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ENERGY AND GREEN ECONOMY IN MONTENEGRO

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GREEN ECONOMY IN MONTENEGRO

- **A green economy** is one that results in improved human well-being and social equity, while significantly reducing environmental and ecological risks (UNEP 2010)
- **Green economy concept is**
  - An instrument that contributes to the sustainable development
  - The principle of economic growth and development is imposed by the requirement for sustainability and environment preservation, with maximum social inclusion and respect of equity.
- Montenegro was constitutionally declared as an **Ecological State** in 1992 – the impetus in strategic orientation towards the sustainable development.
- **Key sectors for green economy in Montenegro:**
  - Energy
  - Agriculture
  - Tourism
- **Science, knowledge and innovations –** precondition for development of green economy

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STRATEGIC FRAMEWORK FOR DEVELOPMENT OF ENERGY SECTOR IN MONTENEGRO (1)

- Draft **National Development Plan** of MN 2013 – 2016
- National **Sustainable Development** Strategy of MN (2007)
- Strategy for **Regional Development** of MN 2010-2014 (2010)
- **Energy policy of MN until 2030** (2011)
  One of three key priorities – **Sustainable energy development**:

  Ensuring sustainable energy development based on accelerated but rational use of own energy resources, taking into account principles of environmental protection, increase of energy efficiency (EE) and higher use of renewable energy sources (RES), including the need for socio-economic development of Montenegro.

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STRATEGIC FRAMEWORK FOR DEVELOPMENT OF ENERGY SECTOR IN MONTENEGRO (2)

- ***Energy Development Strategy (EDS)*** *of MN until 2025* (2007) (harmonized with the Spatial Plan of Montenegro until 2020)
  Action Plan *for Implementation of EDS of MN 2008-2012* (2008)

- ***Small Hydropower Plant Development Strategy*** *of MN* (2006)

- ***Energy Efficiency Strategy*** *of MN* (2005)
  Action Plan *for Energy Efficiency 2010-2012* (2010)

Strategic documents under preparation:

- Energy Development Strategy of MN until 2030
- Program on development and use of renewable energy sources

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LEGAL AND REGULATORY FRAMEWORK FOR DEVELOPMENT OF ENERGY IN MN (1)

- **Law on Ratification of the Treaty Establishing the Energy Community between the European Community and RoM** ("Official Gazette of MN", no 66/06)
- **Energy Law** – EL ("Official Gazette of MN", no 28/10)
  Regulations based on EL:

- Rulebook on criteria for issuance of the **energy license**, content of a request and registry for energy license ("Official Gazette of MN", no 49/10)
- Rulebook on **types and classification** of plants for generation of electricity from renewable sources and highly efficient cogeneration ("Official Gazette of MN", no 28/2011)
- Rulebook on closer conditions that are to be fulfilled by legal entities for **measuring and exploring** potential renewable energy sources ("Official Gazette of MN", no 28/11)
- Decree on requirements for obtaining the status and rights of **privileged electricity producer** ("Official Gazette of MN", no 37/11)
- Decree on requirements for issuing, transfer and withdrawal of **origin guarantees** for energy produced from renewable energy sources and in highly efficient cogeneration ("Official Gazette of MN", no 37/11)
- Decree on the tariff system for determining **incentive prices for energy** produced from renewable energy sources and in highly efficient cogeneration ("Official Gazette of MN", no 52/11)
- Decree on types and manner of incentives for production from renewable energy sources and in highly efficient cogeneration (under preparation)

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LEGAL AND REGULATORY FRAMEWORK FOR DEVELOPMENT OF ENERGY IN MN (2)

- **Energy Efficiency Law**– EEL ("Official Gazette of MN", no 29/10)

Regulations on the basis of EEL:

- Instructions for determining the **methodology for calculation of indicative targets** for improvement of energy efficiency ("Official Gazette of MN", no 18/11)
- Decision on **determining indicative targets** for improvement of energy efficiency ("Official Gazette of MN", no 48/11)
- Rulebook on the content of the report on implementation of the **energy efficiency improvement plan** by local self-government units ("Official Gazette of MN", no 61/11)
- Rulebook on **information system** on energy consumption and manner for delivery of data on annual energy consumption ("Official Gazette of MN", no 06/12)
- Rulebook on the limit values of energy consumption for **determining large producers**, the content of the energy efficiency improvement plan and the report on implementation of the plan ("Official Gazette of MN", no 10/12)
- Many regulations in the energy efficiency are under preparation.

