRATEGY OF CONSTRUCTING NEW ELECTRICITY-GENERATING CAPACITIES

Development according to above mentioned guidelines shall provide construction of elastic energy system, which will be, in uncertain and changeable conditions, competitive along with high level of security of electricity supply. The Strategy is based on the principle that the independent, regulated, competitive

electricity market is the most effective and costly the most affordable way to achieve that objective. However, the market is not sufficient in solving the issues of the supply security, so the Government shall track the market functioning, as well as the trends, in order to timely decide whether corrective measures are needed considering the investors' encouragement for constructing the power plants necessary to satisfy security of Croatian customers' supply.

Perceiving the future is always connected with uncertainties. In Energy sector the most influential uncertainties are the movements of oil and other energy sources' prices, as well as price of emission units. The issues on successful fulfilling of energy efficiency goals set up by the Strategy, the issue on economic growth and development, and issue on energy consumption increasing are quite significant as well. Awareness on uncertainty and poverty of the Croatian energy sources refers to a fact that, in order to build the elastic energy system, diversity of applied technologies and energy sources for energy conversion is required. Although due to insufficient generation capacities, Croatia is obliged to import the electricity, a diversity of its energy system is satisfying: hydropower plants contributes with 35% in satisfying the total electricity consumption, while the electricity-generating structure out of coal, natural gas and heavy fuel oil and uranium is balanced. Current significant electricity import in a period of poverty indicates on reduced security of supply and a need for quick building of own sources.

The Government shall make assumptions to persist on diversity of applied technologies and energy sources for energy conversion in future development of power plants structure in the Croatian energy system.

6.3.1 LARGE HYDROPOWER PLANTS

Croatia has significantly used the economically justified potentials of its water capacities for electricity conversion. Nowadays, not only in Croatia, usage of additional water capacities is connected with a number of obstacles and disputes. Construction of hydropower plants demands large investments, while the period of return on investment is extremely long. Therefore, the Government shall pay special attention to environmental protection, to assistance at the licensing and removing the administrative obstacles, in order to encourage the investors.

- **New electricity-generating capacities in large hydropower plants in 2020 will amount to 300 MW.**

It is estimated that new installed capacities in hydropower plants in 2020 will amount to 300 MW, and they will start-up in 2015. This amount accounts

hydropower plant Lešće as well, although small hydropower plants are not included because they are balanced with renewable energy sources. For new hydropower plants the utilization factor of 0.3 is assumed, which is lower than the average factor in existing hydropower plants, for a greater utilization of hydropower plants is planned to cover peak loads. In addition to the construction of new hydropower plants, increased capacities will be enabled with the rehabilitation of existing plants.

Within the assumed energy structure and geographical position the continuation in building the pumped storage hydropower plants is expected. In such case, a competitive ability of energy system on electricity market will be significantly increased.

6.3.2 RENEWABLE ENERGY SOURCES

Due to environmental sustainability of the power sector development and aim to use indigenous energy sources in electricity generation and encouraging indigenous industry and services,

- The Republic of Croatia has set the goal that in the period until year 2020 the share in electricity generation from large hydro power plants and renewable energy sources in total electricity consumption is maintained at the present level of 35%.

The increase of electricity generation from large power plants will be much lower than the increase in total electricity consumption, therefore, the set goal of maintaining the 35% share in large hydro power plants production and renewable energy sources demands extremely high increase rate of electricity generation by 2020 from renewable energy sources (wind farms, biomass power plants, small hydro power plants, solar power plants, waste to energy power plants, geothermal power plants).

With this goal, according to the Strategy Implementation Programme the dynamics of the incentive construction of the renewable energy sources in four-year period depending on the expected average electricity generation in large hydro power plants will be defined. The structure of the incentive construction of the renewable energy sources will be defined in more details in the Strategy Implementation Programme. The Government of the Republic of Croatia will define the structure depending on available financial funds for incentives in the system of the warranted redemption electricity prices, estimated financial contribution of the individual renewable energy source in domestic industry and services employment and depending on mutual price competitiveness of the renewable energy sources.

Including renewable energy sources and their intermittent work respectively unpredictable production is setting special task when planning the security and reliability of the power system with respect to necessary reserves in power in conventional power plants. Therefore, the renewable energy sources on the figure 6-2 are shown with 25% power. The importance of this problem is fewer if the regional electricity market is more developed.

6.3.3 THERMAL POWER PLANTS

Thermal power plants and nuclear power plants are the basic generation units for the electricity generation. Their main characteristics are: large unit capacities, high availability, possibility to operate in accordance with the consumption needs, and stability of technical parameters considering energy network demands. In a period of 2013-2020 thermal power plants of total capacity of 1,100 MW will be shut down in Croatia due to their deterioration.

Increasing of electricity consumption, shutting down the thermal power plants with no longer valid life time and a need to ensure reserve capacity in the system require for building the thermal power plants of total capacity not less than 2,400 MW in a period of 2009-2020, along with the share of 35% renewable energy sources.

- Thermal power plants of total capacity of at least 2,400 MW should be built in a period until 2020.

Due to desirable level of security of energy supply the Government shall take care of achieving at least the minimum of dynamics in building the power plants. Due to the competitiveness among the power plants in a single regional market, the Government shall presume to provide investors with the ability to choose between all available options of electricity generation, which could satisfy the conditions of environmental protection and population health. The goal is that investment decisions should be borne by the investors.

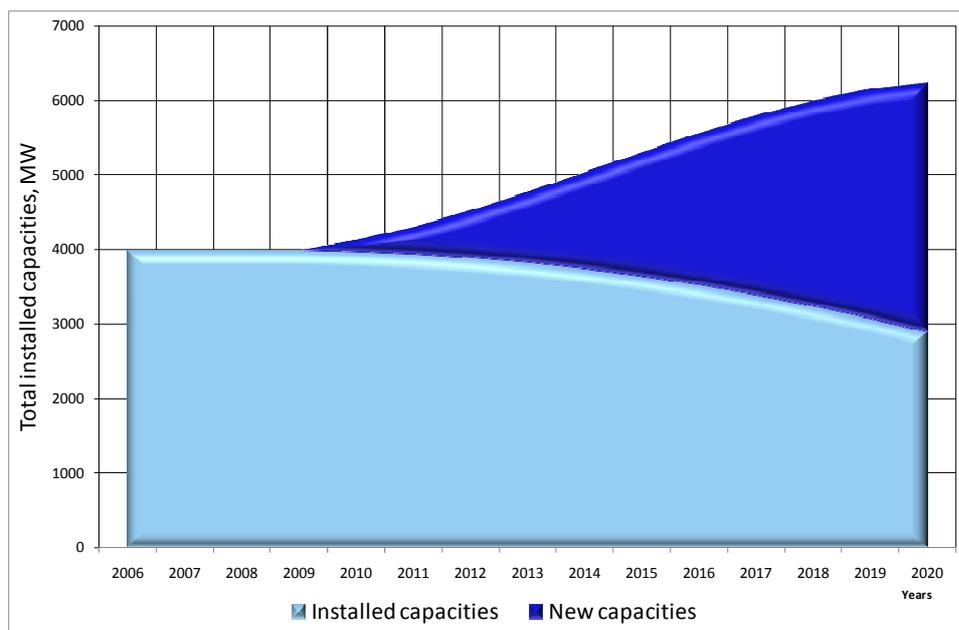


FIGURE 6-2 INSTALLED CAPACITY AND STARTING UP NEW HYDROPOWER PLANTS

6.3.3.1 ELECTRICITY AND HEAT COGENERATION

Development of natural gas supply and technological development of gas turbines and gas engines will vitally reduce specific investments to raise energy efficiency of heating cogeneration units for heat and electricity generation. Due to the higher degree of efficiency of these solutions compared to separate production of heat in steam generators, rarer in warm water and oil fired boiler, and electricity from condensation plants it is worth motivating the construction of these solutions. Achieved energy savings due to their construction will lower energy dependence, contribute to relieving climate change, adds dynamics to private investment into the Energy sector, and raises electricity supply security and, most often, reduces losses in electricity transmission and distribution.

Adopted national regulations define these solutions, the conditions relating to their construction and incentives. Croatian Industrial sector has good conditions to apply these solutions due to the heat demand. True incentives to build cogeneration units will be to develop the electricity market as this will direct market competitors to compare prices of electricity generated in cogeneration units in comparison to electricity generation in thermal power plants, particularly with high prices of natural gas and emission units of CO₂.

- Back-pressure cogeneration units of total capacity of at least 300 MW shall be built by 2020.

The Government shall constantly monitor and, if necessary, harmonize the incentives' system for cogeneration units, especially those defined as highly-effective, perceiving it in a context of national goals of a country dependent on

imports along with obligations to reduce the CO₂ emissions. The goal is to create an investment climate for building the back-pressure cogeneration units of total capacity of at least 300 MW by 2020 based on the incentive policy and development of competitive electricity market. The majority of this capacity is related to the industrial cogeneration units, while the minority to cogeneration units in district heating systems.

6.3.3.2 NATURAL GAS-FIRED POWER PLANTS

Due to the security of the Croatian customers' supply, the Government shall create general investment climate for investors to take over the minimum risk of building the natural gas-fired power plant of total capacity of 1,200 MW by 2020. At least 800 MW in natural gas-fired power plants should be built by 2013. This capacity includes the back-pressure capacity of cogeneration units and capacity of thermal power plants already in construction.

- Natural gas-fired power plants of total capacity of at least 1,200 MW should be built by 2020.

Considering the less environmental impact, public acceptance and simple procedure of locating and licensing, as well as the openness of the regional electricity market, Croatia shall enable the investors to build the natural gas-fired power plants of even larger capacity, than there is a need to. Such construction contributes to economical growth and to security of energy supply, and increases the competitiveness of the natural gas transport system and transmission energy system. It is important that power plants satisfy conditions regulated for the construction of the power facility, especially conditions determined by the operator of transmission energy system and operator of the natural gas transport system.

6.3.3.3 IMPORTED COAL-FIRED POWER PLANTS

The Government shall continuously make assumptions that will enable the investors to prepare and start up the coal-fired power plants of total capacity of 1,200 MW by 2020. Investors shall be encouraged to start up the first unit, out of two expected units, by 2015.

- Coal-fired power plants of total capacity of at least 1 200 MW are expected to be built by 2020.

Construction of modern coal-fired power plants is connected with the public resistance and a fact that the licensing procedures are complicated and long-lasting, despite of acceptable local and regional environmental impact. Since the investors are less favourable of risk and long-term investments, Croatia shall

create a suitable legislative, institutional and administrative support for investors. One of the priority tasks of the Government is to initiate the research of locations for building the coal-fired power plants and insertion of chosen locations into the Physical Planning Programme of the Republic of Croatia and appropriate county's plans in order to timely prepare the locations for building the coal-fired power plants of the required capacities. Furthermore, the public has the right to be informed about the situation of energy in the country and the environmental impact of certain technologies. During the process of implementation of this Strategy, the Government shall give special attention public right to information.

The main advantage of coal is security of supply, resulting from the large equally distributed world coal reserves. Croatia is a maritime country with good locations for building the coal-fired power plants. Coal sources of good quality along with the competitive price are available by the sea, thanks to which the electricity generated in these plants could be regionally competitive. It is especially related to the position of the coal-fired power plant in a basic part of the load diagram.

The main problem relating to environmental impact of the coal-fired power plants is the emission of carbon dioxide. The increased efficiency is at the moment the only way to achieve CO₂ emission reduction. Thanks to technological development, modern coal-fired power plants are achieving high operating levels. It is estimated that technology to capture carbon dioxide from flue gasses and storage into underground storage tanks will be available commercially in about ten years time and so the construction of new coal-fired power plants should foresee sufficient storage capacities for CO₂ storage. Till then, the European trading scheme, through its mechanisms ensures that emissions of CO₂ are restrained following the set objectives. In that way a balance is made between energy supply security, competitiveness of the energy system and anthropogenic influences on green house gasses in the atmosphere.

6.3.4 NUCLEAR PROGRAM

Regardless of the experience in building the nuclear power plant Krško, and a fact that Croatia is in a group of countries using nuclear power in energy purposes, before making the decisions on building the nuclear power plant, it is necessary to perform preparation activities in accordance with the International Atomic Energy Agency (IAEA).

Preparation activities, construction and nuclear power plant operation are divided into three stages. The first stage is the Government's task and includes creating the national infrastructure necessary for making decision on building

the nuclear power plant. The aspects of preparation activities are as follows: national position, nuclear security, nuclear program management, program financing, legal framework, proliferation issue, regulatory framework, environmental protection, radiation protection, locations and infrastructure, transmission energy network, human resources development, public communication, crisis planning, safety and physical protection, nuclear fuel cycle, radioactive waste, involvement of local industry, operations and services, equipment and services purchase policy. Croatia has already developed some of these aspects. Time period within which the first stage activities could be performed is estimated to 3-4 years.

Upon completion of preparation activities it would be possible to initiate making decision on building the nuclear power plant. Decision on building the nuclear power plant shall be made by the Croatian Parliament.

- Croatia initiates the Croatian nuclear program;

Reports from the Strategy Green Book notify that the Government cannot take over the responsibility for excluding the nuclear option from the future energy structure, as well as the responsibility for delaying the preparation activities necessary to make decision on building the nuclear power plant. Lost time could not be possible to compensate, and the right strategy does not limit the future development possibilities.

All relevant researches show that the excluding the nuclear power from the future energy structure is quite risky. The Strategy Green Book indicates that energy system development scenarios with nuclear power plants and coal-fired power plants provide the regional competitiveness in electricity generation, contribute to the security of energy supply, and that the nuclear power is the only one, along with the renewable energy sources, which contributes to reducing the CO₂ emissions in the atmosphere.

Lower electricity price from nuclear power plants shall enable the construction of renewable energy sources power plants, as it is assumed by the Strategy. If the construction of the coal-fired power plant and/or nuclear power plant fails, the electricity price will be too high for end users, so it will be questionable, and probably economically and socially unacceptable, to surcharge the compensation for renewable sources incentives, without which the required investments into these technologies would surely fail.

Preparation activities and construction of the nuclear power plant are related with a number of obstacles. Those programs should be initiated without delay for the security of electricity supply could be endangered or the import dependence could be even higher. If the electricity consumption growth in Croatia is lower than the one estimated by the Strategy, construction of these

plants could not be premature, since it is referred to private, regionally competitive investments, which would not have problems with the electricity export.

