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SEA Report

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Acronyms and Abbreviations

°C	Degrees Celsius
%	Percentage
µg	Micrograms
€	Euros
BAT	Best Available Techniques
BOD	Biological Oxygen Demand
BREF	Best Available Techniques Reference Document
BSAP	Biodiversity Strategy and Action Plan
CAA	Civil Aviation Agency
CAP	Common Agriculture Policy
CCA	Climate Change Adaptation
CCM	Climate Change Mitigation
CDM	Clean Development Mechanism
CH ₄	Methane
CLRTAP	Convention on Long-range Transboundary Air Pollution
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CPH	Combined Power and Heat
DHW	Domestic Hot Water
DSP	Detailed Spatial Plan
EC	European Commission
EDS	Energy Development Strategy
EE	Energy efficiency
EIA	Environmental Impact Assessment
EMAS	Eco Management and Audit Scheme
EMEP	European Monitoring and Evaluation Programme
EPA	Environmental Protection Agency
ERA	Energy Regulatory Agency
ETS	Emissions Trading Scheme
EU	European Union
EUD	European Union Delegation
F-gases	Fluorinated gases
FBC	Fluidised Bed Combustion
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GIS	Geographical Information System
GJ	Gigajoule
GoM	Government of Montenegro
GWh	Gigawatts-hour
ha	Hectares
HPP	Hydroelectric Power Plant

IED	Industrial Emissions Directive
IHSM	Institute of Hydrometeorology and Seismology of Montenegro
INSPIRE	Infrastructure for Spatial Information in the European Community
IPCC	Inter-governmental Panel for Climate Change
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation
IUCN	International Union for Conservation of Nature
KAP	Aluminium Plant Podgorica
Kg	Kilogrammes
Km	Kilometres
Km ²	Square kilometres
KP	Kyoto Protocol
kWh	Kilowatt-hour
l	Litre
LCP	Large Combustion Plants
LEED	Leadership in Energy and Environmental Design
LFA	Less Favoured Area
LFG	Landfill Gas
LPG	Liquefied Petroleum Gas
LULUCF	Land Use, Land Use Change and Forestry
m	Metres
m ²	Square metres
m ³	Cubic metres
MARD	Ministry of Agriculture and Rural Development
masl	Metres above sea level
M&B	Man & Biosphere
MDD	Montenegro Development Directions
M€	Million euros
MCEE	Montenegro Centre for Energy Efficiency
ME	Ministry of Economy
MEEU	Montenegrin Energy Efficiency Unit
MEPS	Minimum Energy Performance Standards
MI	Ministry of Interior
MLSW	Ministry of Labour and Social Welfare
mm	Millimetres
Mm ³	Million cubic metres
MONSTAT	Montenegro Statistical Office
MSDT	Ministry of Sustainable Development and Tourism
Mt	Metric tonnes
MTMA	Ministry of Transport and Maritime Affairs
MW	Megawatts
N ₂ O	Nitrous Oxide
NAP	National Adaptation Plan
NBSAP	National Biodiversity Strategy and Action Plan
NCCS	National Climate Change Strategy

NH ₄	Ammonia
Nm ³	Normal Cubic Metres
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
NP	National Park
NSCR	Non-Selective Catalytic Reduction
NSSD	National Strategy for Sustainable Development
NWMP	National Waste Management Plan
O ₃	Ozone
ODS	Ozone Depleting Substances
OG	Official Gazette
PJ	Petajoule
PM _{2.5}	Particulate matter under 2.5 micrometres
PM ₁₀	Particulate matter under 10 micrometres
POPs	Persistent Organic Pollutants
PV	Photovoltaic
RES	Renewable energy sources
SEA	Strategic Environmental Assessment
SME	Small and Medium Enterprises
SO ₂	Sulphur Dioxide
SP	Solar Panel
SPEC	Species of European Conservation Concern
SWH	Solar Water Heating
t	Tonnes
ToR	Terms of Reference
TPP	Thermal Power Plant
TSP	Total Suspended Particles
TWh	Terawatts-hour
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Conventions to Combat Desertification
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
US\$	United States Dollars
VOC	Volatile Organic Compounds
WAM	With Additional Measures
WEM	With Existing Measures
WHO	World Health Organisation
w/o	Without
yr	Year

1. Introduction

The Strategic Environmental Assessment (SEA) of Montenegro's National Climate Change Strategy (NCCS) is prepared in response to Montenegro's SEA Law (2005). As specified in the ToR, this SEA aims:

- To contribute to the reforms in the area of environment and climate change in Montenegro in order to comply with obligations from the climate change *acquis* ensuring the continuity of a recently initiated assistance provided to the beneficiaries in the Sector and to avoid delays in implementation of already planned support.
- To assist in achieving environmental protection and sustainable development by:
 - Consideration of environmental effects of proposed strategic actions;
 - Identification of the best practicable environmental option;
 - Early warning of cumulative effects and large-scale changes.

The end objective of the SEA is to enhance the environmental performance of the NCCS, minimising its potential environmental impacts.

The scoping phase was carried out based on the 12 February 2015 version of the NCCS. The scoping and inception reports were submitted to the client jointly early March 2015. The key issues were validated in a participatory workshop that took place on 20 March at the Ministry of Sustainable Development and Tourism (MSDT) premises in Podgorica.

The findings of the scoping phase were revised in light of the changes to the draft NCCS (its 4th draft was submitted on 5 May). The revised draft NCCS took into account the findings of the SEA scoping report, as well as other general observations discussed bilaterally between the team leaders for the corresponding two assignments (SEA and NCCS drafting).

A note on the implications of draft 4 (May, 2015) of the NCCS for the findings of the scoping phase was submitted on 15 May. The changes were not substantial; key points to highlight being:

- It was proposed that the SEA would consider available lower-level alternatives (sub-options) to optimise the NCCS's environmental performance and provide recommendations for further steps in decision-making or implementation of the proposals contained in the NCCS, rather than broader strategic-level alternatives. As well, it was not considered necessary to subject these alternatives to a consultative validation process.
- It was concluded that the NCCS explicitly promotes the elaboration of the National Adaptation Plan (NAP) establishing the necessary institutional, policy and regulatory set-up and that it is not necessary for the NCCS to enter into further details on climate change adaptation.
- Some initially identified key issues were dropped: (i) co-generation with incineration (the NCCS does not promote this option); (ii) climate change adaptation of the tourism sector (will be covered under the NAP); (iii) urban adaptation to climate change (will be covered under the NAP).

This SEA report presents an analysis of the potential environmental impacts associated to the implementation of the NCCS. During the inception phase it was agreed with the client that the SEA would not be limited to the analysis of potential impacts of the environment, but that it would also address – to a reasonable extent – opportunities to enhance the state of the environment.

The SEA was carried out by a team of five experts: Dr Juan Palerm (team leader); Mr Jiří Dusík (deputy team leader); Ms Ivana Šarić (SEA biodiversity expert); Mr Gordan Golja (SEA air quality expert); and Mr Marko Slokar (legal expert).

2. SEA approach and methodology

The SEA focuses on the impacts on the environment of climate change mitigation and adaptation measures proposed by the NCCS, including soft measures (e.g. use of fiscal instruments). The SEA uses a mixed assessment approach that combines assessment of general risks associated with various mitigation and adaptation options as well as possible consideration of location options and their specific impacts (in cases where the NCCS proposes very concrete and location-specific interventions).

Due to the nature of the NCCS, the SEA also takes into account the identification of opportunities to enhance the environmental performance of the NCCS, as well as the possible trade-offs between climate change mitigation and adaptation.

The SEA involved facilitation and preparation of documents both in English and Montenegrin language in order to ensure effective consultations with relevant authorities and interested stakeholders.

The SEA complies with the requirements of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (hereafter SEA Directive) and Montenegro Law on strategic environmental assessment (OG 80/05, 59/11).

The SEA was conducted through the following activities specified in the ToR:

- Preparation of detailed operational work plan
- Preparation of context, baseline and scoping
- Preparation of alternatives and assessment
- Consultations on draft SEA report
- Finalisation of SEA.

Preparation of detailed operational work plan

The work plan was prepared in line with the objectives and outputs of the ToR, taking into account recommendations agreed with the EUD and beneficiary during the inception phase. The work plan was presented together with the Inception Report, specifying the detailed steps and timeline of the SEA process, contents of specific reports, inputs of the SEA team and required support to be provided by the Ministry of Sustainable Development and Tourism (MSDT). It also specified the detailed tasks for the core members of the SEA team and specific technical inputs needed.

Some details of the work plan suffered a modification based on the revision of the 4th draft NCCS, namely in relation to the key issues to be addressed and the analysis of alternatives.

Preparation of context, baseline and scoping

The scoping report presented: aims and objectives of the proposed NCCS; key alternatives and options considered within the NCCS; identification of possible

environmental risks associated with the proposed mitigation and adaptation options; and SEA objectives and indicators.

The scoping report was shared with the NCCS drafting team, who used its findings in the preparation of the new draft NCCS.

Preparation of alternatives and assessment

As discussed in the note revising the results of the scoping phase in light of the new draft of the NCCS, and due to the nature of the NCCS, the SEA addresses lower-level alternatives (sub-options) within the key issues analysed. As part of its analysis, the SEA recommends options that achieve the best environmental outcomes and specifies technical issues that should be examined in follow-up feasibility studies and project level EIAs.

Preparation of the draft SEA report

The SEA assesses environmental risks and benefits of NCCS interventions and their alternatives. This entails the review of available data for key issues of concern and field visits to sites as relevant.

The SEA provides an overview of and opportunities for mitigating adverse impacts on the environment that can be deployed at the level of the NCCS. The SEA also generated recommendations for detailed planning of specific projects and project-level EIAs.

Consultations on draft SEA report

The MSDT made this report available for consultations at the same time as the draft plan. In agreement with the MSDT, the findings of the SEA were presented in a dedicated meeting at the end of the public consultation period.

Finalising the SEA for the NCCS

All inputs obtained through the public meeting or submitted directly as part of the public commenting on the SEA report were collected and considered, and the SEA report adjusted accordingly.

3. Overview of the National Climate Change Strategy

The draft NCCS proposes climate change mitigation and adaptation options in various sections of the document.

Chapter 8 (Road for Implementation – Action Plan) synthesises the climate change mitigation measures. These are expressed in general terms, and reproduced in

Table 1.

Table 1 NCCS mitigation and adaptation measures as per Action Plan

Description of measures	Verification indicators
Energy	
Increase in primary energy savings	
High energy efficiency for generation, transmission and distribution	Substitution of coal fired generation with oil or gas Introduction of smart grids Application of BAT for generation, transmission and distribution
Increase in energy efficiency for renovated buildings	50% of renovated buildings must have an energy rating and achieve one of the following green building standards by 2025: Living Building Challenge, Built Green; LEED, Evergreen Sustainable Development Standard or Passive House
High energy efficiency for all new buildings	50% of permitted new construction projects achieve one of the following green building standards by 2025 (note: same as above)
Full roll-out of smart grids and smart metering	
Significant and highly standardised RES generation	30% increase in wind and hydropower generation, several biomass energy demonstration facilities
Decarbonisation pathway for energy sources that can compete on the market	20% increase in micro-generation such as solar PV systems and solar hot water systems for residential use
High energy savings in transport vehicles	20% increase in mixed fuel, electric, hydrogen, high efficiency fossil fuels or alternative fuelled vehicles in operation Electric cars charging network developed Hydrogen (highway) in place Options for different transport modes (roads, aviation and waterborne transport) BAT for Fuel Primary Storage to control volatile organic compound emissions implemented New storage (truck loading facilities using BAT) Retail stations for new fuels (biofuels) in place
New regulatory developments focusing on 390 standardisation, infrastructure policy and further research and demonstration efforts in clean and efficient energy	Legislation put in place that mandates new and improved standards in clean and efficient energy
An increase in the use of ICT in energy and transport and for smart urban applications	20% increase in the use of appropriate ICT systems in the fields of energy and transport
An increase in public acceptance and behaviour towards energy efficiency	All schools and universities have courses relating to energy efficiency end-use
An increase in energy storage via hydrogen through RES sources for application on a large scale, for transport and to manage load demand	5 hydrogen powered buses being used in Montenegro
Waste diverted from landfill to recycling and composting	70% diversion rate by 2020

Methane emissions from landfill	50% reduction in methane emissions
Enhance the efficiency of maritime, rail, air and off-road transportation	15% increase in energy efficiency measures or the enhancement of processes, conversion to less-polluting energy sources, or the modernisation of equipment
Agriculture	
Equip farmers to better manage GHG emissions from crop and livestock production	Regulations implemented that focus on crop, livestock and soil management, in particular the integrated management of mineral nitrogen fertilisers, to avoid over-application, the attendant GHG emissions, and the contamination of groundwater and surface water Implementation of technologies such as the capture of biogas produced by manure storage structures can contribute to reducing GHG emissions stemming from the composition of manure
Ensure sustainable land use planning	Climate change adaptation integrated into national planning and risk management Preparatory measures established that will enable an effective intervention when disasters occur
LULUCF	
Inclusion of climate change aspects in the Forest Policy	Revision of forest management recommendations to correspond to climate change
Revision of forest management recommendations to correspond to climate change	Forest management recommendations revised in 2006 (sic), specific recommendations for the management and use of forest
The evaluation of the impact of climate change will be included in the long-term planning of regional and urban structures	Climate change policies must be promoted in regional land use plans, local plans and activity of regional authorities
Industrial processes	
Inclusion of adaptation and mitigation to climate change in the long-term surveys of different industrial sectors	Industries have a detailed implementation plan for climate change
Buildings	
Climate change will be included in long-term planning and research activities in the construction sector	
Transport	
Inclusion of climate change in the transport sector's long-term planning	
Other	
Anticipatory systems and warning systems for extreme events	Meteorological Institute maintains and develops several observation and warning systems relating to weather and wind information

Other sections of the document give more precise indications on potential mitigation and adaptation measures, an overview of which is provided below.

In Chapter 4 (Sectoral Projections Emissions Scenarios), the emissions scenarios include ‘with existing measures’ (WEM) and ‘with additional measures’ (WAM), the latter containing measures that will affect emissions in order to fully comply with national and EU air quality standards. It is assumed that such ‘additional measures’ will be promoted under the NCCS.¹ Chapter 5 of the NCCS (Mitigation) also indicates ‘additional measures’ for different sectors.

‘Additional measures’ considered in the NCCS are referred to in Table 2 below.

Table 2 Additional mitigation measures promoted in the NCCS

<p>Energy Industry</p> <ul style="list-style-type: none"> • Retirement of coal plant (TPP Pljevlja I); • Involvement in EU-ETS; • Biomass co-firing or conversion (additional option); • Change dispatch of the existing power generation fleet (“clean-first” dispatch, priority dispatch of renewable) (additional option); • Existing TPP Pljevlja I – limited operating hours (20,000 working hours) in horizon 2018-2023 (additional option); • TPP Pljevlja II commissioning in 2020 (additional option); • Direct regulation of plants (regulated lifetime limits, regulated phase-out); • Regulated change in supply/demand balances (fleet-wide GHG emissions performance standard, regulated increase in renewable capacity – renewable generation quota, demand reductions); • Influence markets via price (fuel price changes, carbon pricing, removal of fossil fuel subsidies).
<p>Manufacturing & Construction</p> <ul style="list-style-type: none"> • Co-generation representing 40% of heat produced in manufacturing; fuel is completely substituted by natural gas; • Solar thermal energy and traditional biomass substitute up to 20% of coal and LPG fuel used for heat generation; • High-efficiency industrial equipment and systems; • Energy efficiency services for SMEs; • Complementary policies to support industrial energy efficiency; • Tighter emission standards in line with EU environmental directives and adoption of guidelines set out in the EU IPPC BREF documents; • Increasing adoption of ISO 14000, EMAS, CDMs; • Adoption of new and cleaner technologies in industrial policies; • Installation of NSCR (Non-Selective Catalytic Reduction) in a production plant combustion facility.
<p>Transport</p> <ul style="list-style-type: none"> • Increasing of freight transport using railway for additional 20% with respect to the WEM

¹ The text states, with regards to the WAM scenario, that ‘it must contain measures that will affect emissions in order to fully comply with national and EU air quality standards...’, and that it ‘includes planned policies and measures with a realistic chance of being adopted and implemented in due course to reduce GHG emissions’.