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GOALS IN BECOMING GREEN IN ENERGY SECTOR

- **In accordance with the strategic commitments of MN, the following goals in becoming green in the energy sector have been recognized**:
  - **Reduction of final energy consumption** for 1% at the annual level and respectively for 9% until 2018 in comparison to the average consumption determined for the period 2002-2006, respectively for 12% until 2020;
  - **Reduction of energy intensity** (consumption of energy per GDP unit) for 10 % in respect to 2002;
  - Undertaking decisive measures for maintenance of at least **20% of RES share** in the total consumption of primary energy in MN (Energy Development Strategy of MN until 2025)
  - Use of RES in accordance with the **Directive 2009/28/EC** and the Decision issued by the Energy Community (national goal on use of RES in MN - most likely **above 30%)**

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SWOT ANALYSIS: DEVELOPMENT OF ENERGY SECTOR AND POSSIBILITIES FOR BECOMING GREEN (1)

Advantages:

- Energy Policy of MN until 2030 recognizes the energy sector as a pillar of overall, sustainable and long-term stability of MN
- Commitment of MN to European integrations and active role in international cooperation in the energy sector
- Compliance of strategic commitments in energy sector with national strategies (Sustainable Development Strategy, Regional Development Strategy, National Development Plan) and with the Spatial Plan of MN
- High degree of harmonization between the national legislation and the EU acquis (EL, EEL)
- There is a significant potential for use of RES, especially for hydro energy
- MN is located at a strategically important position for construction of energy corridors towards Croatia, B & H, Serbia, Kosovo, Albania and Italy
- There are favorable conditions for investments into private sector in terms of energy, especially for RES
- Schemes for promotion of EE (energy certification of buildings, labeling of devices, eco-design)

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SWOT ANALYSIS: DEVELOPMENT OF ENERGY SECTOR AND POSSIBILITIES FOR BECOMING GREEN (2)

Weaknesses:

- Great dependence on import of energy
- Unfavorable structure of final energy consumption (electricity is dominant), no infrastructure /market for use of natural gas
- Insufficient exploration of energy resources and potentials (oil and gas, RES)
- Energy inefficiency in distribution of energy, as well as in consumption of final energy, which increases the already high energy intensity
- High amortization for the existing energy infrastructure and necessity for its rapid revitalization and technological modernization
- Trend of constructing buildings with inadequate energy characteristics
- Lack of energy management in public sector (at the state and local level) and with large energy consumers

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SWOT ANALYSIS: DEVELOPMENT OF ENERGY SECTOR AND POSSIBILITIES FOR BECOMING GREEN (3)

Weaknesses:

- Non-existence of funds for exploration and technological development in energy sector
- Insufficient financing /incentives for EE and RES
- Unused opportunities and inefficient use of biomass
- Due to relatively small number of buyers and low number of energy undertakings, there are limited possibilities for development of energy market in MN and development of a regional market is in delay
- Not regulated relations with neighboring countries regarding the optimal use of joint waters
- Insufficient inclusion of domestic scientific and professional institutions in energy sector issues; non-existence of domestic industry that would actively support energy development and creation of new jobs
- Existence of formal limitations for activation of significant energy potentials and options (Declaration on Protection of the Tara River, legal prohibitions for construction of nuclear plants, etc.)