Regarding the decision on initiating the nuclear program, i.e. preparation activities, upon which a decision on building the nuclear power plant could be made, the Strategy, in accordance with the latest European recommendations, introduces an equal evaluation of all available options. Public debate has supported the nuclear option, but it showed that there was certain concern on issues regarding the nuclear security and environmental impact. During the preparation activities and making decision on building the nuclear power plant, the public shall be included as well in order to obtain the clear and acceptable solutions for all the issues causing the concern.

- Decision making on building the nuclear power plant is expected by 2012 at the latest.

Preparation activities of the nuclear program are demanding and comprehensive tasks and its success depends largely on the role of the Government. Introduction, as well as the management of the nuclear program, regardless whether national or international projects such as NPP Krško are in question, is confronted with the constant affirmation of the work quality in security, protection and infrastructure efficiency, and performing all regulated international obligations. Within the Strategy Implementation Programme, the Government shall develop the program of preparation activities in order to initiate decision on building the nuclear power plant by the end of 2012.

6.4 TRANSMISSION LINES AND DISTRIBUTION NETWORK DEVELOPMENT

6.4.1 DEVELOPMENT GUIDELINES FOR TRANSMISSION NETWORKS

Transmission of electricity in Croatia is regulated electricity activity combined with power system management. The operator of the transmission system is responsible for management, development planning and maintenance of the transmission network as well as being obliged to secure long-term operability of the transmission network in order to satisfy a variety of requirements of users of electricity transmission networks.

The Croatian electricity network is part of the European continental system. Opening the electricity market in Europe had caused an increase of trade electricity transactions and significant electricity transit for which the majority of the European transmission network (as well as Croatian) is not adequately built.

Therefore, the congestion in electricity transmission can be caused due to which defined trade methods in managing the congestion shall be performed.

Funds collected by the transmission systems operators from the transit compensation are insufficient to finance the construction of new facilities (especially transmission lines). Optimal solutions of further development of common electricity market, as well as transmission infrastructure, are being searched for on the European level in formalizing the cooperation between the transmission systems operators through the European network of transmission systems operators for the electricity (ENTSO-E), which arises from the modification of the European Union regulative. Along with the existing technical coordination of facilities within the single synchronous areas, coordination of planning the transmission network development has been introduced as well, not only between the neighbouring countries, but on the European level as well.

As a link between the Middle and Southeast European networks, as well as a part of so called the ring around the Mediterranean, Croatian transmission network is quite well connected with neighbouring countries' networks (except for Montenegro and Italy) with a large number of interconnection lines on transmission voltage levels (400, 220 i 110 kV).

Croatian transmission network corresponds with specific shape of the Croatian national territory, and provides secure supply of all its parts. Its further development will be based on:

- Continuous increasing of the facilities' security and maintaining the high availability;
- Providing the connections of new power plants and consumers;
- Harmonized improving of the internal parts of the Croatian transmission network (by removing so called bottlenecks) and increasing the transmission capacity of interconnections with neighbours, where it is technically and/or economically justified;
- Monitoring and applying the modern technological and/or organizational solutions for transmission and management, as well as protecting the transmission network facilities as the infrastructure critical for the society functioning.

The Croatian 400 kV network is of regional and the European significance, and some corridors, north-south and east-west, are included in Trans-European Networks (TEN), which development is of general European interest.

At transmission networks of 110 kV and 220 kV following activities shall be performed:

- Continue with the revitalization of facilities and equipment, and construction of the replacing lines and transformer stations;
- Improve connections between the Croatian regions and networks due to secure electricity supply;
- Track the growth and locations of electricity consumption by securing the electricity supply for large demand areas and other consumers;
- Provide connections of new power plants, especially RES, to 110 kV network;
- Ensure consistent application of defined criteria „n-1“ in security of the electricity placement from the power plants, as well as other criteria increasing the security of critical infrastructure;
- Upgrade the 220 kV network during the revitalization of the power plants and/or increasing of nominal capacity.

In order to achieve the conditions for safe connection and operation of the renewable electricity sources, it is required to foresee the additional systems for predicting the production out of the renewable sources, as well as to improve systems for planning the system's operation and its management due to the increasing and more effective usage of regulation capability of the energy system as a whole.

Transmission network development should be harmonized with other infrastructural systems through physical planning documents of all levels, particularly new Physical Planning Program of the Republic of Croatia. To be able to secure sufficient flexibility in developing Croatian transmission networks in conditions of an open European and regional electricity market to satisfy requirements by users it is necessary for physical planning documents to contain corridors and location sites for transmission facilities according to their use for the demand of the current or another voltage level which ensures rational utilization of space and reduces the environmental impact.

6.4.2 DEVELOPMENT GUIDELINES FOR DISTRIBUTION NETWORKS

Operator of the distribution system is responsible for management, development planning, construction and maintenance of distribution networks from metering sites and connection nodes in transmission networks to each

metering location for each user in the distribution network. It is the operator's duty to secure undisturbed access to the distribution network for all users and to ensure access to information that is necessary for them to use the network efficiently. Users of the distribution network can be either buyers (consumers) of electricity, producers of electricity and at the same time buyers and producers of electricity. Production of electricity in the distribution network is distributed production and most often represents a privileged category of producers due to their use of cogeneration plants and renewable energy sources.

Changes that must be made to the distribution network are as follows:

- Renew some parts of the distribution network in order to increase the quality of supply
- Functional changes of voltage levels in the distribution network;
- Structural changes in the network to increase acceptance of distributed production;
- Technological development and adapting to European technological platforms relating to distribution networks (e.g. Smart Grids).

The development of distribution networks therefore needs to be directed towards:

- Gradual transition to two-level transformation;
- Installation of metering apparatus with the possibility of two-way communication at metering locations of users of distribution networks;
- Construction of simple distribution facilities and apparatus at all voltage levels of the distribution network where this can be justified;
- Construction of typical distribution facilities (especially transformer stations);
- Automation of plants and networks and significant application of information-communication technology.

Increased usage of renewable sources presumes the distributed energy sources as well, connected to the distribution network. It is required to provide the acceptance of distributed sources and to create technical conditions for the operation of active distribution networks.

DRAFT

7 DISTRICT HEATING SYSTEMS AND DISTRIBUTED ENERGY GENERATION

7.1 DISTRICT HEATING SYSTEMS (DHS)

7.1.1 FUTURE HEAT DEMAND IN DISTRICT HEATING SYSTEMS

The total installed heating power of production units in the District Heating System (DHS) in Croatia amounts to around 1,800 MW. Around 10% of total number of households in Croatia is connected to the DHS, while the total number of users is around 154,000. A large share of production capacities and heat distribution networks is outdated technology and so there is a significant possibility to increase its energy efficiency.

Due to the current practice of unplanned, *ad hoc* approach to energy development in Croatian cities and poor management of most small DHS's, their development has been ceased, and therefore, the security of energy system's supply has been reduced and a great number of opportunities to improve its competitiveness and sustainability has been missed.

- Energy development of the Croatian settlements shall be systematic planned in order to ensure harmonious, complimentary development systems of the natural gas supply and the district heating systems

A growth rate of connections of surface consumers in the district heating systems of 2.1% per annum is assumed as a result of systematic planning of energy development in Croatian cities and settlements and the application of state-of-the-art technological solutions and methods to manage the district heating systems. The advantages of complimentary development systems of supply of natural gas and district heating supply enable: a reduction in the total costs of heating and domestic hot water production, the use of biomass, municipal solid waste, geothermal energy and other replaceable energy forms and the application of heat and electricity cogeneration.

A growth in heat consumption from existing district heating systems is not expected in industry in comparison to the current level due to restructuring and displacement of industry to areas with lower costs. It is however, expected that industrial consumers in new industrial zones, led by private initiatives and

mutual benefit from supply from a unified system of heat, will establish new district heating systems.

7.1.2 DEVELOPMENT GUIDELINES FOR DISTRICT HEATING SYSTEMS

Development guidelines for district heating systems, including systems for production and distribution of water steam and hot water, used in industry, as well as systems for production and distribution of cooling energy, are based on the comprehension of the district heating system's state and possibilities for improvement. Croatia recognizes following development guidelines for district heating systems:

- Improving the legislative framework for the efficient functioning of the heating sector;
- Introducing the planned energy supply to settlements from the position of the lowest cost;
- Technological modernizing the DHS and incentives for development and application of domestic equipment and services;
- Utilization of renewable energy sources to produce heat and incentives for distributed production;
- Incentives for efficient use of heat;
- Application of up to date information technologies to maintain and manage assets.

7.1.3 GOALS AND ACTIONS FOR DISTRICT HEATING SYSTEMS

According to the Act on Heat Production, Distribution and Supply ("Official Gazette" No. 42/05), the Government and county administrative bodies that is, the Zagreb Central Administrative Body responsible for energy, participates in preparing documents for physical planning that are adopted by representative bodies in local and regional self-government units. In order to facilitate planning and decision making in local self-government units, particularly those responsible for the Energy sector and district heating systems, the Ministry of the Economy, Labour and Entrepreneurship has started the preparation of the "Methodology, Planning, Implementation and Management of District Heating Systems in the Republic of Croatia". Preparation of the Methodology is in accordance with the Government of the Republic of Croatia decision to initiate activities to prepare strategy for the Heat Sector in the Republic of Croatia.

The main objective of the Methodology is to define technical, economic and legal framework to increase energy efficiency and optimizing development of district heating systems in urban centres. Special emphasis is given to systems in smaller towns and the production of heat from renewable energy sources.

The realization of the Project is planned for the period of 2007–2009. Its application will improve management and technological features of district heating systems to modern level of an efficient energy management system in accordance with the demand of individual consumers. These are the guidelines followed by the Project:

- The energy efficiency of existing district heating systems will be improved with an advanced management system;
- Compulsory energy planning will be advanced and coherently implemented at the local self-government level;
- Heat demand and heat required for hot water production in multi-residential facilities larger than 1000 m², shall be produced from house furnaces or from district heating systems;
- In district heating systems, incentives will be made for the use of renewable energy sources, as well as a diversification of energy sources used;
- In natural gas fired district heating systems, the use of replacement fuel will be ensured during periods of supply interruption or peak consumption in the natural gas supply system;
- District heating systems with the heat and electricity cogeneration will be stimulated, if this proves to be economically viable regarding the external costs.

With reference to this Strategy, it is not vital to plan, but only to stimulate the development of production capacities of the heating network in district heating systems as this is a free investment decision to be made by the concessionaire and local self-government based on previously adopted objectives and determinants.

7.2 DISTRIBUTED HEAT AND ELECTRICITY GENERATION

Distributed energy resources include systems to produce and store energy located in the vicinity of the end users. The definition encompasses renewable

energy sources, electricity generation and/or heat production and heat pumps. If we exclude renewable sources, the majority of technological solutions for distributed energy resources use natural gas (or liquefied petroleum gas) but also electricity in heat pumps. Distributed energy resources are usually featured with less power; they can operate on islands but are most often connected to electricity distribution networks and less frequently to heating networks.

This Strategy gives guidelines in development of distributed energy resources so that their role in energy supply will be of a complimentary nature to large energy systems. The construction of distributed energy resources will be stimulated, when this is viable from a sustainable development position. Their application is useful in energy intensive commercial buildings in the Commercial/Institutional sector, larger residential buildings, but may also apply to smaller residential buildings. This directive is positioned from the fact that the power system and natural gas supply system is the fundamental national energy system that offers energy supply security and price competitiveness due to their economic size. The position of these systems facilitate a series of solutions for energy conversion that in themselves would not be able to offer a quality energy supply however, supported by these large systems, they can contribute to abate the problem of CO₂ emissions, lowering the country's energy dependence, as well as supply security due to the greater diversity of energy sources to the system.

- Croatia shall stimulate construction of distributed energy resources as the complimentary systems to large energy systems.

Massive application and technological development of these systems can, in a period of high energy prices and increased allowances for CO₂ emissions, be a competitive energy supply from conventional energy systems due to their economic features. As investments into these technologies are mostly of a private nature, their application stimulates a favourable climate of entrepreneurship and facilitates development of energy services. Cogeneration units will be used for heating, cooling and electricity generation.

- Croatia shall stimulate the application of heat pumps due to their high efficiency and less environmental impact.

Heat pumps are used in low-temperature heating and as such are not applicable to the existing heating system. With higher energy prices they are becoming competitive and with good incentives the application for heating and cooling is expected.

8 OIL, NATURAL GAS, COAL

8.1 FUTURE OIL, NATURAL GAS AND COAL DEMAND

8.1.1 OIL

Liquid fuels (oil products) are the main energy source in the Republic of Croatia and this will remain so in the period encompassed by this Strategy. Along with the existing oil consumption of around 1 t per capita, Croatia is close to the developed European economies in total energy consumption.

- It is estimated that the average growth of the liquid fuels consumption in the final energy consumption will amount of 0.9% per annum, and that the consumption in 2020 will amount around 4.3 millions tons.

Despite all measures of energy efficiency and the replacement of liquid fuel an increase in the consumption of liquid fuel is foreseen in final consumption from 0.9% per annum until 2020, from 3.1 millions tons in 2006 to 3.5 millions tons in 2020. It is assumed that total consumption of liquid fuels in 2020 will be around 4.3 millions tons.