<p>scenario regarding all freight transport;</p> <ul style="list-style-type: none"> Increasing the share of electrical railway freight transport for additional 10% with respect to the WEM scenario regarding the share of electrical railway freight transport within total railway freight transport; Intra-city transport; Introduction of electric vehicles; Increasing the share of buses in the total intra-city transport up to 50%; Increasing the share of passengers using public transport with respect to car transport to 30%; Introduction of CNG buses in public transport with share of 5%; Mandatory vehicle fuel-efficiency standards; Measures to improve vehicle fuel efficiency; Fuel-efficient non-engine components; Eco-driving; Transport system efficiency.
<p>Residential Sector</p> <ul style="list-style-type: none"> 15% of total energy needed for space heating will be supplied from modern biomass boilers; 10% of total energy needed for space heating will be supplied from district heating systems; 20% of total energy needed for space heating will be supplied by natural gas fuelled boilers; 20% of total hot water needs will be supplied by SWH systems; 15% of total hot water needs will be supplied by modern biomass fuelled boilers; 20% of total hot water needs will be supplied by natural gas fuelled boilers; 10% of total hot water needs will be supplied by district heat powered boilers; 30% of total energy needed for cooking will be used by LPG stoves; 20% of total energy needed for cooking will be used by natural gas stoves.
<p>Commercial Sector</p> <ul style="list-style-type: none"> Decrease of specific heat demand per square meter down to 80 kWh/m² year; 16% of total energy needed for space heating will be supplied from modern biomass boilers; 18% of total energy needed for space heating will be supplied by natural gas fuelled boilers; % of total energy needed for space heating will be supplied from district heating systems (note: % not specified); 16% of total energy needed for space heating will be supplied from modern biomass boilers; 18% of total energy needed for space heating will be supplied by natural gas fuelled boilers; % of total energy needed for space heating will be supplied from district heating systems; % of other thermal energy use in service sector will be supplied by LPG boilers (substitution of residual oil boilers); 50% of total hot water needs will be supplied by SWH systems; Decrease of specific energy demand used for air conditioning per square meter down to 50 kWh/m² year; Mandatory building codes and Minimum Energy Performance Standards (MEPS); Net-zero energy consumption in buildings; Improved energy efficiency in existing buildings; Building energy labels or certificates; Energy performance of building components and systems;

<ul style="list-style-type: none"> • MEPS and labels for appliances and equipment; • Test standards and measurement protocols for appliances and equipment; • Market transformation policies for appliances and equipment; • Phase-out of inefficient lighting products; • Energy-efficient lighting systems; • Data collection and indicators; • Strategies and action plans; • Competitive energy markets, with appropriate regulation; • Private investment in energy efficiency; • Monitoring, enforcement and evaluation.
<p>Industrial processes</p> <ul style="list-style-type: none"> • Involvement of KAP plant within EU-ETS scheme; • Better process control of KAP plant (further improvements in reducing length of life of the anode effect, as well as number of other effects); • Adoption of tighter emission standards in line with EU environmental directives; • Adoption of the guidelines set out in the EU IPPC BREF documents; • Increasing adoption of ISO 14000, EMAS, CDMs; • Adoption of new and cleaner technologies in industrial processes; • Installation of NSCR in a production plant combustion facility.
<p>Solvents sector</p> <ul style="list-style-type: none"> • Adopting a proactive approach towards the reduction of the use of solvents in line with EU and international best practice.
<p>Agriculture sector</p> <ul style="list-style-type: none"> • Improvement in cattle stock switch to Holstein breed as more appropriate with regards to methane emissions; • Emphasis on livestock development rather than crops and cereals; • Strengthen wine production industry as it is a very positive sector for export; • Development of livestock market strategy for halal lamb slaughter for Middle East market; • Emphasis on good animal waste management practices in line with EU veterinarian requirements; • Improved system of animal slurry 7 manure management by construction of bonded impoundments so as to surface groundwater contamination.
<p>LULUCF sector</p> <ul style="list-style-type: none"> • No additional measures are proposed, although reference is made to measures foreseen under the Forests and Forestry Strategy.
<p>Waste sector</p> <ul style="list-style-type: none"> • Implementation of 'waste-to-energy' plants for municipal solid waste, instead of waste disposal to landfill; • Anaerobic digestion combined with CHP can be considered as an alternative to landfill; • Diversion of biodegradable waste away from landfill for reuse as compost or anaerobic digestion.

With regards to **climate change adaptation**, a number of measures are recommended by sector. These are taken from the Second National Communication to the UNFCCC.

Table 3 Adaptation measures promoted in the NCCS

<p>Water resources</p> <ul style="list-style-type: none"> • Strengthen the network of measuring stations for hydrology and meteorology monitoring in Montenegro; • Better coordination between the Government, the Agency for Environmental Protection and IHSM to ensure the workings of the National Archives of water quality data are kept and made available; • Support is needed to relevant agencies in the use of GIS tools and GIS identification of needs concerning the environment in Montenegro; • Harmonise the standard data sets, and clearly define responsibility and 'ownership' of specific data sets as well as procedures for version control of data and how updated are card files with the latest data exchanges between institutions; • Study of groundwater in Montenegro and GIS mapping of hydro-geological boundaries of groundwater used for water supply; • Water information system and options to be considered for implementation of better software information system for water/cadastre, e.g. Water Ware, WISYS or WISKI and to decide on the structure of the information system for water /cadastre.
<p>Agriculture</p> <ul style="list-style-type: none"> • There is a need for scientific research on the impact of climate change on agriculture and on different crops; • It is necessary to use varieties and hybrids of different maturity periods, in order to avoid the least favourable parts of the year; • It is necessary to develop irrigation and drainage systems, in order to regulate the water content in the root system; • There is a need for a reduced tillage, deep tillage, crop residue cover of the soil surface, the change of density of sowing or planting, in order to preserve a certain amount of moisture in the root zone system; • There is a need for early application of remedies against pests and insects; • A change in the use of fertilisers, i.e. quantity and time of application; • There is a need to establish a more flexible farming system in order to reduce the consequences of climate change; • A national policy on drought management is needed.
<p>Livestock</p> <ul style="list-style-type: none"> • There is a need for scientific research on the impact of climate change on livestock and regions that are favourable to certain races and types of livestock; • During the process of cattle rearing attention should be paid to those types of livestock that are less sensitive to warmer weather and possible heat stress; • To provide adequate conditions for the cultivation of the new climatic conditions and to use new technology that includes the management of nutrition and special attention to ventilation systems, temperature and humidity control in stables; • There is a need to organise advisory activities with the aim of educating producers in the application of new technical adjustments; • As prevention or slowing of climate change, it should be proposed to construct tank/pits, digesters on farms for fertiliser production from biomass for use as energy production – composting waste from the farm; • It is necessary to provide financial support for research programmes.

Forestry

- Forest management close to nature – the basic stability of forest stands;
- Increasing the share of high natural forests compared to low productive ones;
- Natural regeneration as a basic orientation in the cultivation of forests, adequate support with reforestation in the absence of natural rejuvenation;
- Use of indigenous tree species in reforestation;
- Encourage a mix of forest stands, special attention to the preservation of selection stands of beech, fir and spruce (uneven-aged stands);
- Conservation of forest gene pool, in particular through the protection of key habitats and species, as well as woody plants and animals;
- Develop measures to protect forests from forest fires (emphasis on prevention and rapid response in case of fire);
- Work to improve logistics for fire-fighters: road infrastructure, anti-fire lines, remove combustible materials from the forest, forming points with material for fire, intensive control activities in the forests during the dry period;
- The establishment of forest order after felling, adequate and timely rehabilitation of burned areas;
- The constitution and functioning of the reporting and forecasting services of forest protection, the definition of environmental indicators that would point to the current changes in forest ecosystems.

Coast and coastal area

- Recommendations for the size of the inundation zone and vulnerability of the coast:
 - It is necessary in the present and near future, in terms of the flooding zone, to apply a scenario that provides a sea level rise of 96cm;
 - It is necessary to make vulnerability assessment of areas in terms of expanding coastal detachment, CAMP project recommends as the most realistic and most likely scenario in which projections of sea level rise is 62cm by the end of the 21st century;
- Analysis of small river flows
 - Further analysis of large water bodies on the coast are needed;
 - It is necessary to map areas endangered by the great waters, and understand possibilities for organising observation system (monitoring) on the priority streams by hydrological services of the IHSM and relevant municipal departments;
 - Special attention should be paid to defining the erosive potential of these streams, both for the protection of deposited sediment and the potential impact of sediment on the conservation of beach coastline.

Health

- It is necessary to implement bio-meteorological forecasts to provide early warning of a favourable or unfavourable impact of weather on people, especially for the chronically ill persons;
- It is necessary to establish an early warning system of heat waves and cold waves;
- It is necessary to make bio-classification of different weather conditions, data collection and archiving: collecting data from questionnaires about bio-meteorological reactions and from the records of Emergency Room for which there is proven correlation with biometeorology. The Institute's role would be to collect, sort and analyse the data, together with the Institute of Hydrometeorology and Seismology perform their validation.

As well, the NCCS (Chapter 7) indicates the relevant EU climate change regulations that need to be implemented (including on monitoring, EU ETS, Decision on effort sharing of greenhouse gas emissions reductions, regulation on certain fluorinated gases, regulation on ozone depleting substances, and regulation on CO₂ emissions from cars and vans).

4. Key environmental aspects

Key issues associated to the NCCS were identified during the scoping phase and validated in the scoping workshop. These key issues were later revised in light of the fourth draft NCCS document. The key issues identified fall into three categories:

1. **Potential impacts** – those aspects promoted under the NCCS that may have significant adverse impacts on the environment;
2. **Missed opportunities** – aspects that could be promoted to better address climate change mitigation (CCM) and climate change adaptation (CCA), but are not present in the NCCS;
3. **Enhancing impacts** – aspects with positive impacts, but that would need to be further developed to capitalise on their benefits.

The following key issues were originally identified (further described below):

1. Potential impacts derived from the promotion of a thermal power plant as part of the energy mix (high priority);
2. Potential impacts derived from the promotion of an additional hydroelectric power plant (high priority);
3. Opportunities to maximise positive impacts from the promotion of solar power (photovoltaic and thermal) (medium priority);
4. Potential to maximise positive impacts from the promotion of biomass as a source of energy (low priority);
5. Opportunities associated to the promotion of waste-to-energy systems (medium priority);
6. Opportunities and potential risks associated to the promotion of wind power (medium priority);
7. Opportunities associated to the promotion of alternative modes of urban transport (low priority);
8. Potential impacts associated to the production of bioethanol and the potential increase in use of pesticides (low priority).

For each key issue a justification is provided for its selection as well as feedback from stakeholders during the scoping workshop.²

² Key issues (or elements within key issues) that were dropped as a result of the stakeholders' workshop and/or revision based on new NCCS draft are not recalled here.

Table 4 NCCS key issues

Issue	Observations	Views expressed during the scoping consultations
Energy sector		
Promotion of TPP as part of the energy mix - potential impacts [Preliminary ranking: high priority]	<p>The NCCS refers to the EDS, which promotes the 2nd block for the TPP Pljevlje. The EU is promoting shifting away from coal. Consistency with EU policies (and policies from the European Energy Community) is not clear.</p> <p>The TPP would have to comply with EU standards on air emissions.</p> <p>Decommissioning of the existing TPP and eliminating burning of coal at household level would improve air quality. The TPP is to include co-generation to supply heat to the local community, but it is not clear who will pay the costs of the infrastructure and which would be the mechanisms to ensure this is cheaper than directly purchasing coal.</p>	<p>The EDS has been subject to an SEA process, which basically agreed with this proposal because the 2nd block would replace an existing and highly polluting source of energy.</p> <p>The ME is committed to use BAT for the new TPP. There is an SEA for the detailed spatial plan for the TPP 2nd block, which examines these issues in detail. It is not clear if an EIA is being conducted. There is also an Air Quality Plan for Pljevlje (Feb 2013), which addresses these matters in detail.</p> <p>The ME confirmed that they are committed to use the 2nd block of TPP for central heating.</p>
Promotion of an additional HPP – potential impacts [Preliminary ranking: high priority]	<p>The NCCS considers HPPs on Morača and Komarica. The HPP at Morača has been very controversial.</p> <p>Impacts would include those common to impoundment of water, e.g. impacts on flora and fauna, interference with aquatic fauna, alteration of sediment dynamics in the delta.</p> <p>The EDS did not take into account the potential impacts of climate change on water availability in the future, which may compromise the capacity for generating electricity.</p> <p>An improper operation of the HPP cascade may worsen flood and drought events (if energy production is prioritized over flood protection and drought management).</p> <p>If hydroelectric power is to become one of the main future</p>	<p>There is an unfinished SEA of the HPP cascade on Morača (4 years old study by COWI), which suggested reducing number of HPPs from 4 to 2 and reducing their height and locations due to significant impacts on local ecosystems. ME is now considering even more alternatives.</p> <p>No information on Komarica cascade was obtained.</p> <p>IHSM has a study that confirms there may be a problem with water supply in light of climate change.</p> <p>ME is committed to ensure that operation will not worsen flood and drought events, and will build these considerations into planning of the respective HPPs.</p>

	sources of power generation for the country, there is a need to strategically identify no-go areas (e.g. integrity of key ecological corridors).	
Promotion of solar (PV + thermal) – enhancing impacts [Preliminary ranking: medium priority]	<p>Solar power (PV and thermal) is promoted under the NCCS and has already received attention by the government.</p> <p>Credit lines in the past (including subsidies for solar heating systems) have not been successful.</p> <p>Only two municipalities (Podgorica and Budva) require new buildings to have solar panels.</p> <p>The right mechanisms have to be put in place so the promotion of solar power is successful. These may include the right mix of subsidies, technical assistance (which are present now) and revisions of regulatory obligations and of administrative formalities (which are now excessive) to guarantee re-purchase of power and connections to the grid that encourage use (as in the case of Podgorica and Budva), by households, hotels, public buildings (offices, schools, hospitals).</p> <p>For the future, use of SP should be limited to roofs and built surfaces as currently required by the legal framework.</p>	<p>Use of solar power is limited mainly to thermal systems.</p> <p>ME confirmed that feed-in tariffs are relatively high at €0,15 KWh and the technical assistance projects are in place but there is still a low uptake of PV panels. This happens for two reasons: it is difficult to get loans to cover initial investment costs and the current system encourages solar power to be used only within the respective facilities but does not facilitate selling of the power to the grid.</p> <p>A representative of Podgorica mentioned that they installed PV panels on their building as a demonstration project but cannot connect them (despite trying for 3 years) to the grid due to legal, administrative and technical problems.</p> <p>The Ministry of Agriculture has experience with use of 300 SP installations in highland settlements that cannot be connected to the grid.</p>
Promotion of biomass – enhancing impacts [Preliminary ranking: low priority]	<p>The NCCS has an important component on the promotion of biomass (pellets) for heating systems.</p> <p>There is one factory producing pellets, but these are mostly exported.</p> <p>Due to significant forest stock in the country, there are no problems with the sustainability of the sources of biomass.</p> <p>There are no plans for farming of biomass for energetic use.</p> <p>Biomass heating systems have been tried out in a number of</p>	Reportedly none of the existing systems work.

	<p>locations.</p> <p>Pellets are expensive and normally not affordable by households, besides the technology is also costly. Costs to households are important to determine the source of energy they choose.</p>	
<p>Waste-to-energy systems – Missed opportunities</p> <p>[Preliminary ranking: medium priority]</p>	<p>The NCCS does not make any explicit reference to the generation of waste from recovery of biogas from landfills, which is a missed opportunity.</p>	<p>This option is being considered within SEA of the Montenegro Waste Management Plan.</p>
<p>Wind power</p> <p>Possible risk high</p>	<p>NCCS includes general support to wind power. It does not address offshore.</p> <p>There are currently only two planned wind farms (Možura and Krnovo) and no further wind farms are planned at the moment. But few investors now undertake local air movement measurements in order to check feasibility of possible projects.</p> <p>There is no plan to develop offshore wind farms before 2030 but ME is starting research on this.</p>	<p>The wind power (inland and offshore) could be promoted through a strategic planning process that considers wind potentials as well as possible environmental risks.</p>
Transport sector		
<p>Promotion of alternative modes of urban transport – Missed opportunities</p> <p>[Preliminary ranking: low priority]</p>	<p>The NCCS (and the Ministry of Transport) are centring their efforts at promoting electric and hybrid vehicles, as well as allowing only import of Euro 5 standard vehicles (produced after 2011).</p> <p>There is a preliminary plan for producing ethanol (as bio-fuel) as by-product of wine production.</p> <p>However, the promotion of alternative urban transport is not being addressed, namely public transport and cycling</p>	<p>In case of production of ethanol, attention needs to be given to management of waste residues (vinasse has a very high BOD content and is highly acidic).</p> <p>There is huge difference in transport needs.</p> <p>Public transport for most of the year is constrained by the geographic characteristics of the country, limited density of population and unpredictable frequency of demand. Hence, public transport is practically non-</p>

	<p>lanes.</p> <p>Systematic suggestions for promotion of public transport and cycling have been in Podgorica but have not been implemented yet.</p>	<p>existent, and normally it is cheaper to pay for a taxi. No attention is given to needs for connectivity between transport modes – e.g. parking places with taxi stands and public transport, etc.</p> <p>On the other hand, touristic areas during the high season feature a significant demand. Some cities, e.g. Perast, have good experience with economically self-financed entrepreneurial initiatives with electric vehicles to arrange public transport for tourist. However, congestions constrain reliability of schedules. Urban cycling is limited due to limited separation of routes for cycling.</p>
Agriculture		
<p>Potential increase in use of pesticides – potential impacts</p> <p>[Preliminary ranking: low priority]</p>	<p>Use of agrochemicals is very low in Montenegro.</p> <p>Montenegro has a policy to promote organic production, so use of pesticides is expected to decrease.</p> <p>The NCCS promotes better pest control, but does not specify mechanisms for that, which could imply use of pesticides, in contradiction with the agriculture policy.</p> <p>Montenegro has produced a Codex of Good Agriculture Practices (GAP) that must be followed to receive state support.</p>	<p>The Rural Development Plan, which is just being finalized, includes many agro-environmental measures that also address climate change matters in line with the latest revisions of the CAP.</p>

5. SEA objectives and indicators

SEA objectives and indicators, to be used in the analysis phase of the SEA, are proposed. These objectives and indicators are informed by national environmental policy documents as well as the experts' own appreciation.

Relevant objectives/indicators from national strategy documents are presented in Table 5 below. These are used to inform the SEA objectives.