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SWOT ANALYSIS: DEVELOPMENT OF ENERGY SECTOR AND POSSIBILITIES FOR BECOMING GREEN (4)

Opportunities:

- Higher use of RES potentials can increase security of supply and investments and could enable local development
- Reduction of energy dependence through EE measures (high potentials for energy savings through energy efficiency measures) and construction of RES capacities
- Higher opportunities for exchange of electricity and increased security in supply with construction of new interconnections with neighboring energy systems (Italy, B & H, Serbia)
- Development of electricity market
- Opportunities for connection with the regional gas-line system through IAP and/or TAP gas-line system
- Opportunities for development of EE and ESCo markets
- Use of international mechanisms for financing in the area of climate changes and trade with CO_2 emissions

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SWOT ANALYSIS: DEVELOPMENT OF ENERGY SECTOR AND POSSIBILITIES FOR BECOMING GREEN (5)

Dangers:

- Energy intensive industry inherited, concentration of consumption with two large consumers of ferrous and non-ferrous metallurgy and high share of households in the final energy consumption
- Hydro potential (main energy resource of MN) not used to the degree that would be optimum for development of the country
- Barriers not removed and inadequate organizational structure, which could jeopardize fulfillment of EE goals
- Unfavorable budget situation does not allow strengthening of administration capacities and reduces opportunities of the state to provide support to the energy sector and especially to the development and implementation of EE program
- Vulnerability to natural disasters and catastrophes and sensibilities to climate changes
- High initial costs for green investments
- Lack of experts of all levels for the green economy

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RES POTENTIALS IN MONTENEGRO (1)

The most important renewable energy sources in MN:

1. hydro potential
2. wind energy
3. solar energy
4. biomass and
5. communal waste

1. **Hydro potential** – the most important energy resource in MN
   - total theoretical hydro energy potential of main water streams is around **10000** GWh/year (only **17%** used)
   - Gross hydro energy potential on **small water streams 800-1000** GWh
2. **Wind energy** – good potential for use of wind energy in the coastal and central area:
   - **Mountain Rumija**, hills behind **Petrovac**, mountains between **Herceg Novi and Orahovac** (average wind speed 6-7 m/s)
   - Area around **Nikšić** (average wind speed 5.5-6.5 m/s)

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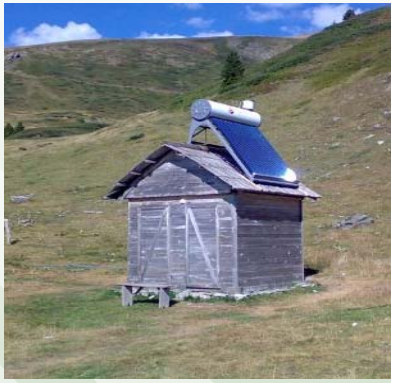
RES POTENTIALS IN MONTENEGRO (2)

3. **Solar energy –** This is an important potential and we can be compared with Greece and Italy. **Coastal and central area** are the most attractive as regards the use of solar energy, due to the number of sunny hours (**2.000-2.500 hours/year**.)
4. **Biomass and plant waste –**Technically usable potential of firewood is estimated to around **1000 GWh/year**, whilst the potential of biomass from forests, wood-processing and agricultural residues are estimated to around **400 GWh/year**.
5. **Communal waste –** it is estimated that around **200.000 to 250.000 tons** of communal waste are formed in the area of MN per year, which means that there are opportunities for constructing 3 to 5 industrial plants for their burning, depending on the capacity. Potential locations for such plants are near by larger towns (**Podgorica and Nikšić**).