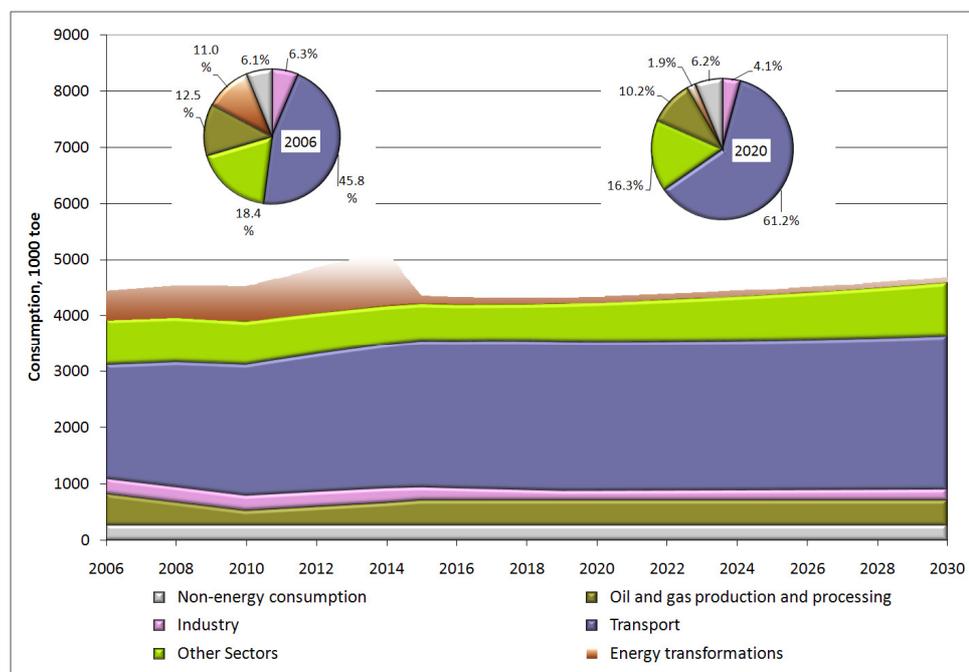


FIGURE 8-1 PROJECTION OF CONSUMPTION OF LIQUID FUELS IN CROATIA BY 2020

TABLE 8-1 PROJECTION OF CONSUMPTION OF LIQUID FUELS IN CROATIA BY 2020

Consumption of oil derivatives	2006	2014	2020	2006	2020	2006-2020	2030
	1000 t oe	1000 t oe	1000 t oe	%	%	%	1000 t oe
Final consumption	3110	3500	3500	70,4	81,6	0,8	3830
Industry	280	270	180	8,9	5,1	-3,1	200
Trasport	2020	2550	2650	65,0	75,8	1,9	2730
Other sectors	810	680	670	26,1	19,1	-1,4	900
Oil and gas production and processing	550	400	440	12,5	10,3	-1,6	440
Energy transformations	490	890	80	11,0	1,9	-11,9	50
Non-energy consumption	270	270	270	6,1	6,3	0,0	270
Total	4420	5060	4330	100	100	-0,2	4590
Total, PJ	190	210	180	100	100	-0,2	190

8.1.2 NATURAL GAS

The share of natural gas in total energy consumption in Croatia is around 25% and around 16% in final consumption. Consumption over the past twenty years is marked with a constant growth. Due to the orientation of Croatia that natural gas supply should be a basis of energy development, final energy consumption foresees a growth in natural gas consumption in final consumption with a rate of 4.2% by 2020. It is assumed that in Other Sectors the consumption will be developed as it is shown in table 8-2 and in figure 8-2.

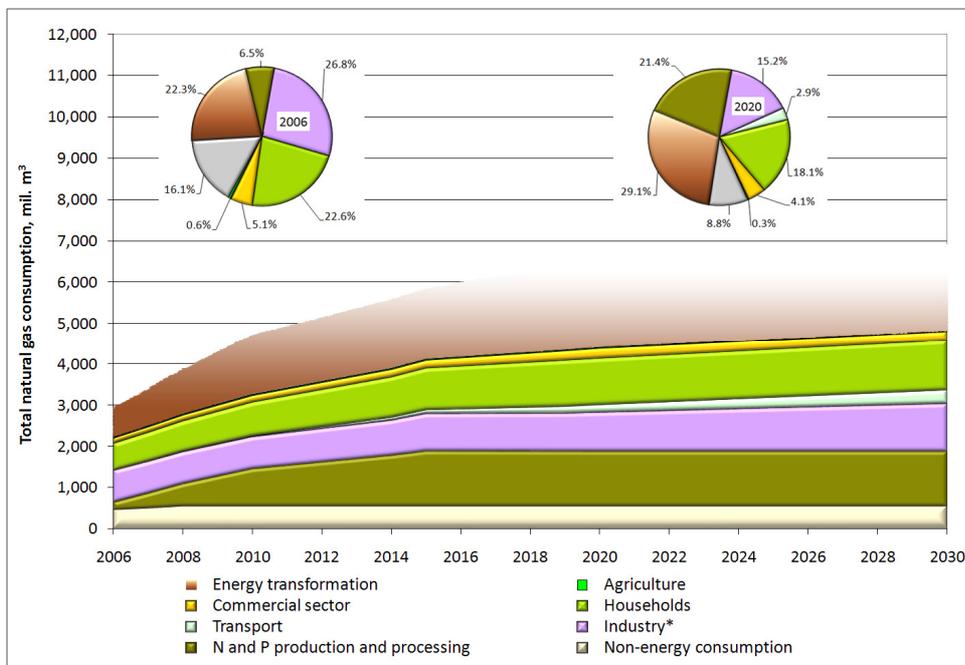


FIGURE 8-2 PROJECTION OF THE NATURAL GAS CONSUMPTION IN CROATIA BY 2020

TABLE 8-2 PROJECTION OF THE NATURAL GAS CONSUMPTION IN CROATIA BY 2020

Gas production	2006	2015	2020	2006	2020	2006-2020	2030
	mil. m ³	mil. m ³	mil. m ³	%	%	%	mil. m ³
Final production	1.590	2.230	2.520	55	47	3	2.920
Industry*	770	910	950	49	38	1	1.160
Transport	0	90	180	0	7	28	330
Other sectors	820	1.240	1.390	51	55	4	1.440
Non-energy consumption	460	1.010	1.000	16	19	6	1.000
Oil and gas production and processing*	190	880	870	6	16	12	870
Energy transformations	640	1.600	1000 - 1800	22	19 (29)	3 (8)	1.200
Ukupno	2.880	5.720	5410-6210	100	100	5 (6)	5.990
* final energy consumption, own electricity and heat & hot water preparation							
** Total natural gas losses included							

Natural gas consumption in Energy sector shall depend on the structure and level of the electricity generation on the Croatian territory. In the following ten years the European and regional natural gas and electricity market will develop into a single energy market where power plants will mutually compete according to their competitive abilities and therefore consumption of natural gas in the Energy sector will depend on the structure of production capacities in the region. Considering the openness of Croatia towards possible investors' intentions to build gas-fired power plants on its territory, which will serve to supply the regional market, it can be seen that it is not possible to project future natural gas consumption in Energy sector. It is possible to determine that the Plinacro's transport system will provide the construction of gas-fired power plants, which natural gas consumption for the electricity generation will significantly exceed 2 billions m³ per annum, but at the same time, provide favourable possibilities of natural gas transit.

8.1.3 COAL

Croatia does not have any domestic coal reserves that it can utilize commercially. However, favourable import of the coal of good quality has been provided by the maritime transport. Imported coal is used today in cement industry and the Plomin thermal power plant, but is insignificant in Residential sector, Commercial/Institutional sector and other industry. What is significant is that the complete domestic cement industry over the past few years has moved from using residual oil and natural gas to coal and therefore securing market competitiveness.

- It is assumed that in 2020 around 375 thousand tons of the equivalent coal shall be used in industry, while around 3 million tons in electricity generation;

- The advantage of the Republic of Croatia is the possibility of favourable import of the coal of good quality by the maritime transport;
- The main advantage of coal is security of supply, competitiveness and relative price stability;

The main advantage of coal is security of supply, due to the enormous coal reserves worldwide, distributed in politically stable countries, with greater availability in comparison to oil and gas reserves.

The second advantage of coal is its relative price stability in comparison with other fossil energy forms. Even though the price of coal reacts to changes in oil prices, this reaction is restrained.

Regarding the environmental impact of thermal power plants, modern coal-fired power plants have small air emissions of other pollutants into the atmosphere - SO₂, NO_x and particulate matter. In public, however, remains the resistance to the coal as a result of inherited perception, although the environmental impact issues have already been solved.

The only problem relating to environmental impact of the coal power plants is the emission of carbon dioxide. Although it is not pollutant and poison, but essential for plants, it is the main cause of increasing the concentration of greenhouses gases into the atmosphere. Carbon dioxide is emitted at the combustion of every fossil energy form; therefore, the natural gas emits 59% of carbon dioxide per energy unit in comparison with the coal emission.

Considering the CO₂ emission the increased efficiency of energy transformation is at the moment the only way to achieve CO₂ emission reduction. Environmental protection requirements have always dominantly affected the development of coal-fired power plants and even now technology that will reduce or completely eliminate carbon dioxide emissions is being intensively developed.

With regard to completely eliminating carbon dioxide emissions it is estimated that technology to capture carbon dioxide from flue gasses and storage into underground storage tanks, exhausted oil and gas basins, will be available commercially in about ten years time and so the construction of new coal-fired power plants should foresee sufficient storage capacities for CO₂ storage. Through its mechanisms the European trading scheme ensures that emission of CO₂ are abated following the set objectives and therefore, when investment decisions about construction are being considered generally the price of fuel should include the expected price of emission units. In that way a balance is made between the security of energy supply,

competitiveness of the energy system and anthropogenic influences on green house gasses in the atmosphere.

8.2 DEVELOPMENT GUIDELINES FOR OIL AND NATURAL GAS SECTOR

Croatia recognizes following development guidelines for oil and natural gas sector:

- Continuation in using the remaining indigenous oil reserves, condensates and natural gas;
- Efficient consumption of oil, oil products and natural gas that could slow down the growth rate of consumption of these energy sources, and diminish dependence on imports and improve supply security;
- Accelerated modernization of domestic refineries;
- Ensure exploration dynamics of our own oil and natural gas findings and the use of new technical and technological solutions to advance exploitation, increase exhausting and increase gained oil and natural gas reserves;
- Securing new supply directions for oil and natural gas by participating in international projects;
- Construction of storage capacities and securing compulsory oil and oil products stocks;
- Construction of underground storages for natural gas;
- Further development of gas transportation and distribution networks;
- Creating a favourable legislative-regulatory framework for the efficient functioning of an open natural gas and oil market.

8.3 GOALS AND ACTIONS IN OIL AND NATURAL GAS DEVELOPMENT UNTIL 2020

The objectives of the Energy Strategy for the oil and natural gas sector are as follows:

- Secure regular supply on the domestic energy market of required quantities of oil and natural gas;

In order to achieve that goal, the Government shall create conditions to: modernize the Croatian refineries, diversify supply directions, construct an LNG terminal, conclude long-term inter-state agreements for deliveries of natural gas from the Russian Federation, further modernize the Janaf's oil system and the natural gas transport system, and to continue with the participation and realization of international projects of oil and gas lines.

- Increasing security of supply of the domestic oil market, oil products and natural gas;

In conditions of global and regional instability, growing geopolitical tensions and possible disturbances to the global energy market, the Government shall, by forming operation and compulsory stocks of oil and oil products, as well as building the underground natural gas storages, increase security of supply of the domestic oil market, oil products and natural gas.

- Being included in the regional energy market;

Within the regional initiatives and market goals, the Government shall actively operate in order to integrate the energy infrastructure of Croatia into the energy infrastructures of immediate and wider international surrounding.

- Openness of the oil and natural gas market with the aim of increasing supply security and market competitiveness;

In order to increase supply security and market competitiveness, and in accordance with the international obligations considering the organization of the domestic energy market, network and other regulations on the energy market and their adaptation to international energy markets, the Government shall ensure all legislative and regulatory capacities.

- Construction of a terminal for Liquefied Natural Gas (LNG);

The Government shall achieve all conditions, under its jurisdiction, to provide the enterprise project of building the terminal for LNG, as well as its adaptation to the domestic and international energy infrastructure.

- Improve the quality of oil products that are sold on the Croatian market to match European quality standards;

Even in segments of the quality of oil products, Croatia shall meet the standards defined by the European Union in its guidelines.

- Adjusting the energy infrastructure with current security and environmental protection requirements;

The Government shall timely transpose all standards presented in the European Union in purpose of consumers' and/or environmental protection.

- Enabling technological development of energy activities in the oil and gas sector

This measure is particularly related to gas, considering a development of new natural gas transport systems, such as liquefied natural gas and compressed natural gas;

- Developing the system of compulsory oil and gas stocks in Croatia.

8.3.1 OIL

8.3.1.1 EXPLOITATION OF DOMESTIC OIL RESERVES

Oil production on domestic exploitation fields covers around 20% of domestic needs. Production of gas condensate has also been included into the oil production assessment.

- Domestic oil production of around 917,400 tons in 2006 shall be reduced to only 600,000 tons in 2020.

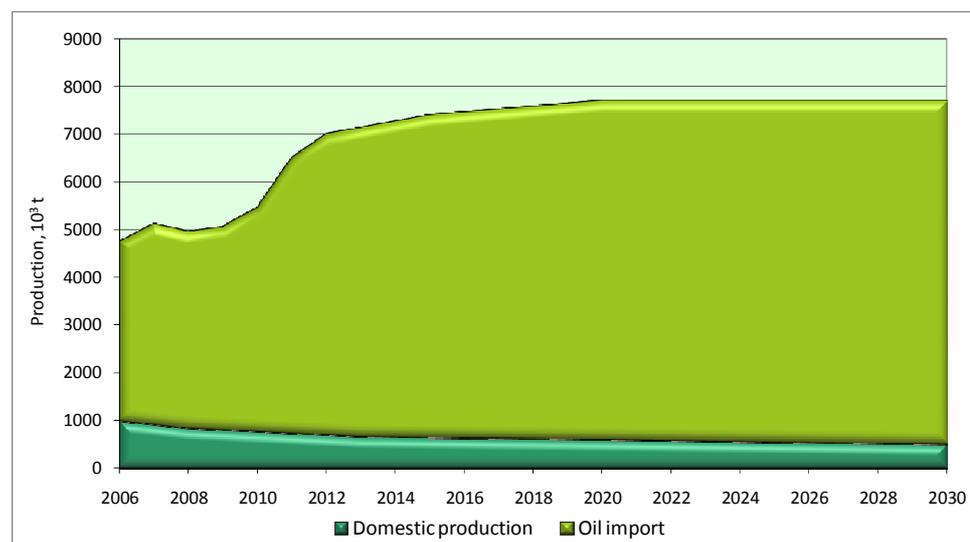


FIGURE 8-3 ESTIMATE OF OIL PRODUCTION IN CROATIA

Domestic oil production will decrease and consequently decrease the share in covering the energy demand in Croatia which renders the energy system more sensitive to supplies of primary energy resources. Due to geopolitical sensitivity of the energy market and the high price of oil on the world market it is necessary to foresee special measures to motivate technological development of technological exploitation of remaining increasingly valuable oil reserves.

Therefore, if oil price is sufficiently high, it is expected that the oil will be produced using Enhanced Oil Recovery method which increases the extraction ratio and also the estimated bypassed oil will be recovered using new technologies.

8.3.1.2 SECURING NEW SUPPLY DIRECTIONS

Considering the growing dependence on imported oil, Croatia shall take advantage on its geographical position to provide participation of its companies in international projects of oil transit and import. Croatia recognizes following projects which may significantly contribute to its economical and security goals:

- Croatia's participation in the planning and construction of the Pan-European Oil Pipeline (PEOP);

Representatives of Croatia, Romania, Serbia, Slovenia, Italy and European Commission signed the Declaration on Pan-European Oil Pipeline (PEOP) in April 2007. New supply direction for oil supply of the European consumers has been provided by PEOP. The oil pipeline route goes from the Romanian Black Sea port Constanta, through Romania, Serbia, Croatia, Slovenia (underwater oil pipeline is the alternative direction through Slovenia), Italy, to the oil pipeline TAL near Trieste, and connection with the Italian oil pipeline network and further on to Genoa and Marseille.

