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ENERGY DEVELOPMENT STRATEGY
OF THE REPUBLIC OF MONTENEGRO BY 2025

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ABBREVIATIONS AND SYMBOLS

BAT	Best Available Technology
BOT	Build-Operate-Transfer
CANU	Crnogorska Akademija Nauka i Umjetnosti (Montenegrin Academy of Science and Art)
CDM	Clean Development Mechanism
CO ₂	Carbon Dioxide
TL	Transmission Line
EC	European Commission
EE	Electrical Energy
EES	Electro-energetic System
EIHP	Energy Institute «Hrvoje Požar»
EPCG	Elektroprivreda Crne Gore (Electric Power Company of Montenegro)
ES	Energy System
EU	European Union
EU-15	Fifteen states of European Union
EUR	Euro
EUR/cap	EUR per capita
GDP	Gross Domestic Product
GDP/cap	GDP per capita
GJ	Gigajoule
GWh	Gigawatthour
HPP	Hydro Power Plant
IEA	International Energy Agency
IREET	Institute for Research in Energy, Ecology and Technology
KAP	Kombinat aluminijuma u Podgorici (Aluminium Combinat in Podgorica)
kcal	Kilocalorie
kg	Kilogram
kJ	Kilojoule
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatthour

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LNG	Liquified Natural Gas
MEDEE	Modele d'Evolution de la Demande d'energie (Model of Energy Demand Development)
MJ	Megajoule
MVA	Megavoltamper
MW	Megawatt
MWh	Megawatthour
NO _x	Nitrogen oxides
OPM	Open pit mine
PJ	Petajoule
RoM	Republic of Montenegro
RSE	Renewable sources of energy
SC	Share-holding Compay
SEE	South-East Europe
SO ₂	Sulphur Dioxide
t	Ton
Tcal	Teracalorie
toe	Tonne of oil equivalent
TJ	Terajoule
LPG	Liquified Petroleum Gas
TPP	Thermal Power Plant
TS	Transformer Station
TWh	Terawatthour
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation
UNMIK	United Nations Interim Administration Mission in Kosovo
US\$	US Dollar
WASP	Wien Automatic System Planning Package
ŽN	Željezara Nikšić (Steel Plant Nikšić)

TABLE OF CONTENTS

1. PRELIMINARY NOTES.....	1
2. INTRODUCTION	5
10. MAIN STRATEGIC COMMITMENTS.....	7
11. STRATEGY DEVELOPMENT BACKGROUND.....	9
4.1. INSTITUTIONAL ENVIRONMENT.....	9
4.2. REGULATORY ENVIRONMENT.....	9
4.3. DOMESTIC LEGISLATION AND REGULATIONS.....	10
4.4. RELEVANT INTERNATIONAL REGULATIONS	10
4.5. EUROPEAN DIMENSION OF MONTENEGRIN ENERGY SECTOR.....	11
12. ENERGY SECTOR OF MONTENEGRO IN THE PERIOD 1990-2004	12
5.1. ENERGY SECTOR POSITION IN THE ECONOMY	12
5.2. PRIMARY ENERGY PRODUCTION	12
5.3. ENERGY IMPORTS AND EXPORTS	12
5.4. PRIMARY AND FINAL ENERGY CONSUMPTION	13
5.5. TOTAL ENERGY BALANCE.....	13
5.6. ENERGY EFFICIENCY AND ELECTRICITY LOSSES.....	14
5.7. HIDRO-ENERGY POTENCIAL.....	15
5.8. POTENCIAL OF OTHER RENEWABLE ENERGY SOURCES.....	16
5.9. COAL RESERVES.....	16
5.10. PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY	17
5.11. LIQUID FUEL SUPPLY	17
5.12. HEAT PRODUCTION.....	18
5.13. ENVIRONMENTAL ASPECTS.....	18
5.14. SOCIAL ASPECTS AND PRICES OF ENERGY PRODUCTS	19
5.15. INFORMATION SYSTEM	19
5.16. EXISTING SCENARIOS, PLANS AND STRATEGIES FOR THE OVERALL DEVELOPMENT OF REPUBLIC OF MONTENEGRO.....	19
5.17. OTHER AREAS – WATER INDUSTRY ASPECTS	20
13. KEY ASSUMPTIONS FOR THE STRATEGY	21
14. ENERGY DEVELOPMENT STRATEGY.....	22
7.1. FINAL ENERGY CONSUMPTION UNTIL 2025	22
7.1.1. Scenarios of Gross Domestic Product (GDP) development.....	22
7.1.2. Main assumptions for calculation of the final energy consumption until 2025	22
7.1.3. Consumer structure and forecast of final energy consumption by scenario	23
7.2. STRATEGY FOR EFFICIENT USE OF ENERGY.....	24
7.2.1. Public sector.....	25
7.2.2. Households.....	25
7.2.3. Industry and economy	25
7.3. DEVELOPMENT OF USE OF HYDRO POTENTIAL.....	25
7.4. DEVELOPMENT OF USE OF COAL RESOURCES	26
7.5. DEVELOPMENT OF LOCAL ENERGY CONCEPTS, COGENERATION AND HEAT ENERGY SUPPLY	26

GREEN PAPER

7.6.	SUPPLY OF LIQUID FUELS	27
7.7.	DEVELOPMENT OF THE SYSTEM FOR LIQUID PETROLEUM GAS (LPG) AND NATURAL GAS SUPPLY	27
7.8.	STRATEGY OF INTRODUCTION OF RENEWABLE SOURCES OF ENERGY	28
7.9.	RESEARCH IN THE ENERGY SECTOR	29
7.10.	DEVELOPMENT OF THE POWER SECTOR.....	29
7.10.1.	Electrical energy consumption.....	29
7.10.2.	Existing power generation units	30
7.10.3.	Scenarios of development of power generation.....	30
7.10.4.	Scenario „N-2“ of construction of new power plants.....	31
7.11.	DEVELOPMENT OF POWER TRANSMISSION SYSTEM	32
7.12.	DEVELOPMENT OF POWER DISTRIBUTION SYSTEM.....	33
7.13.	TOTAL ENERGY BALANCE (SCENARIOS: S1, S2, S3).....	33
15.	ENVIRONMENTAL PROTECTION.....	36
8.1.	ANALYSIS OF ENERGY DEVELOPMENT SCENARIOS FROM THE ENVIRONMENTAL PROTECTION ASPECT.....	36
8.2.	EMISSION FOR VARIOUS ENERGY DEVELOPMENT SCENARIOS	36
8.3.	ENERGY INFRASTRUCTURE AND SPATIAL PLANNING	37
16.	INVESTMENT PROMOTION, COSTS AND FINANCING OF THE ENERGY STRATEGY	38
9.1.	WHAT DIFFERENTIATES THE ENERGY SECTOR OF MONTENEGRO FROM THE NEIGHBORHOOD?.....	38
9.2.	INVESTMENTS IN THE ENERGY SECTOR OF „ROM“ AND COMPARATIVE ANALYSIS	38
9.3.	INVESTMENTS PROMOTION AND CAPITAL MARKET	39
9.4.	REQUIRED FINANCIAL RESOURCES FOR THE DEVELOPMENT OF THE ENERGY SECTOR.....	39
9.5.	FINANCING SOURCES OF ANTICIPATED DEVELOPMENT OF THE ENERGY SECTOR	41
17.	OTHER STRATEGY ELEMENTS.....	42
10.1.	ELECTRICITY PRICES AND POVERTY REDUCTION	42
10.2.	PRICE POLICY.....	42
10.3.	KEY INDUSTRIAL CONSUMERS.....	43
10.4.	LOCAL AND REGIONAL ENERGY MARKET	43
10.5.	ACCESSION TO EU, REGIONAL AND EUROPEAN DEVELOPMENT TRENDS.....	43
10.6.	TECHNOLOGICAL DEVELOPMENT AND RESEARCH	44
10.7.	EDUCATION AND INTERNATIONAL COOPERATION.....	44
10.8.	BOLOGNA CONVENTION	45
10.9.	ALTERNATIVE (NUCLEAR) OPTION?!	45
10.10.	PUBLIC AWARENESS AND STRATEGIC COMMUNICATION	45
18.	STRATEGY IMPLEMENTATION	47
11.1.	ACTION PLAN	47
11.2.	STRATEGY IMPLEMENTATION MONITORING OBJECTIVES AND TOOLS	47
19.	MAJOR STRATEGY RECOMMENDATIONS.....	48
20.	CONCLUSION	53

GREEN PAPER

1. PRELIMINARY NOTES

The development of Montenegro's energy policy is both a short- and a long-term challenge. Thus it requires a clear, yet adjustable framework: clear in a sense to represent a determined approach supported at the highest level, and adjustable meaning to be regularly improved and supplemented.

"The Energy Development Strategy of Montenegro by 2025" (hereinafter "the Strategy") is a document resulting from a continuous work of institutions managing the energy supply in Montenegro, and it sets out specific objectives and defines mechanisms for shifting from a classical understanding of supplying consumers with energy to a safe, competitive, and environmentally acceptable energy services. The Strategy sets out the perseverance and mechanisms for the alteration to the understanding of the role and the importance of energy in production and infrastructure development, defines the guidelines of the Montenegrin energy sector development, thus attracting foreign investors interested in this sector, and in the long term, aiming at increasing employment, reducing poverty, and raising the level of overall social welfare.

The Strategy represents the Montenegrin vision of energy management in its wider sense, prepared in accordance with the Terms of Reference of the Montenegrin Ministry of Economy (July 2005), and based on the results of a comprehensive scientific research previously defined by the expert team in the first part of the project called "Professional basis for the Energy Development Strategy of Montenegro".

The authors of the Strategy applied the following methodologies: MEDEE, WASP, some sector-specific methodologies (e.g. for grid planning, and the like), as well as a special methodology (EIHP) for the preparation of energy balance after the professional assessment of the authors that the level of EUROSTAT and IEA methodologies would not be sufficient for the Strategy purposes since the economy sectors of vital importance for Montenegro require a wider analysis in order to make better quality forecasts on future energy needs.

The Strategy is a document resulting from a close cooperation of the authors with numerous domestic and international experts in the field. Workshops and many consultations provided useful advices, suggestions, and positive critiques, which contributed to quality improvement of the Strategy. The dynamics of its preparation pointed to numerous differences in viewpoints, neglected fields, and approach differences, and professionally, it revealed the boundaries and limits of our present knowledge.

The Strategy preparation was coordinated by the Ministry of Economy/Ministry for Economic Development of Montenegro. The preparation of the Professional basis and the final document of the Strategy is the result of a teamwork of experts from the IREET Institute for Research in Energy, Ecology, and Technology (Ljubljana, Slovenia), the Energy Institute Hrvoje Požar (Zagreb, Croatia), the representatives of the Montenegrin Academy of Science and Art (CANU), the University of Montenegro, Electric Power Company of Montenegro (EPCG), the representatives of the Coalmine Pljevlja, Jugopetrol, Montenegro Bonus, and representatives of various other institutions and the Government of the Republic of Montenegro.

The Energy Development Strategy incorporates the energy, ecological, economic, legislative, organizational, institutional, and educational dimensions. It covers the period up to the year 2025 that will experience the succession of existing and future technologies, and changes in the diversity mix and the manner of resources and energy management; it envisages legislative, economic, organizational, institutional, educational, counseling, and promotional measures for its implementation.

The unemployment rate in Montenegro is higher than the global average and that in the EU. Therefore, the imperative of the Strategy, as a prerequisite and a support to other development segments of the society, is to give its contribution to domestic employment through a wise opting for indigenous production and energy services and by introducing such technologies that will not devastate the environment, bearing in mind the international reputation and status of Montenegro as an ecological state.

GREEN PAPER

The Energy Development Strategy is certainly a part of the overall strategy for a planned economic development of Montenegro and gives a clear vista of the Montenegrin future energy system that prioritizes the interests of the state and its citizens; it takes cognizance of all EU documents; it implies a significant reform of the energy sector and the continuation of transition with the ultimate objective being the creation of new energy sources in line with European standards. That is why the envisaged measures for the implementation of the Strategy are in manifold dimensions, and their implementation is of great importance both regarding dynamics and priorities.

Therefore, for the purpose of a comprehensive documentation background and better insight in the present condition of available resources, and as a part of the overall project and set out terms of reference, the following studies have been prepared:

- o Book A: HISTORIC ENERGY BALANCES (July 2006)
- o Book B: FORECASTS OF FINAL ENERGY DEMAND (July 2006)
- o Book C: DEVELOPMENT OF COAL, OIL, AND GAS SYSTEMS IN MONTENEGRO
- o Book D: DEVELOPMENT PLAN FOR ELECTRIC POWER SYSTEM OF MONTENEGRO (Master plan) (July 2006)
- o Book E: LONG-TERM PLAN OF ENERGY SUPPLY TO MONTENEGRO – ENERGY BALANCES UP TO 2025 (July 2006)
- o Summary of Books A, B, C, D, and E (August 2006)

A logical continuation of the aforesaid documents was presented in the final document “The Energy Development Strategy of Montenegro by 2025” (“the Green Book”) which takes the central place in the overall project as it opens a new road to the development of Montenegrin energy by respecting its multifunctional role in overall development of the country.

The basic documents of the Strategy (Books A-E) have been conceived and prepared so that each of them represents a whole and can be used separately; at the same time, they are integral parts of the unique document, the Strategy. Bearing in mind their dual nature, the authors tried to avoid certain repetitions as much as possible. Where necessary, some of the basic starting points of the future energy sector reforms have been reiterated.

Abstract from the Energy Strategy (“Green Paper”) represents a summary of results of all integral research and expert analyses prepared for the purpose of this project.

The first chapter of the Green Book describes energy as an incentive of global growth. It presents international trends in energy management and the movement of primary energy sources in the world market in the previous period, as well as the European energy dimension in the conditions of interdependency by pointing to the main indicators of the current situation in the EU energy sector.

The second chapter deals with the relevant energy statistics of Montenegro, through energy balances, in the period 1990 – 2004 with an overview of supply with all forms of energy by sectors and used energy sources. It also shows the energy infrastructure in Montenegro, both from the aspect of energy efficiency and environment protection and impacts. It also gives the main macroeconomic and energy indicators, as well as the prices of energy sources.

The third chapter is dedicated to the analysis of the existing, and proposals for the enactment of new, laws with regard to the Montenegrin energy sector, and the summary of regulations prescribing the organization of economic subjects, property law, water management and forestry, investments, building, and environment protection.

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The fourth chapter gives a detailed overview on European dimension of Montenegro's energy by taking into account the common European energy policy and its main development directions, and the effects of its energy market development on the Montenegrin energy sector development.

The fifth chapter deals with the long-term energy balances of Montenegro up to the year 2025, the assumptions and starting points for forecasting energy supply wherein, based on the three possible scenarios of GDP growth and the research of Montenegro's economic growth, the authors give two scenarios of the electro-energy system (EES) development and growth (N-1 and N-2), the structure of energy sources and system of meeting future energy demand. Based on the scenario of growth in final energy consumption and energy transformation and the scenario of the electro-energy system development, the authors give three possible scenarios of the building and development of the entire energy system of Montenegro (S1, S2 and S3) with energy balances projections.

The sixth chapter presents the strategy for efficient use and supply of energy in Montenegro, defining the strategy for efficient use of energy, the strategy for electricity supply, the strategy for production sector development as by scenarios, the strategy for distribution and transmission network development, and the strategy for development and supply of Montenegro with all types of energy sources.

The seventh chapter gives the technological development and technical possibilities in Montenegro's energy system and the required measures for energy supply are presented in the eighth chapter of the Strategy. The strategic importance of education and international cooperation are underlined in the ninth, while the tenth chapter gives an overview of the required funds for the implementation of the Energy Development Strategy of Montenegro by 2025, along with the necessary fiscal and tax instruments.

The detailed effect of the strategy for the development of energy production and supply in Montenegro is viewed from the aspect of legal obligations with regard to environment protection and impacts and described in the eleventh chapter wherein, depending on a scenario, potential locations of new production sites were also presented.

Objectives and mechanisms for the implementation of the Strategy on the basis of the current situation in Montenegro the authors give in the twelfth chapter, and the method of monitoring the implementation with regard to international framework and requirements is recommended in the thirteenth chapter.

The Strategy presentation, promotion, informing the public and the relevant public relations are described in the fourteenth chapter.

The Strategy ends with the authors` concluding remarks and bibliography.

Hereby we would like to thank numerous institutions and individuals who, whether directly or indirectly, contributed to the realization of this voluminous project.

We hope that the Energy Development Strategy of Montenegro, besides its basic purpose of being a platform in the process of Montenegro's energy sector approaching the EU, will be able to serve many users (professional agencies and government institutions, representatives of international organizations, potential investors, donors, energy companies, and the like) as a rich source of all the relevant and useful information about the Montenegrin energy.

Authors of the Document

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2. INTRODUCTION

A resolute commitment of Montenegro, as an independent and internationally recognized country, to continue with the initiated process of Euro-Atlantic integrations requires a responsible and complex development approach, particularly a planned development of the energy sector as the mainstay of the overall development of the country. The energy sector development is of great, and maybe the crucial, importance for the overall development of the Republic of Montenegro (RoM) as from ecological and social, so as from macroeconomic point of view.