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RES PROJECTS IN MONTENEGRO

- **Project on construction of HPP on the river Morača** (HPP Andrijevo, HPP Raslovići, HPP Milunovići and HPP Zlatica) with total installed capacity of **238** MW and with estimated annual production of **721** GWh
- **Project on construction of HPP Komarnica** (total installed capacity of **168** MW and with estimated annual production of **232** GWh)
- **Projects on construction of small hydropower plants** (sHPP)
  - Concession agreement concluded for construction of sHPP's on 14 water streams, envisaging construction of **35 sHPP's** with total installed capacity of around **100 MW** and with estimated annual production of around **300** GWh
  - **3 energy licenses** were issued for construction of sHPP's with installed power of up to 1MW
- **Projects on construction of wind farms –** agreements concluded for construction of wind farms at the locations of **Možura and Krnovo** (total installed power of **118** MW and estimated annual production of **272** GWh/year
- **Project on construction of biogas power plant** (installed capacity of **526 kW**), on the basis of issued energy license
  - Biogas produced from the poultry waste in Mataguži

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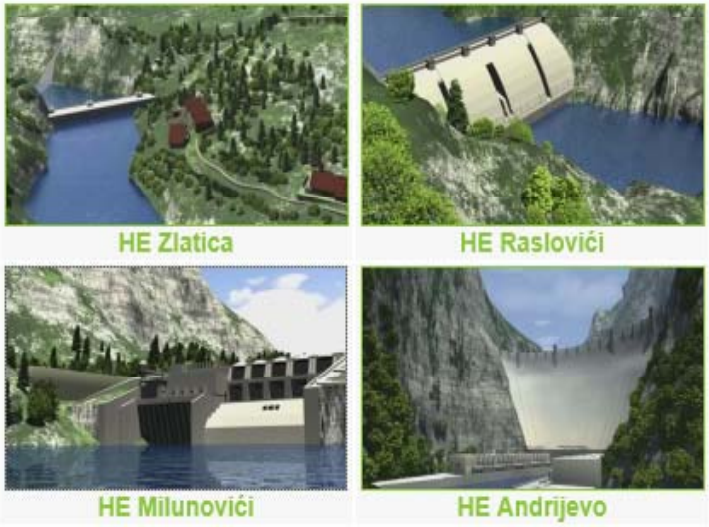
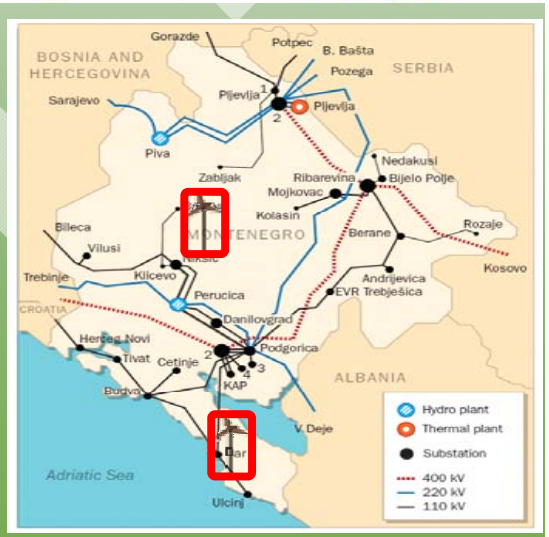
DRAFT ENERGY DEVELOPMENT STRATEGY OF MN UNTIL 2030

Green scenario of EDS of MN until 2030:

- construction of HPP on Morača (2019)
- construction of HPP Komarnica (2020)
- construction of sHPP (422 GWh/year)
- construction of wind farm (436 GWh/year)
- generation of energy from biomass (1257 GWh/year)
- generation of solar energy (173 GWh/year) and
- generation of bio-fuel energy for transport (422 GWh/year)