Table 5 Montenegro strategic objectives/indicators as per national policy documents

National Development
Advance economic growth and development, and reduce regional development disparity (<i>National Strategy for Sustainable Development policy objective 1</i>).
Alleviate poverty; provide equal access to services and resources (<i>National Strategy for Sustainable Development policy objective 2</i>).
Ensure efficient control and reduced pollution, and sustainable management of natural resources (<i>National Strategy for Sustainable Development policy objective 3</i>).
Maintain cultural diversity and identities (<i>National Strategy for Sustainable Development policy objective 5</i>).
Agriculture and rural development
Sustainable management of resources, stable and sustainable supply of safe food, ensuring appropriate standard of living for rural population (<i>Montenegro Development Directions 2013-2016</i>).
Ensuring stable and acceptable supply of food in terms of quality and price (food safety) (<i>Agriculture and Rural Development Strategy Objective 2</i>).
Ensuring an adequate standard of living for the rural population and a comprehensive rural development together with the preservation of traditional values of rural areas (adequate standard of living and rural development) (<i>Agriculture and Rural Development Strategy Objective 3</i>).
Protection of soil as a production and ecological resource, prevention of erosion, pollution and other forms of degradation (<i>Agriculture and Rural Development Strategy Objective 1, Operational Objective 2</i>).
Protection of water resources from possible pollution (<i>Agriculture and Rural Development Strategy Objective 1, Operational Objective 3</i>).
Prevention of risks to biodiversity in general (<i>Agriculture and Rural Development Strategy Objective 1, Operational Objective 4</i>).
Protection and prevention of loss of agro-biodiversity – genetic resources in plant and livestock production (<i>Agriculture and Rural Development Strategy Objective 21, Operational Objective 5</i>).
Maintenance of the landscape in its esthetical function and in the function of tourism development (<i>Agriculture and Rural Development Strategy Objective 1, Operational Objective 6</i>).
Energy
Meet the energy demand at least economic costs in the system of generation and supply, and minimum impacts on the environment; Increase energy efficiency; Increase in reliability and quality of electric supply; Environmental protection over the whole life cycle of the electricity generation (<i>Montenegro Development Directions 2013-2016</i>).
Gross production of electricity from RES power plants: 7.37% increase (2020 vs. 2008) and 0.57% increase (2030 vs. 2020) (<i>Energy Sector Development Strategy by 2030</i>).
Share of RES in final energy consumption: 4.16% increase (2020 vs. 2008) and -0.68 (2030 vs. 2020) (<i>Energy Sector Development Strategy by 2030</i>).
CO ₂ emissions per capita (tCO ₂ /cap): 5.09% increase (2020 vs. 2008) and 2.72% (2030 vs. 2020) (<i>Energy Sector Development Strategy by 2030</i>).
Emissions of CO ₂ per unit of GDP (kgCO ₂ /€2000): 0.07% increase (2020 vs. 2008) and -3.58 (2030 vs. 2020) (<i>Energy Sector Development Strategy by 2030</i>).
Maintenance, rehabilitation and modernisation of existing and construction of new infrastructure

for production, transmission and distribution of energy on the principles of fulfilment of international technical standards, energy efficiency, reduction of losses and its negative impact on the environment (<i>Montenegro Energy Policy by 2030</i>).
Gradual reduction of energy import dependency by (i) reducing the specific consumption of final energy..., (iii) reducing the energy losses from production to end consumption. (<i>Montenegro Energy Policy by 2030</i>).
Reach the indicative target of EE increase, which represents saving in the amount of 9% of the average final energy consumption in the country (w/o aluminium plant Podgorica). Interim indicative goal until the end of 2012 amounts to 2%. Remaining average annual saving after 2018 shall be in compliance with the goals set out at the level of Energy Community or EU. (<i>Montenegro Energy Policy by 2030</i>).
Rational use of energy in transport and promotion of EE measures (improved public transportation including the railway transport, promotion of energy efficient and low-emission vehicles, and integration of EE criteria in the transport infrastructure projects. (<i>Montenegro Energy Policy by 2030</i>).
Increased share of RES utilisation in transport aimed at securing the achievement of RES share in overall consumption of energy in transport, in accordance with the obligations of the state. (<i>Montenegro Energy Policy by 2030</i>).
Improved heating and/or cooling systems in buildings by (i) substitution of direct transformation of electricity into heat and (ii) use of new technologies acceptable from the environmental aspect, which implies increased use of RES and use of high-efficient cogeneration. (<i>Montenegro Energy Policy by 2030</i>).
Sustainable development of energy sector in relation to the environment protection and international cooperation in this field, especially regarding the reduction of greenhouse gas emissions. (<i>Montenegro Energy Policy by 2030</i>).
Significant reduction of non-rational energy consumption in all energy sectors. (<i>Energy Efficiency Strategy</i>).
Reduction of the negative environmental impact of energy use. (<i>Energy Efficiency Strategy</i>).
Reduction of energy costs for households, increasing the living comfort, health and safety, and playing a significant role in the improvement of the poorest population. (<i>Energy Efficiency Strategy</i>).
Reduction of energy costs for the commercial sector and industry, therefore increasing their competitiveness. (<i>Energy Efficiency Strategy</i>).
Reduction of energy cost in the public sector, therefore reducing the public expense. (<i>Energy Efficiency Strategy</i>).
Improvement of international relations through contributing in the goal of reduction of CO ₂ emissions.
Environment and Forestry
Sustainable protection of nature and biodiversity, minimising pollution of air, noise and radiation, protect water quality and cleaner wastewaters in sewage systems, manage waste (<i>Montenegro Development Directions 2013-2016</i>).
Protection and improvement of all components of biological diversity, their sustainable use and equitable distribution of the benefits arising from utilisation of genetic resources. (<i>Long term objective 1 of the National Biodiversity Strategy</i>).
Address the underlying causes of biodiversity loss by maintaining biodiversity across government and society (<i>revised BSAP Strategic Goal 1</i>).
Reduce the direct pressures on biodiversity and promote sustainable use (<i>revised BSAP Strategic Goal 2</i>).
Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity (<i>revised BSAP Strategic Goal 3</i>).
Enhance the benefits to all from biodiversity and ecosystem services (<i>revised BSAP Strategic Goal 4</i>).

More efficient use of forest resources, development of forestry services; Improving the competitiveness of forestry, ensuring long-term resistance and productivity of forests and other ecosystems/preserving the biodiversity; Enhancing the social functions of forests, forest estates (<i>Montenegro Development Directions 2013-2016</i>).
Ensure and improve long-term resistance and productivity of forests and other ecosystems, and maintenance of plant and animal species (<i>Forest and Forest Land Administration Policy general objective 1</i>).
Administration of forests and forest resources ensures sustainable implementation of social, economic and environmental forest functions (<i>Forest and Forest Land Administration Policy general objective 2</i>).
Forests contribute to sustainable social and economic development of rural areas (<i>Forest and Forest Land Administration Policy general objective 3</i>).
Maintaining the current size of forests and forest land (<i>Forest and Forest Land Administration Policy Statement 2</i>).
Forests have a significant role in mitigating and adjusting to climate changes (<i>Forest and Forest Land Administration Policy Statement 3</i>).
Improve conditions for wild fauna in forest ecosystems and increase the number of game and protected species (<i>Forest and Forest Land Administration Policy Statement 7</i>).
Tourism
By applying sustainable development principles and objectives Montenegro will create a strong position of a global high quality destination; tourism will provide to Montenegrin citizens enough jobs and increasing living standards, and the government will have stable and reliable revenues (<i>Tourism Development Strategy Strategic Goal</i>).
Transport
The transport system in Montenegro will be developed in order to minimise the negative impacts of transport on environment (<i>Transport Development Strategy Strategic Goal 5</i>).

Table 6 SEA objectives

SEA Objectives
Promotes poverty alleviation
Maintains cultural diversity and identities
Promotes preservation of traditional values of rural areas
Guarantees maintenance of the landscape in its esthetical function and in the function of tourism development
Promotes creation of decent jobs
Enhances tourism potential
Contributes to the enhancement of public health
Guarantees sustainable supply of safe food
Guarantees protection of soils as a production and ecological resource
Guarantees protection of biodiversity and integrity of ecosystems
Promotes enhancement of ecosystems
Guarantees the integrity of nature protected areas
Guarantees the maintenance of current size of forests and forest land

Promotes enhanced access to water & sanitation
Promotes reduced generation of waste
Guarantees compliance with national and EU air quality standards
Guarantees protection of water quality (surface and groundwater)
Guarantees ecological water flows
Guarantees water availability for human consumption
Minimises conflicts over competing water uses
Guarantees protection and prevention of loss of agro-biodiversity – genetic resources in plant and livestock production
Promotes increase in energy efficiency
Promotes increase in the share of renewable energy
Contributes to the decrease of greenhouse gas emissions
Reduces vulnerability to climate change

6. Institutional, policy and legal framework

Institutional framework

The NCCS deals primarily with the energy sector, which is the main sector responsible for emission of greenhouse gases. However, its proposals have an incidence in various other sectors, be it because they also contribute to greenhouse gas emissions, or are particularly sensitive to the impacts of climate change. Other sectors relevant to the NCCS include: industry, water, waste management, environment, agriculture, transport, tourism and health. In this context the following stakeholders play an important role:

The Ministry of Sustainable Development and Tourism (MSDT) is responsible for the development and implementation of the NCCS, taking a coordinating role. It has the key competences in the area of environment and climate change. It is primarily responsible for the preparation, coordination, adoption and implementation of relevant policies, strategies, implementation plans and legislative acts. In relation to the EU environmental *acquis* the MSDT has its competences in the following sub-chapters of the Chapter 27 – Environment: horizontal legislation, air quality, climate change, waste management, nature protection, industrial pollution control and risk management, noise and chemicals.

Various sectors relevant to the NCCS are represented by Directorates under the MSDT, namely: **planning** (land use planning); **construction** (some climate change mitigation measures are related to construction standards and design); **tourism** (a key sector for the country's economy which is vulnerable to climate change); **environment and climate change** (responsible for environmental protection, including potential impacts derived from NCCS implementation); **waste management and communal development** (waste management is a source of GHG emissions that also offers opportunities to generate energy).

The Ministry of Agriculture and Rural Development (MARD) has the main competencies and responsibilities for agriculture and farming, water quality and overall water management as well as for management of forests and other activities relating to

land use, land-use change and forestry (LULUCF). These are all directly relevant to the NCCS.

These sectors fall under the following MARD Departments: agriculture and fisheries; forestry and hunting; water resources; and rural development. As well, the following semi-autonomous bodies under the MARD are particularly relevant: the Forestry Directorate and the Water Directorate.

The **Environmental Protection Agency (EPA)** takes an important role in securing a healthy environment in the country. Its activities include the issuing of permits; environmental monitoring, analysis and reporting; and environmental inspections. It has responsibility for the development and maintenance of the national GHG emissions inventory and is also the designated body to administer the activities on the protection of the ozone layer and F-gases regulations.

The key State body for implementation of the renewable energy and energy efficiency policy is the **Ministry of Economy (ME)**. The ME has three sections that are particularly relevant to the NCCS: **energy**, **energy efficiency** and **industry and entrepreneurship** (especially important for climate change mitigation options in industry, but also for adaptation options that may imply environmental impacts, such as the production of bioethanol). Ownership of the NCCS by the Ministry of Economy is therefore fundamental for its success, which will entail alignment with the Energy Development Strategy (EDS).

An independent organisation the **Energy Regulatory Agency of the Republic of Montenegro (ERA)** regulates the electricity and liquid fuels market conditions, issues guarantees of origin for electricity, which is generated from renewable energy sources or from high-efficiency cogeneration and maintains register of issued guarantees.

The **Ministry of Transport and Maritime Affairs (MTMA)** is responsible for the adoption and implementation of the transport policies and the sectoral development. It plays a key role in the promotion of fuel-efficient vehicles and adoption of corresponding standards. Nevertheless, aspects associated to transport fuel are under the competence of the ME, whereas aspects related to public transport fall mainly upon competence of local authorities.

The **Ministry of Interior (MI)** is responsible for collecting the information related to the road transport, which falls under the regulations for monitoring of the emissions in the transport sector.

The **Institute of Hydrometeorology and Seismology of Montenegro (IHSM)** is particularly relevant insofar as it is responsible for the network of weather stations and capturing of climate data. As such, it is critical both to the understanding of climate change in the country as well as to the development and operation of early warning systems for climate change adaptation (e.g. drought monitoring).

The **Ministry of Health** is responsible for health policy and strategy. Health is relevant to the NCCS with regards to the potential impacts of climate change on public health (e.g. in relation to increased frequency of heat waves). In this regard, the role of the **Institute of Public Health** is also particularly important, as it deals with aspects such as preventive health care measures, monitoring of environmental impact on health of the population (air, soil, noise), planning of health resources, health statistics, etc.

Other relevant stakeholders are the **Ministry of Labour and Social Welfare (MLSW)**, **Local Authorities (Municipalities)** and other institutions such as the **Montenegro**

Statistical Office (MONSTAT), Civil Aviation Agency (CAA), University of Montenegro and National Academia of Science.

Municipalities play an important role in regional planning and development (including preparation of local spatial plans). Various on-the-ground activities that may derive from the NCCS are responsibility of local authorities, including, e.g. monitoring of implementation of legal provisions, preparation and implementation of local energy efficiency programmes.

Important stakeholders in the area of climate change are also business associations, such as the **Chamber of Commerce of Montenegro**, the **Montenegrin Employers Federation and Civil Society**, as well as a number of **Non-Governmental Organizations (NGOs)**.

In 2013 restructured **National Council for Sustainable Development and Climate Change** marked a positive development in inter-institutional coordination of climate change policy in Montenegro.

However, adequate institutional setup for effective implementation of the climate change policy in Montenegro is still missing and the main competent institutions at the State level remain significantly understaffed. Therefore the administrative capacities should be strengthened at both central and local level in order to address the need for enhanced climate action in a sustainable manner, beyond the project-by-project basis. Substantial efforts are also needed to fully integrate climate considerations into all relevant sectoral policies and strategies.

Policy framework

Due to the inter-disciplinary nature of the NCCS, various sectoral policies and planning instruments have an incidence in the implementation of the NCCS and the analysis of its potential environmental implications. In some cases, the NCCS captures policy measures already decided at the sectoral level. The key policies and planning instruments relevant to the NCCS are briefly described here.

Montenegro Development Directions (MDD) 2013-2016 (2013) establishes a vision for socio-economic development, including specific investments and development measures. Four development priority sectors are identified: tourism, energy, agriculture and rural development, and industry.

Overall objectives of strategies by policy fields are defined. Although climate change mitigation does not feature explicitly (e.g. in terms of reduction of greenhouse gas emissions), we do find environmental protection, sound management of natural resources and energy efficiency. In spite of the lack of reference to renewable energy at the level of objectives, the MDD highlights that energy production based on renewable energies “has a very high development potential and can represent one of the central future investment areas”.

The objectives for key sectors relevant to the NCCS are reproduced below.

Energy	Meet the energy demand at least economic costs in the systems of generation and supply, and minimum impacts on the environment; Increase energy efficiency; Increase in reliability and quality of electricity supply; Environmental protection over the whole life cycle of the electricity generation
Agriculture and rural development	Sustainable management of resources, stable and sustainable supply of safe food, ensuring appropriate standard of living for rural population, Increase in the competitiveness of food producers
Forestry	More efficient use of forest resources, development of forestry services; Improving the competitiveness of forestry, ensuring long-term resistance and productivity of forests and other eco-systems / preserving the biodiversity; Enhancing the social functions of forests, forest estates
Environment	Sustainable protection of nature and biodiversity, minimizing pollution of air, noise and radiation, protect water quality and cleaner wastewaters in sewage systems, manage waste
Transport	High quality and efficient transportation, Increased efficiency and mobility of transport, Quality development of transport infrastructure; Improvement of the environmental protection, Increase of safety in carriage of goods and people
Construction and Housing	Improved spatial planning; High quality of construction products (sustainability), competitiveness of construction companies and encourage entrepreneurship, foreign investments; Integrate informal settlements into formal housing sector; Higher standards for energy efficiency and increased use of renewable energy sources

Sustainable Growth is one of the three development directions for the country. Under this development direction, headline targets are established for key sectors. We can highlight ‘minimum environmental protection’, ‘increased use of renewable energy sources’ and ‘reduced final energy consumption’ for the energy sector; and ‘implementation of agro-environmental measures’ in the case of the agriculture and rural development sector.

National Strategy for Sustainable Development of Montenegro (NSSD) (2007). Ensuring efficient pollution control and reduction, and sustainable management of natural resources is one of the general goals of the NSSD. The focus on this goal includes both environmental and climate change mitigation aspects, as evidenced by the corresponding NSSD performance indicators:

- % of the territory protected to preserve biodiversity
- Area of marine protected areas and coastal zone
- Water consumption per capita
- Share of wastewater being treated
- Territory under forests
- Tourism density at the coast
- CO₂ emissions per capita
- Consumption of substances damaging for the ozone layer

Some relevant priority objectives are as follows:

- Full integration of environmental requirements in the development of infrastructure projects and in the adoption of regulations in the field of transport; reduced pollution from transportation and increased transportation safety.
- Provision of a stable and good-quality food offer through the increase in competitiveness of local producers and sustainable management of natural resources.
- Rational use of electricity with the increase of at least 10% in energy efficiency by 2010 in comparison to 2005.
- Reduction in energy import dependency through optimal use of available national resources and with priority to utilization of renewable sources.
- Improvement of industry's environmental performance.
- Increase national nature protected areas.
- Ensure sufficient quantity of good quality drinking water.
- Preserve, and if possible improve air quality, especially in urban areas.
- Improvement of soil management and prevention of the causes of land degradation and damages.
- Renewal and restoration of degraded forests.
- Protection of natural and cultural landscape.
- Reduction of pollution of the sea and coastal zone.
- Improve the health-related quality of life.
- Preservation and improvement of public health with particular emphasis on vulnerable groups.

The **Spatial Plan of Montenegro until 2020** (2008) provides a framework for the spatial development of the territory; to that end it defines general principles and objectives (including at the level of area, sub-area, sector and sub-sector) of spatial development based on sustainable development.

Especially when it comes to NCCS activities that refer to the development of new infrastructure (e.g. HPP, wind farms), the Spatial Plan becomes a reference document. As indicated in the Plan, *"the task of the Spatial Plan is to verify sector requirements referring to long-term spatial development using integrative i.e. inter-sector approach which is in accordance with an optimum use of the space as a limited and undoubtedly non-renewable resource"*. However, it must be noted that the Spatial Plan does not replace sector policies and that matters of local planning or sector responsibilities are not solved by the Spatial Plan.

One of the general goals of the spatial plan is *"ensuring efficient control and reduction of pollution and sustainable management of natural resources"*.

The Spatial Plan identifies key conflicts in use and purpose of space that are relevant to the NCCS from an environmental point of view. We can highlight the following:

- Uncoordinated planning of infrastructure systems – uncoordinated plans and projects of infrastructure systems create conflicts and lead finally to a failure of the improvement of necessary infrastructure;
- Energy – protection of natural environment – the second phase of construction of the Pljevlja TPP should be conditioned with prior solving of the current environmental problems. Construction of new HPP also bring serious negative consequences on the environment, thus decisions on their realization should be made with detailed and comprehensive environmental impact assessment.

We may also highlight that the Spatial Plan promotes the development of renewable resources of energy (especially hydro), “where it is spatially acceptable”. Principles and Objectives for the energy and environment sectors are defined, which must be taken into account in the further definition of sector developments and their implementation.

Agriculture and Rural Development Strategy (2006). The development of the agriculture sector is to be based on the concept of sustainable agriculture. One of the policy objectives is the *“Management of resources in a long-term sustainable manner, together with promotion of agriculture that is, to the greatest extent, coordinated with environmental protection (sustainable resource management)”*. This principle is also reflected in “better management of land and environmental resources” being one of the key areas of rural development.

The **National Programme for Food Production and Rural Development 2009-2013** is an operational programme for the implementation of agricultural policy. The programme includes measures for sustainable management of natural resources, which focus on: less favoured areas (LFAs); preservation of genetic resources in agriculture; organic production; and sustainable use of mountain pastures.

It must be noted that Montenegro has developed a Code of Good Agricultural Practice³ that will help instrumentalise the policy measures in line with the concept of sustainable agricultural production.