At the time when Montenegro's energy development faces new challenges, the following document emerges

“The Energy Development Strategy of Montenegro by 2025”

(“The Strategy”) as the starting point for a European model of a sustainable and strategic development of its energy sector and the enactment of other necessary legislation, and the institutional support for a successful implementation of Montenegro's energy policy on its way to European and broader international integrations, and certainly as a support to the Government of the Republic of Montenegro and other government institutions in the preparation of other energy program documents.

The Energy Development Strategy, as one of the highest legal acts, also has the key development dimension within Montenegro, as in defining its spatial development, providing conditions for a sustainable development of the ecological state, in gaining the broadest consensus for its adoption and implementation, so as in energy end economy domains as important components of GDP growth, and the process of inevitable constructive communication among all the interested segments of the Montenegrin society.

The Strategy implementation is expected to increase investors` interest and volume of foreign direct investments in the Montenegrin energy sector.

The main objective of this document is to define the strategic mechanism that will enable the fulfillment of all key objectives of a sustainable energy development and provide a clear basis for their implementation.

Montenegro's Strategic Energy Development

The objectives of Montenegro's energy policy were adopted in April 2005. In the period 2005 – 2006, the professional basis for the Strategy was finalized (Books A-E), and in January 2007 the document “Energy Development Strategy of Montenegro by 2025”. The next step is the preparation of the Action Plan for the Strategy implementation for the first 5 years.

Strategy Timetable

The Strategy covers a long-term period, up to 2025, which can be considered sufficient for the achievement of structural changes in the energy infrastructure development, yet having a significant positive effect on quality of supplying consumers with energy and on the overall macroeconomic development of Montenegro.

Energy Policy Objectives

The following main objectives of the adopted energy policy which are supported in the Strategy are:

1. Secure, high quality, reliable, and diversified power supply aimed to comply the supply with the demands in all forms of energy,
2. Maintenance, rehabilitation and modernization of the existing infrastructure and the construction of reliable new infrastructure required for generation and utilization of energy,

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3. Reduction of import dependence, primarily through creation of stable conditions for investments in research /exploration and construction of new power facilities (especially on the basis of already explored resources related to unused hydro-potentials), as well as investments in other energy infrastructure,
4. Design of relevant legislative, institutional, financial and regulatory framework to encourage private sector involvement and investments in all aspects of energy infrastructure,
5. Creation of conditions for higher utilization of renewable energy resources, combined power and heat generation (CHP) and for the usage of fossil fuels based on clean technologies,
6. Establishment of competitive market in order to provide energy in the fields where there is a possibility to do so (generation and supply) in accordance with the concept of regional energy market, with regulated monopoly network activities,
7. Provision of institutional and financial incentives with the purpose to improve energy efficiency and reduce energy intensity in all sectors, from generation to consumption of energy,
8. Sustainable production and utilization of energy in relation with environmental protection, and international cooperation in this field, especially with respect to reduction of GHG emission,
9. Supporting research, development and promotion of new, clean and efficient energy technologies, as well as implementation of energy policy based on expert and scientific grounds.

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10. MAIN STRATEGIC COMMITMENTS

1. The Strategy is based on Montenegro's Energy Policy (2005), its current international obligations, and the EU Energy Policy Guidelines;
2. Montenegro accepts obligations set out in the Energy Community Treaty as the key document for implementation of energy reforms - prescribing directions, rules, and measures for the (re)organization of the electro-energy sector and the gas sector in future, as well as the regional market development of these energy sources;
3. Montenegro will strive to fulfill all the required measures for a successful implementation of the Acquis Communautaire regarding energy, environment, competition, and renewable energy sources in line with requests and dynamics set out in the Energy Community Treaty;
4. Identify energy as the mainstay of the overall, sustainable, and long-term stable growth of Montenegro with positive macroeconomic effects;
5. Improvement of energy efficiency in production and consumption to the level of moderately developed EU countries;
6. Undertake concrete measures to achieve 20% share of renewables energy sources in total consumption of primary energy in line with an objective set by the European Commission;
7. Rational and wise use of hydro-energy potentials at the river basins of Morača, Komarnica, Lim, Piva, Tara, Zeta, Ibar and Čehotina with full adherence to the applicable UNESCO declarations, decisions of the Montenegrin Parliament, and principles of sustainable development;
8. Rely on the exploitation of domestic coal reserves as the second important energy resource of Montenegro besides hydro-energy; the construction of thermal power plant Pljevlja 2 and the heating system in town Pljevlja;
9. Revitalization and technical modernization of the existing electricity production, transmission, and distribution system;
10. Improve business efficiency and reduce the impact of coal exploitation and thermal power plants on environment;
11. Reduce energy dependency (reduction of energy imports) and improve the safety of energy supply in Montenegro;
12. Support development and accelerate the introduction of renewable energy sources, replace industrial and small boiler rooms with cogenerations using liquefied petroleum gas (LPG), introduce other local energy systems in the country's energy system;

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- 13. Develop the system of liquefied petroleum gas (LPG) as a strategic precedent to natural gas;**
- 14. Implement the strategic 90-day reserves of oil derivatives in accordance with the EU directive;**
- 15. Implement a program of regulatory, legislative, and operational inclusion in the process of EU accession with regard to energy and ecology;**
- 16. Continue with oil and gas exploration at the Montenegrin coast, coal exploration in Pljevlja and Berane basins, and carry on the study work on the exploitation of the remaining hydro potential;**
- 17. Improve the regulatory process and professional independence of the regulatory agency exclusively in line with Montenegro's energy policy and government instructions;**
- 18. Reach agreements with neighboring countries (Bosnia and Herzegovina, Croatia, Serbia, and Albania) on the optimal utilization of the joint hydro potential and the general water use and management;**
- 19. Active inclusion of Montenegrin institutions in international cooperation in energy research and development, and the introduction of energy in the educational program at all educational levels;**
- 20. Continue with energy sector reforms, in line with adopted Montenegro's Energy Policy and energy sector development concepts of the European Union, with a view to creating conditions for a safe, secure, reliable, and quality supply of consumers with energy at competitive prices, simultaneously respecting the principle of sustainable development and market operations;**
- 21. Continue with the restructuring of the Montenegrin Electric Power Company AD Niksic, pass a Development Strategy and a Strategy of privatization of this company;**
- 22. With a view to creating conditions for following an active energy policy, establish the system for tracking data on energy output, consumption, and losses in accordance with the EUROSTAT system of national energy accounts;**
- 23. Based on the ratification of the Kyoto Protocol in March 2007, as a country outside the annex for developed countries at least by 2012, provide opportunities and support to foreign investors for the implementation of the so-called Clear Development Mechanism projects (CDM).**

11. STRATEGY DEVELOPMENT BACKGROUND

4.1. INSTITUTIONAL ENVIRONMENT

The role of the Montenegrin Government in the energy field is to define and implement: the National Energy Policy and the Energy Development Strategy, long-term and annual energy balances and policy for their implementation, and provide for the implementation of environment protection measures.

Another role of the Government is to promote and facilitate: investments, competition based on transparency and non-discrimination, connect Montenegro's energy system with systems of other countries by taking into account economic trends and energy needs and the participation of the private sector in the energy sector. The Government also defines policies and strategies of building new, and reconstructing the existing capacities, and passes the relevant procedures.

Via the Ministry authorized for energy operations, the Government: implements the policy for energy efficiency and the preservation of energy resources, supports and advises on energy efficiency and rational energy utilization, develops and promotes efficient use of energy and renewable energy sources at the domestic market, manages funds designated for energy saving and efficiency, implements new energy technologies, promotes the participation of the private sector in Montenegro's energy sector, and carries out the privatization of state-owned energy subjects or their parts.

There is a number of active organizations in Montenegro whose activity supports the energy sector operations, starting from the Montenegrin Chamber of Commerce, the Montenegrin Engineer Chamber, the Association of Economists of Montenegro, and numerous professional institutions, such as the Academy of Science, the Quality Association, the Standardization Bureau, the Institute for Technology Development, as well as many organizations of institutional character, which are a sort of incubator for ideas and technical support for energy development strategies.

Education is an important segment of the Montenegrin society which, in the tradition, gives the best human resources to the energy sector. Education is available to the broadest society, which is considered a good foundation for the inclusion in energy programs and projects.

4.2. REGULATORY ENVIRONMENT

The Montenegrin legislation, which is in line with EU regulations, implies the respecting of dynamics and deadlines for the implementation of EU directives contained in the Energy Community Treaty (2005). The Treaty came into force on 1 July 2006 and was ratified in the Montenegrin Parliament on 26 October 2006, with which Montenegro accepted short-, medium-, and long-term tasks and deadlines prescribed in the Treaty. The key tasks are: (i) the implementation of *Acquis Communautaire* for energy, environment, competition, renewable energy sources, (ii) the passing of development plans for the implementation of "generally applicable European Community standards" in electricity and gas sectors, and (iii) the adoption of the "security of supply" statement that defines diversity of supply, technological safety, geographic origin of imported fuels, and other elements.

With a view to protecting consumers, providing financial sustainability of energy producing companies, promoting competition, collecting and extending information, the Strategy supports a continuous improvement of the regulatory process and professionalism of the regulatory agency.

The regulatory agency should be given the authority to establish fixed regulatory practices (tariffs, licenses, and monitoring) and a clear responsibility in order to ensure transparency and credibility of the energy sector.

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4.3. DOMESTIC LEGISLATION AND REGULATIONS

The creation of a business-friendly environment with regard to the energy legal framework is based on regulations prescribing: energy, organization of companies and the tax system, property law, water management and forestry, investments, spatial planning, environment protection, and construction in a broader sense.

The legal infrastructure represents a good basis for the implementation of investments in this sector. However, the removal of normative barriers and improvements of regulations via their harmonization with EU regulations are under way, so the following laws are waiting for the enactment or being drafted: the Law on Waters; the Concession Law (replacing the Law on the Participation of the Private Sector in Public Services Provision); the Law on Construction of Buildings; the Law on Water Financing; the Law on Ecology Fund; the Law on Environment Protection (as amended); the Spatial Plan of the Republic of Montenegro by 2020, and other regulations.

The Montenegrin legal system as the Strategy basis: the Strategy has recognized and acknowledged the following applicable laws and regulations, as well as other documents in preparation, and pointed to the need of preparing new and amending the existing regulations of importance for Montenegrin energy:

- a. Regulations related to energy: the Energy Law (Official Gazette of the Republic of Montenegro, no. 39/03). The Law serves as the basis for the enactment of numerous relevant regulations that are under way or have already been enacted.
- b. Regulations related to the organization of companies and the tax system: the Company Law, the Law on Value Added Tax, the Law on Property Tax, and the Law on Immovable Property Tax.
- c. Regulations related to property law: the Property Law, the Law on Expropriation.
- d. Regulations related to water management and forestry: the Law on Waters, the Law on Forests.
- e. Regulations related to investments: the Law on Foreign Investments, the Law on the Participation of the Private Sector in Public Services Provision.
- f. Regulations related to spatial planning: the Law on Spatial Planning and Land Development.
- g. Regulations related to environment protection:
 - o Law on Environment Protection,
 - o Law on Nature Preservation,
 - o Law on Strategic Environmental Assessment Impact,
 - o Law on Integrated Prevention and Control of Environment Pollution,
 - o Law on Waste Management, Law on Ionic Radiation Protection,
 - o Law on National Parks,
 - o Numerous regulations and rules of procedure prescribing environment protection in details.
- h. Regulations related to building: the Law on Construction of Buildings.
- i. Other: It is necessary to prepare and enact legislation proposals and enabling regulations, as well as documents primarily referring to energy efficiency, use of renewable energy sources, and other documents pertinent to the European Union judiciary, as well as to maintain the level of applicability and adequacy of the existing legal solutions.

4.4. RELEVANT INTERNATIONAL REGULATIONS

One of the general provisions of the Energy Law prescribing “unbiased, transparent, and non-discriminatory energy sector regulation in line with the applicable international standards, including the European Energy Charter Treaty and EU energy regulations”, brings to light Montenegro's commitment to harmonize its energy policy and energy sector regulations with European best practices.

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As previously mentioned, the Energy Community Treaty requires the implementation and respecting deadlines and provisions:

- Directives 2003/54/EC and 2003/55/EC on the internal electricity and gas market, respectively. Regulation 1228/2003/EC on the access to transport network for cross-border exchanges in electricity, and the agreements on deadlines for qualified consumers (all consumers except households as of 1 January 2008, and all other consumers as of 1 January 2015 onwards) up to 1 July 2007;
- Directive 85/337/EC (and amending Directives 97/11/EC and 2003/35/EC) on the assessment of effects of certain public and private projects on the environment as of 1 July 2006, Directive 1999/32/EC (and amending Directive 93/12/EC) on reduction in the sulphur content of certain liquid fuels (up to 31 November 2011), Directive on limitations of emissions of certain pollutants into the air from large combustion plants up to 31 December 2017, and the relevant provision of the Directive 79/409/EC on the conservation of wild birds as of 1 July 2006;

In addition, by 1 July 2007, Montenegro has to prepare for the European Commission the action plan for the implementation of Directive 2001/77/EC on promotion of electricity produced from renewable energy sources and Directive 2003/30/EC on promotion of biofuels use for transport.

With the implementation of projects and programs defined in this Strategy, Montenegro shall completely adhere to and affirm international agreements and assumed responsibilities, thus harmonizing its development with international regulations.

Montenegro ratified the Kyoto Protocol for the United Nations Framework Convention on Climate Change (UNFCCC) on 27 March 2007 (the Law on Ratification, Official Gazette of the Republic of Montenegro, no. 17/2007). Montenegro is not on the list of developed and/or transition countries towards market economy (Annex 1), thus not having direct obligations to reduce greenhouse gas emission at least by 2012. By signing the Protocol Montenegro also fulfilled one of the conditions for joining the European Union.

4.5. EUROPEAN DIMENSION OF MONTENEGRIN ENERGY SECTOR

Montenegro will continue with an active policy of European integration with the ultimate objective being a full membership of the EU. Therefore, it is necessary for its Energy Policy and Strategy to be in line with the EU energy policy. The proposed Energy Strategy reflects all the required elements of such an approach and a geo-political development of Montenegro.

Montenegro has accessed: (i) the Geneva Convention on Long-Range Transboundary Air Pollution (1979), (ii) Multilateral agreement on Energy Charter and the Protocol on Energy Efficiency and Related Environmental Aspects (1994), (iii) the Energy Community Treaty (2005), and (iv) the Kyoto Protocol (2007).

Montenegro accepts EU energy policy based on five groups of European energy regulations with regard to defining future development: (i) security of energy supply, (ii) single electricity and natural gas market, (iii) efficient energy consumption and production, (iv) utilization of renewable energy sources, and (v) nuclear energy.

RoM agrees with a proposal of the European Commission (January 2007), to fulfill the following goals in the member countries of EU until 2020:

- § reduce the emission of greenhouse gases by 20%,
- § drastically increase energy efficiency and reduce energy consumption by at least 20%,
- § increase the share of renewable energy sources to 20% of total primary energy consumption,
- § increase the share of biodiesel fuel to at least 10%.

12. ENERGY SECTOR OF MONTENEGRO IN THE PERIOD 1990-2004

5.1. ENERGY SECTOR POSITION IN THE ECONOMY

According to macroeconomic indicators, the main characteristics of the Montenegrin macroeconomic system reflect in a stable growth of Gross Domestic Product (GDP), with a continuous decline in inflation and unemployment.

However, as other countries in the region, Montenegro also has a high foreign trade deficit of some 7.3% of GDP (the South East Europe region average is 9.32% of GDP). The foreign trade deficit is mainly due to a large energy import dependency of Montenegro. Considering all the aforesaid trends, the importance of developing indigenous energy production and attracting investments in the energy sector is far more important as it represents one of the most efficient mechanisms for boosting growth and reducing the balance of payments deficit.

Montenegro's GDP in 2003, as at the official exchange rate, amounted to 2,477 US\$ 2000 per capita, which is 8.7 times less than the EU 15 average, but higher than GDPs of most countries in the region. In the same year, final energy consumption amounted to 1,159 kilogram equivalents of oil per capita, which is 2.5 times less than the EU 15 average, but similar to that in other countries of the region. Gross electricity consumption amounted to 7,290 kWh per capita, which is almost equal to EU 15 consumption, and two times more than in countries of the region.

In the GDP structure by certain economy sectors closely connected with the energy sector, the sector of electricity, gas and water production and supply showed an increase in the period 2000 – 2003 from 5.7% to 6.3%, while a share of the mining and quarrying sector fell from 2.7% to 2%. Manufacturing industry accounted for 9.6% and 12% in the same period.

Of the total number of employed people in Montenegro (141 thousand in 2000 and 144 thousand in 2005), 3.8% - 3.9% were employed in the sector of electricity, gas and water production and supply (some 5,400 – 5,500 people), while most of the employed were in manufacturing industry, nearly 18%. The mining and quarrying sector accounted for the additional 3% of employees in the same period (Coalmine AD Pljevlja: 1,570 employees in 2006).