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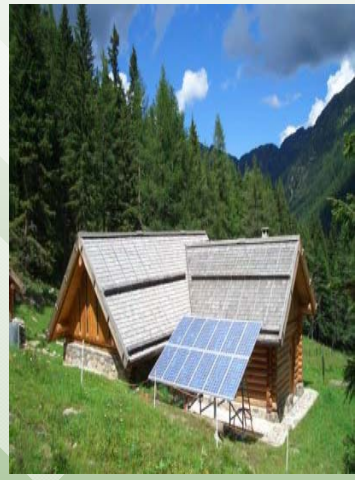
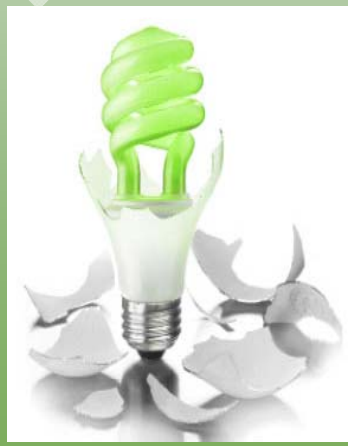
MEASURES FOR INCREASE OF ENERGY EFFICIENCY

Long-term measures for increase of energy efficiency (EE)

- **Promotion of financial mechanisms** for sustainable energy and alternative financing mechanisms
- **Infrastructural measures in the traffic sector** with the energy saving effects
- Implementation of measures for the increase of EE and EE investments into the public and communal companies of local self-governments and other **public companies**, as well as into **small and medium-sized enterprises**
- Financial incentives for the **use of solar thermal systems**, small biomass heating systems, energy saving bulbs and other measures for EE improvement and use of RES, which are intended for the citizens
- **Capacity strengthening** in the sector of services (public and private sectors)





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FINANCING ENERGY EFFICIENCY MEASURES

Recommendations for financing EE measures:

- Total funds from the **state budget** should amount to **1 million €/year** for the period 2012-2015, with the increase of 2% per year until 2020

- Contribution from the **local self-government budgets** in the amount of **1-2%** for EE improvement at the local level

- Inclusion of “green and EE" investments into **business plans** and financial reports of **companies**, especially for private sector

- **3-year "funding-gap" analysis** – assessment of additional funds required for implementation of EE projects, which will be a base for implementation of projects in cooperation with international financial institutions and development agencies

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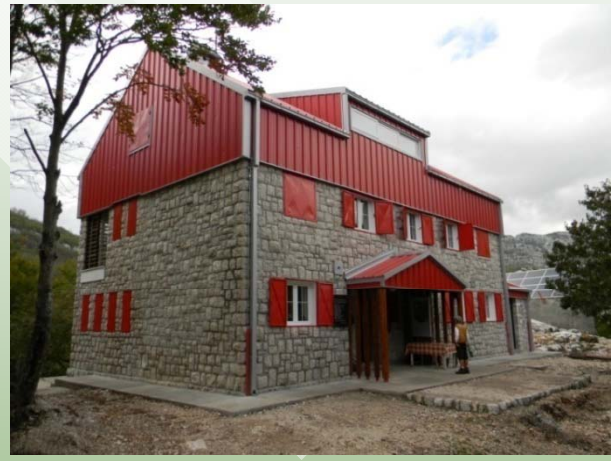
ENERGY EFFICIENCY IN CIVIL ENGINEERING AND HOUSING (1)

Implementation of green economy principles:



- Introduction of strict projecting and **construction plans** that are in compliance with EE principles, including calculation of energy characteristics of buildings with application of the most cost-efficient measures and **certification of buildings**. There is a great potential for making existing job positions “green” (project engineers, construction workers), as well as for making completely new green job positions (energy auditors).
- Use of **construction materials** and products that increase energy characteristics of buildings
- Maintenance of buildings and **energy management for buildings**. In this regard, there is an obvious space for opening of new green job positions.