All benefits of this project are being observed: increased supply security for European refineries, including Croatia, by supplying oil from new directions via land, unloading the Adriatic and Mediterranean tanker transport by several dozen million tonnes of oil per annum, increasing budget revenue for the local community and country, increasing revenue from transit tariffs and revenue for companies participating in the construction and operation of the oil pipeline, etc.

- Reconsidering the Družba Adria Project;

Analyzing costs and benefits, from the environmental protection point of view, Croatia shall reconsider the Družba Adria project. Oil would be transported from Russia to Omišalj through the existing oil pipeline system which is technically integrated and can already supply oil from Hungary to Sisak and from 2009 will facilitate reversibility of the JANAF pipeline to Omišalj as a port of shipment. It will provide supply of the Urinj refinery by Russian oil via these oil pipelines. Possibility of oil transport from Omišalj towards Sisak shall remain as it is.

Croatia and its companies will participate in other oil pipeline projects that are considered important for the EU and Croatia in keeping with the objectives of energy and economic policies of the country.

- **Creating compulsory and operation stocks;**

Compulsory stocks of oil and oil products are created for the purpose of oil and oil products supply in case of threats to the energy security of the country as a consequence of extraordinary disturbances in supply. Compulsory stocks should include petrol, diesel fuel, kerosene, gas oil and residual oil with dynamics and in quantities determined by valid regulations that are entirely harmonized with EU legislation. Finally, compulsory oil and oil products stocks should meet the obligation of minimum oil stocks of 90 days of average daily consumption – not later than 31 July 2012. Regarding stocks forming it is important to keep a maximum possible share of compulsory stocks in crude oil.

Additional storage capacities will be constructed for the purpose of forming compulsory stocks which will be distributed around Croatia, depending on the level of regional consumption. When choosing the location to form compulsory stocks it is vital to primarily use locations that are already used as warehousing facilities for oil and oil products.

The project to create compulsory stocks will at the same time develop storage installations for commercial warehousing with the aim to lower costs of creating and maintaining compulsory stocks as well as continuing to open the market and inspiring competitiveness.

Apart from creating compulsory stocks it is vital to develop a system of operation oil and oil products stocks. Operation stocks are formed for the purpose of ensuring stability and safety of technological processes in refining oil and oil products, producing heat and electricity for the market and consumers requiring special security and quality supply. Operation stocks of oil and oil products shall be created in keeping with the provisions of valid legislation.

8.3.2 NATURAL GAS

With regard to natural gas, the fundamental question is supply security and the desired level of market competitiveness. On a liberal market, Croatia shall create conditions for suppliers and market mechanisms to create the supply security. Compared to supply, the distribution and transport system and storage capacities are a natural monopoly and as such demand a clear division of responsibility between market subjects and the system operator. Special responsibility lies on the transport system operator concerning strategic development interests of the heating system in order to secure supplies for domestic consumers, as well as the system which shall contribute to international competitiveness of natural gas consumers within the economic sector, i.e. price availability of natural gas to other consumers. The Government shall ensure for the transport system operator to be also responsible for utilizing

the regional position of the country and the possibility of developing its transport system in the interest of the national economy and satisfying internationally accepted obligations.

The stability of the system and the uniform use will additionally be influenced by the market mechanisms, for example, interruptible consumers with the possibility of using replacement fuel, plants shutdown due to more favourable natural gas price etc.

8.3.2.1 EXPLOITING DOMESTIC NATURAL GAS RESERVES

Croatia covers 60% of total domestic natural gas consumption from own sources. By 2020, along with the future gas production on existing domestic exploitation fields in Pannonian Basin and the northern Adriatic, gas production following additional investment into existing fields was accounted as well as the gas production qualified as possible with the use of new techniques and technology. Increased production by 2010 will result from developing and activating some other additional field in the northern Adriatic as well as measures to activate production from reserves at small fields in Pannonian Basin. It is estimated that beyond 2010 gas production in Croatia will decrease due to depleting of the reservoirs.

- Domestic natural gas production of around 2.6 billions m³ in 2010 will be reduced to 1.8 billions m³ in 2020;

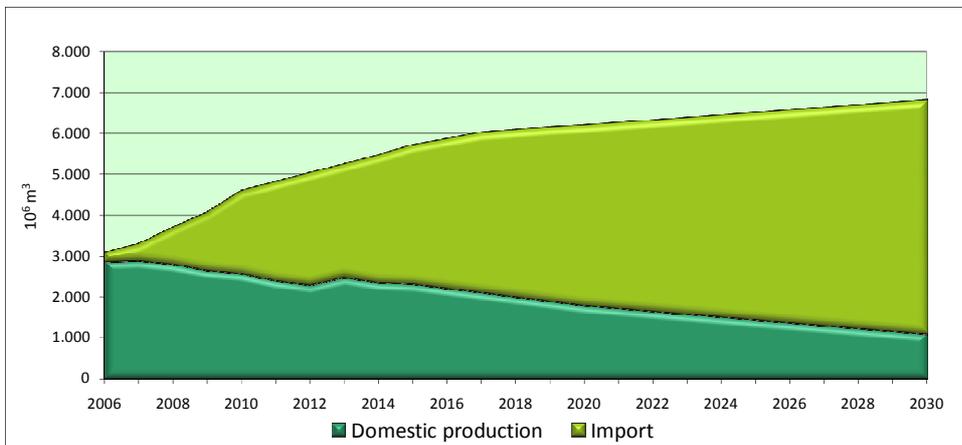


FIGURE 8-4 ESTIMATED DOMESTIC GAS PRODUCTION IN CROATIA

Domestic natural gas production shows total domestic production in 2006 which includes 700 million cubic meters of gas used for repayment of the obligations from joint investments for gas production in North Adriatic Sea. These obligations will be decreasing in time depending on the gas price change and oil and oil derivatives price at the world market.

8.3.2.2 SECURING NEW SUPPLY DIRECTIONS AND CONSTRUCTION OF THE CROATIAN GAS TRANSPORT SYSTEM

Development of natural gas demand in Croatia and being included in the energy infrastructure of the immediate and wider European surrounding requires securing new import directions of natural gas and the completion of construction of Croatia's gas transport system. Croatia shall be included in international projects being of its economical interest and interest of international project coordinators, due to its transit position. For time being, Croatia recognizes following projects:

- Inter-state connecting gas pipelines with the Hungarian system to natural gas transport;

Construction of the oil pipeline Varosfeld-Slobodnica represents a priority project for Croatia. Constructing such direction the security of natural gas supply shall be significantly increased, as well as the security of electricity generation. This project is important over the long term as Varosfeld is a great gas hub.

Inter-state connecting gas pipeline capacity of 6.5 billions m³ shall provide natural gas transit toward Slovenia, Austria and Italy, while building the terminal of liquefied natural gas, if it will be requested so by the market, a direction of gas transport could be.

- Constructing a Liquefied Natural Gas (LNG) terminal, constructing associated transit gas pipeline and connecting it with the Croatian transport system;

Constructing the planned terminal for liquefied natural gas, of final capacity of 15 billions m³ per annum, Croatia shall significantly and over the long term improve the security of natural gas supply. Supply directions and natural gas sources shall be diversified, while the presence of the largest European natural gas suppliers shall indicate the integration of Croatia into unique European energy market.

- Constructing the Adriatic – Ionian direction to import natural gas;

In September 2007 Albania, Montenegro and Croatia signed the Ministry Declaration expressing the political will to perform the Adriatic-Ionian oil pipeline project. The oil pipeline route goes from the Albanian port Fier to Ploče, connecting the Croatian gas transport system with the TAP (*Trans-Adriatic Pipeline*) project and providing new natural gas supply and transit direction from the Caspian region and Iran. Although the project has not yet been completely defined except for the region supply (5 billion m³), it is expected that such direction would be represented as a transit direction to Europe as well. Besides

increasing the supply security, the project significance is in increasing the economical efficiency of planned transport oil pipelines in the southern part of Croatia as well.

- Completing the construction of the 75 bar planned main gas pipeline system;

Completing the construction is related to the oil pipeline system in eastern Slavonia and towards Dalmatia, as well as construction of the transport system in all regions where this is economically viable in relation to the supply of LPG.

8.3.2.3 CONSTRUCTION OF STORAGE CAPACITIES

Croatia has one natural gas storage capacity in Okoli with a total estimated capacity of 550 million m³, and a maximum injection capacity of 3.8 million m³/day and a maximum exhaustion capacity of 5 million m³/day. Considering the expected growth in natural gas consumption, large seasonal imbalance in the hourly consumption of natural gas in Other Sectors consumption and in smaller extent variable natural gas consumption in industry, it is vital to construct additional underground capacities for natural gas.

EU Directives and Croatian legislation do not foresee compulsory natural gas stocks. Today, Croatia covers around 60% of its demand by domestic production while in 2020 it will depend on around 60% of imported gas. Security of supply of natural gas will be vitally increased with the construction of an LNG terminal and its larger storage capacities.

Apart from warehousing the working volume of the storage, the required capacities of extraction of natural gas (mass flow or hourly supply) during peak hour consumption of the natural gas system shall be ensured. Extraction capacities shall be determined while forecasting new storage capacities based on forecasted consumption characteristics, structure of consumer groups and their diagram of consumption.

Based on the knowledge of the characteristics of exploitation of natural gas and oil resources, it is expected that Croatian geological features will facilitate the construction of significantly larger storage capacities than it will be required to satisfy domestic consumption of natural gas. The Republic of Croatia is able to recognize the regional advantages and therefore it can commercialize this advantage with the construction of storage capacities of regional significance. The access to these storage capacities will be granted on the basis of the commercial principles.

8.3.3 LIQUEFIED PETROLEUM GAS

After modernizing the oil refineries in Croatia, production of the liquefied petroleum gas (LPG) will amount around 770,000 t. Liquefied petroleum gas, as a complement to natural gas, enables the same conditions of gas supply on a whole Croatian territory. By the Government's document, Program of using the liquefied petroleum gas on islands in a period of 2008-2012, the policy objectives have been defined.

- For the purpose of equalizing the conditions of energy supply on the whole territory, Croatia shall stimulate the usage of the liquefied petroleum gas on islands and other areas out of reach of natural gas supply

Liquefied petroleum gas and other liquid fuels will be used in a wide consumption sector and industries for covering the peak load at consumers supplied by the natural gas, located in a supply system with supply interruption.

Liquefied petroleum gas will be distributed equally as mixed gas and in this way it will satisfy the consumers' needs either prior to natural gas or as long term solution on locations where the natural gas is not available. On locations which are afar from the natural gas network the liquefied petroleum gas will be used in combined systems together with renewable energy sources.

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9 RENEWABLE ENERGY SOURCES

9.1 DEVELOPMENT GUIDELINES AND NATIONAL GOALS

Croatia has good conditions for significant increase in using the renewable energy sources due to its great experience in energy equipment production.

- Larger usage of renewable energy sources shall be stimulated by electricity consumers' funds and it is necessary to ensure that such sources are directly in a function of development of the Croatian economy.

Success of implementation depends on improving the inter-sector cooperation in energy, industry, agriculture, forestry, water management, environmental protection, building and physical planning.

Local possibilities of technological development are suitable considering the usage of renewable energy sources, so the Government shall stimulate investments into research, development and application. There are good opportunities for the technologies development referring to the usage of biomass and wind power in wind power plants, distributed energy production systems and small hydropower plants, development of advanced energy networks based on two-way power flow paradigm, way to predict the production out of renewable energy sources, as well as managing the energy systems with large share of renewable energy sources.

- Croatia declares itself to use the renewable energy sources in accordance with the principles of sustainable development. Renewable energy sources' share in gross final energy consumption in 2020 will amount 20%.

Croatia adopts the following objective of using the renewable energy sources according to the Directive 2003/54/EC: in 2020 gross final energy consumption out of renewable energy sources in gross final energy consumption will be 20%.

Croatia shall accomplish this objective by fulfilling following sector objectives in 2020:

- Electricity share out of renewable energy sources will amount 35%, including large hydropower plants, in total electricity consumption

- Renewable energy sources share used in all forms of transport will amount 10% in comparison with final energy consumption in land transport
- Gross final energy consumption for heating and cooling share out of renewable energy sources will amount 20% in gross final energy consumption for heating and cooling.

Table 9-1 shows the sector objectives of shares in gross final energy.

TABLE 9-1 SECTOR OBJECTIVES OF RES SHARES IN GROSS FINAL ENERGY CONSUMPTION IN 2020

Sector	Share of RES, %
Electricity	9.2
Transport	2.2
Heating and cooling	8.6

Along with such defined goals, the Government shall define a dynamics of stimulated construction of renewable energy sources in a single four years period, depending on expected gross final energy consumption, available budget for incentives, assessment of contribution of each renewable energy source in involving the local industry and services, and depending on price competitiveness of renewable energy sources.

Forecast of the renewable energy sources structure to 2020 is given in Figure 9-1.

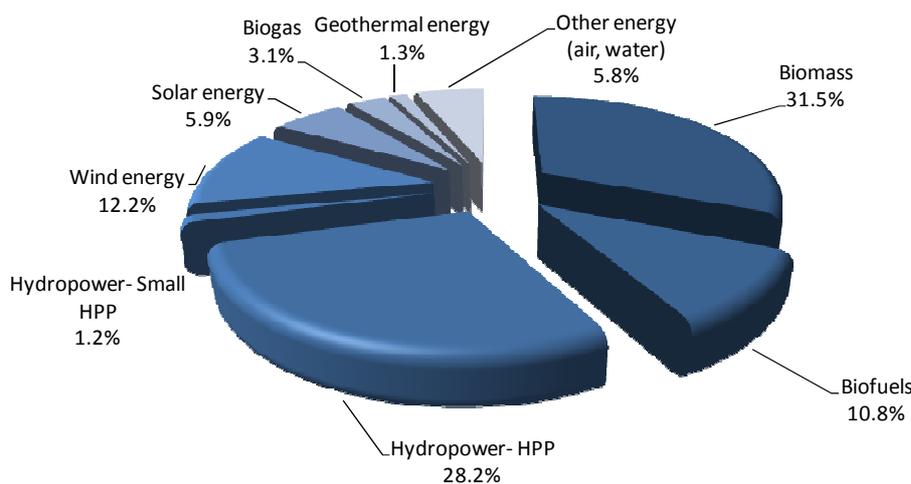


FIGURE 9-1 FORECAST OF THE RENEWABLE ENERGY SOURCES STRUCTURE TO 2020

- Croatia declares itself to use the renewable energy sources in accordance with the principles of sustainable development

The goal is to use around 42 PJ in 2010 and even 84 PJ of renewable energy sources in 2020.