5.2. PRIMARY ENERGY PRODUCTION

Of primary energy sources in Montenegro, brown coal, lignite, and firewood are produced, hydro-energy and industrial wood wastes are used, but there is no oil and natural gas production. In the period 1997 – 2004, the most important primary forms of energy were hydro-energy (35% - 65%), depending on weather conditions, and lignite (35% - 65%), then firewood (3% - 5%) and industrial wood wastes (some 0.3%). In the same period, domestic production gradually increased: hydro-energy – 8.2%, lignite – 2.6%, and firewood – 4.2%, while domestic primary energy production accounted for 69% of total primary energy consumption (“energy independence”). Total production in 2003 amounted to 43.34 PJ (100%), of which hydro-energy 27.03 PJ (62.2%), lignite 13.95 PJ (32.2%), firewood 2.07 PJ (4.8%), brown coal 0.17 PJ (0.4%), and industrial wood wastes 0.13 PJ (0.3%).

5.3. ENERGY IMPORTS AND EXPORTS

Energy imports: This implies energy imports from abroad and energy procurement outside Montenegro's borders, within the former State Union of Serbia and Montenegro. Montenegro imports oil derivatives, more than a third of the required electricity needs, and a very small amount of lignite.

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A share of oil derivatives ranges between 55% and 60%, while that of electricity between 35% and 40%. The imported lignite contribution is below 1%. Oil derivatives and electricity imports rose in 2004 by 7% and 3.4%, respectively, in comparison with 2003. In the period 1997–2004 oil derivatives imports increased (5.6% p.a.), as did the import of electricity (4.3% p.a.).

Oil derivatives imports include heating oil (crude oil), diesel oil, and gasoline. In the last few years, the share of crude oil ranged between 30% and 32%, that of diesel oil between 23% and 26%, while that of gasoline was somewhat lower (some 18%).

Energy exports: Energy exports of 5.48 PJ in 2004 is almost fivefold lower than imports and includes electricity – 4.87 PJ (88.8%), lignite – 0.49 PJ (8.9%), and brown coal – 0.12 PJ (2.2%), while the exported energy includes brown coal and lignite.

5.4. PRIMARY AND FINAL ENERGY CONSUMPTION

Total primary energy consumption in 2004 amounted to 62.72 PJ (100%), of which: primary energy production 43.34 PJ (69.1%), imports 24.85 PJ (39.6%), stock change 0.05 PJ (0.1%), and vessel bunkers 0.04 PJ (0.01%). The average annual rate of consumption increase in the period 1990–2004 was 2.3% (oil derivatives 5.5%, hydro-energy 8.2%, coal 3.9%, and firewood 4.2%).

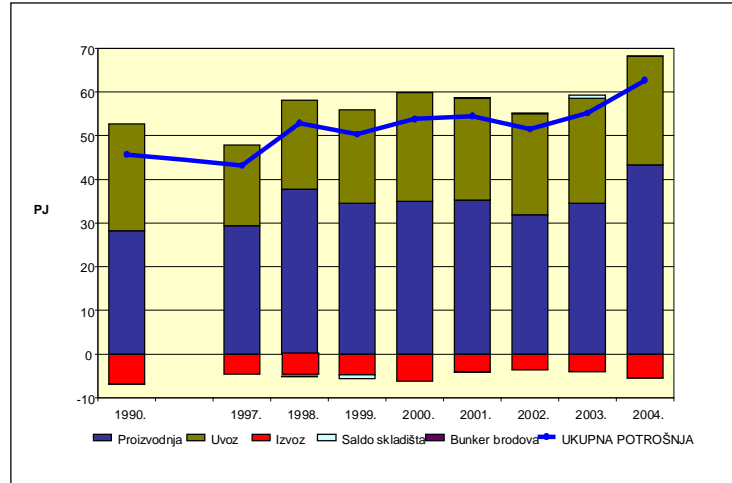
Final energy consumption rose from 29.33 PJ in 1990 to 30.58 PJ in 2004, the forms of energy being coal, firewood, oil derivatives, electricity, and heating energy. The main share was of electricity (41%-47%) with the annual increase of 2.9% in the period 1997-2004. Oil derivatives consumption was on an increase of 6.3% due to a substantial consumption increase of diesel oil and gasoline. Besides heating oil and petrol coke, the remaining consumption was of jet fuel - 7%, extra light heating oil – 3% to 5%, liquefied petroleum gas (LPG) – from 0.5% to 2%. The share of firewood oscillated over the years from 4% to 7%, and the average annual increase in this energy source consumption amounted to 4.2%. The role of brown coal is totally negligible, while lignite consumption is on a downtrend, with the average annual rate being 4.9%.

5.5. TOTAL ENERGY BALANCE

The contributors in total energy balances of Montenegro are hydro-energy, oil derivatives, coal, wood and wood wastes, and the imported electricity. A solid diversity of supply has been achieved since the three main forms of energy account for in equal shares. In the period 1997 – 2004, the noticeable trends were the increase in overall energy consumption at the average rate of 5.5% and the increase of imports at the average rate of 4.3% (Figure 1).

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FIGURE 1: Total energy balance of Montenegro (1990, 1997-2004)



Source: Energy Institute Hrvoje Požar, IREET Institute: Montenegro EES Development Plan, Ljubljana 2006

5.6. ENERGY EFFICIENCY AND ELECTRICITY LOSSES

Energy efficiency: The overall energy chain in the Republic of Montenegro, starting from use of primary sources, through plants for production, transmission and distribution of energy to transformation and its utilization by end users, is characterized by numerous irrationalities that are the result of: absence of energy strategy in the past, orientation towards energy intensive and often obsolete technology and equipment, inadequate engagement and maintenance of capacities, insufficient technical culture of the energy users, irresponsible and unprofessional work in plants, insufficient knowledge and motives to rationally use energy and inadequate price policy of energy products.

Energy sector in RoM is characterized by high-energy intensity in comparison with the EU and other developed countries, which is primarily caused by the high consumption level in aluminum and steel industry. In 2003, energy intensity of gross consumption of electricity amounted 2,955 kWh/10³ US\$ 2000, which is 8.5 times higher than the EU-15 value - and higher than almost all countries in the region. Intensity of total energy consumption in RoM amounts 1.908 kilograms of oil equivalent/US\$ 2000 (GDP), which is 5.6 times higher than the EU-15 average. All of this implies that there is considerable need for energy rationalization.

In 2005 the Government of RoM has adopted the Strategy of Energy Efficiency for RoM. The Strategy is implemented through annual Action Plans that the Energy Efficiency Unit proposes to the ministry responsible for energy. In April 2007, the annual Action Plan for the current year was adopted.

Energy efficiency measures from the Strategy of Energy Efficiency and Strategy of Energy Development by 2025 have been recognized as most convenient and unavoidable element of the energy sector development. Economic/energy potential of the introduction of energy efficiency measures, with the decrease of specific energy consumption, is significant, however time period for complete realization of these potentials should be considered, as well as required investments in relevant programs and projects.

Considering the fact that there is no rational valorization of energy greater than the one achieved by decreasing technically unjustified losses, this problem is particularly appealing for this Strategy in the context of energy efficiency.

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Electricity losses related to transmission and distribution:

Transmission: According to document "Report on Business Operations of EPCG in 2006", losses of electrical energy (EE) in transmission network of EPCG in this year amounted at 156.6 GWh or 2.7% of gross EE consumption of transmission network (5,720.6 GWh). Electricity losses have a tendency of reduction (3.6% in 2004 and 3.2% in 2005).

Distribution: Total losses (technical and non-technical) of EE in distribution network of EPCG amounted at 693.3 GWh in 2006 or 29.1% in relation to consumption of customers at the distribution level (2,382.5 GWh).

The resulting total losses of EE in transmission and distribution networks of EPCG in 2006 were thus around 850 GWh, which represents 14.9% of gross EE consumption of transmission network, which is an extremely high level of EE losses.

Electric power and energy losses in electricity distribution network of EPCG have always been high, with the drastic increase recorded in the period 1991 – 1998, mainly caused by deep economic crisis, fall of industrial production, price disparity of energy products and organizational weaknesses in electricity distribution sector, related to control and sanctioning of unauthorized EE consumption.

The very social environment, where electricity has been implicitly treated as a social element of the standard, has previously encouraged and "stimulated" inadequate attitude of consumers towards EE, i.e. in addition to technical (unavoidable) losses it has generated the increase of non-technical losses.

5.7. HIDRO-ENERGY POTENCIAL

Montenegro has a hydro-energy potential, which is considered among world's top according to the Index of Strategic Priority (ISP) considering its economy and suitability for ecological and social environment. Out of its total hydro-energy potential, Montenegro is exploiting less than 1,800 GWh (HPP Perucica and HPP Piva), i.e. somewhat above 17%. However, it should be considered that the limiting factor for exploitation of water resources is the fact that part of river Tara flow is located in the national park Durmitor, which is on the list of the UNESCO World natural heritage and the basin of river Tara is included in biosphere reserves of UNESCO programs. Pursuant to the Law on National Parks of Montenegro, it is forbidden to construct new structures on the territory of national parks, except when there are special decisions.

Surface watercourses in Montenegro have very apparent water level compared to the relatively small surface territory; generally, they have a significant hydro potential: from the aspect of hydro energy use the estimate is 13.34 billion m³, i.e. 423 m³/s, while total theoretical hydro energy potential on nine major rivers in RoM amounts 9,846 GWh. Depending on the approach to water utilization, estimate of the amount of technically usable potential of main water course outflow direction ranges from 5.4 do 6.3 TWh, while if the approach is to redirect part of waters from river Tara to river Moraca (22.2 m³/s), technically usable potential would amount from 6.3 to 6.9 TWh. In both cases potential is increased by the part of potential that RoM could obtain from 1/3 of production of HPP Buk Bijela, i.e. approx 380 GWh/year (0.38 TWh/per year).

Only in basins of rivers Tara, Piva, Lim and Cehotina, electro-energetic objects of total capacity of 637 MW and production of 1,833 GWh/per year could be built.

Besides above mentioned hydro potential that can be used for construction of production plants of higher capacity on the territory of Montenegro, there is also hydro potential of small watercourses that provide excellent opportunity for energy exploitation through construction of small HPP power plants (up to 10 MW), and hydro potential outside Montenegrin borders, which represents hydro energy potential established on the territory of Montenegro, whose realization is possible partially or completely outside its borders.

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Even though hydro potential is of enormous significance (even of key importance) for overall energy perspective of Montenegro, hydro potential consists of only a part of total water resources of Montenegro. Water resource (water for human needs, ambient characteristics, economic potential, microclimate improvements and specific regulator in the environment preservation system) is important and has the highest strategic value for the development of Montenegro, and an area where quality contribution can be offered for the regional development.

5.8. POTENTIAL OF OTHER RENEWABLE ENERGY SOURCES

Montenegro on its territory produced around 59% of primary energy from renewables energy sources in the period 2000-2004, of which 55% from hydro and the rest 4% from fuelwood, which is significantly above the EU average. However, Montenegro has much more unused potential of renewable sources, which can be valorized with reasonable investments.

Small HPPs: In previous plans, gross hydro energy potential of smaller water streams has been estimated at around 800-1,000 GWh, of which realistically usable potential of small HPPs is approx 400 GWh. This estimate has been given on the basis of quite resolute environmental and special limitations imposed on a number of small water streams in Montenegro.

However, for integrity purposes, it should be emphasized that the amount of estimated technically usable potential of small HPPs (around 400 GWh) is not affected by regimes of water stream use and alternatives of using waters from river Tara (with or without redirection), therefore in order to obtain information on total technically usable potential of all water streams in Montenegro, potential of small hydroelectric power plants as such can be simply added to the potential for any possibility, i.e. alternative of their use. It should be emphasized that additional research is necessary to fully evaluate realistically realizable potential of small HPPs, and their impact on environmental protection.

Wind energy: There is good potential for using wind energy on locations along the Adriatic coast, in the area of Rumija Mountain, between Bar and Shkoder, where the average wind speed is 6-7 m/h. Other areas are on the hills behind Petrovac and mountains between Herceg Novi and Orahovac. Another interesting area in this regard is located near Niksic (5.5-6.5 m/h).

Solar energy: This potential is very important and can be compared with Greece and Italy. Coastal and central zones are the most attractive for utilization of solar energy due to the high number of sunny hours (2.000-2.500 hours/year).

Biomass and plant waste: Annual yield of wood quantities, as the most important energy products of this kind, has been estimated at around 1.03 m³/ha a year. Estimated yield of wood is between 850 thousand m³/year and 1,060 thousand m³/year. Data on available biomass for energy purposes have to be further reconciled. There is additional research required in direct cooperation with local authorities in order to obtain more reliable data.

Communal waste: On the territory of Montenegro annual quantities of solid communal waste is estimated at 200,000 to 250,000 tons, which opens the potential for constructing 3 to 5 industrial plants for its incineration, depending on capacities. Potential locations for these plants are in the vicinity of bigger towns (Podgorica and Niksic).

5.9. COAL RESERVES

In addition to hydro-potential, coal is the most significant energy resource in RoM. Coal reserves in Montenegro are located in Pljevlja and Berane basin. Degree of coal exploration is high in Pljevlja area, while it is insufficient in Berane.

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Pljevlja area: Total exploitation reserves in Pljevlja area amount around 71.5 million tons, Maoce basin around 113 million tons, while total exploitation reserves amount 184.5 million tons.

Brown coal and lignite mine in Pljevlja area is managed by the company Rudnik Uglja AD Pljevlja, shareholding company, whose 68.9% shares are non-state owned, i.e. privately owned, while the remaining 31.1% of shares are still state owned.

Berane area: Brown coal bearing of around 28 km² of surface area is located in Berane coal basin and around 18 km² is located in Polic coal basin. Geological reserves amount around 158 million tons, however, due to insufficient research, total presumed exploitation reserves have been estimates at only approx 18.5 million tons. Company Rudnik Mrkog Uglja „Ivangrad“ AD – Berane, which was privatized / sold to a foreign investor in April 2007 (after having been under bankruptcy since 2004), is responsible for coal exploitation in Berane basin.

5.10. PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRICITY

Elektroprivreda Crne Gore (EPCG)/Electric Power Company of Montenegro is the sole electric power company in RoM, in which the Government has around 68% of ownership. EPCG is organized as four functional units: Production, Transmission, Distribution and Supply and has two organizational units: Directorate and Electro-constructions.

Production: Functional unit Production performs production activities. It consists of HE Perucica, HE Piva, TPP Pljevlja power plants and 7 small HPP power plants.

Transmission: Functional unit Transmission performs electricity transmission activities through the transmission network on 110 kV, 220 kV and 400 kV level, electric energy system management and maintenance and development of transmission network. Within Transmission unit, Market Operator function is temporarily performed. Transmission network is characterised by mainly radial structure on all three voltage levels and good connection with neighboring electric energy systems in Serbia, Bosnia and Herzegovina and Albania.

Distribution: Functional unit Distribution performs transport of electricity through distribution network, maintenance, development and management of this network. There are 16 local distributions in the system, which supply a total of 285,000 consumers. Network development in the past has been based on two degrees of transformation 110/35 kV and 35/10 kV. With the increase of electricity consumption, such concept of distribution network has become insufficient; therefore at the beginning of 80s, direct transformation 110/10 kV has been introduced.

5.11. LIQUID FUEL SUPPLY

Liquid fuel: RoM is entirely importing oil and oil derivatives. In the period 2000-2005, RoM imported 13.3-15.0 PJ or 315,000-355,000 t of oil derivatives. Functioning of companies in the area of oil and oil derivatives is organized as a market activity.

Liquefied petroleum gas (LPG): LPG on the market in Montenegro is currently available in smaller steel containers, smaller containers for service sector and households, and in larger containers for industrial and hotel consumers and as the auto gas. Existing distribution systems are significantly above the market consumption.

Oil and gas potential in the RoM: Based on previously conducted research for determining oil and natural gas reserves, total oil core potential has been determined in two separate submarine zones in Montenegro amounting 12.5 x 10⁹ tons. According to submitted data, potential oil reserves amount approx 7 billion barrels, while potential natural gas reserves amount 425 billion m³. Calculated oil and gas reserves are on the level of geologic reserves (perspective and potential) and

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have been classified as D₁ and D₂ (recognizing sediment basin where conditions for carbon hydroxide creation could occur). Real commerciality of previous emergence of oil and gas in submarine areas in Montenegro can be determined by constructing new additional wells on suitable structures.

It is estimated that significant production can be realized in this area with the increased research, if commercial bearings are discovered shortly.

5.12. HEAT PRODUCTION

Organization of heat supply: Heat is produced in industrial furnaces and one public boiler room. Industrial furnaces are privately owned by some company owners.

Heat production: In 2004 a total of 3.01 PJ of heat energy has been produced, mainly in the non-ferrous metal industry 2.66 PJ, ferrous metallurgy industry 0.24 PJ, wood industry 0.20 PJ and food industry 0.25 PJ.

5.13. ENVIRONMENTAL ASPECTS

Quality of the environment – current situation by 2004: From the general aspect, environmental quality has been preserved, with few disturbances, therefore enabling dynamic, but wise and rationally designed energy and overall development of the Republic of Montenegro.

Domain of environmental requirements is largely determined by natural and ambient values of Montenegro (biodiversity and natural beauty), their current state, risk of irrational use of space and other resources, and ability of nature system to accept, absorb and adjust itself to changed conditions required by the overall social and economic development.

Three regions of RoM (north, central and south) have different environmental features and significantly different requirements regarding environmental protection. While the coastal zone and submarine zone are already showing signs of devastation caused by human activities, north of Montenegro (except Pljevlja region) is subject to devastation that do not come only from Montenegro, therefore not as much caused by economic development.