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ENERGY EFFICIENCY IN CIVIL ENGINEERING AND HOUSING(2)

National Housing Strategy for the period 2011-2020 defines:

Short-term objectives (until 2015)

- Promotion of legislative reform on EE in housing sector
- Support to the Montenegrin European integration process, especially by encouraging application of EU Directive regarding the energy efficiency of buildings
- Implementation of EP certification for all new buildings or buildings that are to undertake significant reconstruction, as well as for all public buildings
- Upraising of public awareness on EE in housing sector
- Encouraging exchange of experience with other EU member states and candidate countries
- Contribution to a consistent application of Strategy in regulation of all informal residential buildings in MN, in accordance with the Vienna Declaration
- Contribution to the application of Strategy in order to ensure a consistent base of knowledge (statistics, expert knowledge, studies)

Mid-term and long-term objectives (2015-2020)

- Better energy efficiency in housing and construction of buildings
- Significant contribution to EU 20-20-20 objectives by reducing the emission of greenhouse gases from residential buildings
- Strengthening the image of MN as of an ecological state in the area of EE in housing and construction of buildings

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ENERGY EFFICIENCY AND RES IN TRAFFIC (1)

- Ministry of Transport and Maritime Affairs has prepared a legal base that is to be incorporated into the Law on Road Traffic Safety, as well as draft regulations that are to regulate homologation of vehicles in a manner which is to allow import and registration of used vehicles with **minimum Euro 3** and for new vehicles with **minimum Euro 5** standard for exhaust emissions.
- **Program for revitalization of vehicles** of Montenegrin transportation services with more ecologically advanced vehicles has been prepared – measures that are related to the emission of dangerous gases of road vehicles classified with M2, M3, N2 and N3 (buses and cargo vehicles).
- Regulated **public transport of passengers** in inter-city road traffic in MN – defined 420 routes with the same number of daily bus departures.
- With the aim to improve and promote railway transportation, projects on **reconstruction of railway infrastructure** are under way (in the last 5 years 150 million € was invested), as well as procurement of new trains (in last 5 years 130 million € was invested).

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ENERGY EFFICIENCY AND RES IN TRAFFIC (2)

- **IPA 2011** – Sustainable development of energy in Montenegro **stipulates preparation of a study, which is to have strategic and regulatory framework, as well as application of RES and EE measures in traffic** in accordance with EU policy.
- **„Green Cars Initiative" –** a part of European economic recovery plan which has been recently adopted by the European Council, aims at supporting development of new and sustainable forms of road traffic.
  - European Commission has supported three main **alternative types of fuel** and drive technologies that are to be developed until 2020, which are as follows:
    - bio-fuel (liquid or gas),
    - hydrogen and fuel cells,
    - electric batteries and hybrid electric drive vehicles

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ENERGY EFFICIENCY IN INDUSTRIAL AND COMMERCIAL SECTOR

- The main drivers of heavy industry are **Aluminium plant Podgorica** and **Steel-mill Nikšić**. These companies are responsible for around 45% of final energy consumption, respectively for 91% of final energy consumption in industry sector.
- Energy intensity of processing industry in MN (measured by energy consumption per GDP unit) is classified under the group of the most intensive transitional countries. **Reduction of energy intensity** could be achieved by structural changes and application of technically more efficient technologies to the industrial processes.
- **Share of service sector in MN is relatively high - 69%** and a dominant energy product in service sector is electricity. There is a great potential for application of EE measures in this sector (education of workers regarding more efficient consumption of energy, investments into more efficient production and supply processes, introduction of low-carbon technologies, which represent a large investment, but with quick return and high profitability in long term).

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PROJECTS ON ENERGY EFFICIENCY

- **UNEP Montesol project** (2010-2012) – no-interest loans for installation of solar-thermal systems in households
- **UNDP Project „Beautiful Cetinje“** (2011-2013) – implementation of EE measures to the historically-culturally significant buildings in the Royal Capitol Cetinje
- **Project financed by the World Bank loan** (2009-2012) – implementation of EE measures and reconstruction in educational and health institutions in MN (15 buildings)
- **Project financed by KfW** loan (2011-2012) – introduction of EE into educational institutions, EE reconstruction of 30 educational buildings
- **GIZ- ASE project** (2008-2012) for technical support to the EE regulatory framework, strengthening of capacities and education of several target groups
- **GIZ project “Solar energy in tourism sector“** (2011-2012) – implementation of feasibility studies and energy reviews aimed at the use of solar energy in tourism sector