9.2 GOALS AND ACTION UNTIL 2020

9.2.1 BIOMASS

Biomass potential is referred to the wood biomass and biomass out of agriculture, as well as the firewood cultivation. Additionally, wood biomass from wood harvesting during maintenance of waterways and power facilities has also been added as a biomass potential.

In accordance with the goals of the Strategy of Waste Management, waste potential of biological origin for the energy production has been particularly valued.

- Croatia belongs among the countries of large biomass potential.

It is possible to use available biomass with various techniques to transform it into electricity and/or internal energy (heat) or to refine it for commercially acceptable forms of energy (pellets, briquettes and wood coal). Part of biomass could be used for production of biofuels of the second generation.

Croatia defines a goal to, along with the existing incentive measures and removing the existing administrative barriers, use around 15 PJ of biomass in energy purposes in 2010, while in 2020 double, around 26 PJ. Part of this biomass shall be used in many biomass fired power plants of total power of 85 MW in 2020, preferably cogeneration plants.

- Synergy operation of development policies of few ministries is required for Croatia to achieve its goals considering the usage of biomass

According to such synergy operation, Croatia shall convert the development prerequisites into incentive measures of government, industrial, agricultural and energy policies:

- Stimulate development of the Croatian wood processing industry;
- Develop forestry and facilitate all forest residues to be utilized;
- Stimulate forest cultivation and energy forest cultivation;
- Stimulate biomass fired cogeneration plants for heat and electricity generation;

- Stimulate usage of biomass for heat production.

9.2.2 BIOFUELS

Placing the biofuels on market shall be stimulated in accordance with the EU policy, and legislative and regulatory framework, while their usage shall be encouraged by promotion campaigns and price policy. Their production shall be stimulated as well.

Biofuels will be referred to as biodiesel and bioethanol, as well as other liquid and gas fuels defined in the Regulation on Biofuel Quality. The most important sources for biodiesel production are: rapeseed, sunflower, soya, palm oil, waste edible oil, beef tallow and lard, while for bioethanol production are: corn, wheat and barley. Since the average yields of the most important agricultural crops for the production of biofuels in Croatia are low, within the existing production conditions there are no reserves for production of liquid biofuels out of these crops.

- Croatia sets up a goal to use 9 PJ energy out of biofuels in 2020, which amounts 10% of petrol and diesel consumption in transport;

Croatia sets up a goal to increase the yields and areas cultivated with above mentioned crops in order to achieve a share in biofuel consumption in petrol and diesel consumption in transport of 10% in 2020 (8.91 PJ) without importing the sources, i.e. producing the biofuels based on sources out of domestic agricultural and other productions.

In addition, Croatia is determined that biofuel sources do not compete to food. The priority shall be satisfying the food needs of people and animals, as well as creating the compulsory grain and respecting cultivating timetables in order to avoid negative affects to the soil.

Directive 2003/30/EU on using the biofuels in transport is valid only until 2010. It is a subject of discussion for main sources in production of biofuels are food products, and such production, therefore, competes to food and causes a global price increasing. CO₂ emission savings in a cycle of the biofuels production are represented as issue as well. These discussions resulted in creating a new proposal for a Directive on the promotion of the use of energy from renewable sources (COM(2008) 19 final) for a period until 2020, which adoption is expected in 2009, while harmonizing the legislative of the EU member states until April 2010. The main news is that the share of the biofuels of the second generation shall be double calculated. Second generation biofuels are derived from the waste, residues from the agricultural production, non-food cellulose materials and lignocellulose biomass. Although these technologies are still in

development, Croatia shall ensure conditions for their implementation. Consideration should be made due to the fact that it is not possible to exploit all the available biomass resources. Namely, of the total biomass produced on agricultural fields, 40% must be returned to the soil, 30% is used for fodder and on farms and the remaining 30% may be used to produce biofuels.

Taking into consideration that Croatia has a significantly larger area of arable land than is cultivated today, it can be expected that part of this arable land can be utilized to produce corn, wheat, barley and rapeseed for this purpose. Nevertheless, it needs to be said that the best quality arable land has been left for food production and the agricultural land planned for crops with the purpose of biofuel production will require significant investments (clearing scrub, cleaning water canals, clearing roads, etc.).

- Croatia sets up a goal to produce around 340.000 tons of biofuels in 2020;

The important source used to produce biofuels, biodiesel, is also waste edible oil. It is estimated that the potential of the biodiesel production out of the waste edible oil is around 3,800 tons per annum. Due to the biodiesel production and savings in environmental protection due to such waste management, Croatia shall stimulate collecting and processing of the waste edible oil.

9.2.3 BIOGAS

Biogas is a gaseous fuel derived from anaerobic decomposition of organic compounds. Sources for biogas production are: cattle production waste, animal breeding waste (liquid manure, faeces) and/or agricultural production waste (silage, grass mixture, etc.). Biogas is also produced out of agroindustry and food industry waste, butcher waste and municipal waste.

Technologies for conversion of sources into biogas are today widely available in the EU countries. Technologies for using the biogas in electricity generation and heat production are available as well. In the EU countries purified biogas, with a large content of methane, is being added to the existing natural gas networks. Biogas is often used in a city bus transport as well.

- Croatia shall stimulate the production and usage of biogas, domestic production of biogas plants, as well as construction of distributed energy sources;

Croatia sets up a goal by this Strategy of 20% of total conditional cattle heads for energy purposes from agricultural production in 2020 and to produce around 2.6 PJ of energy from biogas, i.e. 100 millions m³ of biogas.

Croatia shall stimulate production and usage of biogas, domestic production of biogas plants, as well as construction of distributed energy sources (usable for farms' needs, as well as local community) in order to manage the waste from the agricultural production, reduce the greenhouse gas emissions and to stimulate a development of farms.

The Government shall, through its policies, reduce the barriers recognized in insufficient cooperation between the authorized ministries, and create educational programs directed towards the consumers and potential entrepreneurs.

9.2.4 WIND POWER

The Government shall create favourable investment climate and stimulate a construction of wind power plants, so their share in total energy consumption will amount 9-10% in 2020.

- The Government shall stimulate a construction of wind power plants.

It is expected that the installed capacity of the wind power in the Republic of Croatia in 2020 amount 1,200 MW. Dynamics of building the wind power plants shall be defined according to the Strategy programs, regulation capabilities of the Croatian energy system, analysis of balancing possibilities on open local and regional energy market, capabilities of domestic industry and other operational bodies to participate in construction of wind power plants and available incentives budget.

Wind power plants are favourable renewable source for electricity generation considering the investments and costs. There is great interest shown by investors which is greatly facilitated by favourable legislation, guaranteed sales prices and contract maturity.

9.2.5 SMALL HYDROPOWER PLANTS

Technically exploitable water potential resources in Croatia are estimated at 12.45 TWh/annum. Of that potential approximately 6.13 TWh/annum or 49.2% is currently used in hydropower plants. Around 10% of the total potential refers to the potential of small water courses (around 1 TWh/annum).

Research of the potential of small water courses in Croatia was conducted through a cadastre for small water courses (to 5 MW. Based on the cadastre for small water courses, a cadastre for small hydropower plants was prepared, with 67 potential exploitation locations for small hydropower plants, but due to

various limitations this number was reduced to 18 exploitable locations on 6 water courses.

According to available data the construction of 125 MW is possible referring to the hydropower plants of 5-10 MW. However, as further investigation is necessary to satisfy limiting factors, we can expect that this figure will be significantly reduced.

- Croatia sets up a goal to build at least 100 MW of small hydropower plants by 2020;

That goal would be hard to achieve due to high specific investments and limitations related to the environmental impact, cultural-historical heritage protection and landscape protection. In order to achieve the goals set up by the Strategy, Croatia shall: motivate the inspection of remaining water courses to determine the exact location and potential for construction, facilitate administrative procedures to obtain the necessary permits to construct small hydropower plants (particularly for small plants under 5 MW), and to harmonize energy legislation and other laws relating to water management.

9.2.6 GEOTHERMAL ENERGY

Geothermal energy is energy contained in the Earth's interior which is extracted via internal water energy or steam to the surface and exploited for energy purposes. In Croatia there is a long tradition of exploiting geothermal energy from natural resources by natural flows. Today in addition to natural springs, geothermal waters are exploited from shallow bores. Exploration of oil and gas and techniques and technology to obtain geothermal energy from deep bores is well developed in Croatia.

The main objectives of this Strategy with regard to the exploitation of geothermal energy are: economically justified exploitation of existing geothermal bores, economically acceptable utilization of bores in order to use the geothermal energy, and exploitation of medium temperature basins for development.

- The Government shall stimulate the exploitation of geothermal energy in tourist-recreational facilities, as well as for space heating, hot water, agricultural production, industrial manufacturing, fish farms, etc. It is necessary to establish the system of incentives, harmonize the legislation and facilitate the procedure.

Moreover, the Republic of Croatia will encourage the use of geothermal energy for tourism recreational purposes and also for spatial heating, domestic hot

water preparation, agricultural production, industrial agricultural products processing, fish breeding, etc.

9.2.7 SOLAR ENERGY

A goal has been set up by this Strategy regarding the use of solar energy: at least 0.225 m² of heat collectors per capita should be installed by 2020.

- Croatia sets up a goal to install 0.225 m² of heat collectors per capita by 2020;

The Government shall stimulate a construction of solar collectors to obtain heat energy (low temperature heating and hot water use) in all new construction both inland and along the coast, as well as on existing facilities.

Long-term incentives to use solar heating systems will have a positive effect to developing domestic industry and so this segment should be included in the government incentive policies.

Increase of the solar energy use by 2020 shall be conducted by following measures: motivating the solar heating systems through tax relieves and/or subventions, introducing construction regulations and planning incentive programmes for the installation of solar thermal systems in households, services and industry; removing all existing administrative barriers and amending relevant legislation in this regard; raising the awareness (promoting solar energy as a modern way for hot water production and space heating).

Due to advanced technology, low input costs and relatively quick investment return period the primary orientation of the solar energy use will be for heating needs.

- Croatia shall stimulate the photovoltaic systems for the electricity generation and power plants with the solar energy concentration.

Solar thermal power plants still cannot compete with other renewable energy sources in electricity generation regarding the costs. Domestic production of photovoltaic cells is still developing and it hard to expect of extremely high share of imported component in the final product to be significantly reduced. Due to adoption of technologies referring to the photovoltaic cells and expectation that more efficient and affordable technology would occur in time, Croatia shall stimulate a construction of photovoltaic cells.

The Republic of Croatia will encourage the use of concentrating solar technologies for electricity production. Due to the development and enhanced solar thermal plants construction it is expected that the price of equipment will

decrease and this will facilitate the implementation of this technologies in regions where the annual intensity of solar radiation is lower than the actual threshold (1800-2000 kWh/m²/year), in mid and south Dalmatia respectively.

Anticipating the development and commercialization of technology in next decade it is justified to consider as well the possibility to stimulate construction and operation of the similar systems in Croatia in order to initialize the research activities and activate the available production resources. If in due time the domestic companies were included in equipment production and plant construction, those companies would have predispositions for positioning in potentially large regional market (Mediterranean countries and Africa).

The amount of incentives for solar thermal power plants shall be determined in the Strategy programs, depending on total amount of incentives for renewable energy sources, possibilities of participation of domestic industry and their competitiveness within the renewable sources.

9.2.8 MUNICIPAL AND INDUSTRIAL WASTE

In Waste Management Strategy ("Official Gazette" No. 130/2005) and Waste Management Plan for the Republic of Croatia for the period from 2007 to 2015 ("Official Gazette" No. 85/2007) the technological solutions based on the concept of the Mechanical Biological Treatment (MBT) were proposed in accordance to European and domestic legislative framework.

The term Mechanical Biological Treatment includes various technological solutions and some of them include thermal treatment of the specific fraction which resulted from the MBT process. There are two methods:

- MBT with aerobic degradation of the organic matter. The produced material could be used as a fuel in various energy and industrial facilities. The heating value depends on waste quality and amounts between 12-17 MJ/kg.
- MBT with anaerobic degradation where apart from the fuel from waste the biogas is produced

With these technological solutions it would be possible to produce 500,000 tons of fuel from waste in Croatia, partially as biogas and of the total energy value of 6 PJ/g.

Part of the energy from waste, estimated not more than 30%, which refers to biodegradable component of waste, could be treated in given conditions as a renewable energy source.

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10 SUPPORT TO ENERGY POLICY – CROSS-CUTTING ISSUES

10.1 ESTABLISHING A LEGISLATIVE AND REGULATORY FRAMEWORK

10.1.1 TOWARDS INTEGRATION INTO EU INSTITUTIONAL FRAMEWORK

Croatia, as a candidate country for the EU membership, is focused on adjusting its energy legislative framework with the EU Acquis Communautaire. The process of harmonization has started six years ago, and it was based on the orientation for liberalization of energy markets and privatization of Energy sector. New legal framework has been established and adjusted with the EU legal framework, especially with directives related to the electricity and gas market. However, since the EU in 2009 had suggested the third package of laws considering the Energy sector, the process of harmonization of the Croatian legislation in Energy sector with the EU status has been continued.

Introducing the liberalization of electricity and gas markets, competitiveness between energy subjects has been implemented and security of supply has been improved.

Therefore, the EU Acquis Communautaire and international agreements which Croatia has signed with EU are the basis of the legislative framework for the Energy sector. In this respect, Croatia is obliged to implement all accepted legal solutions, taking into consideration its particularities and a need to ensure economic and social development.

The legal framework for the Energy sector includes other international agreements ratified in accordance with the Constitution of the Republic of Croatia, such as the Energy Charter Treaty, the Energy Community Treaty, the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects, the Convention on Nuclear safety, etc.

10.1.2 ELECTRICITY

With respect to electricity, the legal framework has been completely finished. The Electricity Market Act ("Official Gazette" No. 177/04, 76/07, 152/08) is the

basic act proscribing the relations within the Energy sector. The electricity market has been completely opened since 1 July 2008.

For further development of the electricity sector it is necessary to ensure qualitative and efficient implementation of the whole EU Acquis Communautaire, not just the energy part. In the future it is necessary to legislatively include the entities with a public service obligation in preparing the implementation-planned documents.