The **Energy Policy of Montenegro until 2030** defines the goals for energy development and how they will be achieved. It must be highlighted that “sustainable energy development” is one of the three main priorities identified, which promoted compliance with the principles of environmental protection, energy efficiency and renewable energy sources.

The **Energy Development Strategy of Montenegro by 2030 (EDS)** is a key document for the NCCS, as some of the key measures proposed in the NCCS are aligned to the EDS. It must be noted that the EDS has been subject of an SEA⁴, which helped improve its environmental performance. For example, the EDS identifies candidate infrastructure for electricity generation, including the second block in Pljevlja TPP, as well as HPP on Morača.

However, it must be noted that the EDS foresees other investments for energy generation that go beyond those recommended in the NCCS. For example, one or two TPP in Morače, as well as the possibility of constructing TPPs on the coast if there are no investors interested in building the TPPs to operate on domestic coal.

With regards to HPP, the EDS also refers to options in Komarnica (168 MW), small HPPs, and the possibility of other HPPs (e.g. On River Čehotina, River Piva, and River Trebišnjica), although these are not yet considered formally in the EDS as they involve transboundary water courses. In any case, the EDS foresees initiating international negotiations on the use of these water courses for joint hydropower production and water management.

Construction of wind farms, solar PV, and biomass are promoted by the EDS, although developments are still incipient.

Other relevant aspects of the EDS to the NCCS refer to the development of district heating (e.g. associated to the TPP in Pljevlja) and co-generation and energy efficiency. As well, targets for renewable energy are defined.

³ Ministry of Agriculture and Rural Development (2013).

⁴ Ministry of Economy (2014).

Chapter 16 of the EDS is dedicated to the integration of environmental protection and climate change policies.

The **Energy Efficiency Strategy for Montenegro** (2005) is another key policy document in the context of the NCCS, as the NCCS reflects various of its elements. Environmental protection is engrained into this strategy, as one of its specific objectives is the “reduction of the negative environmental impact of energy use”. Objectives and activities towards energy efficiency are identified at a policy level; for buildings; in the industrial sector and in the transport sector.

At an institutional level, the Strategy provides for the establishment of a Montenegrin EE Unit (MEEU) within the Ministry of Economy.

The **Energy Efficiency Action Plan of Montenegro for 2013-2015** is the second Energy Efficiency Action Plan (the first one covered the 2010-2012 period) prepared in response to requirements from the EU and from the Energy Community Treaty. It excludes the participation of the Aluminium Plant Podgorica (which is the largest single consumer of energy in the country), “due to technological limits of the production of aluminium”.

This Action Plan aims at achieving energy efficiency targets for Montenegro. Its main objectives are based on the priorities set out in the Law on Energy Efficiency:

- Implementation of the Law on Energy Efficiency by completing and improving the regulatory framework and a significant improvement of the institutional framework;
- Raising public awareness and improving understanding, knowledge and capacities in terms of new legal requirements and good practice in the field of energy efficiency in institutions of the public sector, local self-governments, big consumers, professional organisations and other stakeholders;
- Significant improvement of statistical and monitoring system in the field.

Measures indicated in this Action Plan are reflected in the NCCS.

The **National Air Quality Strategy 2013-2016** addresses measures for air quality management, recognising characteristic trends and determining the main sources of pollution, and issues to be solved. It considers four sets of measures: horizontal (dealing with the institutional and regulatory framework, capacity building and improvement in other policies that integrate air quality issues); preventive; measures aimed at emission reductions; and specific measures on ozone protection, GHGs and climate change.

This Strategy is particularly relevant with regards to NCCS considerations on thermal power production, modes of transport, and transport fuel.

National Biodiversity Strategy and Action Plan 2010-2015 (NBSAP) (2010). Any NCCS measures that may have an impact on the environment (mainly in relation to power generation, more specially thermal and large hydro) must take into consideration national policies towards environment and biodiversity.

This Strategy was prepared in the context of the UN Convention on Biological Diversity (CBD). One of its principles states that *“other, in particular economic development sectors in Montenegro are responsible for inclusion of biodiversity and nature protection in their policies, strategies, programmes and development plans”*.

The Strategy is mostly relevant to initiatives on the development of large hydroelectric plants, as well as other renewable energy infrastructure (e.g. wind) that may impact on areas of high biodiversity value, especially if protected. It advocates for the application of market instruments to protect ecosystem services, such as systems of payment for ecosystem services, which may be particularly relevant to HPPs (e.g. protection of upper water catchment areas to reduce siltation, guaranteeing ecological water flows).

It also sets a framework to promote a better integration of tourism (a key sector for the development of the country) with conservation of biodiversity.

The Strategy calls for the designation of new nature protected areas, which must be considered also in the areas of potential affectation by NCCS promoted infrastructure.

The **National Forest Policy** (2008) deals with the productivity of forests, but also with its sustainable management to ensure their social, economic and environmental functions. The policy is based, *inter alia*, on the principles of sustainability, ecosystem approach to forest management, synergy between forest functions, value of resources and the precautionary principle.

The National Forest Policy is related to the NCCS as the latter promotes activities for the improvement of carbon sinks through forest management. As well, the NCCS promotes heating using biomass, which relies on the wood industry. However, these NCCS components have not been identified as key issues with regards to their potential environmental impacts.

Montenegro Tourism Development Strategy to 2020 (2008). Tourism is a key sector for the development of the country, as recognised in the MDD. However, tourism is also a sector vulnerable to climate change, for which adaptation measures have been identified in the national communications to the UNFCCC.

Sustainable development is one of the two objectives of the Strategy, in line also with the “Wild Beauty” promotional slogan. Environment is considered as a cross-cutting issue in the Strategy, and aspects of energy efficiency are also incorporated.

Transport Development Strategy of Montenegro. The NCCS has a number of components related to the transport sector, as it is an important source of GHG emissions. These relate to modes of transport and introduction of vehicle standards based on fuel efficiency.

The minimisation of negative impacts of transport development and traffic infrastructure on environment and society in general is one of the basic goals for strategic development in this sector.

Some of the measures provided under the NCCS are already promoted under the Transport Development Strategy, e.g. promotion of sustainable mobility. The Strategy also includes an environment-specific goal on “preserved areas of Montenegro, protected environment against negative impact of traffic”.

Transport planning at a lower level is competence of local authorities (e.g. promotion of electric and hybrid vehicles, public transport, alternative urban modes of transport)

Draft Waste Management Plan 2014-2020 of Montenegro (2014). The NCCS promotes measures on improved waste management as a way to reduce greenhouse gas emissions. One of the key issues identified refers to a missed opportunity related to the production of energy with waste-to-energy systems.

The Waste Management Plan is currently in draft form and being subject to an SEA.

The waste management policy establishes a number of goals, including “decrease of negative influence of waste on the environment”, “management of waste on the principles of sustainable development” and “use of waste in energy purposes”.

Legal framework

Montenegrin legislation with SEA and climate change relevance

The Montenegrin legal frameworks in different sectors are dealing to some extent also with environmental and climate change issues. However, the country is still at an early

stage of developing, transposing EU legislation and implementing its national legal framework on environment and climate change. Integration of environmental considerations into other sectors is also in an early stage.

International commitments (Conventions and Protocols)

In the area of environment and climate change, Montenegro has ratified all important international conventions and protocols, amongst others:

- **United Nations Framework Convention on Climate Change (UNFCCC)** (October, 2006);
- **Kyoto Protocol (KP)** (June 2007);
- **Vienna Convention for the Protection of the Ozone Layer** (2006);
- **Montreal Protocol on Substances that deplete the Ozone Layer** (2006 with all related amendments);
- **United Nations Convention on Biological Diversity (UNCBD)** (succession June 2006);
- **Cartagena Protocol on Biosafety to the Convention on Biological Diversity** (succession June 2006);
- **United Nations Convention to Combat Desertification (UNCCD)** (ratification 2007);
- **Convention on Wetlands of International Importance especially as Waterfowl Habitat - Ramsar Convention** (succession June 2006);
- **UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP)** (succession June 2006), extended by eight protocols. Montenegro accepted only three of them (The 1998 Protocol on Persistent Organic Pollutants (POPs) and its 2009 amended version – acceptance February 2012; The 1998 Protocol on Heavy Metals and its 2012 amended version – acceptance December 2011; The 1984 Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP) – acceptance October 2006).

In the context of SEA of the NCCS it has to be mentioned that Montenegro is a party to:

- **Espoo Convention on Environmental Impact Assessment in a Transboundary Context with its two amendments;**
- **SEA Protocol to the Espoo Convention (the Protocol on the Strategic Environmental Assessment to the Espoo Convention)** (2009);
- **Convention on the Access to Information, the Public Participation in Decision Making and the Access to Justice in Environmental Matters** (the Aarhus Convention) (2009).

National environmental legislation and climate change

- **Law on Environment** (Official Gazette of Montenegro, 48/08, 40/10, 40/11) regulates a broad spectrum of issues relevant to the protection of the environment. However it tackles only partially the issue of climate change in the articles 54 and 55 (development of a National Climate Change Mitigation Plan).
- **Law on Strategic Environmental Assessment** (Official Gazette of Montenegro, 59/11) fully transposes the SEA Directive 2001/42/EC and also Directive 2003/35/EC providing for public participation in respect of drawing up certain plans and programs relating to the environment, and amended with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC.
- **Law on Environmental Impact Assessment (EIA)** (Official Gazette of Montenegro, 80/05 and Official Gazette of Montenegro 40/10, 73/10, 40/11) with its amendments from 2013 (Official Gazette of Montenegro, 27/13).
- **Law on Nature Protection** (Official Gazette of Montenegro, 51/08, 21/09, 40/11, 62/13 i 06/14) defines the measures for the protection of nature as a whole, and in particular the

protection of individual natural resources, which are characterized by biological, geological, ecosystem and landscape diversity. This law establishes the procedure for protection of the natural resources, determines the methods of management and use of protected areas, provides for special measures of protection, and prescribes measures for protection both in the works and in the development of spatial and other plans.

- **Law on Free Access to Information** (Official Gazette of Montenegro, 48/08) has some provisions related to public access to environmental information, however it is not fully in line with the Directive 2003/4/EC.
- **Law on Environmental liability with regard to the prevention and remedying of environmental damage** (Official Gazette of Montenegro No 47/13) is harmonized with the environmental liability Directive 2004/35/EC.
- **Law on State Surveying and Cadastre of Immovable Property** (Official Gazette of Montenegro, No 29/07; 73/10, 32/11, 40/11) only partially transposes the provisions of the INSPIRE Directive 2007/2/EC.
- **Law on Integrated Pollution Prevention and Control (IPPC)** (Official Gazette of Montenegro, 80/2005 and 54/09)) partly transposes the provisions of the Industrial Emission Directive 2010/75 (IED). A new Law on industrial emissions is foreseen for 2016.
- **Law on Waste Management** (Official Gazette of Montenegro, 64/11) partly transposes the provisions of the EU legislation on waste.
- **Rulebook of Waste Incineration and Co-incineration** (Official Gazette of Montenegro, 33/13) and the **Decree on emission limit values from stationary sources** (Official Gazette of Montenegro, 10/11), partly transpose the provisions related to the large combustion plants (LCP).
- **Rulebook on the characteristics of locations, construction conditions, sanitary and technical conditions, operation and closure of sanitary landfills** (Official Gazette of Montenegro, no. 31/13) defines terms for selection of locations, construction, operation and closing of sanitary landfills.

Legislation relating to water, environmental protection and climate change

Water management in Montenegro remains an issue of concern. Significant efforts are needed to align water management, flood risks management, marine strategy, water quality, water supply and wastewater treatment legislation with the EU *acquis* and to implement it. Monitoring networks, river-basin and flood risk management plans are still in their infancy.

- **Law on Water** (Official Gazette of Montenegro, 27/07, 32/11 and 47/11) is the most significant legal act, which governs water management in Montenegro. Although it contains some basic provisions from the EU Water Framework Directive (2000/60/EC) and some other related “water” directives it is far from being harmonized with the EU water *acquis*. From the point of view of the EU climate change policy harmonization with the Floods Directive (2007/60/EC) should be a matter of priority. ^[1]_{SEP}
- **Regulation on the content and management of water information system** (Official Gazette of MNE, no. 33/08) defines the Montenegrin water information system.
- **Regulation on classification and categorization of surface and ground waters** (Official Gazette of Montenegro, 2/07) classifies waters of Montenegro.
- **Regulation on the content and method of preparation of the water management plan of the river basin or its part** (Official Gazette of Montenegro, 39/09) sets basic rules for developing river basin water management plans.

There are some others legislative acts in place, which from the point of view of climate change regulate less important issues. However, a complete overhaul of the legal system in the field of water management, aligned with the EU water *acquis* is required.

Legislation relating to air, environmental protection and climate change

Harmonisation of Montenegrin legislation with the EU climate change *acquis* is at an early stage. Some progress has been made in the field of the ozone layer protection and F-gases regulations, and in the energy sector (Energy Efficiency - EE, Renewable Energy Sources - RES). Yet, key EU climate legislation is still to be transposed into the national legislation, including the EU ETS, carbon capture and storage, transport sector and bio fuels legislation. Further interventions in the EE and RES are needed as well.

- **Law on Air Protection** (Official Gazette of Montenegro, 25/10) regulates air quality monitoring, emission protection measures, evaluating and improving air quality, as well as the planning and management of air quality. It also includes provisions related to the climate change and greenhouse gas emissions, ozone depleting substances (ODS), fluorinated gases (F-gases) and quality of liquid fossil fuels. A new Law on Air Protection is planned in 2016.
- **Rulebook on methods of development of the GHG inventory and exchange of information** (Official Gazette of Montenegro, 39/14) is partially in line with the Regulation (EU) No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions (MMR).
- **Regulation on substances that deplete the ozone layer and alternative substances** (Official Gazette of Montenegro, 05/2011) include measures as regards the Ozone Depleting Substances (ODS) and Fluorinated Gases (F-gases).
- **Regulation on limit values of the content of pollutants in liquid fossil fuels** (Official Gazette of Montenegro, 39/2010 and 43/2010) regulates the pollution from liquid fuels and sets maximum level of sulphur dioxide SO₂ emissions and is harmonized with EU Fuel Quality Directive 98/70/EC and 99/32/EC as amended by the Directive 2009/30/EC.

Legislation relating to spatial planning, environmental protection and climate change