Montenegrin territory already feels the effects of global warming, reflected in increased drought period and drying of water streams of smaller and larger rivers, which has serious consequences for biotic of river and stream flows. There is a need for specially constructed accumulations that would adequately prevent unwanted effects of global warming. Positive effects of construction of accumulation hydroelectric power plants should be considered in this respect.

Energy and space: Today most significant energy structures in RoM are the following: TPP Pljevlja and Coal mine complex, HPP Piva and HPP Perucica with accumulations, and transmission and distribution infrastructure. Potential locations of new TE and HE on energy-important rivers have been presented in the Draft Spatial Plan of RoM. It includes 43 planned and potential accumulations, 11 coal bearings in Pljevlja region and several bearings in Berane and Polic basin, and 69 prospective small HPPs.

Environmental aspects of energy production: There are 3 environmentally most burdened regions in Montenegro: Pljevlja municipality region, Aluminum Plant Pogorica (KAP) and Steel Plant Niksic. Environmental conditions in municipality of Pljevlja region are the result of energy sector activities, while Aluminum Plant Pogorica (KAP) and Steel Plant Niksic environmental problems are caused by energy users/industrial producers.

Burden on the town of Pljevlja is the result of activities in the coalmine, thermal power plants, and particularly smaller furnaces in the town. Due to waste waters from mentioned technologically obsolete

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plants, local rivers Vezisnica and Cehotina are the most polluted waters surfaces in RoM. Also, coal mine, together with ashes and cinder from TPP Pljevlja is considered as hazardous waste.

Present air pollution (primarily due to the use of engine fuel) and subterranean waters pollution should be quantified and considered when drafting energy development plans.

Montenegro has a significant and increasing deficit of electricity production and consumption. Therefore it is necessary to analyze possible effects that will appear if Montenegro opts for development of other types of industries (alternative to construction of hydroelectric power plants) that will enable payment of imported electricity.

5.14. SOCIAL ASPECTS AND PRICES OF ENERGY PRODUCTS

Social component of energy is reflected in national distortion of prices of specific types of energy products, in particular electricity prices that are not market priced in Montenegro. This distortion of electricity prices is one of key factors related to development of electric energy system in Montenegro.

Prices of other energy products (oil derivatives, gas, etc) are in the domain of market values. This is largely due to the inherited practice from previous development period, and insufficient income of households for payment of market prices of electricity, which has a significant impact on unfavorable trends in the energy sector. This is why active and gradual program for reduction of price distortion is initiated, which will shift prices towards the market level, however it is emphasized that this process should be realized considering socially deprived consumers, which is basically not the responsibility of the energy sector, but the ministry responsible for social care of deprived categories of citizens. Electric power industry activities (direct employment in electric power industry; work in companies that service demanding electric power industries and prospective investment activities) can have significant and strategic impact on social conditions in Montenegro, particularly in the north of the Republic.

5.15. INFORMATION SYSTEM

Montenegro has adopted principles and action plans of the World Summit on Information Society (WSIS), Strategy of Information Society Development from 2004 and Strategy of Electronic Communication Sector in Montenegro.

However, there is a notable absence of systematic approach to the development of informatics program solutions that support energy and other industries. There is no minimal set of common standards for development of data collection system.

In the energy sector, The Law on Energy, and in other areas (Law on Spatial Regulation, Law on Construction of Buildings, Law on Construction Land, Law on the Environment, Law on Waters) do not stipulate the obligation to collect and update the data, which can be considered as notable weakness in this stage of overall development of Montenegrin society. Therefore, it is necessary to foresee changes in legislation in all mentioned areas with an aim to improve the current situation.

5.16. EXISTING SCENARIOS, PLANS AND STRATEGIES FOR THE OVERALL DEVELOPMENT OF REPUBLIC OF MONTENEGRO

Period of gradual transition of the Republic of Montenegro from the state union to an independent state is marked with intensive work on multi-component planned development, which includes drafting of numerous strategic documents on: development of specific important economic sectors, sustainable development, environmental protection and as the most important, Updated Spatial Plan of the Republic of Montenegro. National Strategy for Sustainable Development of Montenegro shall be enacted, as well as the Strategy of EPCG Development, Strategy of Electric Power Sector Privatization, Strategy for Development of Small and Medium-

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Sized Enterprises for the period 2007-2010, Strategy for Development of Architecture and specific strategies in the environmental protection area.

All of the planned documents, which relay heavily on modern European and international experiences and related development plans, emphasize the importance of environment for Montenegro, the need for sustainable development, highlighting usage of ambient advantages and accession to Euro Atlantic integration process.

In all plans and development strategies, Montenegro is regarded as a modern and regulated democratic state, fully integrated in Europe, a specific ecological oasis of unspoiled nature, which ensures its progress within sustainable development framework.

Regarding existing strategic solutions in the electro-energetic system, the plan is to stabilize the work of electric energy system (EES) of Montenegro with the decrease of electricity deficit, which will be achieved through:

- Revitalization and optimization of existing production, transmission and distribution structures with the objective of achieving safe and regular supply of users on already reached consumption level,
- Construction of new electricity sources including the most efficient technology for energy transformation, therefore minimizing environment pollution and eliminating deficit and
- Gradual transformation of Montenegro into the exporter of high-quality (peak) electricity.

Also, it should be emphasized that during the period of preparation of Strategy for Development of Energy Sector, numerous other strategic documents are being prepared related to the development of other economic branches. However, common issue for majority of planned documents is the absence of the concrete answer: what is the driving force of sustainable development that is the basis for everything?

In the Strategy of Energy Development in RoM by 2025 energy has been recognized as a pivot of the overall, sustainable and long-term stable development of the state of Montenegro.

5.17. OTHER AREAS – WATER INDUSTRY ASPECTS

Water resource of Montenegro is its key resource, which has a potential to be a bearer of the overall development of the state. As such it deals with energy issues (using hydro potential for large, medium and small HPP), environmental protection, international relations (based on distribution of water resources), social status of citizens; i.e. it provides a basis for implementation of ecological state concept. The essence of this resource is management and strategic overview of water resource value in the broader Mediterranean region. Montenegro considers these issues as very important and it has included them in the Water Industry basis of the state.

13. KEY ASSUMPTIONS FOR THE STRATEGY

In accordance with the Economic Reform Agenda of zMontenegro 2002-2007, the focus of economic policy will be to accelerate growth and development and to strengthen the competitive capability of the economy. Basic directions of activities are oriented towards the development of the entrepreneurship and growth of investments in all areas, and in particular in the energy sector, while respecting regional development components.

Energy Development Strategy will be realized through investment projects for generation and energy infrastructure facilities. Privatization program, various forms of cooperation with international institutions and implementation of contracts with strategic corporations in the energy field, undoubtedly represent a reliable way to achieve the highest multiplier effects to the overall development of the state of Montenegro.

Consideration of resources, main parameters determining the general development of Montenegro and their implications on the strategy of the overall development of the State, resulted in definition of following key assumptions for the development of the Energy Development Strategy until 2025:

- Acknowledging the risk that generation and transmission of the energy may become the critical issue in the region, the Government of the RoM is undertaking firm measures in order to reduce that risk, on the local as well as on the regional and international level;
- Strategy represents a complex management mechanism with main goals defined in the adopted Energy Policy of the RoM;
- It is expected that the implementation of the Strategy will provide for increased interest of investors and the growth of the volume of foreign direct investments in the energy sector in the RoM;
- Energy development is the driving agent for overall ecological-sustainable development of the state of Montenegro;
- Existence of the experts (energy companies, University, Academy of Science) that have required knowledge to implement the Strategy;
- Transparent adoption and update of the Strategy as well as transparent monitoring of its realization;
- Significant participation of the non-governmental sector in adoption of strategic decisions related to the energy development;
- Safe, secure, reliable and quality energy supply of consumers at realistic prices;
- Eliminate the dependency of Montenegro from the import of electrical energy by rational use of available hydro and thermo potentials;
- Reach agreement with neighboring countries on issues related to the use of hydro potential:
 - Water use and management,
 - Water transferring,
 - Division of shared hydro potential,
 - Division of energy effects created as a result of accumulations in Montenegro for downstream users,
- Energy infrastructure built in accordance with sustainable development and environmental protection requirements;
- Created conditions for better use of renewable energy source, cogeneration, replacement of some energy sources, reduction of energy losses and improvement of energy efficiency;
- Energy companies and consumers operate on the open, competitive, local and regional market;
- Legislation of the RoM and its harmonization with the EU regulations.

14. ENERGY DEVELOPMENT STRATEGY

7.1. FINAL ENERGY CONSUMPTION UNTIL 2025

7.1.1. Scenarios of Gross Domestic Product (GDP) development

Usljed Due to different approach in calculation of the GDP per capita, as a key macroeconomic indicator of the development of the RoM, three scenarios of the GDP increase were developed, which were used to forecasting final energy demand until 2025:

- Low scenario which envisages long-term average annual economic growth of 4.6% until 2025 (according to the scenario of the economic growth of the ISSP Institute from Podgorica);
- Medium scenario that envisages the economic growth rate of 6%;
- High scenario that envisages the growth rate of 8% (according to the economic development in the proposed base Studies of the Spatial Plan of the RoM).

7.1.2. Main assumptions for calculation of the final energy consumption until 2025

GDP growth and change of its structure, increase of population, volume of transport activities, changes in habits and standard of living as well as introduction of energy efficiency measures in final energy consumption sectors are those with the highest impact on the increase of the energy consumption:

- a. Growth of GDP: GDP per capita will increase from 2,261 EUR/cap in 2003 to 5,700 EUR/cap (Low), 8,400 EUR/cap (Medium) and approximately 11,000 EUR/cap (High) until 2025.
- b. GDP structure: Share of some sectors in the baseline year, 2003, was: industry – 12%, transport - 10%, agriculture - 12%, construction – 4%, services (including also tourism) – 62%. Until 2025, depending on the scenario, share of the industry will be increased (15-17%), slightly will increase the transport as well 11%, while the share of agriculture will decrease (7-9%), construction will stagnate (4-5%), while the share of service sector will be increased (63%). The growth of the share of tourism and hospitality industry will grow from 2.6% annually to 3.9% until 2025. Until 2025 industrial product would increase from 3 to 7 times, and would grow at the rate from 5.3 to 9.5% annually. Significant change in the share of industrial sectors is assumed as well in the overall industrial GDP: reduction of the share of ferrous metallurgy and non-ferrous metallurgy from 43% to 16-20%, while other base industries, textile and food processing industry will remain at same levels, and the share of other less energy intensive industries (production of machines and appliances, electrical and optical appliances, transportation means and other) will grow from 12% to 31-35%.
- c. Population: Long-term growth of the population is envisaged at the annual rate of 0.25% in the High scenario (from 660,000 to 685,000 inhabitants), in the Medium at 0.16%, and in the Low scenario at 0.07% annually. It is expected that the number of inhabitants per dwelling will decrease (High scenario – 3.0) and that the number of dwellings will increase (High scenario – increase of 28%).
- d. Volume of transport activities: Significant increase of cargo transport from 2 to 3 times, increase of traffic at the Port of Bar, and resumption of the railway transport intensity, further increase of truck-traffic, while the inter-city mobility of population will be tripled.
- e. Households: An increase of standard of living is envisaged, which will lead to an increase of energy demand. Depending on the scenario, the total number of residential buildings, share of new residential buildings, share of apartments with central heating/cooling systems, share of total

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heated surface of buildings and share of residential buildings with cooling systems will increase (50-80% depending on the scenario). The consumption of hot water per capita will increase for 50%, and energy for cooking will decrease for approximately 20%, until 2025.

- f. Measures of energy efficiency and introduction of renewable energy sources: Measures for reduction of energy intensity are envisaged in all final energy demand sectors, depending on possibilities for introduction of new /efficient processes and technologies. Introduction of renewable energy sources is particularly envisaged in the sector of service activities and in households through systems for use of solar energy for hot water preparation and heating of premises (collectors and solar architecture).

7.1.3. Consumer structure and forecast of final energy consumption by scenario

Forecast of final energy demand of RoM was conducted by a procedure that enables capturing of impacts of all relevant generators / drivers of energy consumption (MEDEE model). Forecasts and analysis were performed for all consumption sectors: industry, traffic, public sector and households, agriculture and construction, as for all forms of energy as well.

Total final energy consumption: will grow from 29.82 PJ in baseline year 2003 to 57.40 PJ in the last observed year for the High Scenario, or 51.62 PJ for the Medium and 44.82 PJ in Low Scenario. Realized average growth rate of the consumption for the total final energy for baseline year - 2003 to the last observed year – 2025 in the High scenario is 3.0%, in the Medium scenario is 2.5% and in the Low scenario 1.9% annually, which indicates significant improvement in terms of reduction of the final energy per GDP unit for all scenarios.

Industry: Consumption will increase from 14.07 PJ in the baseline year – 2003 to 23.91 PJ in the High scenario, 21.59 PJ in the Medium scenario and 18.52 PJ in the Low scenario. Average annual growth rate of the final energy consumption in the High scenario is 2.4%. In the Medium scenario amounts to 2.0% and in the Low scenario is 1.3% annually.

Traffic: Consumption will increase from 5.7 PJ in the baseline year – 2003 to 13.8 PJ in the High scenario, or 1.7 PJ in the Medium and 9.7 PJ in the Low scenario. Realized average annual growth rate of the consumption of useful energy in traffic in the High scenario is 4.1%, and in the Medium and Low scenario 3.3% and 2.4% respectively.

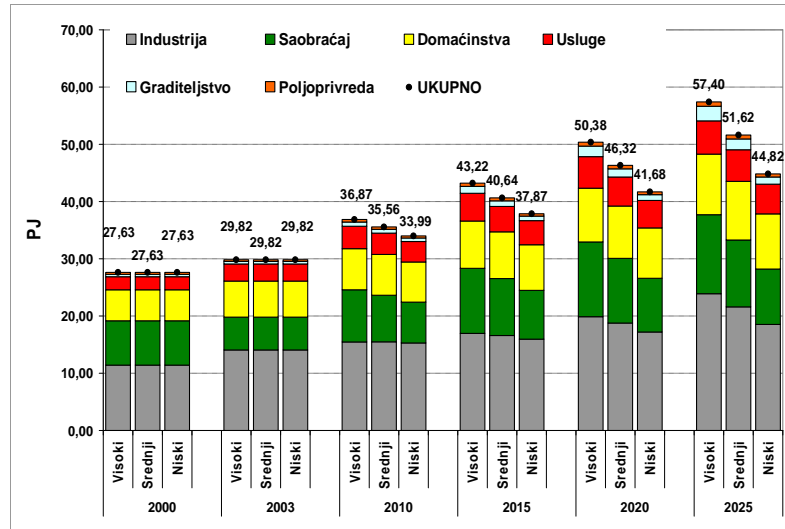
Public sector and households: Households' consumption will increase from 6.32 PJ in the baseline year to 10.58 PJ in the last observed year for the High scenario, or 10.2 PJ in the Medium scenario or 9.62 PJ in the Low scenario. Realized average annual growth rate in the High scenario is 2.4%, in the Medium scenario 2.2%, and in the Low scenario 1/9%. Total consumed energy in the service sector will grow from 2.99 PJ in the baseline year to 5.83 PJ in the High scenario, or 5.52 PJ in the Medium scenario or 5.21 PJ in the Low scenario. Realized average annual growth rate in the High scenario is 3.1%, in the Medium 2.8%, and 2.5% in the Low scenario.

Agriculture: Consumption will grow from 0.30 PJ in the baseline year – 2003 to 0.76 PJ in the High scenario, or 0.69 PJ in the Medium or 0.53 PJ in the Low scenario. Realized average annual growth rate of the final energy consumption in agriculture in the High scenario is 3.2%, in the Medium and Low scenario 2.7% and 1.7% respectively.

Construction: Total final energy consumption in the construction will grow from 0.42 PJ in the baseline year – 2003 to 2.54 PJ in the High scenario, or 1.90 PJ and 1.25 PJ in the Medium and Low scenario respectively. Realized average growth rate of final energy consumption in construction is 7.5% in the High scenario, and in the Medium and Low scenario 6.2% and 4.5% respectively.

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FIGURE 2: Consumer structure and forecast of final energy consumption by scenario



Source: IREET Institute, Ljubljana 2007

7.2. STRATEGY FOR EFFICIENT USE OF ENERGY

As part of the process of harmonization of national legislation with EU legislation will be necessary to adopt new regulations and standards in the area of energy efficiency. Considering significant stagnation in the area of rational use of energy and its importance for economic and social development of Montenegro, in the initial phase a special Law on Energy Efficiency should be adopted. Law would define goals, priorities, areas and administrative functional responsibility of the institutions of the authority as well as obligations of generators, supplies and users of energy, in terms of implementation of the Energy Efficiency Strategy.

Goals of the adopted Energy Efficiency policy are:

- § Identification of mixture of energy systems with low costs and measures for improvement of existing systems;
- § Creation of economic incentives for energy savings;
- § Preparation of comprehensive strategy and legal documents;
- § Increase of information on energy efficient technologies and application methods along with the international cooperation.

Measures of more efficient EE generation are taken into consideration in planned reconstructions and rehabilitations of existing eclectic power facilities (HPP Perucica, HPP Piva, TPP Pljevlja), as well as requirements for application high-end technological standards in the industry (KAP-Aluminum plant, Steel Plant Niksic and Railroads of Montenegro) as well as in case of construction of all new facilities.