10.1.3 NATURAL GAS

In the field of gas, the basic Act is the Gas Market Act ("Official Gazette" No. 40/70, 152/08) regulating the rules and measures for carrying out energy-related activities in the natural gas sector including LNG, biogas, gas from biomass, and all types of gases which could be safely technically transported through the gas system, rights and obligations of the participants on the gas market, separation of system operators' activities, third-party access to the gas system and opening the natural gas market. The gas market has been completely opened since 1 August 2008.

In a segment of the research and exploitation of natural gas from domestic sources, the normative acts have been proscribed related to the mining sector, i.e. the Strategy of mineral raw material management of the Republic of Croatia, the Mining Act ("Official Gazette" No. 190/03) and associated bylaws.

10.1.4 HEAT PRODUCTION

In addition to basic energy acts, the heat production sector is normatively regulated by the Act on heat production, distribution and supply ("Official Gazette" No. 42/05), and associated bylaws.

For further development of the heat production sector it is necessary to ensure qualitative and efficient implementation of the whole EU Acquis Communautaire, not just the energy part. In the future it is necessary to legislatively include the entities with a public service obligation in preparing the implementation-planned documents.

10.1.5 OIL AND OIL PRODUCTS

The Act on oil and oil products market ("Official Gazette" No. 57/06) lays down a normative framework for conducting oil products production activities, transporting oil by oil pipelines, transporting oil products by product pipelines,

oil products wholesale, oil products retail sale, oil and oil products storage and trading, brokerage and representation on the oil and oil products market.

In a segment of the research and exploitation of oil from domestic sources, the normative acts have been proscribed related to the mining sector, i.e. the Strategy of mineral raw material management of the Republic of Croatia, the Mining Act ("Official Gazette" No. 190/03) and associated bylaws.

Subsequently, during the implementation of this Strategy, legal framework shall be amended so as to enable additional construction of systems of required oil and oil products reserves as well as a development of the strategic oil reserves systems in the period after 2020, and as part of the visions of the energy development by 2030.

10.1.6 RENEWABLE ENERGY SOURCES, ENERGY EFFICIENCY AND COGENERATION

The basic legal framework for the field of renewable energy resources, energy efficiency and cogeneration in Croatia is contained in the Energy Act ("Official Gazette" No. 68/01, 177/04, 76/07, 152/08), Electricity Market Act ("Official Gazette" No. 177/04, 76/07, 152/08), The Act on Environmental Protection and Energy Efficiency Fund ("Official Gazette" No. 107/03) and bylaws which represent implementing acts of these Acts.

Croatia shall permanently adjust its legislation with the obligations followed by the EU legislative framework, related to the renewable energy sources and energy efficiency. In order to fully apply the Directive in question, a new act has been enacted, the Act on Efficient Energy Use in final consumption ("Official Gazette" No. 152/08). A number of implementing bylaws shall be created in order to regulate the application of energy efficiency policy.

The Croatian legislative framework regarding cogeneration and renewable energy resources is in compliance with the Acquis Communautaire, and contains primarily the Energy Act ("Official Gazette" 68/01, 177/04, 152/08), Electricity Market Act ("Official Gazette" No. 177/04, 76/07, 76/07), the Act on the Regulation of Energy Activities ("Official Gazette" No. 177/04, 76/07) and Act on Government Incentives ("Official Gazette" No. 140/05), as well as a package of bylaws adopted in 2007, which regulate the system of incentives based on guaranteed electricity redemption price.

During 2009 associated implemented regulations on stimulating the heat and cooling energy production from renewable energy sources shall be enacted.

10.1.7 REGULATION AND CROATIAN ENERGY REGULATORY AGENCY

Croatian Energy Regulatory Agency (HERA) is an independent competent body for regulation of energy related activities. Regulation of energy related activities is pursued for the part regarding regulated energy related activities and in the part related to energy related activities market. Normative framework regarding the Croatian Energy Regulatory Agency (HERA), as completely independent regulator of the energy market, has been established. It consists of the Energy Act ("Official Gazette" No. 68/01, 177/04, 76/07, 152/08), the Act on the Regulation of Energy Activities ("Official Gazette" No. 177/04, 76/07) and acts and by-laws on issuing the licenses for performance of energy-related activities. In the framework of its responsibility, HERA is establishing methodologies and tariff systems as well as other by-law regulations in Energy sector.

10.1.8 MARKET AND CROATIAN ENERGY MARKET OPERATOR

Since 2008 when the electricity and gas market has become an open market the Croatian Energy Market Operator (HROTE) has gained an important role in the Croatian energy system.

In the initial phase of the market opening, the model of bilateral market has been chosen and the electricity trading has been carried out through bilateral contracts. Electricity market procedures and relationships between market players, HROTE, Transmission System Operator and Distribution System Operator are arranged by Electricity Market Rules ("Official Gazette" No. 135/06), established by HROTE and by other relevant bylaw regulations.

HROTE has also a role of gas market operator, which means than in accordance with the legislative framework performs tasks related to organization of the natural gas market. With respect to this it is necessary to stress out the activities for establishment and organization of information exchange between particular participants at the natural gas market, establishment and management of the registry of the balancing group managers and business related to tender preparation, contracting, calculation and charging the balancing energy.

In the system of electricity generation incentives from renewable energy sources and cogeneration, HROTE is responsible for collecting fees for electricity production from renewable energy sources and cogeneration. Furthermore, HROTE regulates repurchase of the entire amount of generated electricity from eligible producers as well as the distribution to the electricity suppliers in the Republic of Croatia.

10.2 CREATING FAVOURABLE NATIONAL CONDITIONS FOR ENERGY SECTOR DEVELOPMENT

10.2.1 ENSURING INVESTMENTS IN ENERGY SECTOR

The Energy sector in Croatia requires significant investments. The public sector shall not be able to finance these investments with its own resources (as this is not its purpose), so there exists the necessity to promote the investments in the Energy sector. To that end, state institutions are facing great demands to create, coordinate and improve conditions which should attract domestic and foreign capital with a purpose to take part in the realization of the required investments in the Energy sector.

For investments in the Energy sector as a special type of investment, favourable conditions can be created only through a combination of general favourable economic conditions and specific conditions resulting from the importance of energy for the economy and population and which have to support the goals defined by this Strategy.

Favourable general economic conditions mean macroeconomic stability, efficient state administration, competitive level of tax burden, legal safety, adequate human resources, well-developed economic infrastructure, protection of market competition, presence of financial investment incentives, presence of specialized state institutions for investment promotion, etc. The Government shall create additional conditions so as to make these investments more attractive in order to encourage investments in the Energy sector, and given the high levels of required investments, long-term nature of investments and sensitivity of investment outcomes to volatile trends of world energy prices.

As far as specific conditions for this type of investment are concerned, of crucial importance are timely planning and clear communication of the plans to a wider public, all stakeholders and especially to interested investors. A strategic framework of future energy development, defined in this Strategy, tested in a public consultation process and supported by the firm and unchangeable political commitment of the Government and the Parliament, provides basic information on priority investments in the infrastructure of regulated activities and necessary market and private investments. The Strategy Implementation Programme shall ensure that obstacles to private investment in Energy sector are eliminated so as to achieve strategy goals based on the guidelines on how to create clear, unambiguous and stable legal framework which shall favour such types of investment and reduce level of uncertainty facing private investors. Success in reaching strategy goals shall be monitored based on annual reports on implementation of the Strategy Implementation Programme and on reports to

the Parliament by the Government on implementation of the Strategy Implementation Programme in the period from 2009-2012.

When it comes to large, investment heavy production facilities with a long-term return on investment period, private investors will be encouraged not only by favourable legal framework but also by efficient state administration whose task is to create favourable investing atmosphere, raise public awareness on the need to invest and assist directly investor so as to put into practice faster and with less risk, their investment ideas. To this end, cooperation between state institutions and local and regional self-government is necessary. Even though market research is investor's obligation, the Government, based on planning systems, will provide potential investor with information on investment needs and possibilities. In addition, special care shall be given to required investments in energy producing facilities, when it comes to physical planning.

When it comes to regulated activities, investment risks are smaller due to lesser impact of world and regional market uncertainty on business conditions of these activities on internal markets. With respect to regulated activities, good planning as information source and the role of regulators are of great importance, since wrong information and investment decisions made on the base of which, can put at risk security of energy supply or unnecessarily increase energy supply costs and reduce energy system competitiveness.

Of great importance are investments in infrastructure for transit of oil, natural gas and electricity, which take advantage of geographical position of Croatia and investment decisions have to be considered bearing in mind positive effects on balance of payments and other effects for the state.

Investments in renewable energy resources and technologies that increase energy efficiency contribute to greenhouse gas emission mitigation, increasing a country's energy autonomy and having a robust energy system. Based on a large number and variety of investments, technology availability and possibilities for a development of domestic products and services in that field, their potential to make activities of small and medium-sized entrepreneurs more dynamic can be the basis for a new development. The existing legal solutions and incentives to economic growth concerning these activities will continue to be examined and improved with a purpose to create special conditions and special assistance of institutions and regional and local self-government.

The Government shall constantly re-examine the purpose of tax system modification in order to encourage energy efficiency and usage of renewable energy sources.

10.2.2 INTEGRATION OF ENERGY SECTOR FACILITIES IN THE PHYSICAL PLANS

Achieving this Strategy requires amendments to documents regarding physical planning which are in force. According to the current regulations (the Act on Environmental Protection ("Official Gazette", No. 110/07), the Act on Physical Planning and Construction ("Official Gazette", No. 76/07) and related documents) it is not possible to start not even preparatory activities for a certain project (procedure) if that project is not adequately planned in the physical planning documents.

Physical Planning Strategy of the Republic of Croatia is a key document regarding physical planning, while The Physical Planning Programme of the Republic of Croatia (PPP) represents the main implementing document regarding physical planning in Croatia. Physical planning documents of lower level (county, city and municipal physical plans) are required to comply with the PPP, and the PPP should contain at least those projects (buildings) defined in the Energy Development Strategy, for which the Ministry for Environmental protection, Physical Planning and Construction issues a location or construction permit (under the Regulation on determining the projects for which the Ministry for Environmental protection, Physical Planning and Construction issues a location or construction permit), and others would be regulated in the county (or city and municipal) physical planning documents.

According to the Strategy demands, related to the physical planning documents, the Republic of Croatia shall perform all necessary modifications to remove the limitations.

Conditions for implementation of this Energy Strategy with respect to physical planning are these up-to-date activities:

- Examination and improvement of documents regarding location selection for power plants, including examination and rating of previously suggested preferential locations and possible new locations;
- Define locations for all types of power plants: imported coal-fired power plant, gas-fired power plant with and without cogeneration, nuclear power plant, repository for low-and intermediate level radioactive waste, LPG terminals, renewable electricity sources of capacity higher than 20 MW, all other energy sources of thermal power greater than 50 MW, new gas and oil pipelines corridors;

- Adjustment and modification of the Physical Planning Programme of the Republic of Croatia in the field of energy-related activities according to the guidelines of the Energy Strategy;
- Adjustment of all county documents regarding physical planning with the Physical Planning Programme of the Republic of Croatia.

10.3 CENTRAL GOVERNMENT'S ROLE AT REGIONAL AND LOCAL SELF-GOVERNMENT LEVEL IN ENERGY SECTOR

In order to achieve the vision of a sustainable energy supply the main role of the Government is to adopt, implement and monitor the energy policy, as a part of overall economic policy, as well as to improve institutional and legal framework and ensure its implementation. The Government shall intervene in the market processes only when the participants are affected by transactions. The main instruments to be applied in the implementation of energy policy are Energy sector regulation, measures promoting energy efficiency, consumers' protection, inclusion of the costs of external effects in the energy price, planning in the Energy sector and, in connection with that, timely intervention in order to encourage investments in the Energy sector.

Central government enables greater energy efficiency based on a transparent public procurement system for the energy efficiency projects. The simplest way to achieve that is by drawing up elaborate examples of standard agreements for specific procurement types, making detailed instructions for savings estimates in different energy efficiency projects, providing measuring systems and regularly monitoring achieved savings. Central government actively promotes products and services which are more energy efficient by improving the concept of costs estimates for equipment, devices and services in the field of energy efficiency. Adoption of a new concept of costs estimates takes into account overall costs of product life cycle, including lower costs of energy consumption. This means that the existing system is abandoned, according to which, a supplier offering the lowest costs should be selected, and it also means that it is possible to avoid a frequent situation where a purchase of more energy efficient product and service is not competitive since the initial costs for their acquisition are greater than for products and services which are less energy efficient.

Promoting the integrated planning and management based on more powerful connection between development strategies of counties and local development plans and local budgets shall bring to an actual monitoring of accomplished results by spending the public funds. In such case, the central government shall

perform necessary modifications in a process of budget planning on national, regional and local level.

Decentralization of energy policy separates roles and tasks of the central government, regional and local self-government. Regional and local self-government shall participate actively in energy related field in legally defined cases (heat production and supply, public lighting, gas distribution, decision-making on location and construction of new energy facilities and other energy infrastructure). The Government recognizes the importance of administrative and absorption capacity in order to achieve the goals.

Subsequently, the establishment of energy offices within bodies of local and regional self-government shall be provided. Basic tasks of the offices for energy-related activities include efficient energy management, incentives to use renewable energy resources, coordination of interests and projects of regional and local self-government and energy-related facilities, energy planning and balancing, promotional and advisory activities. This kind of organization will strengthen local capacities so as to prepare, implement and monitor energy efficiency projects by improving human resources, networking and connecting municipalities and towns, proactive approach to resolving energy-related problems with special emphasis on participation of all interested parties, as well as improving technical capacities for project implementation and monitoring.

In order to systematically improve energy efficiency, regional and local self-government play an important role in establishing the assets register for the assets they own, improving asset management, introducing modern information systems for assets maintenance and energy efficiency increase, in ensuring energy reviews in order to determine in which facilities, owned by local administration, and in which manner, it would be possible to achieve highest savings, and in developing measuring systems in order to ensure monitoring of implemented measures in the field of energy efficiency, as well as in developing networks of local units so as to exchange information on positive experiences in relation to energy efficiency projects.

Different initiative includes regional and local authorities in finding solutions to energy-related problems in the EU. The Intelligent Energy Programme of Europe encourages an establishment and activities of regional and local energy agencies. Special attention is given to the support to local authorities in all energy activities and planning, provision of technical assistance in starting and developing projects, informing and educating the public, promoting energy efficiency and concept of sustainability, establishing communication with European networks and intuitions and other. To that end, we will also encourage establishment of energy agencies as expert support to energy offices. Their very important role will be to develop and support initiatives to participate in national

and EU funds regarding energy as well as to develop entrepreneurship and inform about possible use of different financial mechanisms for the implementation of energy projects.