- **Law on spatial planning and Construction** (Official Gazette of Montenegro“ No.51/08, 40/10, 34/11, 40/11, 47/11) prescribes drafts for permits necessary for building facilities in general and is also relevant for the transposition and implementation of Directive 2010/31/EU. MSDT is the ministry primarily competent for its implementation.^[1]^[2]^[3]^[4]^[5]^[6]^[7]^[8]^[9]^[10]^[11]^[12]^[13]^[14]^[15]^[16]^[17]^[18]^[19]^[20]^[21]^[22]^[23]^[24]^[25]^[26]^[27]^[28]^[29]^[30]^[31]^[32]^[33]^[34]^[35]^[36]^[37]^[38]^[39]^[40]^[41]^[42]^[43]^[44]^[45]^[46]^[47]^[48]^[49]^[50]^[51]^[52]^[53]^[54]^[55]^[56]^[57]^[58]^[59]^[60]^[61]^[62]^[63]^[64]^[65]^[66]^[67]^[68]^[69]^[70]^[71]^[72]^[73]^[74]^[75]^[76]^[77]^[78]^[79]^[80]^[81]^[82]^[83]^[84]^[85]^[86]^[87]^[88]^[89]^[90]^[91]^[92]^[93]^[94]^[95]^[96]^[97]^[98]^[99]^[100]^[101]^[102]^[103]^[104]^[105]^[106]^[107]^[108]^[109]^[110]^[111]^[112]^[113]^[114]^[115]^[116]^[117]^[118]^[119]^[120]^[121]^[122]^[123]^[124]^[125]^[126]^[127]^[128]^[129]^[130]^[131]^[132]^[133]^[134]^[135]^[136]^[137]^[138]^[139]^[140]^[141]^[142]^[143]^[144]^[145]^[146]^[147]^[148]^[149]^[150]^[151]^[152]^[153]^[154]^[155]^[156]^[157]^[158]^[159]^[160]^[161]^[162]^[163]^[164]^[165]^[166]^[167]^[168]^[169]^[170]^[171]^[172]^[173]^[174]^[175]^[176]^[177]^[178]^[179]^[180]^[181]^[182]^[183]^[184]^[185]^[186]^[187]^[188]^[189]^[190]^[191]^[192]^[193]^[194]^[195]^[196]^[197]^[198]^[199]^[200]^[201]^[202]^[203]^[204]^[205]^[206]^[207]^[208]^[209]^[210]^[211]^[212]^[213]^[214]^[215]^[216]^[217]^[218]^[219]^[220]^[221]^[222]^[223]^[224]^[225]^[226]^[227]^[228]^[229]^[230]^[231]^[232]^[233]^[234]^[235]^[236]^[237]^[238]^[239]^[240]^[241]^[242]^[243]^[244]^[245]^[246]^[247]^[248]^[249]^[250]^[251]^[252]^[253]^[254]^[255]^[256]^[257]^[258]^[259]^[260]^[261]^[262]^[263]^[264]^[265]^[266]^[267]^[268]^[269]^[270]^[271]^[272]^[273]^[274]^[275]^[276]^[277]^[278]^[279]^[280]^[281]^[282]^[283]^[284]^[285]^[286]^[287]^[288]^[289]^[290]^[291]^[292]^[293]^[294]^[295]^[296]^[297]^[298]^[299]^[300]^[301]^[302]^[303]^[304]^[305]^[306]^[307]^[308]^[309]^[310]^[311]^[312]^[313]^[314]^[315]^[316]^[317]^[318]^[319]^[320]^[321]^[322]^[323]^[324]^[325]^[326]^[327]^[328]^[329]^[330]^[331]^[332]^[333]^[334]^[335]^[336]^[337]^[338]^[339]^[340]^[341]^[342]^[343]^[344]^[345]^[346]^[347]^[348]^[349]^[350]^[351]^[352]^[353]^[354]^[355]^[356]^[357]^[358]^[359]^[360]^[361]^[362]^[363]^[364]^[365]^[366]^[367]^[368]^[369]^[370]^[371]^[372]^[373]^[374]^[375]^[376]^[377]^[378]^[379]^[380]^[381]^[382]^[383]^[384]^[385]^[386]^[387]^[388]^[389]^[390]^[391]^[392]^[393]^[394]^[395]^[396]^[397]^[398]^[399]^[400]^[401]^[402]^[403]^[404]^[405]^[406]^[407]^[408]^[409]^[410]^[411]^[412]^[413]^[414]^[415]^[416]^[417]^[418]^[419]^[420]^[421]^[422]^[423]^[424]^[425]^[426]^[427]^[428]^[429]^[430]^[431]^[432]^[433]^[434]^[435]^[436]^[437]^[438]^[439]^[440]^[441]^[442]^[443]^[444]^[445]^[446]^[447]^[448]^[449]^[450]^[451]^[452]^[453]^[454]^[455]^[456]^[457]^[458]^[459]^[460]^[461]^[462]^[463]^[464]^[465]^[466]^[467]^[468]^[469]^[470]^[471]^[472]^[473]^[474]^[475]^[476]^[477]^[478]^[479]^[480]^[481]^[482]^[483]^[484]^[485]^[486]^[487]^[488]^[489]^[490]^[491]^[492]^[493]^[494]^[495]^[496]^[497]^[498]^[499]^[500]^[501]^[502]^[503]^[504]^[505]^[506]^[507]^[508]^[509]^[510]^[511]^[512]^[513]^[514]^[515]^[516]^[517]^[518]^[519]^[520]^[521]^[522]^[523]^[524]^[525]^[526]^[527]^[528]^[529]^[530]^[531]^[532]^[533]^[534]^[535]^[536]^[537]^[538]^[539]^[540]^[541]^[542]^[543]^[544]^[545]^[546]^[547]^[548]^[549]^[550]^[551]^[552]^[553]^[554]^[555]^[556]^[557]^[558]^[559]^[560]^[561]^[562]^[563]^[564]^[565]^[566]^[567]^[568]^[569]^[570]^[571]^[572]^[573]^[574]^[575]^[576]^[577]^[578]^[579]^[580]^[581]^[582]^[583]^[584]^[585]^[586]^[587]^[588]^[589]^[590]^[591]^[592]^[593]^[594]^[595]^[596]^[597]^[598]^[599]^[600]^[601]^[602]^[603]^[604]^[605]^[606]^[607]^[608]^[609]^[610]^[611]^[612]^[613]^[614]^[615]^[616]^[617]^[618]^[619]^[620]^[621]^[622]^[623]^[624]^[625]^[626]^[627]^[628]^[629]^[630]^[631]^[632]^[633]^[634]^[635]^[636]^[637]^[638]^[639]^[640]^[641]^[642]^[643]^[644]^[645]^[646]^[647]^[648]^[649]^[650]^[651]^[652]^[653]^[654]^[655]^[656]^[657]^[658]^[659]^[660]^[661]^[662]^[663]^[664]^[665]^[666]^[667]^[668]^[669]^[670]^[671]^[672]^[673]^[674]^[675]^[676]^[677]^[678]^[679]^[680]^[681]^[682]^[683]^[684]^[685]^[686]^[687]^[688]^[689]^[690]^[691]^[692]^[693]^[694]^[695]^[696]^[697]^[698]^[699]^[700]^[701]^[702]^[703]^[704]^[705]^[706]^[707]^[708]^[709]^[710]^[711]^[712]^[713]^[714]^[715]^[716]^[717]^[718]^[719]^[720]^[721]^[722]^[723]^[724]^[725]^[726]^[727]^[728]^[729]^[730]^[731]^[732]^[733]^[734]^[735]^[736]^[737]^[738]^[739]^[740]^[741]^[742]^[743]^[744]^[745]^[746]^[747]^[748]^[749]^[750]^[751]^[752]^[753]^[754]^[755]^[756]^[757]^[758]^[759]^[760]^[761]^[762]^[763]^[764]^[765]^[766]^[767]^[768]^[769]^[770]^[771]^[772]^[773]^[774]^[775]^[776]^[777]^[778]^[779]^[780]^[781]^[782]^[783]^[784]^[785]^[786]^[787]^[788]^[789]^[790]^[791]^[792]^[793]^[794]^[795]^[796]^[797]^[798]^[799]^[800]^[801]^[802]^[803]^[804]^[805]^[806]^[807]^[808]^[809]^[810]^[811]^[812]^[813]^[814]^[815]^[816]^[817]^[818]^[819]^[820]^[821]^[822]^[823]^[824]^[825]^[826]^[827]^[828]^[829]^[830]^[831]^[832]^[833]^[834]^[835]^[836]^[837]^[838]^[839]^[840]^[841]^[842]^[843]^[844]^[845]^[846]^[847]^[848]^[849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Legislation relating to energy, environmental protection and climate change

The legislative framework governing the energy sector in Montenegro relating to Energy Efficiency and Renewable Energy Sources is based on the following laws and sub-law legislation:

- **Law on Ratification of the Energy Community between European Commission and the republic of Montenegro** (Official Gazette of Montenegro, 66/06).
- **Law on Energy** (Official Gazette of Montenegro no 28/10, 06/13) Chapters III and VIII of the Law provide the legal framework for the promotion of renewable energy sources. Chapter III defines the renewable energy sources use and the implementation of high efficiency cogeneration as strategic issues in the development of energy sector of Montenegro and envisages the possibility of introduction of a series of incentive measures. Chapter VIII gives an account of performance of electrical power activities. Among other issues, it regulates matters related to electricity production from renewable energy sources, guarantees of origin, privileged electricity producers, as well research and determination of renewable energy sources potential in Montenegro.
- **Rulebook on types and classification of power plants for electricity generation from renewable energy sources and high efficiency cogeneration plants** (Official Gazette of Montenegro no 28/11). This Rulebook prescribes types and classification of plants for production of electricity from renewable energy sources and plants for high efficiency cogeneration per groups. ^[1]_{SEP}
- **Decree on acquiring the status and accomplishing entitlements of the privileged producer of electricity** (Official Gazette of Montenegro no 37/11). The purpose of this Decree is to regulate the method and procedure necessary for acquiring the status and accomplishing entitlements of a privileged producer of electricity. ^[1]_{SEP}
- **Decree on manner of issuance, transfer and cancellation of guarantees of origin for energy produced from renewable energy sources and high efficiency cogeneration** (Official Gazette of Montenegro no 37/11). This Decree defines the methodology for issuance, transfer and cancelation of guarantees of origin, the data required to request issuance of a guarantee of origin, closer defines the content of guarantees of origin and the method of monitoring deliverance of the electricity through transmission or distribution system. ^[1]_{SEP}
- **Decree on tariff system for determining incentive prices for electricity produced from renewable energy sources and high efficiency cogeneration** (Official Gazette of Montenegro no 52/11). This Decree regulates the tariff system for incentive prices for electricity produced in power plants using renewable energy sources and high efficiency cogeneration power plants. Tariffs depend on type of facilities, their capacities, annual generation and other factors.
- **Rulebook on criteria for issuance of energy permit, content of a request and registry of energy permits** (Official Gazette of Montenegro no 49/10, 38/13). This Rulebook closely defines the criteria for issuance of an energy permit, content of a request and registry for energy permit. Energy permits represent a simplified procedure for authorization of renewable energy projects, as provided by Article 61 of the Law on Energy. ^[1]_{SEP}
- **Rulebook on more detailed requirements legal entity should meet in order to perform measurement and survey of renewable energy sources potential** (Official Gazette of Montenegro no 28/11). This Rulebook prescribes more detailed criteria in terms of professional staff and equipment the legal entity conducting the measurements needs to fulfil in order to perform measurement and survey potential of renewable energy sources. ^[1]_{SEP}
- **Decree on incentive fees for promoting electricity production from renewable energy sources and cogeneration** (Official Gazette of Montenegro no 08/14). This Decree governs the method of determining the level of fee required to encourage the production of electricity from renewable energy sources and cogeneration. It also stipulates the method of distribution of funds collected from fees, as well as the detailed method of calculation of the

proportional share of electricity that suppliers and qualified buyers (self-suppliers) have to take over from privileged producers. ^[17]_[SEP]

- **Rulebook on the amount of the incentive fee for promoting electricity production from renewable energy sources and cogeneration** (Official Gazette of Montenegro no 18/14). This Rulebook determines the amount of the incentive fee for promoting electricity production from renewable energy sources and cogeneration in 2014. ^[17]_[SEP]
- **Law on Energy Efficiency** (Official Gazette of Montenegro, 29/10). The Law is complemented by a package of by-laws establishing the methodology for setting the indicative energy savings target, the adoption of the energy efficiency action plans (on national, local and sector level), the information system for energy consumption in large energy consumers, energy inspections of heating and air conditioning systems, and energy efficiency in buildings. Complete transposition of the EU energy efficiency *acquis* will be achieved with the amendments to the Law on Energy Efficiency, alongside the amendments to the Law on Energy. The Ministry of Economy recently drafted a new Law on Efficient Use of Energy, which was approved by the Government in April 2014 and submitted to the Parliament. However, it has still not been adopted. The draft Law will effectively improve the transposition of Directives 2012/27/EU, 2010/31/EU and 2010/30/EU. A number of additional elements need to be updated, such as measures according to the Energy Performance of Building Directive e.g. those related to cost-optimal levels and the nearly zero-energy building concept. Substantial secondary legislation will also be required before full alignment can be achieved (such as updates of the relevant rulebooks). The Law on Energy Efficiency and the Public Procurement Law transposed Directive 2006/32/EC.
- **Law on Exploitation and Production of the Hydrocarbons** (Official Gazette of Montenegro, 41/10, 62/13) is in compliance with the EU Directive (94/22 EC). This Law governs the conditions, the manner of and the procedure for the exploration and production of hydrocarbons, as well as other matters important for the exploration and production of oil and gas.

Legislation relating to tourism, environmental protection and climate change

- **Law on Tourism** (Official Gazette of Montenegro no 61/10, 40/11 and 53/11) defines basic principles of sustainable tourism based on eco-sensitive business practice and protection of natural resources. However further elaboration of this principles through the legal provisions of this law is missing.

EU legislation with SEA and climate change relevance is presented in Annex 2.

7. Baseline and trends

Geographical situation

Location

Montenegro is an Adriatic–Mediterranean country that lies between 41°39' and 43°32' N and 18°26' and 20°21' E with an area of 13 812 km². To the west and partly to the north it borders with Bosnia and Herzegovina, to the north and northeast with Serbia, southeast with Albania and to the southwest with Croatia. The length of the Adriatic Sea coastline is 293.5 km. Administratively, Montenegro is divided into 21 municipalities. Podgorica is the capital city and administrative centre.

Population

According to the Population Census (2011), population in Montenegro is 620,029 inhabitants, of which 30% live in Podgorica. According to available data, population increased 63% between 1948 and 1991. The increase varies by region; the lowest increase was recorded in the north, and in the central and coastal region population has doubled. Average population density is 44.8 inhabitants/km². The highest concentration

is found in the central and coastal regions and the lowest in the North region. Internal migrations are intensive in Montenegro.

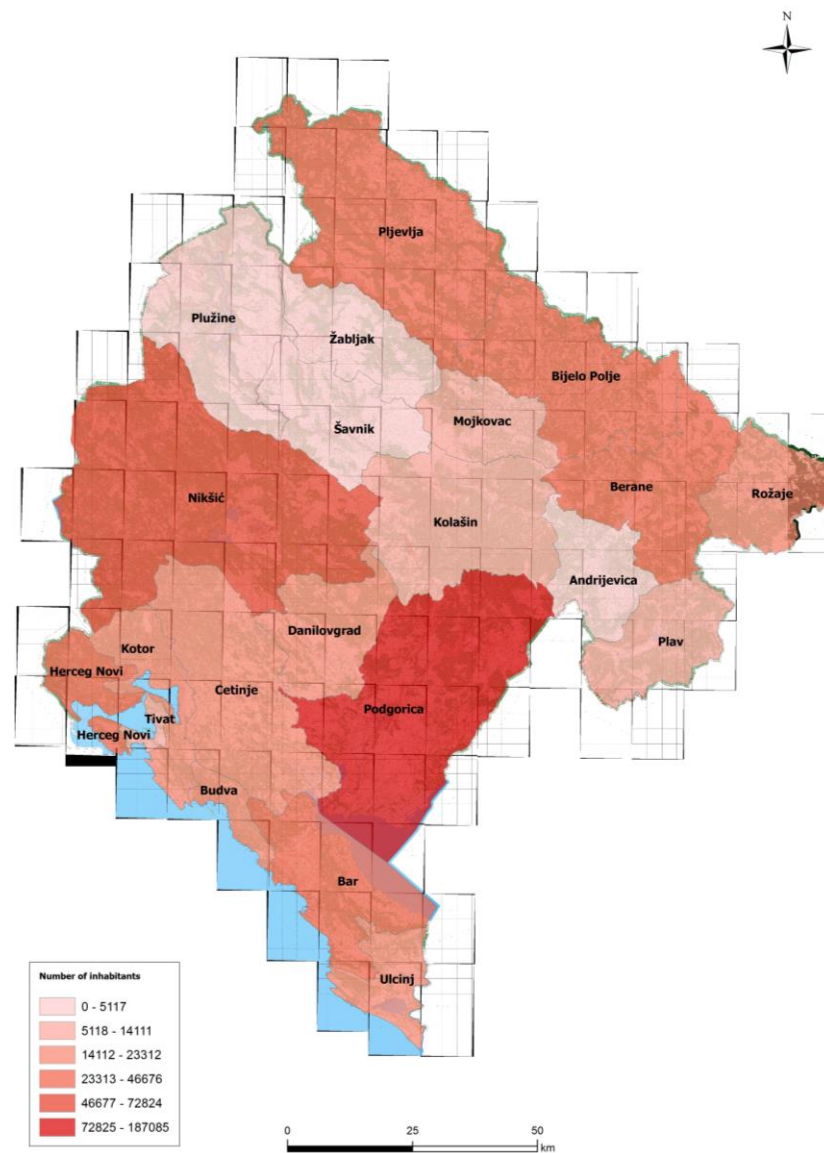


Figure 1 Population in Montenegro (2011)⁵

⁵ Statistical Office of Montenegro, Department of demography and census of population

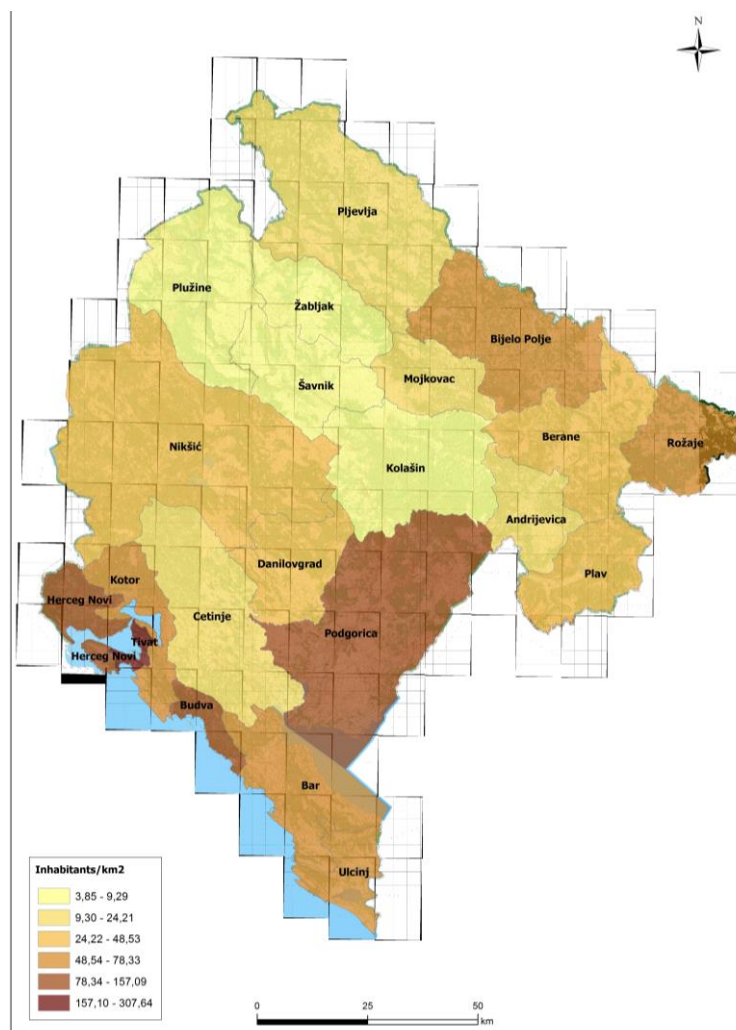


Figure 2 Population density in Montenegro (2011)⁶

The highest percentage of immigrants is located in the coastal municipalities (Budva 36%, Herceg Novi 34%, Tivat 31%, Bar 28%) and in the City of Podgorica (20%)⁷. Internal migrations are mainly caused by the economic situation. The highest migration flow is from the North region, which has a large proportion of cities with economic stagnation.

Employment

There was a significant change in employment by economic sectors in the period 1991–2011. Although data are not fully comparable because of changes in the methodology employed in the different censuses, there was a significant reduction in the number of employees in agriculture, forestry and fishing. Possible reasons can be found in depopulation in rural areas and internal migrations. Also, a possible reason for the reduced number of employees in the primary sector is the closure of agricultural cooperatives after 1991⁸.

⁶ Ibid

⁷ Population projections of Montenegro by 2060 with a structural analysis of the population (2014)

⁸ Ibid

The industry sector has seen an even greater difference in employment in the same period; in 1991 it had 50,375 employees, decreasing to 24,293 in 2011. Employment in the agriculture and industry sectors shows a similar trend. Restructuring and the poor economic situation in the 90's caused the closure of a large number of industrial enterprises. A transition from manufacturing to service industries was dominant in that period. As a consequence, the number of employees in the trade sector increased.

Industry, agriculture, forestry, fishing (primary and secondary sector) and trade had the largest decrease in the number of employees in the past twenty years.

Sectoral development

Economy

In 2011 GDP per capita was 2,277 US\$ 2000, representing one of the lowest in the region. In 2006 Montenegro experienced rapid economic growth based on tourism. GDP growth increased to 10% until 2009, when it became negative. In 2010 and 2011 growth rates were positive 2.5%.

The major GDP contributor is the services sector, with 70%, followed by industry with a 20% share and agriculture with 10%. Industrial output declined by 3.7% in 2009 and recovered in 2011.