A short-term priorities it is recommended: adoption of a special Law on Energy Efficiency, development of expert analysis of large energy consumers (KAP, Montenegro Railways Company and Steel Plant Niksic) from the point of view of rationalization of energy consumption and updating of the Energy Efficiency Strategy.

GREEN PAPER

7.2.1. Public sector

Two areas are important in the public sector: planning and implementation of sustainable energy development of local communities in terms of energy supply and rational energy management in public buildings. Certain potential exists in the public sector both for improvement of energy efficiency and for the use of renewable energy sources and cogeneration (combined generation of electric energy and heat).

7.2.2. Households

Households are one of the largest energy consumers after industry and traffic. Practically, in Montenegro there is a large number of residential buildings and houses where is possible to significantly reduce the energy consumption. Dominant share of the electric heating in households, approximately 66% of needed heating energy, is realistically area for application of numerous energy efficiency measures. Reviewing this realistically, it is not a simple task to present to a Montenegrin household and consumer, a topic "efficient energy consumption" and it will take some time to achieve proper results.

7.2.3. Industry and economy

Industry, service sector and small producers represent the largest energy consumer in Montenegro, and contribute to the great extent to the pollution of the environment as well. It is possible to reduce the energy consumption for more than 20% with more rational energy use and application of modern production and energy technologies (KAP, Steel Plant Niksic, Railways) in this sector and by that to increase the competitiveness and reduce negative environmental impact.

7.3. DEVELOPMENT OF USE OF HYDRO POTENTIAL

Water resource base of the RoM (in 2001) considers use of hydro-energy potentials in watersheds of rivers: Tara, Lim, Moraca, Cehotina, Ibar and Komarnica. In order to use hydro potentials and to construct hydropower facilities on water courses, running through several countries, Montenegro has to reach agreement with interested neighboring countries (Serbia, B&H, Croatia) on more specific use of hydro potential in watersheds of these rivers, based on mutual strategic interests and technical documentation developed in advance, and respect interests of downstream countries in accordance with the provisions of international law covering the area water resources.

It is recommended, as part of procedures and undertaking of specific activities, including new decisions related to the construction of hydropower plants, which have to be accompanied with single integral planning of use of resources, to carefully review other existing energy studies, including the overview of energy consumption (losses), renewable energy sources. Furthermore it has to be taken into consideration that small power plants cannot provide adequate quantity of electrical energy (not even in the scenario of improved energy efficiency and efficient use of existing sources).

Finally, it is necessary to take into consideration positive effects of construction of water accumulations, existing conditionality linked with the Tara Declaration (UNESCO protected area), as well as real possible effects of valorization of these resources (rafting, eco-tourism and similar).

Studies of environmental impact assessment for specific projects have to be developed in accordance with acceptable international standards and scientific procedures, taking into consideration as well EU Directives that regulate the preparation of Studies of environmental impact assessment (EIA), in particular for construction of large hydropower plants (with accumulation of more than 10 million m³) in domestic and cross border context. All legal aspects, in this case, should have to be in line with existing national legislation of those countries, as well as with relevant international agreements. Furthermore, it is

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recommended to conduct a strategic evaluation of defined development alternatives through SEA (Strategic Environmental Assessment) mechanism.

Out of all considered HPP, having in mind Declaration of UNESCO and of the Parliament of the RoM on river Tara protection, the Strategy recommends HPP on river Moraca and HPP on river Komarnica, as energy and economically most attractive and most researched.

Therefore, out of all considered scenarios of use of hydro-potential of Montenegro, the Strategy envisages the so-called Scenario of "moderate construction" - N-2 (see Ch. 7.10.3) as most optimal and according to which is planned following construction in period until 2025:

- HPP on the Moraca River of total power 238.4 MW, generating 693.7 GWh/ annually,
- HPP Komarnica of power 168 MW, generating 231.8 GWh/ annually.

In the future period until 2010, it is planned as well reconstruction and rehabilitation of HPP Perucica and HPP Piva, which would enable that they generate electrical energy at the existing and improved level.

7.4. DEVELOPMENT OF USE OF COAL RESOURCES

Coal as the most important mineral resource in the RoM, other than hydro potential, represents the most important natural resource. The Strategy envisages the use of coal only from Pljevlja region, with its dominant use in the thermo-power plants for generation of electric energy and eventually for heat energy. Due to low level of exploitation reserves, for the time being, the Strategy does not envisage utilization of coal from the Berane basin in the generation of electric energy until 2025. However, the Strategy remains open for potential interest of the private sector for further exploration works, development of the mine and potential construction of a new power generation facility at this location.

TPP Pljevlja 1 and 2: After 2009 and until 2025 production of coal would be executed on the open pit Potrlica, including as well the site Cementara. Using data on exploitation reserves, taking into consideration average thermal value of coal, it could be concluded the coal reserves in the Pljevlja basin with its gravitating basins, are enough to supply TPP Pljevlja 1 (210 and 225 MW after reconstruction) until the end of the expected exploitation life of the block, after which its capital reconstruction and rehabilitation is planned, as well as to supply TPP Pljevlja 2 (225 MW) with coal for its expected operation life of 40 years.

Start of the operation of TPP Pljevlja 2 is envisaged for 2011. Annual coal consumption of both blocks will be between 2.5 and 2.8 million tons.

Heating System of the city of Pljevlja: There are some 40 boiler rooms in the city of Pljevlja, in which the coal from the Pljevlja region is used for generation of heat energy. Introducing central heating system for the city of Pljevlja, the volume of use of coal in decentralized boiler rooms will be significantly reduced and consequently current negative environmental impact.

Available natural resources in Montenegro, and perspectives of energy development in the world as well, indicate that the guidelines for development of coal in the future should be linked, along with improvement of the state of exploration of reserves, modernization and rationalization of the coal mine operations and responsible management of coal reserves, with maximum recognition of environmental protection standards in accordance with European legislation.

7.5. DEVELOPMENT OF LOCAL ENERGY CONCEPTS, COGENERATION AND HEAT ENERGY SUPPLY

In the period until 2025 a replacement of a part of industrial boiler rooms is planned with industrial cogenerations using liquefied petroleum gas (LPG) and liquid fuels. In accordance with the final

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consumption scenarios, such replacement would be at 60% for High, 40% for Medium and 10% for Low scenario.

Generation of industrial cogenerations in 2025 for all scenarios would be as follows: for High scenario heat energy 4.18 PJ and electrical energy 446.07GWh; medium: heat energy 2.25 PJ and electrical energy 240.54 GWh; and Low scenario: heat energy 0.44 PJ and electrical energy 46.53 GWh.

Strategy of introduction of cogeneration: EU has defined cogeneration as most appropriate technology for efficient use of energy of traditional fossil fuels and reduction of gases with greenhouse effect in its Strategy to promote cogeneration and dismantle barriers to its development.

Industrial cogenerations and small cogenerations for the service sector and households are envisaged for Montenegro. Cogeneration fuel will be LPG and liquid fuels. Development of public cogeneration plants is not envisaged.

Strategy of heat energy supply: Potential markets for the remote heating system (cities for construction of the remote heating systems) are primarily estimated based on the site: as a first step Pljevlja and Niksic, and to follow Bijelo Polje, Cetinje and Berane, and in smaller local communities in the municipalities of Kolasin, Zabljak and Pluzine, but only if it is case of recovery of industrial processes waste heat, waste burning or use of biomass. Introduction of the heating system in the city of Pljevlja is planned in the Strategy in the period until 2025.

Strategy of development of local energy systems: In the area of communal energy in the RoM until 2025, potential remote heating systems were considered, as well as public boiler rooms and natural gas supply systems, as their introduction is considered to be realistic in the observed period.

Modernization of existing boiler rooms using coal envisaged as well as gradual coal substitution with liquid gas.

7.6. SUPPLY OF LIQUID FUELS

System for petroleum supply: Actual dynamics of the further development will definitely depend on the discovery of commercial reserves of petroleum and gas in Montenegro. The focus is placed on the terminal in the Port of Bar for the system of supply of petroleum derivatives in the observed period. Road and railroad traffic is used for the further transport.

Supply of petroleum derivatives: Scenarios of the increase in the final consumption of petroleum derivatives until 2025 indicate the growth of 40% to 60% compared to the baseline year - 2003. Reduction of the final consumption of petroleum derivatives is envisaged in the industry sector due to the increase of the share of other energy sources (LPG) and reduction of share of industrial boiler rooms.

Mandatory 90-day reserves: Montenegro plans to meet requirements for storage capacities to keep mandatory 90-day reserves of petroleum derivatives in accordance with the Directive 98/93/EC using the final consumption scenarios for derivatives until 2025.

Since there is a possibility as well to use already existing storage capacities in the RoM for keeping operational reserves adequate for 45 days, the recommendation is to have a maximal use of these capacities in order to significantly reduce investments.

7.7. DEVELOPMENT OF THE SYSTEM FOR LIQUID PETROLEUM GAS (LPG) AND NATURAL GAS SUPPLY

Two scenarios have been defined for the development of the LPG market, as follows:

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- High scenario with potential consumers' connection level of 60%, and
- Medium scenario with potential consumers' connection level of 30%.

Total potential consumption of LPG for heat energy needs in industry, heating and cooling in service sector and in households will grow from 99.8 thousand tons realized in 2003 to possible 227.6 thousand tons in 2005. Share of households would be 63%, share of service sector 24% and share of industry 13% in the consumption structure.

Strategy of natural gas supply: Montenegro still does not have access to international sources of natural gas. If a domestic production does not get developed, there are several possible delivery directions in the future: through the Republic of Serbia, through Albania and across the territory of the Republic of Croatia. For all these options Montenegro can realistically expect delivery of natural gas from international pipelines only after 2020.

The accession of Montenegro to the Energy Community Treaty will have importance on the delivery of needed quantities of gas to its territory.

Planned exploration in the Montenegrin seabed will realistically indicate whether there are significant quantities of its own natural gas. In the case of discovery of natural gas, it is logical to expect that the system of natural gas supply in Montenegro will develop much faster than in any other option of the import of energy sources.

Montenegro has low potential of gas consumption, and planned investments in the development of gas network are rather high. Thus preceding the introduction of natural gas, development of the gas network system and consumption using LPG is planned first.

Introduction of the system of use of LPG for heating in tourism will definitely have impact on the extension of the tourism season in the RoM.

Gas systems are envisaged for following cities: Podgorica, Niksic, Tivat, Bar, Budva, Cetinje, Kotor area, Herceg Novi and Ulcinj.

7.8. STRATEGY OF INTRODUCTION OF RENEWABLE SOURCES OF ENERGY

Overall Strategy envisages use of renewable energy sources at the level of minimum of 20% of total primary energy consumption until 2020-2025.

On 10 January 2007 the European Commission issued a document entitled Energy Policy for Europe. In this document the EC set very ambitious and mandatory targets that until the year 2020, the share of biodiesel in transport-fuels will be 10%, and even more importantly, the 20% share of renewable energy sources in primary energy balance by that time. That means an additional increase of the share of renewable energy sources with respect to the target of 2001 when the share 12% was set for the year of 2010.

- a. Small HPP: In the period until 2025 a construction of several small HPP is planned with minimal power output of 30 MW, generating 78 GWh/annually.
- b. Wind power plants: Detailed measurements are required in order to determine micro locations for potential projects and to develop the study for development of wind power plants, as the technical potential on the most attractive areas in Montenegro is estimated to be 100 MW. Besides investment costs in range of 1,000 EUR/kW and expected number of working hours of 2,200 hours annually, the Strategy envisages a minimum of four wind farms with total capacity of 20 MW, starting to operate in 2010, 2015, 2020 and 2025. Planned investments until 2025 amount to 20 million EUR. In the case of significant interest of investors, the Strategy allows higher capacity and faster development as well, as long as the potential problems of connection of

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- wind power plants in relatively small electric energy system of RoM are resolved within the electric energy system and there is an economic justification.
- c. Solar power: Large obstacle to more significant use of photovoltaic systems is the high installation cost ranging between 4,000 and 6,000 EUR/kW, while their conversion efficiency is relatively small. Therefore in the period until 2025 use of solar energy for electric energy generation (photovoltaic) is not planned, but is to be expected only direct use of solar energy for heat, hot water and other low temperature processes mostly in the services sector, including tourism and in households.
 - d. Biomass: Even though additional researches are required in order to obtain more reliable data, according to estimations the technical potential is adequate for at least 3 to 5 smaller power plants with specific capacity between 5 and 10 MW. At the moment the Strategy does not envisage such plants, but is open for potential interest of private investors.
 - e. Energy from waste: A construction of one such facility of capacity of 10 MW is envisaged until 2025, at the territory of the municipality of Podgorica, investment costs are approximately 3,200 EUR/kW. Planned investments until 2025 are 32 million EUR.
 - f. Biogas: At the moment the Strategy does not envisage introduction of significant biogas facilities until 2025.
 - g. Bio-fuels: Use of bio-fuels in the transport sector may be useful to contribute to the higher level of environmental protection. Use of bio-fuels is envisaged after 2010. In 2025 the consumption of bio-fuels would be approximately 0.68 PJ.

7.9. RESEARCH IN THE ENERGY SECTOR

Researches of remaining technically useable hydro potential for use in large and small HPP should continue in the period until 2025, in order to be able to plan their construction with accelerated dynamics after 2025.

Beside the research of hydro potential, in coming years is planned as well continuation and intensification of petroleum and gas explorations of the seabed of Montenegro. Explorations conducted up to now fully justify intensification of efforts for these exploration works.

Furthermore it is necessary that systematic coal explorations are continued as some kind of preparation for further use of this important energy resource.

7.10. DEVELOPMENT OF THE POWER SECTOR

7.10.1. Electrical energy consumption

In 2005 Montenegro consumed 4,443 GWh of electrical energy, in peak load 752.1 MW and with minimum load 361.3 MW. According to the Medium scenario consumption of electrical energy that needs to be met at the level of the high voltage system from own generation and/or import in the period 2005-2025, assumes that the average annual consumption growth is 1.33%, while the annual average growth of peak load in the system is 1.51%. In more details: in 2010 envisaged consumption is 4,765 GWh and peak load 818 MW, in 2015 those are 4,982 GWh and 868 MW, in 2020 are 5,372 GWh and 938 MW, and in 2025 they are 5,791 GWh and 1,016 MW.

All analysis and calculations in the Strategy are made only on the basis of Medium scenario of final energy demand (MEDEE).

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7.10.2. Existing power generation units

Until 2025 will still operate: HPP Perucica (307 MW), HPP Piva (342 MW) and TPP Pljevlja (210 MW) and 7 small HPP with total capacity of 868 MW. HPP Perucica will be modernized in 2008. Furthermore it is envisaged reconstruction and rehabilitation of the HPP Piva until 2010 and TPP Pljevlja 1 in 2008.

7.10.3. Scenarios of development of power generation

The Strategy has analyzed possibilities for construction of new generation capacities of the electrical energy system of Montenegro, out of large number of combinations, according to the two basic scenarios:

- N-1: Scenario of „limited construction“ assumes 285 MW of new capacities until 2025:
 - Until 2011 TPP Pljevlja 2 (225 MW);
 - Until 2015 wind power plants (5 MW), small HPP (20 MW), waste fueled TPP (10 MW)
 - Until 2020 wind power plants (5 MW) and
 - Until 2025 wind power plants (5 MW).
- N-2: Scenario of „moderate construction“ assumes 691 MW of new capacities until 2025:
 - Until 2010 wind power plants (5 MW), small HPP (10 MW)
 - Until 2011 TPP Pljevlja 2 (225 MW)
 - Until 2013 HPP Andrijevo (127.4 MW), HPP Zlatica (37 MW)
 - Until 2014 HPP Raslovici (37 MW)
 - Until 2015 HPP Komarnica (168 MW), HPP Milunovici (37 MW), wind power plants (5 MW), small HPP (20 MW), waste fueled TPP (10 MW)
 - Until 2020 wind power plants (5 MW) and
 - Until 2025 wind power plants (5 MW).

Recommendation:

Scenario N-1 is not recommended because it cannot be considered as “alternative option” of possible development in accordance with goals of the adopted Energy Policy of Montenegro that envisage reduction of electricity imports and increase of energy in dependency of the country. Based on intensive background research of possibilities for construction of new power generation capacities, the Strategy recommends the construction of new power plants in accordance with the N-2 scenario (Table 1 and Figure 3)!