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IMPACT OF ENERGY SECTOR TO CLIMATE CHANGES (1)

- Montenegro has small share in the overall-global CO2 emissions. **In 2008, Montenegro**, with its total gross domestic energy consumption, amounting to around 49.5 PJ, represented around 0.008% of global energy consumption (513,611 PJ) and with emissions of around 3 million t CO2 represented not more than **0.009% of global CO2 emissions** (29,381 mil. t CO2).
- Currently, MN **does not have any quantified obligations** towards international community in terms of reducing the CO2 emission.
- According to the GHG inventories for 1990, 2003, 2006 and 2009, **fossil fuel burning caused more than 90% of all CO2 emissions in MN** and represents around 55 % of emission of all anthropogenic GHG emissions.
- Sectorial structure for 2008:
  - 51% of CO2 emissions are caused by energy transformation (thermo power plants and public heating plants)
  - 19% industry,
  - 24% traffic and
  - 7% other final consumption
- An **increase of CO2 emissions** is forecasted due to commissioning of new thermo power plants (TPP Maoče in 2018 and TPP Pljevlja II in 2022).

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IMPACT OF ENERGY SECTOR TO CLIMATE CHANGES (2)

As regards the energy consumption, the following measures are planned for **reduction of GHG** emissions and mediation of negative effects to climate changes:

- Combined production of heat and electricity – **cogeneration**;
- Increased **efficiency of heating plants** (industrial and others);
- **Substitution of fuels in** boilers, of engine fuels and fuel for heating;
- Upgrading the **thermal isolation** in residential buildings;
- Increased **share of heat pumps**;
- Use of **solar energy and other RES**;
- Higher **share of LNG** for cooking in households;
- Use of **energy efficient devices** in households;
- **Replacement of traditional light bulbs** with energy efficient bulbs**;**
- Increased **energy efficiency of vehicles**;
- **Replacement of fossil fuels** with alternative fuels;
- Planning and establishing of a **more sustainable transportation system**.

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DEVELOPMENT OF SCIENCE AND INCENTIVES FOR INOVATIONS IN ENERGY SECTOR

- During the transition to green economy, Montenegro should focus its existing capital to green investments into infrastructure and knowledge, strengthening the absorption capacity of green technologies.
- Montenegro should promote a strategy based on intensive investments that would include participation of public and private sector in the process of becoming green in terms of energy sector.
- Intensive **transfer of knowledge** and **application of innovative solutions in EE and RES** in long term contributes to reduction of regional disparities and results with better living standard in MN.
- Necessity for joint actions of public and private sector.
  - Participation of public sector should be focused on:
    Infrastructural measures - investments into public buildings, water supply systems and improvement of electricity transmission and distribution networks
    Horizontal measures – retraining for professional labor and education for target groups on requirements for conversion to green economy
  - Participation of private sector should be focused on:
    Access to new green markets closely related to RES and EE
    Retraining of labor to “green” labor.

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FINANCING AND INCENTIVE MEASURES

- Funds for financing projects and implementation of EE measures are provided from: **state budget, local self-government budgets, donations, loans and other sources.**
- As regards the **EE Fund**, which was established by the Government of MN with the purpose to encourage EE and which is managed by the EE Sector of the Ministry of Economy, in the period 2006 until 2011, **2.38 million €** was spent for projects and EE measures.
- Relives stipulated by the Proposal of Law on Amendments to the Law on Tax on Profit for Legal Entities relate to **reductions on calculated profit tax for legal entities** for the first three years of business in the amount of 100% and for consequent 5 years in the amount of 50% for the newly established legal entities that perform production activities **in insufficiently economically developed municipalities**. This may apply to entities whose activities are related to EE and use of RES, since the most potentials (hydro energy potential, biomass…) are in insufficiently developed municipalities.

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Thank you for the attention!

Sofia, 10-11 June 2012