Energy⁹

Gross domestic consumption of energy in the period 1997-2008 shows an annual increase of 3.86% (Figure 3). Decreased production in KAP and problems with Steelworks Nikšić significantly reduced consumption of energy in 2008 and 2009. During this period, energy dependence of Montenegro was in the range of 40.5% (1998) to 55.3% (2007), while in 2010 it dropped to 29.5% due to the virtually elimination of net imports of electricity. During a 14-year period (1997-2010) Montenegro imported 100% of all liquid fuels and, in average, 37.3% of electricity according to the energy balance of Montenegro. During the period 1997-2010, generation of energy at the primary level (coal, hydro and biomass) ranged from 17.73 PJ (2007) to 29.77 PJ (2010) or constituted from 47% (2009) to 65% (2010) of the total gross domestic energy consumption.

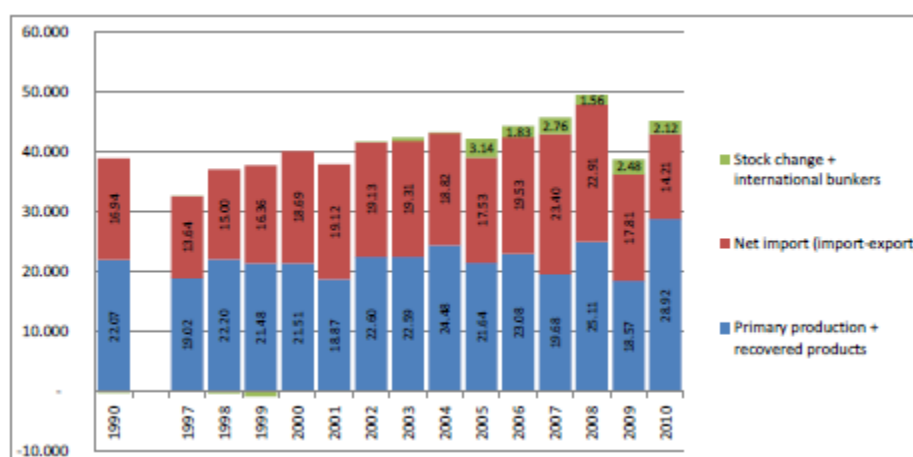


Figure 3 Gross domestic consumption of energy, 1990-2010 (PJ); source: EDS

⁹ Data taken mainly from the Energy Policy of Montenegro until 2030 and the Energy Development Strategy of Montenegro by 2030

In the category of public transformation of energy (power plants, cogeneration and heating plants), TPP Pljevlja is now virtually the only facility in Montenegro, apart from 2 boilers of minor importance in Pljevlja, that consumes primary energy to generate electricity. After reducing primary energy consumption and generation of electricity in 2009 due to rehabilitation of TPP Pljevlja, a record consumption of coal (1.86 million tons) and gross generation of electricity (1,408 GWh) - which was 32% above the average amount for the period 2000-2010 - was recorded in 2010.

Similar to gross domestic consumption of energy, the total final energy consumption (shown in Figure 4) for the period 1997-2008 also indicates a constant increase (average 3.74%/year). According to the consumption structure, there was a reduction in consumption of KAP and Steelworks Nikšić in 2009.

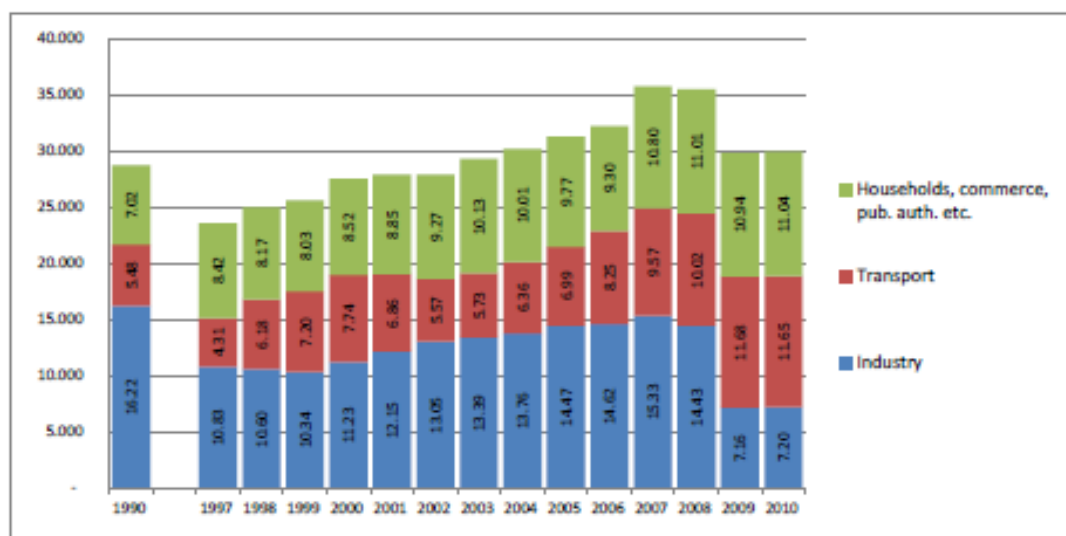


Figure 4 Final energy consumption by sector, 1990-2010 (PJ); source: EDS

According to Figure 5 below and depending on the year, the industry sector dominated energy consumption (40-46%), followed by households and services (29-36%), while the sector of transport represented 18-28%. In conditions with reduced consumption of ferrous metallurgy and non-ferrous metals industry in 2009 and 2010, it was observed that the transport sector has become the dominant sector (39%) compared to other consumption (37%) and industry (24%); also, the transport sector has recorded a constant increase in consumption, indicating the important role of transport in final energy consumption in the future.

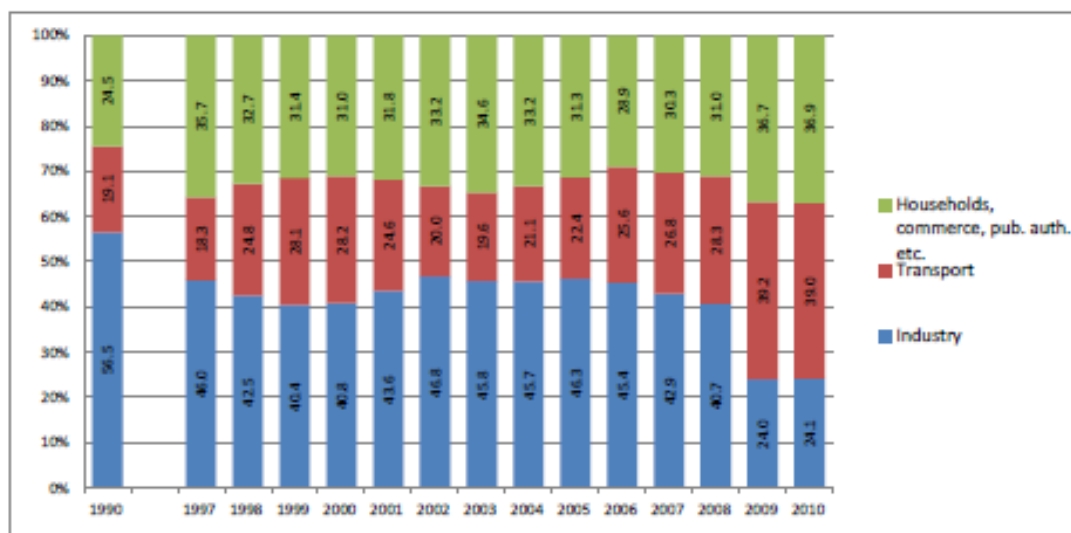
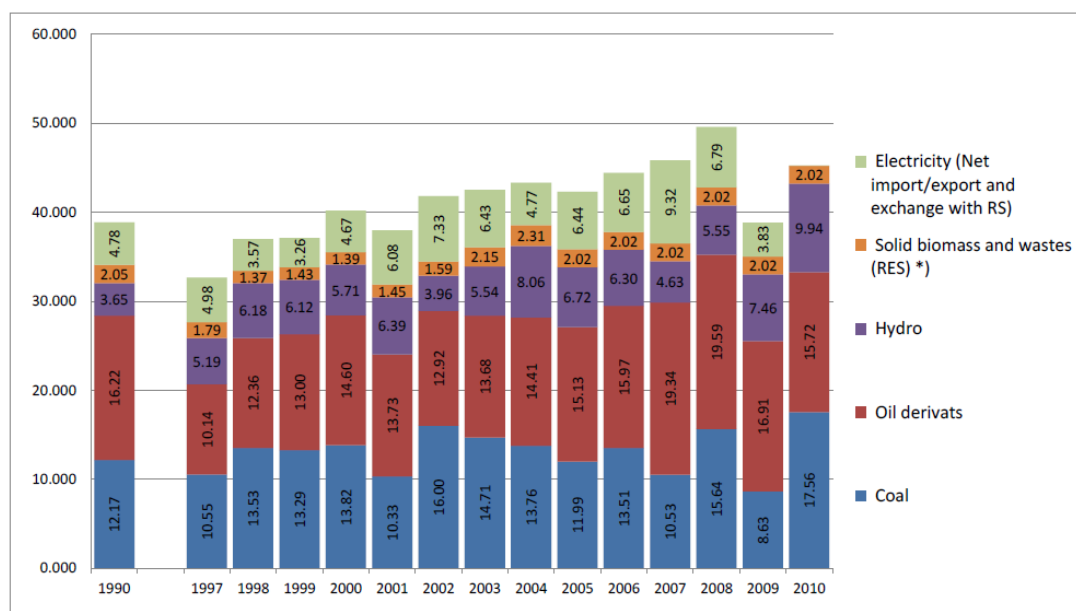


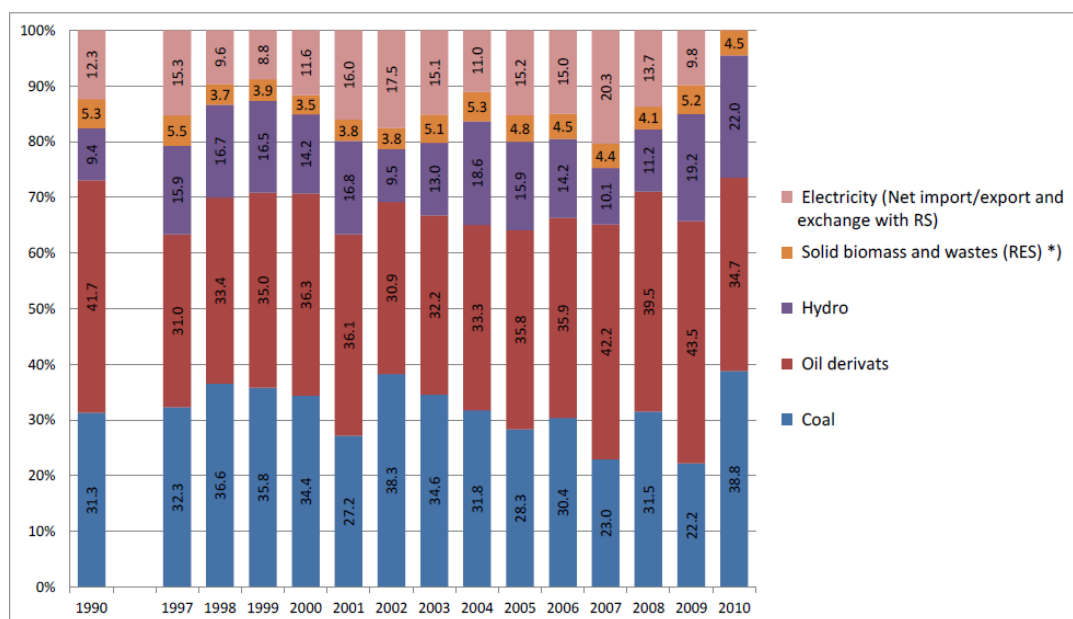
Figure 5 Final energy consumption by sector, 1990-2010 (%); source: EDS

Figures 6 and 7 show gross domestic consumption of energy and fuel by the structure of sources (primary production and imports). Depending on the observed year, the share of petroleum products together with solid fuels (coal) is approximately 70%, of which, the share of imported petroleum products is about 35-45% and the share of domestic coal 25-35%. Consumption of electricity from hydropower plants was 9.5-22% in the period 1997-2010, while the rest was imported (up to a maximum of 2,588 GWh in 2007). It is assumed that the annual contribution of fuel-wood and waste from the wood-processing industry was at the time constant (about 2 PJ or 4-5% of gross domestic energy consumption).



*) woody biomass, forest residues, waste form prim. woody industry, energy crops, agricultural by-products (crop and livestock residues) - all RES

Figure 6 Gross domestic consumption of energy and fuel, 1990-2010 (PJ); source: EDS



*) woody biomass, forest residues, waste from prim. woody industry, energy crops, agricultural by-products (crop and livestock residues) - all RES

Figure 7 Gross domestic consumption of energy and fuel, 1990-2010 (%); source: EDS

According to official data, Montenegro disposes of significant coal reserves and resources of renewable energy while the possible oil and gas reserves are still in the exploration phase.

The most important source of energy is **hydro-potential**. The data of theoretical hydro potential in the EDS were taken from the Water Master Plan from 2001. (Table 7)

Table 7 Technical and theoretical hydro potential; source: EDS

	Theoretical potential	Technical potential
Main water streams	9,8 TWh *	3.7-4.6 TWh **
Small water streams ***	0.8-1.0 TWh	0.4 TWh
Total	10.6-10.8 TWh	4.1-5.0 TWh

* Main water streams suitable for large hydro power plants: Tara (2.2255 TWh), Zeta (2.007 TWh), Morača (till Zeta) (1.469 TWh), Lim (1.438 TWh), Piva (1.361 TWh), Cehotina (0.463 TWh), Mala Rijeka (0.452 TWh), Cijevna (0.283 TWh) and Ibar (0.118 TWh).

** Without diversion of 22.2 m³/s from Tara to Morača, otherwise 4.6-5.3 TWh.

*** On the basis of the previous experience regarding small hydro power plant projects, the theoretical and technical potential of small rivers is underestimated.

Coal is the second most important source of energy. There are two separate geographical areas with coal reserves in the north and north-eastern Montenegro: the Pljevlja area and the Berane area:

- **Pljevlja area** includes three basins:
 - Pljevlja Basin (coal deposits: Potrlica with Cementara, Kalusici, Grevo, Komini and Rabitlje) with gravitating small basins (deposits: Otilovici, Glisnica and Mataruge)

- Ljuce-Sumanski Basin (coal deposits: Sumani I and Ljuce II)
- Maoce Basin

The degree of exploration is high. Total balance reserves in Pljevlja area amount to around 188.4 million tons, of which 109.9 million tons are found in the Maoce Basin, 76.8 million tons in the Pljevlja basin and 1.7 million tons in the Ljuce-Sumanski Basin.

Reserves in the Glisnica and Mataruge basins are estimated with a significant degree of reliability. Glisnica basin is in its final stage of exploration and deposit defining. The amount of coal in Mataruge basin is not brought into question, but it is necessary to carry out detailed geological research to define the quantity and quality of its coal.

- **Berane area** (basins: Polica, Petnjik and Zagorje) is insufficiently explored. Geological reserves of brown coal amount to 158 million tons, but the mineable reserves estimated in 2008 amount to max 17.8 million tons (IMC Study, 2008).

According to official data, Montenegro does not dispose of oil and natural gas reserves. Previous explorations of oil and gas in offshore Montenegro indicate its potential. The existence of basic preconditions for oil and gas production offshore the southern Adriatic geological basin is proven and direct confirmation is the existing production in the Albanian, Italian and Croatian sectors of the basin. Depending on the exploration results in the next 5-10 years and in case these are positive, Montenegro could consider the possibility of exploiting oil and natural gas.

In Montenegro, there is a considerable potential for the use of renewable energy sources for the production of electricity, primarily of small streams, then wind, solar and biomass.

Table 8 Technical and theoretical potential of RES; source: 2. National Communication on Climate Change of Montenegro to the UNFCCC, Draft, February 2015.

Technical wind- potential (on shore)	900 GWh/yr
Theoretical solar potential	20 PWh/yr
Technical potential of biomass	389 GWh/yr – wood
	580 GWh/yr – agriculture (energy crops)
	57 GWh/yr – agriculture (plant and animals residues)

The most interesting areas for **wind energy** exploitation, based on the study, are:

- Coastal areas – with high wind speeds of over 6 m/s on average, and
- Hills around Niksic with average wind speeds in the range of 5.5-6.5 m/s.

Under the assumptions that only high and medium productivity potentials are considered, a gross wind-power capacity of up to approximately 400 MW could be installed, of which, 100 MW deriving from high productivity areas (i.e. with a 30% load factor) and 300 MW from medium productivity areas (i.e. with a 25% load factor). The technical potential wind energy generation is estimated to be approximately 900 GWh/yr.

Insolation of the Montenegro territory is in a range similar to that of other south European countries. Horizontal insolation, i.e. the quantity of the solar radiation as primary energy source per square meter in Podgorica is around 1,600 kWh/m² yr. If we presume that the average solar insolation is 1,450 kWh/m² yr then the theoretical potential of solar radiation can be estimated at about 20 PWh/yr.

Technically **recoverable forest residues** for energy production purposes amount to 58,306 m³/yr, or 127 GWh/yr. Residues from primary wood production are estimated to be 125 m³/yr, or 262 GWh/yr, and are expected to increase to 330 GWh/yr by 2030.

Montenegro has no plants grown as **energy crops** at the moment. Considering the infrastructure and specific geography of Montenegro, a maximum of 3% of arable land can be technically used for growing energy crops (15,482 ha). With an average conversion value of 155 GJ/ha, it is estimated that energy crops can provide 667 GWh/yr of primary energy. It is necessary to carry out detailed research and analysis of biomass potential from agriculture, but since there are no detailed investigations for the potential of growing energy crops in Montenegro, the EDS suggests to maintain the average value of the above figures for the moment. The estimation of technical potential for energy production from **crop residues** is 40 GWh/yr. The technical potential calculated on the basis of the availability of 10% of the total **animal waste** results in a potential of 17 GWh/yr.

The estimation of the theoretical potential of municipal solid **waste** in the CRES report is 197 GWh for the whole territory of Montenegro. The EDS estimates that this level will increase to 280 GWh/year by 2030.