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7.10.4. Scenario „N-2“ of construction of new power plants

TABLE 1: New power plants according to the Scenario N-2

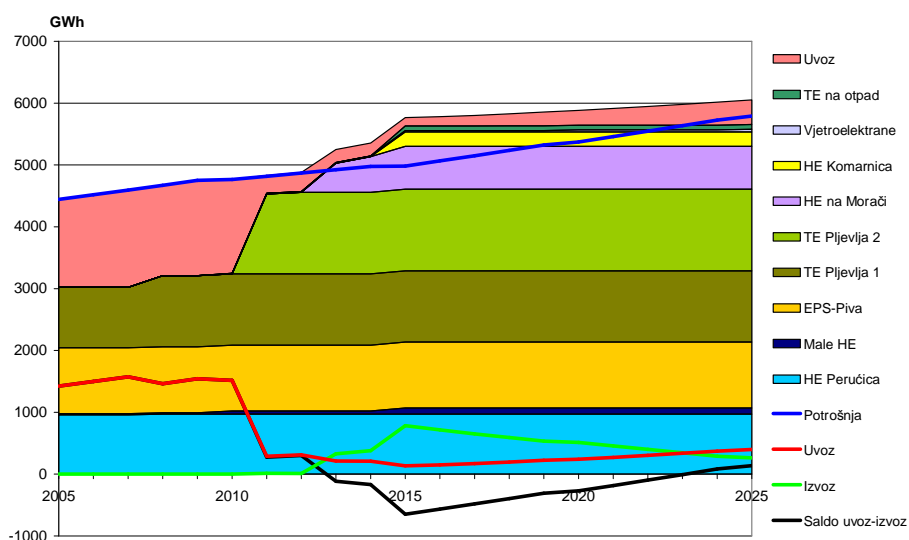
Star of operation	New facility	Capacity (MW)	Investment (mill EUR)
2010	Small HPPs	10	15.0
	Wind Power Plants	5	5.0
2011	TPP Pljevlja 2	225	135.0
2013	HPP Andrijevo	127.4	194.9
	HPP Zlatica	37	84.7
2014	HPP Raslovici	37	73.5
2015	HPP Komarnica	168	134.1
	HPP Milunovici	37	77.0
	Wind Power Plants	5	5.0
	Small HPP	20	30.0
	Waste fired TPP	10	32.0
2020	Wind Power Plants	5	5.0
2025	Wind Power Plants	5	5.0
Total	Scenario N-2	691.4	796.2

Source: IREET Institute, Ljubljana 2007.

Based on results of optimization of power generation expansion according to Scenario N-2 until 2025, candidates for new generation units (HPPs and TPPs) are: HPPs on the Moraca River (Andrijevo, Raslovici, Milunovici and Zlatica), HPP Komarnica, and TPP Pljevlja 2. In the area of renewable energy sources, candidates for construction are two groups of small HPP (10 to 20 MW); four groups of wind power plants (4x5 MW), and one facility for burning of communal waste (10 MW).

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Slika 3: Structure of power generation sources in meeting electricity demand until 2025 according to Scenario N-2



2010	971	1.152	1.065	60	1516	0	4.765
2015	1.896	2.473	1.065	197	134	783	4.982
2020	1.896	2.473	1.065	209	240	511	5.372
2025	1.896	2.473	1.065	220	398	262	5.791
Year	HPPs (without HPP Piva)	TPPs	Valorisation of HPP Piva	RSE	Import	Export	Total

Source: Energy Institute Hrvoje Požar, IREET Institute: Long-term Plan of Energy Supply to Montenegro, Ljubljana 2006

7.11. DEVELOPMENT OF POWER TRANSMISSION SYSTEM

Development of the transmission network until 2025 is planned in such a way to enable exchange of electrical energy with neighboring systems, to improve supply of some areas of Montenegro and to enable connection of new electrical energy sources and reduction of losses as well.

In the short-term period (until 2008), transmissions network will be reinforced with:

- Installation of the substation TS 400/100 kV in Ribarevine (Bijelo Polje),
- Resolution of the connection of Substation Andrijevića to 110 kV network,
- Replacement of existing and installation of new transformer of 20 MVA in the Substation 110/35 kV in Ulcinj,
- Construction of the substation 110/35 kV in Kotor and its connection to the Substation 110/35 kV in Tivat, construction of Distribution Power line 110 kV: Tivat – Kotor – HPP Perućica,
- Construction of 400 kV transmission power line Podgorica – Elbassan.

In the medium-term period (until 2010) following will be performed:

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- Resolve the issue of double feeding of the Substation TS 110/35 kV in Ulcinj, either by construction of parallel power line to Substation 110/35 kV in Bar or the transmission power line 110 kV Ulcinj – Shkoder,
- Resolve a T connection in the Substation 220/110 kV in Mojkovac,
- Install 220 kV collection system in the Substation Mojkovac,
- Construct Substation 220/110 kV in Grbalj and Distribution power line 220 kV HPP Dubrovnik – Grbalj – HPP Perucica,
- Construct new substations 110/x kV, and connect them in an appropriate manner to the 110 kV network.

In the long-term period (until 2025) it is necessary to provide for double connection of almost all 110/x kV substations. Independently on the scenario of construction of new power plants, it will be necessary to connect new adequate substations of 110/35 kV and 110/10 kV to the 110 kV network.

7.12. DEVELOPMENT OF POWER DISTRIBUTION SYSTEM

Development of the distribution network until 2025 is planned in such a way to increase the level of the security of supply to some cities and reduce losses of electrical energy to the level of 10%, which is considered to be needed but very optimistic goal of the Strategy. Significant reduction of distribution losses from present 25-30% (technical and non-technical) is important for the increase of technical and economical efficiency of the EPCG. Second, equally important, but a short-term goal in this direction is a need to increase the collection rate from the tariff consumers (reduction of non-technical losses).

In the planning period until 2025, following construction is envisaged: 110/35 kV substations, 110/10 (20) kV substations, reconstruction of existing 110/35 kV substations to 110/35 – 10 kV substations, 35/10 (20) kV substation and reconstruction directed to increase the apparent power of existing 35/10 kV substations.

7.13. TOTAL ENERGY BALANCE (SCENARIOS: S1, S2, S3)

Projection of energy balances until 2025: Starting from: (a) two scenarios of development of the construction of the electrical energy system (EES) (N-1 and N-2); (b) three scenarios of development of final energy consumption (low, medium and high scenario); and (c) two scenarios of development of LPG market (medium and high); three final projections/scenarios of total energy balances (S1-S3) were developed combining (a+b+c):

- Scenario S1; (a) scenario of „limited“ construction of EES (N-1) + (b) Medium scenario of development of final energy consumption + (c) medium development of the LPG market in network systems,
- Scenario S2; (a) scenario of „moderate“ construction of EES (N-2) + (b) Medium scenario of development of final energy consumption + (c) medium development of the LPG market in network systems,
- Scenario S3; (a) scenario of „moderate“ construction of EES (N-2) + (b) Medium scenario of development of final energy consumption + (c) high development of the LPG market in network systems,

Projection of the primary energy consumption: All scenarios envisage significant increase of production of lignite and hydro energy. An increase in production of fuelwood and biomass is expected, but their share in total production of the primary energy will continuously be reduced. An increase in use of solar power, wind energy, communal waste and wood industry waste is expected. Total consumption

GREEN PAPER

of primary energy will grow until 2025 with an average annual rate of 2.2% in the Scenario S1, and 2.5% in Scenarios S2 and S3 (with the same GDP growth rate of 6% and final consumption of 2.5% for all scenarios), which indicates significant improvement in terms of reduction of the consumption of primary energy per GDP unit for all scenarios.

Projection of the final energy consumption: All scenarios envisage growth of share of petroleum derivatives to approximately 40%, increase in share of heat energy to approximately 12% and reduction of the share of electrical energy to 40%. Reduction of the share of heating wood and biomass is also expected, as well as slight increase of the share of renewable energy sources. Most important part in the consumption of petroleum derivatives will continue to be the one of diesel fuels and motor gasoline. Commencement of use of biodiesel is expected and increase of use of solar power.

Main indicators of overall energy balance of the RoM until 2025:

- Generation of primary energy (Table 2): Total generation of primary energy of 34.55 PJ in 2003 will be increase to 55.04 PJ in 2025, according to the scenario S1 (the slowest growth). According to the scenario S2, primary energy consumption would increase to 62.18 PJ, and to 62.09 PJ in the scenario S3, respectively in 2025. Lignite and hydro energy will be the most important forms, and the share of renewable energy will increase more and more.

TABLE 2: Generation of primary energy in the RoM system by scenario (PJ)

Year/Scenario	S1	S2	S3
2010	37.63	37.63	37.58
2015	52.56	62.01	61.56
2020	54.53	62.14	61.65
2025	55.04	62.18	62.09

Source: IREET Institute, Ljubljana, 2007

- Balance of import and export: Import of energy in Montenegro means all quantities of energy transferred across the border of Montenegro, regardless of their origin. Export of energy from Montenegro is rather small, and the Table 3 shows balance of import and export.

TABLE 3: Balance of import and export in the RoM system by scenario (PJ)

Year/Scenario	S1	S2	S3
2010	23.57	23.57	23.64
2015	23.51	22.65	23.40
2020	28.92	27.59	28.51
2025	34.68	32.61	33.16

Source: IREET Institute, Ljubljana, 2007

- Primary energy consumption: Total consumption of energy will consist of lignite, renewable energy sources, petroleum derivatives and a smaller share will have imported electrical energy and hydrogen. Depending on the observed scenario in 2025, the share of coal will be from 25% to 33%, petroleum derivatives between 24% and 34% and renewable energy sources from 29% to 55%. Total energy consumption will increase from 55.16 PJ in 2003 to a minimum of 89.71 PJ according to the S1 scenario and to a maximum of 94.35 PJ according to the S3 scenario in 2025 (Table 4).

GREEN PAPER

TABLE 4: Total energy consumption in the RoM system by scenario (PJ)

Year/Scenario	S1	S2	S3
2010	61.20	61.20	61.22
2015	76.06	82.08	82.17
2020	83.44	88.22	88.36
2025	89.71	94.18	94.35

Source: IREET Institute, Ljubljana, 2007

- Introduction of the LPG and natural gas: Strategy does not envisage use of LPG or natural gas for the generation of electrical energy in large TPPs. Depending on the scenario of the GDP growth and the level of LPG penetration, the LPG will be used as a vanguard if the natural gas in industry cogenerations, or in small generations in service sector and households.
- Introduction of remote heating system: This is envisaging in the city of Pljevlja along with identified additional locations.
- Import/Export of energy: Republic of Montenegro will not meet all primary energy needs with its own production. Total demand of petroleum derivatives will continue to be met from import. Electrical energy will be imported as well, but its import, due to envisaged construction of new generation facilities, will be significantly reduced compared to the present level. The last five-year period envisages import of smaller quantities of biodiesel and hydrogen. Total balance of import and export of energy in 2025 (Table 3), depending on scenario, is envisaged to be in the range of 32.6 - 34.7 PJ (19.37 PJ in 2004).
- Import/Export of electrical energy: According to all scenarios significant quantities of electrical energy will continue to be imported (approximately 1,500 GWh annually), due to impossibility of construction of any new power plant prior the start of operation of TPP Pljevlja 2 in 2011. In the period from 2012 to 2025 import will be significantly reduced due to envisaged construction of new generation facilities. For the Scenario S1 (N-1), required import in that period is approximately from 100 to 600 GWh annually. In Scenarios S2 and S3 (both are the combination of N-2) Montenegro will become a temporary net exporter of electrical energy in the period from 2013 to 2023 (maximum of 600 GWh in 2015). Assumption used in all scenarios is that the contract on exchange of the electrical energy with the Republic of Serbia based on the revised valuation of the HPP Piva generation will continue until 2025.
- Level of own supply: Ratio of primary energy generation and total energy consumption represents the indicator of "own supply" of the country. This ration would decrease from its value of 62.6% in 2003 to 61.3% until 2025 according to the S1 Scenario, or will increase to 66% according to the recommended scenarios of S2 and S3 (both in combination with N-2).
- Importance of final energy consumption: The most important energy consumption in the total consumption is the final energy consumption which meets energy demand in industry, traffic, households, services, agriculture and construction. Final energy consumption is equal in its structure and quantities in scenarios S1 and S2 and amounts to 51.48 PJ in 2025, while its increases from 29.82 PJ in 2003 to 51.65 PJ in the last observed year in the S3 Scenario due to more intensive development of the LPG market.

Based on realistic assessment, the Scenario S2 for the total energy balance (combined with N-2) is the most realistic and optimal for the proposed Strategy.

15. ENVIRONMENTAL PROTECTION

Implementation of the Strategy is essentially linked with processes of environmental protection. Active participation of stakeholders is envisaged, both in the process of preparation of projects for realization (studies, permits, UNESCO approval, etc) and in the process of construction of energy facilities. The Strategy anticipates in that respect decentralization of levers of authority and democratization as important element of the ecological State concept.

Substantially, environmental protection is the process of management of natural and men created resource, which is exactly identical with the development of the energy sector that could be seen in this Strategy. Therefore it is entirely clear that the Strategy is based on requirements of the ecologically sustainable development and to a great extent it carries the concept of the Ecological State of Montenegro, while respecting necessary economic and other development aspects.

8.1. ANALYSIS OF ENERGY DEVELOPMENT SCENARIOS FROM THE ENVIRONMENTAL PROTECTION ASPECT

Impact of EES on environment is observed in the Strategy through the prism of emission of pollutants in the environment, which are result of burning of fossil fuels in TPPs in the process of transformation of the heat energy content of fuels in the electrical energy. Substances released as a result of processes in TPPs essentially have negative impact on the environment in two ways:

- Damaging air quality (emission of SO₂, NO_x, particulate matter (PM), CO, mercury ...),
- Damaging global Earth climate as a result of greenhouse effect (emission of CO₂, CH₄, N₂O...).

In case of construction of new HPPs and related accumulation lakes, it is necessary to develop detailed studies of impact of hydro energy on environmental, space and natural resource, in terms of environmental impact. Particular researches is required for multi-purpose possibilities to use hydro potentials in order to provide supply of drinking water, development of tourism and pisciculture, irrigation of agriculture land, etc, having in mind the UNESCO declaration on the projection of the Tara River and other domestic and international guidelines.

8.2. EMISSION FOR VARIOUS ENERGY DEVELOPMENT SCENARIOS

In calculating emissions released into the environment certain values of emission factors have been assumed for existing and for future potential TPPs, for following four pollutants: carbon dioxide (CO₂), sulphur dioxide (SO₂), nitrogen oxide (NO_x) and particulate matter.

CO₂ emission: Emission of CO₂ mostly follows the dynamics of electrical energy generation in TPPs; in this respect start of the operation of the 2nd block of the TPP Pljevlja in 2011 could be clearly noticed. Commencement of the operation of the TPP Pljevlja 2 will increase annual emission from the EES to the level of 3 million tons.

SO₂ Emission: In case of SO₂ emission a sudden drop could be noticed in 2010, due to the assumption that the system for desulfurization will be installed in the existing block of TPP Pljevlja. After that an additional increase of emission will take place as a result of start of operation of the second block at the same location in 2011, after which expected annual level of SO₂ emissions is at 11.4 thousand tons.

Nox Emission: In case of NO_x emissions similar trend could be noticed as in the case of emission of CO₂, which increased in those years in which new TPPs start to operate. Construction of TPP Pljevlja 2 increases the emission of NO_x to approximately 4 thousand tons annually.

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Particulate matter emission: In case of emission of particulate matter a trend of significant reduction would be noted, as a result of installation of equipment in the existing facilities of TPP Pljevlja for reduction of emission and construction of new facilities in accordance with EU Directives requirements. In line with those assumptions, emission of particulate matter from the Block 1 records a drastic drop from the level of 4.6 thousand tons in 2009, to the level of 1.3 thousand tons.

8.3. ENERGY INFRASTRUCTURE AND SPATIAL PLANNING

Energy infrastructure requires space for its development. RoM does not have high population density, has rich and preserved cultural heritage, different habitats and a number of areas of intact nature.

Republic of Montenegro will most likely also become in the future a part of the strategic network of trans-European energy networks, as defined in the European Commission Decision 1254/96/EC. Trans-European energy networks are used for increase of energy exchange among EU country members and for removal of barriers. In the area of electrical energy supply cross border connections are in the range of 7% of generation capacities of an individual country. The goal of the EU community is for community countries to establish interconnection capacities at the average of minimum 10%.

Similar directions apply for gas supply networks as well. Projects which are or which will be identified as projects in the broader European interest can be supported by the EU community up to the amount of 10 to 20% of the investment value.

Republic of Montenegro will be certainly involved in future in realization of European energy networks projects that are crossing its territory.

16. INVESTMENT PROMOTION, COSTS AND FINANCING OF THE ENERGY STRATEGY

Energy sector is one of the most interesting for foreign investors, if we have in mind the period until 2009, when a full liberalization of the energy market of Europe is envisaged. In the area of construction of the energy sector of Montenegro, significant inflow of foreign investments is expected in the stated period, which will be caused to the great extent by the adoption and full implementation of the Energy Development Strategy. Furthermore it is expected that the privatization process of the company EPCG JSC Niksic will expedite the investment process and thereof enable faster recovery of the system and rehabilitation of the energy sector of the RoM.