So as to ensure successful complementary activities of government, regional and local self-government in the energy field, administrative employees will be able to attend professional education, develop communication and marketing skills and project management skills.

10.4 IMPROVING ENERGY PLANNING

Investment decisions in the Energy sector have long-term consequences on competition, security of supply and environmental impact, so that planning is inherent to Energy sector. In addition, market participants define planning as data processing with the aim of creating new understandings necessary to make investment decisions. For the Government, planning represents a basis for creating and improving energy policy with the aim of balanced and sustainable development.

Planning in the Energy sector, under the Energy Act ("Official Gazette" No. 68/01, 177/04, 76/04, 76/07, 152/08), is the responsibility of the Government of the Republic of Croatia which, based on the Energy Strategy, recommends long-term basis of energy policy, and based on Article 9 adopts long-term and annual energy balances. The Energy Act obliges regional and local self-government to draft development documents in which they plan for needs and energy supply manner. The Government shall fulfil the absence of the institutional framework and administrative capacity due to the coordination of planning at the government, regional and local level.

Obstacles to planning at regional and local level shall be eliminated by improving the professional, administrative and absorption capacities. The task of the Ministry of the Economy, Labour and Entrepreneurship is to elaborate certain levels of methodological standards of planning, which will facilitate communication between units of local and regional self-government and the Ministry of the Economy, Labour and Entrepreneurship, and other participants in the energy planning (energy subjects, associations, population and others). Methodological standards are a good prerequisite for integration of Energy sector planning into other strategies and development plans (physical plans, economic plans). Planning continuity contributes to the energy planning improvement, so that planning should be understood as successive process of periodical assessment, improvement and adjustment of the previous plan. Care about the continuity of the planning process, at the regional and local level, should be the responsibility of energy offices, which have enough human and

technical resources to be central points of regional energy policy implementation.

The key problem regarding planning is energy statistics. Although the Ministry of the Economy, Labour and Entrepreneurship, in its annual report Energy in Croatia, presents in a systematic manner balance of the energy consumption at the state level. Difficulties in creating such balances represent also an issue of the energy statistics which shall be adjusted with the EU. Lack of common data base, low cooperation between subjects – data sources, data unavailability shall be arranged by certain normative acts. The same task shall be achieved at the regional and local level.

System for creating a unique data base for the Energy sector shall be established. This will ensure collection of all energy-related data in accordance with positive Acts and Directives of the European Commission, single data base management including quality assurance, their storage and availability definition. Single data base will be used to make energy balances, plan, develop strategy, and different analyses and reports, and distribute collected data in accordance with legal powers, as well as report to the European Commission and international and national institutions to which the Ministry of the Economy, Labour and Entrepreneurship and the government are obliged to report. Of great importance, in that respect, are the monitoring of implementation of energy efficiency programme and register of renewable energy resources projects, cogeneration and eligible energy producers. The Strategy Implementation Programme will determine the dynamics of establishing single data base for the Energy sector.

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11 ESTABLISHING FAVOURABLE NATIONAL CONDITIONS FOR ENERGY SECTOR DEVELOPMENT

11.1 ENVIRONMENTAL IMPACT

Energy sector has a significant environmental impact, regardless whether this is a local, regional or global impact. Within the time horizon of the Strategy, the greenhouse gas emissions represent the dominant environmental impact considering the energy.

Environmental impact is decreasing at all levels by achieving the Strategy objectives, especially regarding the larger usage of renewable energy sources and increasing the energy efficiency.

Public interest shall be directed towards certain activities, such as: construction of energy facilities, LNG terminals, energy transport pipeline corridors, transmission line, etc. Impacts of these activities are of wider character and open the issues of space redevelopment and occupancy, water and sea impact, biological diversity and landscape modifications. Qualitative communication strategy and public informing programs are of great importance. Government bodies and investors would have an equal role in it. Technology, impacts, a way of tracking the impacts should be completely and timely explained, as well as to clearly express the interest opportunities offered by the project for various participants and local public in a whole production cycle.

11.1.1 LOCAL IMPACT ASPECTS

Local impact aspects are regulated by cautious planning, national legislation and permits, where the implementation instruments are mostly familiar and implemented into regulations. Objectives and measures given by the Strategy contribute to decreasing the air pollution in urban areas, where the air is moderately or excessively polluted. Air pollution is mostly a consequence of traffic emissions and small furnaces in households and services, except for specific substances pollution from industrial processes. Energy efficiency measures in construction, exploitation of renewable energy sources, increased natural gas use, expansion of district heating systems, biofuels and natural gas in transport are measures which contribute to reducing the air pollution at the local level. Sulphur dioxide emissions, nitrogen oxide emissions and non-

methane volatile compounds emissions shall be reduced, and the most important is the reduction of very small particles emission, particularly danger from the influence on people health point of view.

Consistency in application of the above mentioned instruments of environmental protection, the planned interventions in Energy sector will respect the principle of the minimum biological and landscape diversity impact with emphasis on protected areas.

- Local environmental impact aspects are being reduced by the Strategy measures;

Croatia declares itself not to use the coal as a fuel for small furnaces. Liquid fuel consumption shall be reduced by the energy policy measures in the Residential and Commercial/Institutional sector from the share of 17.1% in 2006 to a minimum of 1.7% in 2020. Cleaner fuels and energy without 'local' emission, electricity, steam and hot water shall cover the total of 98% of energy needs in the Residential and Commercial/Institutional sector in 2020.

The set up goal of 10% of biofuels in transport reduces the air pollution. Compressed natural gas (CNG) and electricity shall have one of the most significant roles in transport.

Use of biomass in small furnaces can be the cause of increased particles emissions and, therefore, the solutions with the district systems having more efficient devices for the emission reduction shall be stimulated.

Existing energy facilities shall obtain integrated environmental protection terms, and the best available techniques (BAT) shall be applied in accordance with these terms. Emissions shall be reduced by replacing the old and worn out facilities with the new ones. The Government shall stimulate such solutions by environmental policies measures. It should be taken into consideration not to distort the competitiveness of energy and industrial companies and to prevent the relocation of energy and industry due to lower environmental protection standards. Possible carrying environmental capacity shall be analyzed by the Strategic Environmental Impact Studies (SEIS), while general criteria to determine the allowed additional loading shall be defined by the regulation.

11.1.2 REGIONAL IMPACT ASPECTS

Regional impact aspects represent the pollutions causing transboundary pollution transmission from other countries, while only a small part is caused by our emissions. Reducing of such pollution is possible by common actions with other European countries.

In preventing the regional pollutions, such as the acidification, eutrophication and ground-level ozone pollution, Croatia shall respect the obligations arising from international conventions and protocols.

- Regional environmental impact aspects are being reduced by the Strategy measures;

With regard to SO₂ emissions, there will be a significant decrease in emission, mainly due to use of low-sulphur fuels and smaller consumption of liquid fuels in electricity production. NO_x emission shall grow until 2015 due to increased volume of road transport, after which it will slightly decrease due to a greater share and less specific consumption of new vehicles. Large energy facilities shall use highly effective de-sulphuring devices and devices for treating nitric oxides. Emission of SO₂ and NO_x shall be below obligations originating from the Gothenburg Protocol of the LRTAP Convention.

In accordance with the Convention on the Environmental Impact Assessment in a Transboundary Context (ESPO Convention) Croatia shall communicate with the neighbouring countries in a case when such impacts exist, as well as to demand the same from other neighbouring countries.

Objectives and measures to reduce the environmental impact at local and regional level are as follows:

- Increasing the share of renewable energy sources and improving the energy efficiency;
- Changing the fuel structure in transport, households, services and small furnaces in;
- Improving the quality of projects' preparation: selection of location, researches, SEIS and EIS, strategies and programs of communication with participants and public;
- Reconstruction of existing and construction of new energy facilities using the best available techniques;
- Keeping the emissions of SO₂ and NO_x on levels originating from the Gothenburg Protocol.

11.1.3 GLOBAL IMPACT ASPECTS

The Republic of Croatia is interested in combating the impact on climate change. The analyses show that significant damages could be caused by climate change, particularly in water management, tourism, agriculture, forestry and flooding in

coastal area. Contribution to the Croatian global emission is harmonized with our share in the world economy, population and energy consumption.

- Global environmental impact aspects are being reduced by the Strategy measures;

Croatia ratified the Kyoto Protocol and thereby made a commitment to decrease the emission of greenhouse gases by 5% in the period 2008-2012 in comparison to level of emissions in the base year. In 2006 the greenhouse gas emission was at the level of 30.6 million tons of CO₂-eq, which is 2.4% less than in 1990 and 12.2% less than in the base year². In the last five years the emission has been increased by an average rate of 2.1% per annum (2001-2006). Croatian emission per capita is relatively small in relation to the emissions of the EU countries, as well as in relation to the emissions of other developed countries in the world.³.

11.1.4 FULFILMENT OF THE OBLIGATIONS OF THE REPUBLIC OF CROATIA RELATED TO GREENHOUSE GAS EMISSIONS

Intergovernmental Panel on Climate change (IPCC) has established in its Fourth Assessment Report (AR4) that Member States of the Annex I, as a group, should reduce the emissions for 25-40% by 2020 in relation to 1990. It is estimated that with such decrease global temperature growth would not be higher than 2°C, in the next 100 years. It could be achieved only if developing countries decrease the emissions and obtain significant deviation from the emission increase, which would happen according to the scenario without measures. Countries of the Annex I should decrease the emissions for 80-95% by 2050. In the next decade, emissions from the countries in the Annex I shall become less than the overall emissions from developing countries

For the post-Kyoto period (2013-2020) international negotiations have been initiated in order to define objectives referred to the greenhouse gas emissions. The negotiations shall be completed in December 2009 on the Conference in Copenhagen.

The EU's objective is to reduce the emissions in relation to 1990 for 20%, i.e. 30% if other countries accept certain obligations (especially China, India, and Brazil). The EU's methodology of internal distribution of obligations takes into consideration economic differences between the member states, whereof the

² Pursuant to the Decision 7/CP.12 of the Conference of Parties of the United Nations Framework Convention on Climate Change, Croatia is allowed to increase the emissions from 1990 by 3.5 million tons of CO₂ in order to determine the base year

³ Croatia 6,8 tCO₂-eq/st, EU 10,7 tCO₂-eq/st, the average of countries from the Attachment 1 which ratified the Kyoto Protocol 11,0 tCO₂-eq/st, USA 23,9 tCO₂-eq/st, data from 2004 (UNFCCC)

principles diverse for the sector where the emissions trading is allowed (ETS sector⁴) and other emission sources representing the non-ETS sector.

- Croatia accepts its task in global control of greenhouse gas emissions and usage of all mechanisms established by the European Union;

In non-ETS sector the emissions shall be reduced by 10% in 2020, in relation to 2005, while the obligations of certain countries are in range from +20 to -20% depending on the economic development.

In ETS sector in a period after 2012, only common emission amount will be presented on the EU level. Member States will not prepare national plans of distribution of emission amounts for this sector. Total emission amount will be linearly decreased by 2020, when decreasing of 21% in relation to 2005 should be achieved (18% if the air transport is included as well). Emission units shall be bought on auctions and the approach to the auctions shall be open for all market participants non depending on the home state. Participants from the electricity generation sector should buy all their decreasing units at auctions, while partial auction will be for some industrial branches. Quite sensitive industrial branches from the aspect of endangering the competitiveness shall obtain the emission units for free. National auction amounts are defined by the regulations. Funds obtained at the auction belong to the state in amount of the assigned amount, while 50% of these funds should be spent on a policy of mitigation and adjustment to climate change.

Emissions in non-ETS sector will slightly increase and stabilize in a following period. This sector is represented by transport and small furnaces in general consumption and industry.

Emissions shall increase in ETS sector, particularly in electricity generation and heat production sectors, as well as in refineries due to the production increase. After 2020 in new coal fired power plants the emissions in ETS sector will decrease due to the assumption of applying the Carbon Capture and Storage (CCS) technology.

All future ETS participants should include emission reduction costs into their business plans by expected international prices. Croatia shall ensure conditions to access the international market and usage of other Kyoto Protocol's mechanisms (CDM – Clean Development Mechanism, JI – Joint Implementation).

Objectives and measures to reduce the greenhouse gas emissions are as follows:

⁴ ETS sector includes facilities of following activities: electricity generation, oil refining, production of cement, lime, iron, steel, aluminium, non-ferrous metal, glass, ceramics, nitrogen acid, ammonium, etc.

- Energy efficiency in energy production and consumption;
- Renewable energy sources share in gross final energy consumption is 20%;
- Involvement in the European Union Emission Units Trading System and implementation of other flexible Kyoto Protocol's mechanisms;
- Preparation for applying the Carbon Capture and Storage technology on new coal fired power plants;
- Research and implementation of CO₂ injection technology for increase in oil extraction rates (EOR)
- Preparation and making decision on the nuclear energy usage;
- Stimulating the research and transfer of new technologies for energy production, energy savings, renewable energy sources, hydrogen use, more efficient transport, intelligent network systems, CO₂ storage, etc.

11.2 IMPACT ON SECURITY OF ENERGY SUPPLY

Security of energy supply is defined as a long-term availability of energy sources and ability for proper market functioning, i.e. a desired level of competitiveness on the market (especially on the natural gas and electricity market).

Market mechanisms create the security of supply. However, the Government is responsible for the security of supply. The Government shall take care of the supply security by planning, timely observing the possible endangerment of the security of energy supply and timely encouraging the investor's interest for building the necessary infrastructure.

- Croatia recognizes its role in regional planning of the security of energy supply;

Decisions on the new electricity generation, natural gas or making imports are in the hands of private energy entities that act upon price signals and estimates of demand on the market. Opposite to the supply, distribution and transport systems and storing capacities present a natural monopoly and thus are regulated activities, which mean that the price is defined by independent regulatory body. Division of responsibilities between market entities and operators of systems of regulated activities is necessary for optimal maintenance of system's security. Particular responsibility rests on the operator of transmission and transport system, which, besides the care for strategic interests of system development in order to secure supply of local consumers, also is

responsible for the use of country's regional position and for the development potentials of own transport system in the interest of national economy and for the fulfilment of international commitments.

Croatia will respect the principles of the European Union according to which each Member Country is responsible for its own security of supply and the fact that the solidarity between the Members is the key factor of the EU membership. Therefore, the Republic of Croatia will act in order to promote ideas based on solidarity which will lead towards efficient solutions of the security of supply question especially in crisis situations.

11.3 IMPACT ON ENERGY MARKET DEVELOPMENT

Strategy points to further liberalization and development of energy market and to leaning on public sector cooperation with private, both local and foreign investors entering energy market under the same conditions.