Montenegro has a binding national target of 33% share of RES in gross final energy consumption by 2020, which was set by the Energy Community in 2012.¹⁰

10 Montenegro Environmental Performance Reviews, Third Review, UNECE, 2015

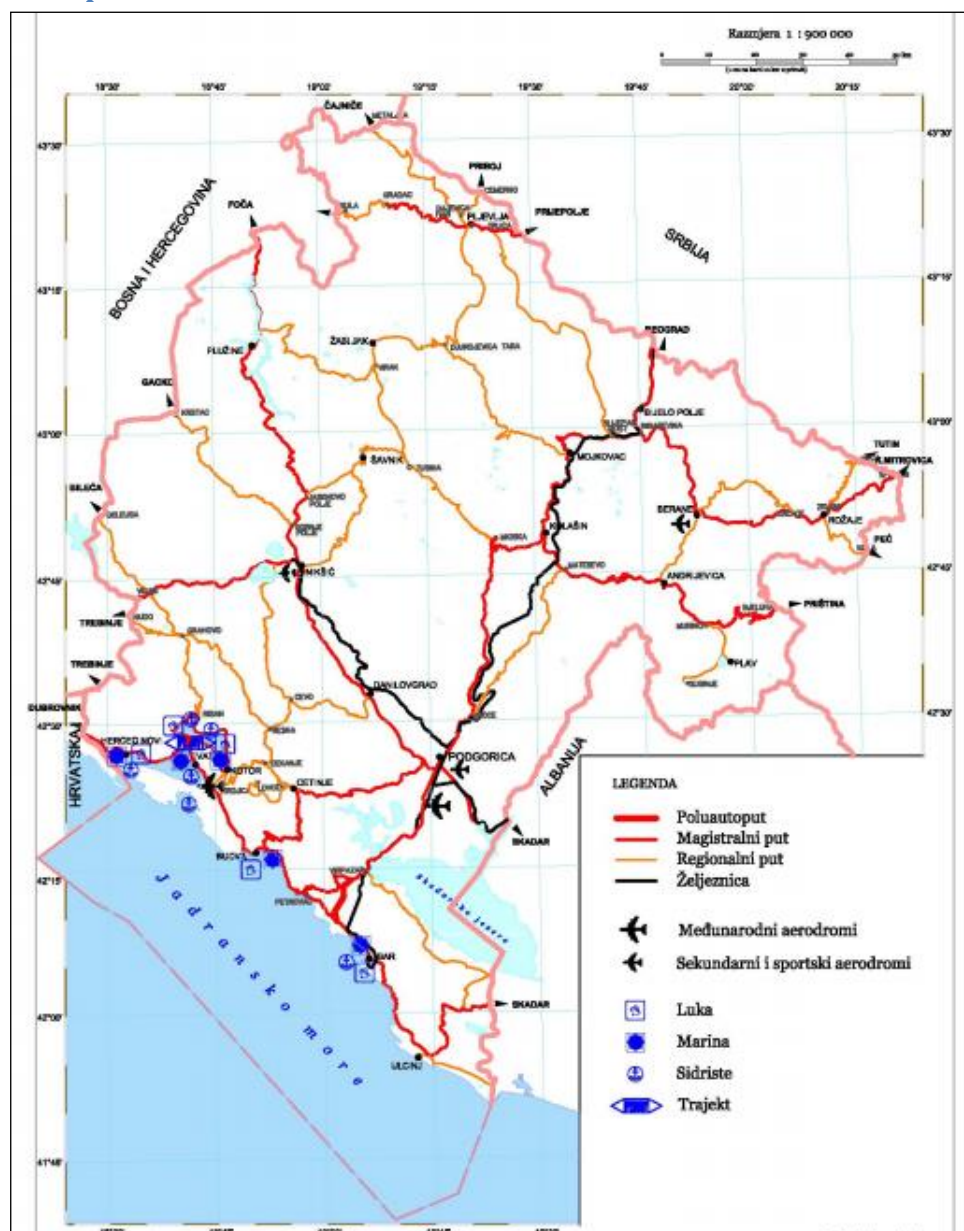


Figure 8 Transport infrastructure in Montenegro– current (Source: Spatial plan of Montenegro until 2020 (OG Nr. 24/2008))

Road transport

The length of the road network in Montenegro is 6,928 km (846 km of highways, 950 km of regional and 5132 km of local roads).

Factors which aggravate the functional linking of Montenegro with the immediate environment are natural conditions, unfavourable topography and mountain passes with difficult transitions, which result in underdeveloped transport infrastructure, rank and state of the roads and an insufficient number of border crossings. The problems are partly alleviated by the modernization of sections of the Budva-Podgorica and Kolasin-Bijelo Polje highways, construction of the Sozina tunnel and connections to the existing

¹¹ Spatial plan of Montenegro until 2020 (OG Nr. 24/2008)

main routes. The northern region, which accounts more than half of the territory of Montenegro, is especially characterized by underdevelopment of transport (and other) infrastructure, especially in rural areas.

Public transport

Bus lines form the basis of public transport in the city of Podgorica. The Public Transport Company, which was owned by the city, went bankrupt, and bus transportation is now under private companies (27 lines). In the central part of Podgorica the frequency of bus lines is relatively good, whereas in the wider area it is insufficient. The relation of public mass transportation to other modes is inadequate, as public transport corresponds to only 6.4% of all trips.

Railway transport

The existing railway network in Montenegro consists of single-track rails of standard width: Vrbnica - Bar, part of the Belgrade - Bar that passes through Montenegro (electrified); Podgorica - Tuzi - state border (part of Podgorica - Skadar) (not electrified) and Podgorica - Niksic (electrified).

The total length of railways is 248.6 km, 327.6 km with station tracks. Important companies in Bar, Podgorica, Spuž, Danilovgrad, Krusevo and Bijelo Polje are connected to the railway network with industrial tracks. The density of the railway network is not satisfactory and, due to the quality of the network, under constant threat of interruption of the system, exacerbated by the concentration of road and rail transport in the same corridor that passes through extremely difficult terrain.

Maritime transport

Current maritime traffic is taking place in ports for international maritime transport: Bar, Kotor, Zelenika, Risan and Budva and also in the ports for domestic maritime transport, marinas and moorings on the coast.

Differentiation of the Port of Bar terminal¹² was performed according to the characteristic types of cargo. The port of Budva has recently acquired the status of international port primarily intended for marine vessels. Alongside the Montenegro coast there are a number of existing marinas and a significant number of projects exist for the construction of new ones.

Air transport

The primary airport network of Montenegro includes the airports of Podgorica and Tivat. Podgorica Airport has a runway with a length of 2500 meters. Generally, the airport complex has adequate spatial capacity for present needs.

The secondary airport network includes: the airports in Berane and Nikšić (recreational airport) and the airport at Ulcinj (recreational and agricultural aviation). The airport of Žabljak exists only as a location.

Agriculture

Agricultural land covers about 38% of Montenegro (518,064 ha), dominated by natural grasslands and meadows (25%) and pasture (62%). Only cropland is under extensive management (9%). Arable land is around 10–12% of agricultural land, but has decreased from 53,000 ha in 1995 to 44,800 ha in 2006.

¹² Port of Bar will be further developed as the main international airport in Montenegro; facilities and operational management will be improved to meet international requirements for cargo, ferry and cruise and take over other commercial functions (transport logistic terminal, free zones, manufacturing functions) and, also, will grow into an important intermodal transportation centre (Source: Spatial plan of Montenegro until 2020 (OG Nr. 24/2008).

Category/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Arable land and gardens	53.3	51.0	52.4	52.3	52.5	51.2	50.0	49.8	44.8	46.9	46.2	44.9
Perennial plantations	14.3	14.3	14.3	14.3	14.3	14.5	14.6	14.6	14.6	13.4	13.4	13.4
Meadows	118.8	120.7	119.4	119.4	119.3	121.2	121.4	120.9	121.5	129.3	130.6	131.5
Pasture	326.6	326.6	326.3	326.5	327.0	328.2	328.4	328.4	327.6	325.3	326.6	325.7
Swamps	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.3	2.7	2.7	2.7
Total	517.5	517.1	517.2	517.0	517.6	519.6	518.9	518.2	512.8	517.6	518.5	518.2

Table 9 Agricultural land and structure of utilization during 1995-2006 (000 ha)¹³

Sown land is 70% of arable land, uncultivated arable land and fallows about 30%. In sown areas the main crops are vegetables (57%), followed by fodder crops (25%), cereals (17.5%) and industrial crops (0.5%). Arable production is characterized by low yields as a result of lack of technology and inputs, primary fertilization etc. A small area of arable land is irrigated.

Livestock production

Livestock is the most important branch of agriculture as it is well adapted to the environmental conditions; the animal husbandry sector is gradually adapting to the market economy.

Cattle production is the most important branch of animal husbandry. Although present on all farms, cattle are not evenly distributed. The largest number of cattle is found in Polimlje-Ibar and the Northern-mountain regions, and the lowest in the Coastal region. Cattle numbers in the Karst region, Zeta-Bjelopavlici and the Coastal region show slow growth, while it is declining in Polimlje-Ibar and the Northern-mountain region.

Sheep rearing comes next to cattle production from an economic point of view. Sheep are mainly kept in northern Montenegro (Northern – mountain about 37% and Polimlje-Ibar region about 32%), where most of the meadow – pasture land (about 60%) is found. Natural grasslands meadows and pasture are the most important sources of bulky feed in Montenegro, especially in hilly-mountain areas where they provide the only feed for cattle.

Main agricultural areas

Montenegro is provisionally divided into five production regions: Coastal, Zeta and Bjelopavlici region, Karst region, Polimlje-Ibar region and Northern mountain region.

The Coastal region covers 11.5% of the national territory and includes 9.8% of agricultural land, 9.8% of arable land and 14.36% of meadows and pasture land. Approximately 20,000 ha of arable, relatively fertile land, is only partially used; most of the area is under-used, neglected and degraded natural pastures. This area is influenced by Mediterranean and sub-Mediterranean climate, and is suitable for sub-tropical fruits, olive and vegetable production, both protected and open field.

The Zeta-Bjelopavlici region is the main plain of the complex (Zeta, Malesia, Bjelopavlici plain, Cemovsko province, etc.). Thanks to its sub-Mediterranean climate this region can very successfully produce most crops vegetables, fruits and vines. Zeta and Malesia had long been an important centre for early vegetables, but recently due to falling demand interest in their production has reduced. Irrigation is essential for achieving high yields because of a pronounced dry period during summer.

The Karst region covers the southwest of Montenegro and over 20% of the total territory, but has a very meagre stock of arable, particularly cultivated land. Most cultivated land is in valleys and depressions; most of the territory consists of rocky

¹³ Country Pasture/Forage Resource Profiles, MONTENEGRO

terrain, very unfavourable for plant production. Previously this area was known for breeding small ruminants, mainly goats, but now livestock is much reduced due to migration from the villages.

The Polimlje-Ibar region covers the territory that gravitates to the river valleys of Lim and Ibar, with one-quarter of agricultural and one-third of arable, relatively fertile land. Although the amount of rainfall is lower compared to other regions, it is better distributed making conditions much more favourable for crops and livestock. The rim of the valley region has the characteristics of mountain areas, with less favourable natural conditions.

The Northern-mountainous region has the largest territory, with one third of the agricultural and arable land. Most of the area is covered by shallow soil on slopes with deeper and more fertile land on plateaux and depressions. The fertile part of the area is suitable for growing potatoes, cabbage, small grains and forage plants. This region is best suited to livestock production.¹⁴

Consumption of Mineral Fertilizers¹⁵

In the 2005-2010 period, a pronounced upward trend in consumption of mineral fertilizers in Montenegro is clearly visible per unit area (Figure 9). On the basis of the data (

¹⁴ Country Pasture/Forage Resource Profiles, MONTENEGRO

¹⁵ Indicator-based State of the Environment Report of Montenegro, Environmental Protection Agency of Montenegro, Podgorica, 2013

Table 10) the highest consumption per unit area in Montenegro was in 2010. Consumption of mineral fertilizers in 2011 compared to 2010 was reduced by 57%. Based on the results obtained, it can be concluded that there has been a significant drop in consumption of fertilizers. In any case farmers in Montenegro use in excess of 10 times less fertilisers than the EU average¹⁶.

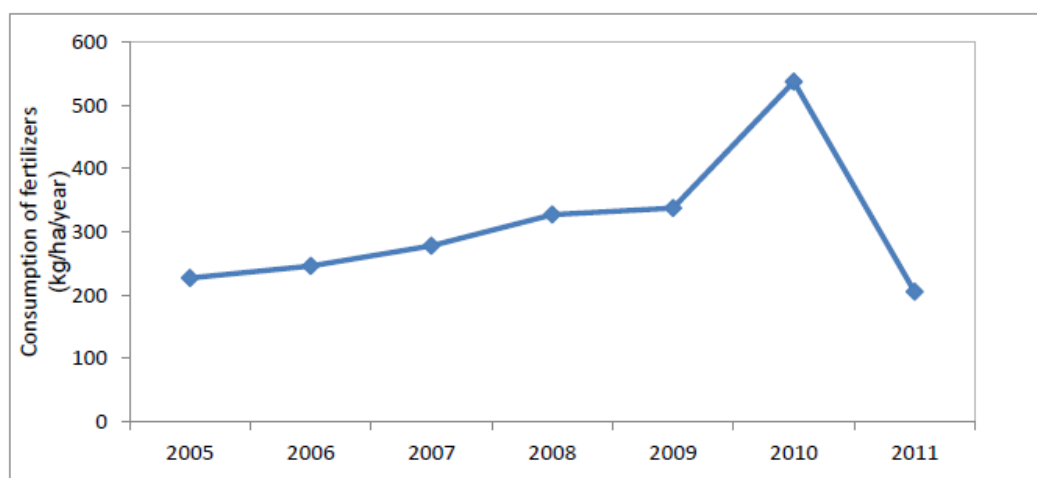


Figure 9 Total and unit consumption of mineral fertilizers per unit area in Montenegro, 2005-2011

¹⁶ Second National Communication on Climate Change, 2015

Table 10 Arable land and consumption of fertilizers in Montenegro, 2005-2011

	2005	2006	2007	2008	2009	2010	2011
Arable land (ha)	5775	5746	5883	5399	5243	5150	5776
Total consumption of fertilizers (t)	1310	1413	1635	1766	1769	2767	1185

Consumption of Plant Protection Products

There are no reliable data on the consumption of pesticides. Figure 10 shows data indicating possible consumption of pesticides, created on the basis of imported quantities.¹⁷

Based on the results shown in Figure 10, it can be seen that in 2008 Montenegro had the highest consumption of pesticides (190 t). The use of plant protection products in the period 2005-2011 varied, showing a peak in 2008 (mainly due to a large increase in use of insecticides), followed by a reduction and relative stabilisation towards 2010/2011 at around 140 t.

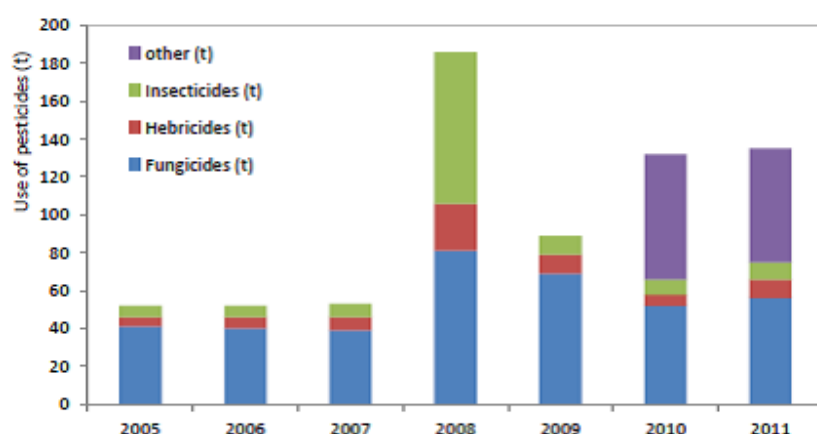


Figure 10 Total use of plant protection products in Montenegro, 2005-2011

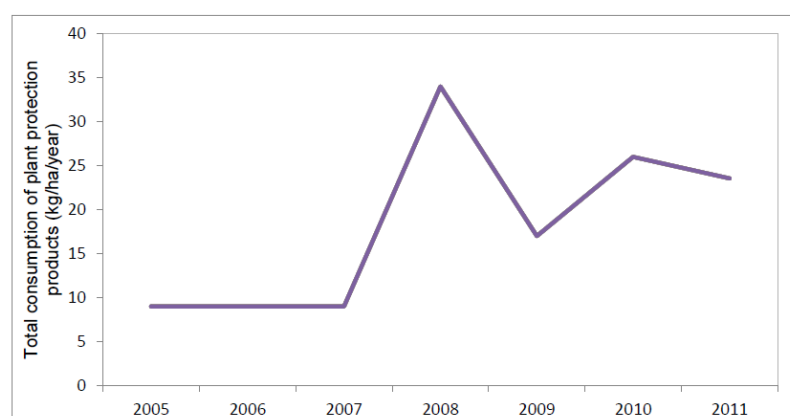


Figure 11 Total consumption of plant protection products by surface area, 2005-2011¹⁸

¹⁷ Indicator-based State of the Environment Report of Montenegro, Environmental Protection Agency of Montenegro, Podgorica, 2013

Organic Farming

Organic farming means farming with the best use of soil fertility and water availability, natural properties of plants and animals, allowing for increased yield and plant resistance with the prescribed (and limited) use of fertilisers and pesticides.

According to the data of the Ministry of Agriculture and Rural Development (MARD) and the Control and Certification Body "Monteorganica", there were 13 registered producers in 2007, 26 in 2008, 34 in 2009, 67 in 2010 and 100 in 2011. In 2011, "Monteorganica" issued 10 certificates (7 for organic production, 3 for production in the interim period in organic agriculture). In 2011, the area under organic farming covered 0.6% of the total agricultural land. In total, 3086.07 hectares of arable land under organic farming were registered.¹⁹

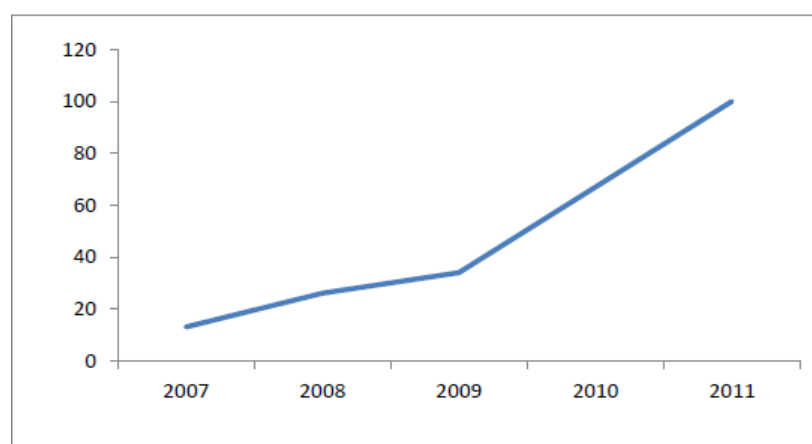


Figure 12 Number of registered organic producers in Montenegro, 2007-2011²⁰

Forestry

In the 2007-2011 period, Montenegro prepared a new National Forest Programme, which resulted from the implementation of the FODEMO project²¹ with its key components: National Forest Policy, adopted by the GoM in 2008, and the implementation of the National Forest Inventory performed in 2008-2009.