9.1. WHAT DIFFERENTIATES THE ENERGY SECTOR OF MONTENEGRO FROM THE NEIGHBORHOOD?

When one analyzes energy potentials of Montenegro in comparison with regional trends, following country advantages could be derived from SWOT analyzes:

- § There is a large potential and possibility for use of renewable energy sources, particularly of the hydro energy
- § Montenegro is on the strategically important routes for construction of energy corridors towards Croatia, Serbia, B&H, Italy and Albania
- § Privatization process in the energy sector is already underway
- § High level of own knowledge exists
- § Significant interest of international donors and investors for development of the energy sector as well as of the national economy (tourism for example)
- § Possibility for fast creation of the energy information base as a result of relatively small system
- § Resources are in the State with relatively small and highly open and flexible economic system

9.2. INVESTMENTS IN THE ENERGY SECTOR OF „ROM“ AND COMPARATIVE ANALYSIS

Region of South-East Europe (SEE) represents one of the most competitive locations for attracting foreign investments, primarily due to significant changes in investment policies of these countries. Comparison of the investment environment of Montenegro with the SEE region is based on three basic elements that are determining future investor's decision:

- Standard (general) operation risks: Montenegro has very good indicators of investment quality in terms of standard risks taken into consideration by investors in course of deciding on investments, considering political, macroeconomic and financial stability. According to the annual economic freedoms report of the Frasier Institute for 2005, Montenegro's grade was 6.0 and it classifies within 86 countries of the World, while in 2006 this growth of 25% was the highest in the region.
- Achieved level of legislative reforms (achieved fiscal, regulatory and financial incentives for attracting investments): Montenegro is very competitive from the point of view of achieved legislative reforms and fiscal incentives: it has lowest corporate profit tax rate in Europe of 9%; number of laws was adopted which are harmonized with EU standards (Law on Foreign Investment, etc)

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- Level of basic operation costs (costs of labor, energy and other): Significant education level of the labor force compared to countries in the region represents a strategic advantage of Montenegro. Taking into consideration overall operation costs in the region, Montenegro has relatively expensive labor force compared with the countries in the region. However, Montenegro's labor market is competitive from the education stand point, while it could be assumed that the high unemployment level will keep the labor cost competitive for a longer period.

9.3. INVESTMENTS PROMOTION AND CAPITAL MARKET

As a result of increased openness of the neighboring countries, competition will be very hard, and the fight for quality investors inevitable. Therefore, in accordance with this Strategy it is necessary to develop appropriate goal-oriented Program of Promotion of the Energy Sector of Montenegro to attract investments, in order to provide incentives for direct domestic and foreign investments, and to develop Action plan of realization of planned activities with clearly set promotion goals and systematic project approach, which includes all available human resources and adequate financial resources.

Strategic and clear concept of promotion of investments in the energy sector of Montenegro should be based on two main activities:

- Promotion of Montenegro's advantages as location of foreign direct investments in the energy sector. Promotion goals should be set in the process of image creation based on the identified perception of potential investors. Main promotion messages, having a purpose to achieve goals, must take into account specific competitive advantages of the energy sector of Montenegro (potential of renewable sources and hydro energy, which is a destination on strategic routs of energy corridors, and other). Selection of suitable future energy promotion program and activities of advertising have to be harmonized with other activities of the State that relate to the persuasion of foreign investors.
- Ensuring direct investments through immediate promotion. Immediate promotion is the best way to establish connections with new potential investors, as this represents a direct access adjusted to the very investor. Therefore, beside harmony of characteristics of the energy sector of Montenegro as a destination with investor's needs and expectations, final decision therewith may be influenced to the great extent by an active professional role of the promoter of investments both in the pre-investment period (informing, setting contacts and providing professional services to foreign investors, and establishing connections among investors and other institutions in the State), during the investment process (permits and approval of competent bodies, infrastructure, locations) and in the post-investment period (business communication and keeping links with existing investors, efficient resolution of problems that appear with every new investments and assistance with new investments).

Increase of inflow of direct investments (foreign and domestic) in the energy sector of Montenegro is one of the main goals of the Strategy. In this respect, this strategic document can influence the real inflow of investments, only to certain limit. Strategy cannot directly influence certain factors which are also important in the investment process that is it can impact some of them but only in a long run.

9.4. REQUIRED FINANCIAL RESOURCES FOR THE DEVELOPMENT OF THE ENERGY SECTOR

Developed and documented analysis in the Strategy clearly indicate that significant resources are needed for the implementation of the Strategy. Depending on the selected development Strategy (selection of the

GREEN PAPER

development scenario) the following Table 5 gives a sum of funds needed for the development of the energy sector.

TABLE 5: Funds needed for realization of scenarios for development of energy sector of RoM until 2025 (million EUR)

NAME	SCENARIO / mill EUR		
	S1	S2	S3
ELECTRICAL ENERGY SECTOR			
Coal Mine Pljevlja	79	79	79
Central heating in Pljevlja	20	20	20
New TPP (Pljevlja 2)	135	135	135
Investments in new HPPs	0	565	565
Investment in renewable energy sources			
Investments in small HPPs	45	45	45
Investments in wind PPs	20	20	20
Investments in waste fired TPP	32	32	32
Rehabilitation of existing power plants			
Rehabilitation of TPP Pljevlja 1	43	43	43
Rehabilitation of HPP Piva	70	70	70
Rehabilitation of HPP Perucica	49	49	49
Rehabilitation of small HPP	4	4	4
Investment in electrical energy network			
Investments in transmission network	191	199	199
Investments in distribution network	491	491	491
GAS AND LIQUID FUELS SECTOR			
Liquefied Petroleum Gas LPG	47	47	52
Investment in existing storage capacities	1	1	1
Storage of mandatory reserves of petroleum derivatives (entirely new capacities, Medium scenario)	18.3	18.3	18.3
TOTAL INVESTMENT	1,245.3	1,818.3	1,823.3

Source: IREET Institute, Ljubljana 2007.

GREEN PAPER

9.5. FINANCING SOURCES OF ANTICIPATED DEVELOPMENT OF THE ENERGY SECTOR

Required financial resources for implementation of energy sector development of the RoM may be provided by:

- § Using financial potential of existing power plants (“access to capital”) for financing construction of new generation capacities of electrical energy;
- § Active development of the concept and conditions for use of the PPP (Public-Private Partnership) scenario;
- § Investments of energy undertaking with the assistance of financial institutions;
- § Privatization of the part of the energy sector, and thus investment of capital in development of the energy sector
- § IPP (Independent Power Producer), concessions and BOT models;
- § Use of financing technology of Public and Municipal Bonds;
- § Attracting private investments in the energy development and energy projects;
- § Development of alternative project financing methods (“Third Party Financing”, etc);
- § Direct state investments (with the assistance of development banks) in projects of highest priority and with relatively lower investment return rate;
- § Issuing state bonds for some projects, considering that future energy investments do not have risky character;
- § Credit lines from international financial institutions; and
- § Other financial approached in line with positive practice in this area in the World and in the neighboring countries.

17. OTHER STRATEGY ELEMENTS

10.1. ELECTRICITY PRICES AND POVERTY REDUCTION

National distortion of prices of electric power (prices of other energy products are largely market-based) has a considerable impact on unfavorable trends in the energy sector and represents a rather extorted solution in the circumstances of low living standard of citizens. Changes in oil prices on the global market will affect the level of inflation in Montenegro. The Strategy initiates an active program of decisions by the energy regulator concerning gradual increase of tariff prices in order to get them closer to the market prices, but it also states that this process needs to take into account socially vulnerable population categories, which essentially is not only the matter of energy sector but also of the activities and measures of the ministry in charge of social protection of the vulnerable population, so that all consumers can be able to pay real market price of the energy they consume.

The Ministry of Health, Labor and Social Welfare, in cooperation with the Ministry for Economic Development, Montenegro Electric Power Company (EPCG) and Regulatory Agency for Energy, and with a view to protecting the interests of consumers-buyers with respect to their ability to pay electricity bills, and following the commitment that tariff and price policy for energy should be market-based, will prepare a program for subsidizing the most socially vulnerable groups of citizens aimed at satisfying minimum needs for electric and heating energy.

Poverty Reduction Strategy Paper for Montenegro will be updated and harmonized with other strategic documents.

10.2. PRICE POLICY

In the light of causes and consequences of inadequate price (impossibility of co-financing the activity; unsustainable development of entities dealing with energy activities), there comes the role of the Regulatory Agency for Energy. It should determine the reasonable costs of respective energy activities and propose to the Government such tariff systems and price levels that will simultaneously protect the economy and citizens from monopolistic position of individual entities and allow the energy entities to perform the energy services entrusted to them by the Law, in accordance with the Energy Policy and this Strategy.

In accordance with the Energy Law and responsibilities of the Government, based on the review of the implementation of the Energy Development Strategy and in cases of inadequate and untimely interest of investors in the construction of new energy sources/facilities, the Government should, by special measures, such as decisions to increase energy prices, to issue public tenders for new facilities and the like, provide conditions for energy entities to be able to perform obligations arising from their activity, particularly those related to security and regularity of required energy supply to consumers.

In that, when energy price increase is concerned, the increase must be carried out gradually to come to the level of market prices and the Government should provide special social protection program to subsidize a portion of energy expenses (from the budget and/or from increased prices) for socially vulnerable groups of citizens.

It is recommended to establish mechanism for establishing and changing energy price in Montenegro before the company privatization.

Specific technical and economic features of the emerging Montenegrin energy market require a well established system of energy price changes, so that future investors may be generally assured about the consistency and stability of market laws, which is particularly important for transition countries,

GREEN PAPER

because political and budget needs must not be the only reasons for undertaking fast steps in the privatization and energy price policy.

10.3. KEY INDUSTRIAL CONSUMERS

Key energy consumers in Montenegro are Aluminium Plant in Podgorica (KAP) and Steel Plant in Niksic. The period of transition (including the process of privatization) has offered solutions that steadily bring these consumers into market conditions, retaining at the same time the advantage that these facilities possess (in the context of energy): being stable and balance consumers dominating in the overall electricity consumption.

It is also important to note that, even with the current price structure, there is a motivation for both EPCG, which has been assuming the role of an active participant in the process of environmental protection, and these consumers to invest resources and efforts in introducing (from the aspect of energy) most efficient production processes aimed at observing all applicable environmental standards: in the domain of wastewater, air pollution, soil pollution and human health impact, by applying state-of-the-art technologies and know-how in these areas.

10.4. LOCAL AND REGIONAL ENERGY MARKET

Within retail and wholesale elements, efforts should be made to establish a central function at the local market that will enable unimpeded trade in electricity. It should be a part of the broader market environment with the following energy trade elements:

- Market administration;
- Managing the market as a whole, to support the work of market operators;
- Measurements;
- Market information; market arrangements through bilateral agreements and with other appropriate options with mandatory balancing mechanism to enable final energy settlement;
- Ancillary services to maintain security and stability of the system.

At the regional level, Montenegro should participate in the creation of the integrated market for electricity and natural gas (when conditions have been created) on the basis of common interest and solidarity, having in mind that Montenegrin integrated market may, at a later stage, also include other energy products and carriers of energy sources such as LPG and natural gas, gasoline, hydrogen or other more important network infrastructure facilities. In that respect, it is necessary to create a stable regulator and market framework able to attract investments in power generation, construction of energy transmission network and construction of gas network, to enable access to stable and continual delivery of electricity, and subsequently gas as well, which is very important for economic development and social stability of the state.

10.5. ACCESSION TO EU, REGIONAL AND EUROPEAN DEVELOPMENT TRENDS

The objectives of Montenegro's accession to EU, broader regional and European integrations will be achieved by:

- leading a continual and verifiable development policy, financing the exploitation of hydro potential, new renewable sources and combined generation of electric and heating energy;
- accepting and adopting EU legislation and directives;
- preparing the existing energy entities and consumers for equal participation in the local and regional market, in the first five years of the Strategy implementation already, but in spite of

GREEN PAPER

opening up competition in the supply, by providing adequate support to the provider with the obligation of public supply at regulated tariffs;

- providing conditions that, before the expiry of the five-year period (2007-2011), price of electricity and network services will cover the expenses of energy entities, including variable costs, maintenance costs, capital expansion costs, costs of energy security and environmental protection, but also the payment security;
- by not later than end 2011, eliminating any state interference in the determination of price for large consumers, because since that time onward these consumers will be totally left to the market.

10.6. TECHNOLOGICAL DEVELOPMENT AND RESEARCH

Montenegro will take determined measures for the introduction of innovations in energy sectors because new technologies are of special importance in planning future reliable energy supply, resolving the issue of efficient consumption of energy, sustainability and industrial competitiveness, use of renewable sources and environmental issues.

Technological innovations in efficient consumption of energy must become one of basic programs in the power consuming industry and equipment production.

The use of *energy labels* may help a lot in increasing the scope of research and technological innovations in the industry in that direction.

Energy labeling for buildings will, in addition to heating protection regulations, contribute to the technological development in the areas of insulation techniques and installations in construction.

In order to provide technical innovation and modernization of industry and contribute to energy saving, Montenegro will take into account the IPPC Directive that has made a great breakthrough, as well as the development of BREF documents that define the best available technology and optimum energy consumption for a certain type of industry (BAT).

10.7. EDUCATION AND INTERNATIONAL COOPERATION

Montenegro wishes to be a modern and knowledge based, successful society. That requires increasing the quality and efficiency of the educational system and strengthening the role of knowledge as competitive capacity on the global energy market.

Proposal for changes in education system: During the full-time and part-time education, specialists will be educated in the area of energy, increasing their knowledge of efficient use of energy, which will improve the overall economic and social attitude towards energy. Education system should spread knowledge of energy management, of better understanding of energy processes, sustainable development, efficient energy consumption, decreasing negative effect of energy and energy consumption on the environment, decreasing energy consumption and energy expenses, and it should be carried out in an organized way as part of both full-time and part-time training through the following activities:

- technical education in primary schools, introducing students to power generation and consumption, and environment issues;
- special program for technical secondary schools;
- curricula improvement regarding energy management at technical universities;
- additional education (seminars, courses...).

Basic required activities:

GREEN PAPER

- additions and changes to curricula at all levels and all departments
- preparation of teaching equipment for efficient energy consumption and renewable energy sources;
- new study courses in the field of sustainable energy development and
- promotion of extracurricular programs and projects.

Researches in the field of energy, development of local expertise and local experts will have a long-term favorable influence on the economic competitiveness, education and employment of the young, as well as on international recognizability of the state. It is necessary to design a national scheme of researches in the field of energy, to employ new domestic expertise, prevent "runaway" of energy professionals and promote a number of PhD papers. It is also necessary to develop targeted study programs in energy and environment, promote the establishment of specialized and research groups and finance good programs.

10.8. BOLOGNA CONVENTION

To an appropriate degree, energy, particularly energy efficiency, should be largely represented in lower level schools (primary and secondary schools). That would, in addition to education of technical staff, contribute to raising the public awareness and general culture in all activities, including the field of energy.

For more efficient implementation of strategic goals, a concept of continual education should be introduced in the system of education, so that specialists can have the opportunity to monitor the developments and innovations in modern knowledge and technologies.

10.9. ALTERNATIVE (NUCLEAR) OPTION?!

In the circumstances of high objectives of preserving the untouchability of Montenegro as an ecological state, especially with respect to air pollution in some areas (e.g. Pljevlja), and the need to increase security of energy supply in the constant part of the load diagram, as an alternative to the proposed significant exploitation of Montenegro's own hydro potential (Scenario N-2) and coal, which solution is also not a cheap option, there are also voices for introducing nuclear option. Significant new and additional analyses, mostly in relation to the issue of possible location and macroeconomic impact on Montenegro, are needed for more concrete decisions regarding such an approach, which is generally associated with neutral opinion of the EU in recent years. It is quite obvious that such an option would contribute to the preservation of the environment because of non-construction or delayed construction of new hydropower plants, it would drastically influence on the reduction of greenhouse gas emissions, but on the other side, it would bring about the dependence on foreign investor and a high degree of energy dependence on imports of nuclear fuel, and furthermore, due to imported technology, it would cause a significant problem of labor restructuring in electric industry, mining and associated industries. The question of credibility of Montenegro as an ecological state would also arise (e.g. the question of radioactive waste management and disposal). The Strategy does not foresee such options by 2025.

10.10. PUBLIC AWARENESS AND STRATEGIC COMMUNICATION

In all decision-making processes, particularly in various stages of decision-making in the area of strategic environmental assessment, it is foreseen to conduct active measures for public awareness and participation: it means that public debates should include the largest number of participants.

Access to public documents in relation to possible impact of every specific project on the environment should be ensured, and procedures in connection to such projects and their alternatives should also be subject to transparent monitoring, with participation of domestic and international public.

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That is why the presentation and promotion of the Energy Development Strategy requires a special effort; of importance is not only the communication with employees in the energy sector and Government bodies but also a «partnership» with non-governmental organizations and population.

For the adoption of the Strategy, Action Plan and successful implementation of the Energy Development Strategy, it is therefore important to provide consistent communication support at all stages and to all involved sections of the public, among which some will be limited to the territory of Montenegro and some will also have international dimension.

For the successful implementation of the strategic energy development project, strategic public communication management is also needed, because the public expects to be properly informed.

For that reason, a complex approach to the project of communication support to the Energy Development Strategy of Montenegro and the preparation of a communication strategy is recommended, with a long-term objective primarily to provide favorable conditions for the overall development of energy sector in Montenegro, as one of the crucial pillars of economic development of the state of Montenegro.

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18. STRATEGY IMPLEMENTATION

With the assumption of successful institutional reforms and maintenance of macroeconomic stability of Montenegro, the Strategy recognizes the goals and establishes implementation mechanisms in the areas of (i) reliability and quality of energy supply, (ii) competition in energy supply, (iii) protection of the environment, (iv) in other relevant areas (diversification of energy mix, preservation of existing sites for power generation, economically viable use of renewable sources, stimulation of the construction of cogeneration facilities, where there is heating consumption, promotion and introduction of new clean technologies, fostering of domestic production of electric energy within the allowed mechanisms, optimum reduction of import dependence of the energy system).