Competitive market only exists where there is a sufficient supply and a right number of competitors, in a situation where security of supply enables market functioning. In this case, prices of energy have to be determined on the market. Only such market structure in return secures sufficient security of energy supply as one of fundamental goals of this Strategy, as well as removal of a pressure to increase the price of energy, which secures that energy as an important input contributes to the competitiveness of Croatian economic entities at a global market.

- Market price and market position of energy entities is a powerful incentive to the market development;

Liberalization of gas and electricity market in Croatia as EU acceding country was necessary also in order to make easier adjustments to business conditions in a single market, which are something that local entities in the Energy sector are also going to have to face in the future.

In case of natural monopolies, there is a necessity to regulate the price of service and the goal of such regulation is to protect the interests of consumers by defining a required quality of service which reflects necessary costs, while at the same time protecting also the interests of activities in a manner that final tariffs enable efficient service providers to do business while making profits adequate to investment risks. These regulation goals presume adequate information on the regulated entities, so the development of information systems for asset management is in the interest of both regulated entity and the regulator.

11.4 IMPACT ON ENERGY PRICES

Energy prices are the largest mystery that all world economies dependent on energy imports are facing with. As an energy dependent economy, Croatia can alleviate the justified risk of further increase in the price of energy only by building an energy system which would be price-flexible enough, i.e. to be competitive both in case of moderate and high energy products' prices. This involves the increase in the security of supply of natural gas, electricity, oil and oil products, diversification of energy structure, increase in energy efficiency and removal of monopolies in the energy supply.

The Republic of Croatia stands up for building such energy system, so that strict implementation of Strategy and consistent application of principles on which it is based would contribute to restraining the impact on living standard and business operating costs that are caused by increase in the energy products' price. However, on the other hand, the Strategy clearly requires gradual liberalization of prices which were up to now regulated in an administrative manner.

The impact of further, rapid liberalization of energy products' prices shall mostly impact the increase in prices of outputs of all sectors: electricity supply, gas and water supply, transport, storage and connections, hotels and restaurants, mining and extraction, and only then the producers in the processing industry.

In order to prevent unwanted social consequences, which are possible given the fact that the share of expenses for electricity, gas and other fuels in the structure of household consumption is about 9%, in the process of price liberalization in the area of energy, the Government shall determine a minimum standard that has to be available even to citizens out of social category.

- Croatian energy policies shall be socially sensitive;

Such measures shall require careful preparations and setting up a database on citizens, which is a prerequisite for effective social policy and which would enable that state support is only awarded to those citizens who really need it. This will contribute to decreasing the costs for implementing such measures and minimize ineffective waste of state funds.

Energy efficiency in Croatia is low. It is also the consequence of existing lack of price pressure. Actual prices of all energy products stimulate economic processes by which the social welfare is achieved in the optimum way, as well as the consumption elasticity.

Securing balanced quality of supply and availability of energy forms in Croatia, particularly natural gas and liquid petroleum gas; it will have an additional

influence on the decrease in share of costs associated with energy consumption in the total household and economic entities costs.

11.5 IMPACT ON ECONOMIC GROWTH

Despite the increase in energy efficiency, Croatia's economic growth requires for increased energy consumption. Increasing the supply of total energy is at the same time a prerequisite for economic growth, but also an additional contribution to the growth of economy.

Croatia is positioned among the countries in front of which is the new large investment cycle due to the old-age of energy facilities and their required shut down, expected energy demand increase, and long-time insufficient investment into the Energy sector. Furthermore, given Croatia's geopolitical position and scarce primary energy, the Government shall persist on a concept of building the regional energy hub, which additionally affects the amount of required investments.

It is estimated that the value of total investments into the Energy sector in a period of 2009-2020 could be to 15 billion Euros in current prices.

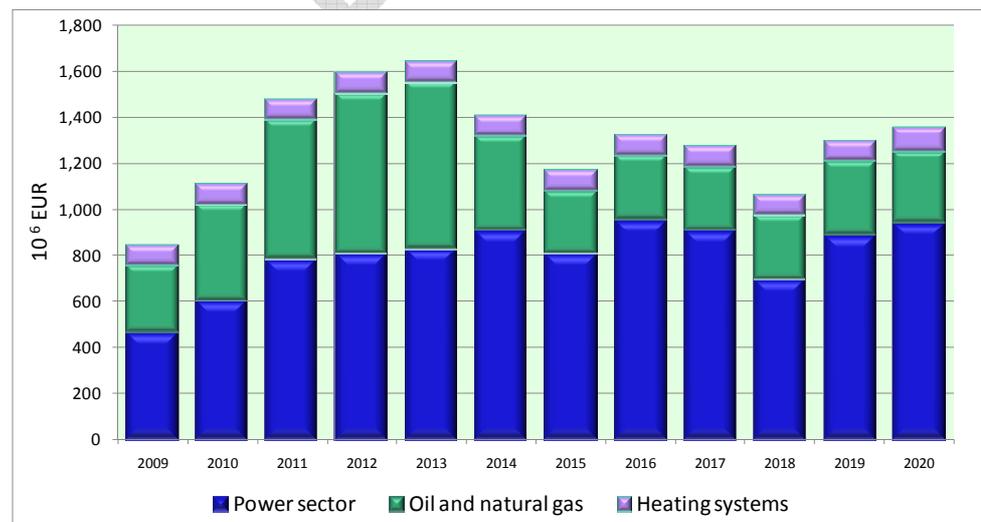


FIGURE 11-1 DYNAMICS IN INVESTMENTS INTO THE ENERGY SECTOR OF THE REPUBLIC OF CROATIA IN A PERIOD OF 2009-2020

The most financially demanding investments are those in the energy system, whose share in total required investments is around 60%. The investment share in the system of production, processing, transport and oil and gas storage is around 30%, while in heat system is around 10%. Within the first two years of the Strategy implementation the investments' value will be slightly lower due to required preparation activities, and the highest investment amounts will be achieved between 2011 and 2014, after which the annual investment amounts will be stabilized on the level of around 1.2 billion Euros.

The Republic of Croatia does not manage with its own capital accumulation of such level, so such funds should be searched for on the international capital market. Overall impacts of investments in Energy sector will depend primarily on how energy facilities are financed, for these are large and complex investments. Due to level of Croatia's foreign debt, as well as increasing vulnerability due to negative shocks originating from the environment, when making each individual investment, the Government shall prefer the funding that does not result in the growth of foreign debt and which contributes to sharing the risk between local and foreign investor.

Considering the constant changeable economic conditions due to which is impossible to predict with certainty the economic movements in a period covered by this Strategy, before taking certain investments foreseen by the Strategy, it is necessary to perform the comprehensive evaluation of its total economic effects, considering the investments which could significantly affect the majority of macroeconomic variables by their amount and significance.

Structure of future investors is hard to estimate, for the majority of investments shall be released to the market. Although various models are possible for the Strategy realisation, it shall be assumed, due to the economic efficiency assessment of the Strategy that two thirds of investments will be taken by local investors, while the one third will be taken by foreign investors. The greatest interest of foreign investors is expected at investments in energy system and LNG terminal, while at other projects less foreign investments are expected. It is assumed that local investors shall finance the investments partially from achieved profit and partially from credits, while the proportion of these two sources will be 1:3. Credits' requirement would not be completely satisfied on local market, so it is expected that one fourth of credit needs would be settled on foreign market.

Above mentioned financing model of expected investments would require an annual amount of local financing of around 850 million Euros, of which almost 300 million Euros would be necessary to be financed by local investors' profit, while 550 million Euros by credits. It is evaluated that considering the existing business terms a potential of achieving the profit for local investors is significantly lower than 300 million Euros per annum. Therefore, in order to finance the required investments in energy system, it would be necessary to: (i) potential local investors should achieve larger profits by reducing the costs or increasing the incomes, or (ii) foreign investors should achieve larger direct investments. In both cases, the energy prices will have an important role, because the local investors could not be able to accomplish a larger profit without increasing the energy prices, and foreign investors could be attracted to the Croatian market only by higher energy prices.

- For the Strategy realisation it is necessary that local investors achieve the larger profit or that foreign investors achieve larger direct investments;
- Market energy prices will provide for local investors to achieve a profit and will attract the foreign investors as well;

In order to increase the credit rating of energy projects, investors' incentives, energy efficiency incentives and other, Croatia decided to gradually implement the market energy prices. This is especially in reference to the price of electricity and natural gas, which are the backbone of the Strategy, both in the sense of diversifying energy-generating products and using geo-strategic rent. In terms of great sensitivity of energy prices and possible increase due to the adjustment of tax system with the EU system, achieving the proper prices' increase on local energy market will represent a great challenge for economic policy-makers.

Existing knowledge and capacities of consulting, civil engineering, installation and partly production companies can be significantly advanced by involving them into the investment cycle, thus contributing to the increase in employment, growth of gross domestic product and strengthening their international competitiveness. Involving local producers is of special importance, given that the most of equipment required to build investment facilities would be imported.

Due to the usage of local inputs, especially in a segment of performing the construction works and installation, assumed investments will increase the gross domestic product for 7 billion Euros or 600 million Euros per annum during the Strategy implementation. Subsequently, the average annual growth rate of GDP could be increased for 1 percentage point due to Energy sector investments.

As the multiplicative effects of Energy sector investments are quite high, the growth of GDP could be even higher to a maximum of 2 percentage points per annum. Since there are still no up-to-date input-output tables for Croatia, it is not possible to assume with accuracy total macroeconomic effects of the Strategy implementation.

Due to the investments' financing by foreign borrowing, the Strategy implementation shall have not quite insignificant impact on the increase of share of foreign debt in GDP. Such impact is estimated to 0.8-1 percentage point per annum or total of 10 percentage points. Subsequently, the growth rate of GDP caused by Energy sector investments will affect the ratio movement of foreign debt in GDP.

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12 REASONS FOR ADOPTING NEW ENERGY STRATEGY OF THE REPUBLIC OF CROATIA

Work on still existing Energy Strategy of the Republic of Croatia has begun in 1994 when the Croatian Government has initiated a program “Development and organization of the Croatian Energy sector” (PROHES), out of which national energy programs have come out, and based on which a draft of Energy Strategy of the Republic of Croatia has been developed in 1998. Within the Strategy “Croatia in the 21st century”, chapter Energy Sector, that draft of the Strategy has been harmonized with new assessment of general and especially economic development, and, along with small amendments, pursuant to the Energy Act from 2001, valid Energy Strategy of the Republic of Croatia was adopted on 19 March 2002.

Since the 2002 Strategy has been developed, adopted and implemented, significant changes have happened at both international and national level. These changes affected the energy situation in Croatia and the basic facts for reconsideration of the Croatian Energy sector future:

- Croatia has become a candidate country for full membership in the European Union (EU);
- Croatia has accepted the Energy Community Treaty;
- Croatia has signed and ratified the Kyoto Protocol along with the United Nations Framework Convention on Climate Change;
- Croatia is faced with a serious instability of energy prices on global market.

In accordance with changes happened since adopting the 2002 Strategy, it was necessary to update and upgrade an existing Strategy and, therefore, Government of the Republic of Croatia suggests to the Croatian Parliament to adopt a new Energy Strategy even before the expiry of ten-year period prescribed by the Energy Act.

Implementation of the Energy Strategy of the Republic of Croatia shall be ceased by a date of entering this new Strategy into force ("Official Gazette" No. 38/02).

Government of the Republic of Croatia shall, pursuant to Article 6 paragraph 1 of the Energy Act, based on new Energy Strategy of the Republic of Croatia, develop an Energy Strategy Implementation Programme of the Republic of Croatia where the measures and activities' holders will be established, as well as a dynamics of energy policy realization for four-year time period.

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13 CONCLUSION

Energy Strategy of the Republic of Croatia is being developed during negotiations on its full membership in the European Union. Since the European Union has defined goals until 2020, the Strategy is considering that period as well taking into account projections until 2030. The Strategy has answered to the European Union demands and offered solution for achieving the basic goals related to the security of energy supply, competitiveness of Energy sector and sustainable development, which develops in accordance with the Croatian particularities and its national interests.

Beside common goals including a reduce of greenhouse gas emissions for 20% in 2020 in relation to 1990, 20% of renewable energy sources in gross final energy consumption in 2020, 10% of renewable energy sources share in all types of transport in relation to the final energy consumption in land transport, decrease of final energy consumption of 9% in a period until 2016 using the energy efficiency measures; Croatia is setting up a national goal to maintain the share of electricity generation out of renewable energy sources, including large hydropower plants, at level of 35% in total electricity consumption in a period until 2020.

Security of supply is a condition of economic and social development, so, despite the energy efficiency increase, energy development and growth are essential. Government of the Republic of Croatia is responsible for the supply security. It shall observe market movements in order to evaluate on time whether the supply security would be endangered and whether it would be necessary to intervene due to additional encouragement of the investors' interests to develop certain segments of the energy system. However, there is a feedback as well, so an achievement of the Strategy assumptions could be a significant contribution to a development of the Croatian industry and other economy.

The Strategy assumes significant investments into Energy sector in amount of around 15 billion Euros within the period from 2009-2020, calculated according to current prices.

The Republic of Croatia does not manage with enough capital accumulation for such significant investments, so it should require for the funds on the international capital market. Regardless of the actual world crisis, there is a significant interest for investments in Energy sector.

An expected wide exploitation of renewable energy sources is also of great importance for the Croatian economy, especially for small and medium entrepreneurship sector due to the opening of new working places and adopting modern technologies. If the expected goals are achieved considering the exploitation of renewable energy sources, required investments in environmental protection would be significantly decreased.

For investments in the Energy sector as a special type of investment, favourable conditions can be created only through a combination of general favourable economic conditions and specific conditions resulting from the importance of energy for the economy and population and which have to support the goals defined by this Strategy.

Favourable general economic conditions mean macroeconomic stability, efficient state administration, competitive level of tax burden, legal safety, adequate human resources, well-developed economic infrastructure, protection of market competition, presence of financial investment incentives, presence of specialized state institutions for investment promotion, etc. However, in order to encourage investments in the Energy sector, due to high levels of required investments, long-term nature of investments and sensitivity of investment outcomes to unpredictable trends of world energy prices, it is necessary to create additional conditions so as to make these investments more attractive and direct them towards desired direction.

Therefore, the guidelines which provide further economic and social development of Croatia have been enclosed by this Strategy, based on which the Government of the Republic of Croatia shall, pursuant to Article 6 paragraph 1 of the Energy Act, develop an Energy Strategy Implementation Program of the Republic of Croatia where the measures and activities' holders will be established, as well as a dynamics of energy policy realization for four-year time period.