11.1. ACTION PLAN

Energy Strategy presents the paths, needed measures and steps (the so-called “roadmap”) that Montenegro will follow in the implementation of adopted objectives of the long-term energy Policy. However, the historic experience suggests that declarative documents as per definition require an action plan for the current maintenance of the targeted implementation time schedule.

Action Plan is essentially a component of the Strategy and is a concrete reflection of strategic perception of the energy development. It should consist of a number of concrete programs and project, the implementation of which will accomplish the Strategy goals, as well as appropriate control mechanism for monitoring and corrective actions.

In accordance with Montenegrin legislation, the Action Plan will be drawn up by the ministry responsible for energy. The Action Plan will identify specific tasks for the Strategy implementation for at least the first five years of the implementation, together with description of relevant programs and projects, the assignment of tasks among local institutions, expenses, timeframes and manner of funding, and point to special measures (critical paths) required for their implementation.

11.2. STRATEGY IMPLEMENTATION MONITORING OBJECTIVES AND TOOLS

Kroz Implementation of the Strategy will be monitored through the Action Plan, with the main objective to avoid and/or warn about possible delays and to identify/carry out any needed intervention measures. Monitoring tools will operate at several levels:

- **Annual report of the Ministry:** Ministry in charge of energy will monitor the implementation of the Energy Strategy through an annual review. The annual review of the energy sector will give quantitative and qualitative overview of the implementation of tasks specified in the Energy Strategy on the basis of a selected system of indicators. Annual review of the energy sector is an annual publication that will present implementation of the Strategy from the aspect of newest changes, events and legislation, connected to energy management in the world and in the EU.
- **Internationally recognized parameters for establishing a degree of implementation of the planned Strategy:** Montenegro will apply the system according to pre-selected indicators that are internationally recognized and will enable quantification and monitoring of the identified Strategy targets. On that basis, assessment of the implementation successfulness and comparison to other states will be made.
- **Periodic updating of the Strategy:** In Montenegro, it is necessary to institutionalize the system for monitoring and control of Strategy implementation, with clear responsibility and authorization. Based on periodic review of the Strategy implementation (the period not exceeding two years), reasons for possible deviations from the Strategy should be carefully analyzed and appropriate measures should be taken to achieve or possibly modify certain goals.

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19. MAJOR STRATEGY RECOMMENDATIONS

AREA OF APPLICATION	STRATEGY RECOMMENDATIONS
A. ENERGY EFFICIENCY	
EFFICIENT ENERGY CONSUMPTION STRATEGY	<ul style="list-style-type: none"> • <i>Adoption of special Law on Energy Efficiency;</i> • <i>For a more thorough analysis of overall losses incurred in the energy sector in Montenegro, preparation of a special expert study;</i> • <i>Expert analysis of large consumers (KAP, Steel Plant and Railways Company) from the aspect of reducing energy consumption;</i> • <i>As a measure for introducing energy efficiency for large industrial consumers, imposing urgent regulatory requirement is recommended for the mandatory preparation of annual/semi-annual energy balances and introduction of energy efficiency measures!</i>
STRATEGY OF REDUCING ENERGY LOSSES IN TRANSMISSION AND DISTRIBUTION	<ul style="list-style-type: none"> • <i>Preparation of a new study of losses in voltage and energy in transmission and distribution networks in Montenegro and an action plan for the reduction of losses to a foreseen technically achievable level of 10% (distribution)!</i>
PROGRAM SOLUTIONS AND DATA CONNECTION	<ul style="list-style-type: none"> • <i>It is recommended that geodetic experts review the proposed Law on Surveying and Cadastre in relation to GIS introduction and energy sector needs, and then propose appropriate amendments!</i>
PROGRAM SOLUTIONS AND DATA CONNECTION	<ul style="list-style-type: none"> • <i>It is recommended that geodetic experts review the proposed Law on Surveying and Cadastre in relation to GIS introduction and energy sector needs, and then propose appropriate amendments!</i>
CENTRAL (CONSOLIDATED) CADASTER OF PUBLIC ECONOMIC INFRASTRUCTURE	<ul style="list-style-type: none"> • <i>Introduction of Geographic Information System (GIS)!</i>
PUBLIC SECTOR ENERGY EFFICIENCY	<ul style="list-style-type: none"> • <i>Efficient and rational use of energy in public sector should be supported by subsidizing energy plans of municipalities, energy rating analyses of buildings and feasibility studies of investments in efficient energy consumption and use of RSE!</i>
HOUSEHOLDS	<ul style="list-style-type: none"> • <i>Energy saving in households should be encouraged by free energy advising;</i> • <i>From time to time, financial incentives should be offered for reconstruction of residential building and use of RSE, to be granted to citizens over public announcements!</i>
ENERGY ADVISING FOR CITIZENS	<ul style="list-style-type: none"> • <i>A project titled «Energy advising for citizens» should be introduced!</i>
COST MEASUREMENT AND	<ul style="list-style-type: none"> • <i>Co-financing of projects related to co-generation and heating system for</i>

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CALCULATION ACCORDING TO ACTUAL CONSUMPTION	<p><i>the city of Pljevlja;</i></p> <ul style="list-style-type: none"> • <i>Cost calculation with measurement and distribution of costs according to actual consumption!</i>
EFFICIENT TRANSPORT MODELS	<ul style="list-style-type: none"> • <i>Subsidizing energy analyses of companies and feasibility studies of investments in efficient energy consumption and use of RSE;</i> • <i>In cooperation with media, introduction of a practice to give awards to energy efficient companies, energy managers and energy efficient projects!</i>
B. POWER SUPPLY STRATEGY	
REVITALIZATION AND RECONSTRUCTION OF EXISTING FACILITIES	<ul style="list-style-type: none"> • <i>In the coming period by 2010, existing power generating plants should be reconstructed and revitalized with a view to environmental stabilization, increased generation efficiency and improved performance of existing plants;</i> • <i>In order to provide relevant data for the revitalization and reconstruction of HPP Piva, activities should be intensified on the preparation of feasibility study for the reconstruction and modernization of plants and equipment, the increase of plant preparedness and work safety, and possible increase of power of generators in this plant.</i> • <i>The Strategy also recommends the intensification and finalization of examination of possibilities for the incorporation of the 8th generator in the Hydropower Plant Perucica (66/58.5 MW), which would increase the overall capacity of existing plants by 95.5 MW!</i>
CONSTRUCTION SCENARIOS FOR NEW ENERGY FACILITIES	<ul style="list-style-type: none"> • <i>Based on former analyses of possibilities for the construction of new generation facilities – power plants, the Strategy recommends the construction of new plants according to the analyzed Scenario N-2;</i> • <i>An econometric model of Montenegrin economy for the evaluation of macroeconomic effects should be developed!</i>
NEW PLANTS USING RENEWABLE SOURCES OF ENERGY	<ul style="list-style-type: none"> • <i>In the coming period, it is necessary to intensify studies of envisaged locations in order to ensure sufficient quality basic data for making informed investment decisions for the construction of small hydropower plants;</i> • <i>Study of wind plant development should be prepared!</i>
THERMAL PLANT PLJEVLJA 2	<ul style="list-style-type: none"> • <i>Construction of Thermal Power Plant 2;</i> • <i>Reconstruction of Thermal Power Plant Pljevlja 1!</i>
HPP ON THE MORACA RIVER	<ul style="list-style-type: none"> • <i>In the coming period, it is necessary to intensify investigation works in order to ensure sufficient quality basic data for making informed investment decisions for the construction of hydropower plants on the Moraca River!</i>
HPP KOMARNICA	<ul style="list-style-type: none"> • <i>In the coming period, it is necessary to intensify investigation works in order to ensure sufficient quality basic data for making informed investment decisions for the construction of hydropower plants on the Komarnica River!</i>

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C. NATURAL GAS SUPPLY STRATEGY	
INTRODUCTION OF LPG	<ul style="list-style-type: none"> • <i>Introduction of LPG as energy substitute and as predecessor to natural gas is recommended!</i>
D. LIQUID FUEL SUPPLY STRATEGY	
SUPPLY OF LIQUIFIED PETROLEUM GAS (LPG)	<ul style="list-style-type: none"> • <i>Introduction of LPG system in tourism is recommended!</i>
SUPPLY OF PETROL DERIVATIVES	<ul style="list-style-type: none"> • <i>To preserve operational reserves of petrol derivatives sufficient for 45 days, the use of existing storage facilities is recommended;</i> • <i>Construction of additional storage facilities for obligatory 90-days reserves of petrol derivatives is recommended!</i>
E. DISTRICT HEATING SUPPLY STRATEGY	
HEATING ENERGY SUPPLY	<ul style="list-style-type: none"> • <i>For the district heating system, the sites in Pljevlja and Niksic, and then Bijelo Polje, Cetinje and Berane are recommended;</i> • <i>For the needs of district heating in Podgorica, the use of residual heat from the process of waste incineration or similar processes, as the most competitive one, is recommended;</i> • <i>As a possible option for introducing district heating system in smaller local communities in the municipalities of Kolasin, Zabljak and Pluzine, the use of waste heat from industrial processes, waste incineration or the use of biomass is recommended!</i>
HEATING SYSTEM FOR THE CITY OF PLJEVLJA	<ul style="list-style-type: none"> • <i>It is recommended to revise the existing and prepare new needed studies of justifiability and feasibility of construction of the heating system for the city of Pljevlja;</i> • <i>In the coming period, it is necessary to intensify investigation works in order to ensure sufficient quality basic data for making informed investment decisions for the construction of district heating system in Pljevlja!</i>
F. STRATEGY OF INTRODUCTION OF RENEWABLE SOURCES OF ENERGY (RSE)	
RSE INTRODUCTION STRATEGY	<ul style="list-style-type: none"> • <i>In the next period until 2020, the Strategy recommends maintenance of the share of RSE of at least 20% of total primary energy consumption in accordance with goals set by EU-member states!</i>
RENEWABLE SOURCES OF ENERGY	<ul style="list-style-type: none"> • <i>Stimulate use of RSE by subsidizing investments!</i>
WIND ENERGY	<ul style="list-style-type: none"> • <i>Preparation of additional studies of possible use of wind energy in Montenegro should be intensified and micro-locations with the</i>

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	<p><i>larges wind power should be determined;</i></p> <ul style="list-style-type: none"> <i>• In the coming period, it is necessary to intensify investigation works at the so determined micro-locations in order to ensure sufficient quality basic data for making investment decision for the construction of wind plants;</i> <i>• Legal and other barriers to faster investments in wind plant projects should be removed!</i>
ENERGY FROM WASTE	<ul style="list-style-type: none"> <i>• In the coming period, it is necessary to intensify investigation works concerning micro-locations and capacity of industrial plants for waste incineration;</i> <i>• Preparation of additional studies on possible use of waste energy in Montenegro for the production of electric and heating energy, as basic data for making investment decisions, should be intensified!</i>
SUN ENERGY	<ul style="list-style-type: none"> <i>• The use of direct sun energy for heating, preparation of warm water and other low-temperature processes is recommended!</i>
BIOGAS	<ul style="list-style-type: none"> <i>• Preparation of additional assessments of biogas resource availability in Montenegro and feasibility study in local conditions is recommended in order to determine economic potential of using biogas in concrete projects!</i>
BIOFUEL	<ul style="list-style-type: none"> <i>• Preparation of additional assessments of availability of resources for biofuel production in Montenegro and feasibility studies in local conditions is recommended in order to determine economic potential of biofuel production!</i>
G. STRATEGY OF CO-GENERATION INTRODUCTION AND OF LOCAL ENERGY DEVELOPMENT CONCEPTS	
CO-GENERATION INTRODUCTION STRATEGY IN COMPLIANCE WITH THE DIRECTIVE 2004/8/EC	<ul style="list-style-type: none"> <i>• Preparation of additional assessments of availability of resources for introducing industrial and small co-generation plants in Montenegro and feasibility studies in local conditions is recommended in order to determine economic potential of using co-generation in concrete projects!</i>
LOCAL ENERGY DEVELOPMENT STRATEGY	<ul style="list-style-type: none"> <i>• Modernization of existing boiler rooms using coal and gradual LPG substitution is recommended;</i> <i>• Preparation of additional assessments of availability of resources for the local energy development in Montenegrin municipalities and feasibility studies in local conditions is recommended in order to determine economic potential of using local energy development in concrete projects!</i>
H. ENERGY PRICE MATCHING	
ENERGY PRICE MATCHING POLICY IN MONTENEGRO	<ul style="list-style-type: none"> <i>• Regulatory agency should determine reasonable costs of appropriate energy activities and propose to the Government such tariff systems and price levels that simultaneously protect the economy and citizens from monopolistic position of individual entities and enable energy entities unimpeded conduct of energy business allowed to them by the Law, in accordance with objectives of Montenegrin energy Policy and this</i>

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	<p>Strategy;</p> <ul style="list-style-type: none"> • <i>Putting in place of a mechanism for establishing and changing energy price in Montenegro before company privatization is recommended;</i> • <i>Gradual increase in energy price is recommended, in order to come to market prices and the preparation of a special Government program for the social protection and subsidizing of part of energy expenses (from the budget and/or increased prices) to socially vulnerable categories of citizens!</i>
I. PRIVATIZATION OF THE POWER SECTOR	
IMPORTANCE OF POWER SECTOR PRIVATIZATION	<ul style="list-style-type: none"> • <i>To be determined later!</i>
J. PROMOTION OF INVESTMENTS AND KAPITAL MARKET	
PROMOTION OF INVESTMENT IN ENERGY SECTOR OF ROM	<ul style="list-style-type: none"> • <i>Ministry responsible for energy should establish a unit for promotion of investments in the energy sector on the basis of a “one-stop-shop” principle”, the main objective of which will be to ensur updated and relevant iformation to the interested investor</i>

20. CONCLUSION

Montenegro, after a longer period of time, has a clear Energy Policy supported by Energy Strategy. To achieve the foreseen ambitious plans, Montenegro needs a broader coalition and strongly coordinated action of all stakeholders inside and outside of Montenegro.

The development of energy sector in Montenegro is based on better and more efficient utilization of its own resources, since Montenegro has an interest primarily in taking advantage of favorable domestic sources and thus decrease the import energy and a clear intention to become electricity exporter in future, which will directly influence on both the overall and accelerated development of the economic system of the state and also better quality of living for its citizens.

Main macroeconomic effects of the construction of new energy facilities are certainly: the increase in Gross Domestic Product, reduction in energy imports, decrease of foreign trade deficit, opening of new industrial sectors and thereby increase in employment, and finally, in international terms, increase of competition of Montenegrin economy. Moreover, due to new initiatives in energy industry, in various new development sectors increased overall entrepreneurship initiative will not doubt come to surface and related employment opportunities.

With the introduction of innovations in energy, encouragement of diversification in the use of different types of energy, and strategic choice of partner states, when energy import or export is concerned, Montenegro will really create favorable conditions for the development of energy and entire economy, additional jobs, higher security in energy supply and cleaner environment.

By implementing the Energy Strategy, Montenegro will make a large step forward with respect to security of energy supply, because the Strategy envisages in the future the connection of EES of Montenegro with all neighboring states and the use of trans-European major routes of natural gas.

Due to a long interruption in the construction of its own energy sources, extremely high import dependence on more than 1/3 of energy needs, large unutilized potential of high quality from the aspect of energy, domination of electricity in energy balance, high amortization of energy infrastructure and the need for its accelerated revitalization and technological modernization – are reliable facts, due to which it is necessary to start construction of new generation sources. The construction of hydropower plants very successfully fits into the measures of integrated land management, urban development and much more successful valorization of waters, water courses and mountainous areas in tourist industry. It is a very important strategic determinant that such a construction, which entails appropriate economic and infrastructural facilities and tertiary service facilities, conditions will be created, primarily in tourism, to keep the people in the mountainous regions, because they will have the opportunity to conduct business and will be provided with excellent communication connections with urban centers.

Advantage is, by all means, given to renewable sources of energy. Any alternative, not giving advantage to renewable sources, is economically unreasonable. The construction of new hydropower plants, in addition to additional annual production of energy, also enables better development of local communities in the zones around new hydropower plants, better protection of the environment and better regional development, because energy facilities are always followed by parallel construction of infrastructure. Better use of renewable hydro energy at favorable rates is of national interest, primarily due to increasing independence, security, stability and competitiveness of the Montenegrin EES. The reduction in import dependence may also be achieved by constructing a larger thermal power plant that would use domestic coal.

The Strategy is not a fixed document. It will be renewed every several years, along with Action Plan, but always in consideration of the newly created conditions, both in the energy sector in Montenegro and in broader energy environment.

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Timely decisions of all relevant decision-making factors in the state and determined enforcement of the adopted decisions will be a reliable guarantee to Montenegro for the successful accomplishment of the assumed tasks and targeted development objectives in the field of energy.

Future economic development of each country is naturally always connected with numerous doubts, and conflicting situations and interests; their timely resolution is extremely important for the implementation of programs and projects in energy, which are as a rule, long-term programs, with long lasting preparation and implementation, while their final positive effects in commercial exploitation are achieved only later, both in respect to population and general public.

Main macroeconomic effect of the application of construction of new energy facilities will bring Montenegro increased GDP, decreased energy imports and reduced foreign trade deficit, opening of new development possibilities with increased employment and sustainable environmental development and, eventually, increased competitiveness of the OVERALL Montenegrin economy.