According to the latest National Forest Inventory²², forests and forestland cover around **69.7%** of the country (59.5% and 9.8% respectively). Forest abundance, growing wood stock and annual increment is much higher than estimated (**59.9%** forest coverage compared to **45%** estimated, 118 Mm³ of wood stock compared to 72 million estimated, and annual increase of 2.8 Mm³ compared to 1.4 estimated). Although this situation provides for the increase in total annual cuts, the absence of financial effect is quite likely to appear due to high cutting intensity throughout the whole of the 20th century, which significantly lowered the diameters of trees and accordingly worsened the structure of log assortment. Because of the country's orography, there is a large portion of coniferous forests (**32.5%** - the fact from which the country actually gained its name), and the most abundant tree species are Balkan beech (*Fagus moesiaca*), Norway spruce (*Picea abies*), silver fir (*Abies alba*), sessile oak (*Quercus petraea*), Scots pine (*Pinus*

¹⁸ Ibid

¹⁹ Ibid

²⁰ Ibid

²¹ Forestry Development in Montenegro, project jointly performed by the GoM and Luxembourg Agency for Development and Cooperation in the period from 2007 to 2011 (www.fodemo.com)

²² Ministry of Agriculture and Rural Development of Montenegro (2011): National Forest Inventory, Podgorica 2011.

sylvestris), black pine (*Pinus nigra*), ash (*Fraxinus* sp.), hornbeam (*Carpinus betulus*), pubescent oak (*Quercus pubescens*) and other pine and oak species. In such a situation, where wood assortments structure is highly disturbed but the overall wood stock is beyond expectations and growing, there is an increasing opportunity in the utilization of woody biomass as a RES.

State-owned forests account for **67%** of forests and forestland, while the rest is under private ownership²³. Nevertheless, latest data from the National Forest Inventory indicate that the amount of privately owned forests is much higher, but this information cannot be verified prior to the completion of cadastral restitution. High economic forests cover approximately **61%** of the forest territory, coppices account for **25%** while the rest comprises of barren land. A significant increase of forest area has occurred in the past decade, caused mostly by the abandonment of rural areas and artificial afforestation.

Some of the main problems in Montenegrin forestry, as laid down in the working draft of the National Forestry Strategy, are: low level of final products compared to the amount of available wood on the market; obsolete equipment and machinery; insufficient investments in forest production; bad condition of private forests; overall absence of thinning and cleaning measures; failure to fulfil the prescribed annual cut; insufficiency and inadequacy of the forest road network; inefficient concession system; insufficient activity of the extension service; insufficiency of work force and low level of education; insufficiently valorised general welfare forest functions in national parks, etc.²⁴.

Improvement of log assortment is the major challenge set before the Montenegrin forestry. This issue should be regulated by management plans, i.e. cutting intensities and cleaning and thinning measures. When implemented, this could reduce the available woody biomass on the market to a certain amount (higher share of technical wood), therefore any woody biomass-run facilities will have to be carefully planned from the aspect of sustainable fuel supply.

A significant role that forests play in mitigation and adjustment to climate change is expressed in Policy Statement 3 of the National Forest Policy. The most important role of forest in mitigation of climate change effects is their service as a carbon sink. In order to ensure easier and more efficient adaptability of forests to climate change, management of forests should strive for the more diverse structure of species and forests, i.e. for forming of forest stands as close as possible to nature which would make them more resistant to adverse biotic and abiotic impacts caused indirectly by climate change, e.g. forest fires. Forest inventory and monitoring results may allow rising funds for "carbon credits" within the Kyoto Protocol and the future post-Kyoto mechanisms²⁵.

Tourism

In Montenegro, tourism is one of the most important activities that have the potential for economic growth and development. Number of foreign tourist arrivals since 2001 is growing steadily, with significant growth after independence. (

²³ Ministry of Agriculture and Rural Development of Montenegro (2008): National Forest Policy of Montenegro, Podgorica 2008, p. 14

²⁴ Ministry of Agriculture and Rural Development of Montenegro (2013): Working Draft of National Forestry Strategy with Forests and Forestry Development Plan, Podgorica, June 2013, p. 6.

²⁵ Ministry of Agriculture and Rural Development of Montenegro (2008): National Forest Policy of Montenegro, Podgorica 2008, p. 35.

Table 11)

Table 11 Arrivals of local and foreign tourist (2006-2012) (Source: MONSTAT; 2nd National Communication on Climate Change, February 2015)

Structure of tourists	Year						
	2006	2007	2008	2009	2010	2011	2012
Total	953.928	1.133.432	1.188.116	1.207.694	1.262.985	1.373.454	1.439.500
Foreign tourist	377.798	984.138	1.031.212	1.044.014	1.087.794	1.201.099	1.264.163
Local tourist	576.130	149.294	156.904	163.680	175.191	172.355	175.337

Tourism is best developed in the coastal region, which is characterized by a beautiful jagged coastline, a variety of beaches for swimming and relaxation and cities with findings from the Middle Ages such as Budva, Kotor, Herceg Novi, Perast and Petrovac which represent a kind of tourist attraction. However, in the last 10 years more afford is given on promotion of tourism in the central and northern mountain region and the development of active tourism for the elderly and the young with emphasis on the development of adventure tourism, hiking and biking. Parallel to this, cultural and religious tourism is more prevalent in the central parts, where the main tourist attractions are Cetinje and the monasteries of the Middle Ages in Cetinje, Morača and Ostrog.²⁶

The recorded arrivals per month over the period 2002–2007 point to the fact that, in addition to the considerable increase in the numbers of visitors each year, the season is also extending. For several years in a row summer tourism season starts earlier (March–April) and ends later (October–November). Furthermore, the resorts in the northern region are recording increased visits over the summer months, leading eventually to reduced seasonality of the tourism industry.

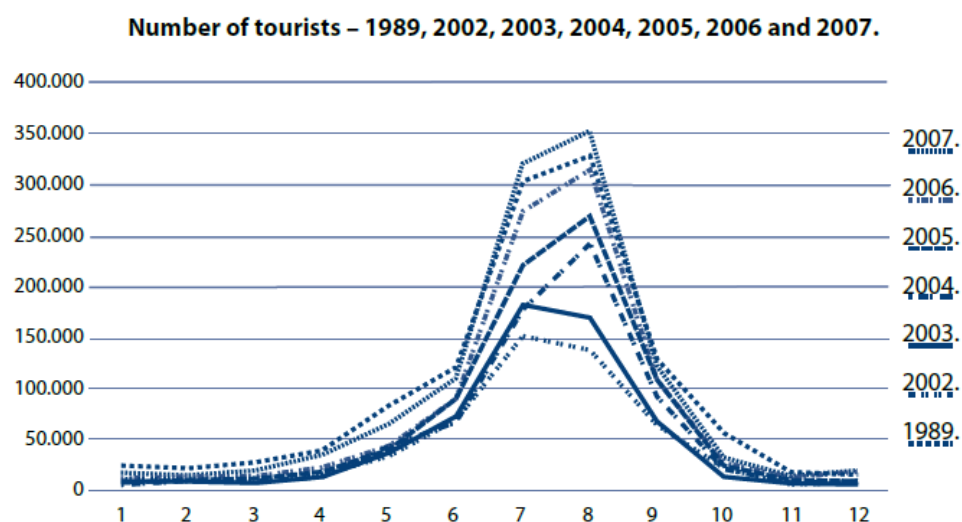


Figure 13 Number of tourist in Montenegro during 1989 and in period 2002-2007 per months (Source: Montenegro Tourism Development Strategy to 2020)

The Montenegro Tourism Development Strategy to 2020 recognizes that present volume of tourists causes an excessive user concentration both on the summer months

²⁶ Second National Report on Climate Changes, February 2015

and on the coast. Accounting for the grey market, the coast makes up over 95% of all overnight stays - mostly in the holiday period July-August. This peak load has adverse economic, ecological and quality impacts. It overstretches the infrastructure and beach capacity, impairs job attractiveness and sometimes conveys an impression of mass tourism in the high season.

Climate change impacts and reduction of protected beach areas together with increasing transport costs and food prices are recognized as major threats for the sector.²⁷

Plans for tourism development recognize the fact that the tourist potential of the mountain areas is under-utilized and that the further development of tourism in this area is of great importance not only for the overall tourist offer of the country but also for the development of the northern region. Current plans for the development of tourism in mountain resorts are directed to the development of summer as well as winter and ski tourism.

Other most critical aspects of current tourism are the focus on a relatively short period of the year. In regard to that, one of the measures to achieve successful and high quality tourism is to develop all-year-round appeal of the destination.

Industry²⁸

Since the late 80's the structure of employment in mining and industry has changed significantly. In 1989, the manufacturing industry employed around 42,000 workers and in 2002 less than 17,000. The production and processing of metals had about 17,000 employees in 1989, and in 2002 less than 11,000.

The main characteristics of the structural changes in the mining and industrial production are the following:

- According to the situation in 2002, the extraction of minerals still dominates, metal production, aluminium, energy and industry, which is the basis for the livelihoods of the population (food, beverages and tobacco);
- One part of the industrial activities, some of which have had a significant role in the creation of income (e.g. production of machinery and electrical equipment, production of final products in wood processing, textiles, etc.) has practically disappeared;
- Part of an industry that is preserved is privatized, or is facing privatization (e.g. metal processing, production of leather and leather products, chemical industry etc.)

With a significant decrease in the 90's, industrial production was preserved mostly in the energy production and in the manufacturing industry, on the basis of domestic raw materials for the domestic market. The largest industrial facilities are the extractive metallurgy and metal processing - Podgorica Aluminium Plant and Nikšić Ironworks.

Mining and industry have negative effects on the environment of Montenegro creating polluted and degraded "environmental hot spots". Such points include the Podgorica Aluminium Plant (KAP), the Pljevlja thermal power plant and Nikšić Ironworks.

Health

Climate change and human health are strongly related. These include direct impacts such as disease and death related to temperature, as well as health impacts of extreme weather conditions. The most vulnerable groups are older people, children and chronic patients (especially with chronic cardio disease).

²⁷ Montenegro Tourism Development Strategy to 2020

²⁸ Spatial plan of Montenegro until 2020 (OG Nr. 24/2008)

Also, there are more indirect impacts that cause diseases transmitted through food, water, vectors and air, or cause shortages of food and water. They can also include wider effects on health and wellbeing.

Several public institutions (Public Health Institute of Montenegro in cooperation with partners), in order to raise public awareness of the impact of heat waves and climate change on the health of the general population and vulnerable population groups (children, the elderly, the chronically ill, pregnant women), conducted a public campaign about this theme.

Above all, there is a strong need to control health risks of climate change integrated into existing processes at local and national level and to ensure an adequate level of preparedness of the health sector to respond to these challenges.

Temperature

There is a direct link between mortality and temperature that differs by climate zone and geographical area. High ambient temperature is related to the mortality rate of heart attack, cardiovascular, renal and the respiratory diseases, metabolic disorders, etc. The influence of temperature on mortality is higher in respiratory and cardiovascular disease than in the other causes of death. The most vulnerable group is population older than 65 years. There are no data available for connection between a certain temperature (limit values) and mortality²⁹.

Human health, air quality and health safety of the water

Basic indicators of the health status of the population of Montenegro are registered number of patients with respiratory diseases (2004 - 2013) and water health safety (2013). A significant decrease in the number of patients with respiratory diseases³⁰ can be perceived in 2013 compared to previous years. 2010 registered the smallest number of patients.

Air quality

Air quality is closely connected with human health. There is a trend of high concentrations of PM₁₀ particles in the air in urban and industrial and urban areas. Mean annual concentrations of PM₁₀ particles (40 µg/m³) were higher than permissible in Nikšić and Pljevlja during the period 2009-2012.

Increased concentrations of PM₁₀ particles, fraction of TSP, which according to the recommendations of the WHO (World Health Organization) is of particular harmful effects on human health were reported at all measurement locations. They have a significant impact on air quality. The allowed number of exceedances during the calendar year is 35. The largest number of exceedances and maximum concentrations were measured in Pljevlja (North Zone), although the number of exceedances per year was above the permissible levels at all measuring points, except in Bar (2012).

In the municipality of Pljevlja (within the north critical zone) it is necessary to improve air quality, which could have an impact on human health. The main sources of air pollution in Pljevlja are the TPP and the "Pljevlja" coal mine.

²⁹ Source: Economic impacts of climate change in Montenegro: first look.

³⁰ The number of new cases in defined period

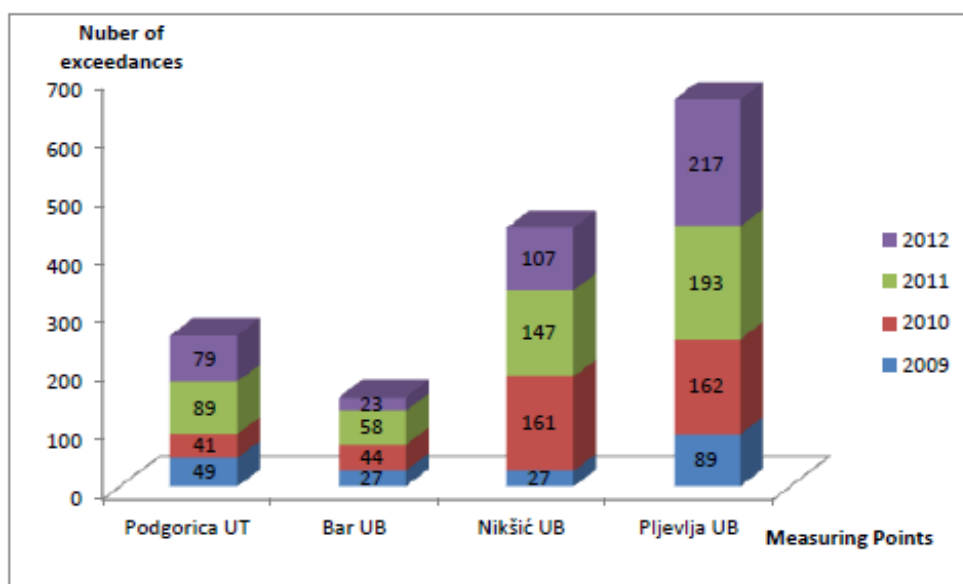


Figure 14 Number of PM10 exceedances for permitted average daily concentrations

Climate change³¹

Montenegro is in the group of developing countries, so-called Non-Annex 1 Parties of the UNFCCC, and so with no obligation of quantified reduction of emissions of greenhouse gases.

Montenegro is located in the central part of a moderately warm zone in the Northern Hemisphere. Owing to its latitude, it has a Mediterranean climate with warm and somewhat dry summers and mild and rather humid winters.

Large bodies of water, its altitude and the position of its coastal mountains, along with the relief of its terrain affect both its local and regional climates; thus within a small area there are big differences between the climates in the coastal and high mountain areas. There are also numerous transitional local climates in-between these areas.

The average annual air temperature ranges from 4.6°C in the area of Žabljaka, which is 1,450 m above sea level, to 15.8°C on the coast. The average annual precipitation ranges from 800 mm in the far north to around 5,000 mm in the far southwest.

On average, the annual number of days with precipitation is about 115-130 on the coast and around 172 in the north of Montenegro. The rainiest month on the coast is November, while July is the driest. Snow cover is formed at altitudes above 400 m. it is deeper than 50 cm and remains on average from 10 to 76 days. On the high land it snows much more frequently in spring than in autumn.

According to the IHSM's data and taking into account the general climate complexity of the area, the following data was obtained for Montenegro; the period represented being one of climate normality (1961-1990):

- Mean annual temperature: 11.2°C
- Mean annual precipitation: 1,500.5 mm
- Mean intensity of heavy rain on days with over 20 mm: 38.2 mm/day
- Mean duration of dry periods; 28.7 days/year

³¹ Indicator-based State of the Environment Report of Montenegro, Environmental Protection Agency of Montenegro, Podgorica, 2013; Drugi nacionalni izvještaj Crne Gore o klimatskim promjenama ka Okvirnoj Konvenciji o Klimatskim Promjenama Ujedinjenih Nacija (UNFCCC) (NACRT), Ministarstvo održivog razvoja i turizma, 2014

- Mean duration of frosty periods: 71.5 days/year
- Mean duration of heat waves: 7.5 days/year
- Climate classification – three climate types: Cs-Mediterranean, Cf-warm temperature and humid, and Df-snow forest climate.

The following changes in extreme weather and climate events were observed up until 2010:

- Frequent, extremely high maximum and minimum temperatures;
- More frequent and longer heat waves;
- Increase in the number of very warm days and nights;
- More frequent droughts;
- Increase in the number of wildfires;
- Dry periods followed by heavy precipitation;
- More frequent storms (cyclones) during colder parts of the year;
- Fewer consecutive days with rain;
- Fewer days with heavy precipitation;
- Increase in the intensity of precipitation;
- Reduced total annual quantity of snow.

On the basis of sea water temperature data on the measurement station in Bar (1980-2012) and the mean sea level data from the same station (1965-2012), sea water temperature has seen a constant positive trend over decades, with increase of $+0.02^{\circ}\text{C}$ per year. Sea level has also positive trend, but with small changes in rate over the years.

Greenhouse Gas (GHG) Emissions

In Montenegro, in the period 1990-2009, after the downward trend in emissions until 1994, there is an upward trend, with the exception of 2009, when a significant decrease was recorded as a result of reduced energy production in the TPP Pljevlja due to repairs and closing of the power plant at the Aluminium Plant Podgorica (KAP).

GHG emissions are monitored based on emissions data from major sources classified by major emitting sectors (IPCC nomenclature) with 1990 as the baseline year. In the reporting period, as a clear consequence of the crisis in early 90's, emissions were reduced by over 50% over a 5-year period.

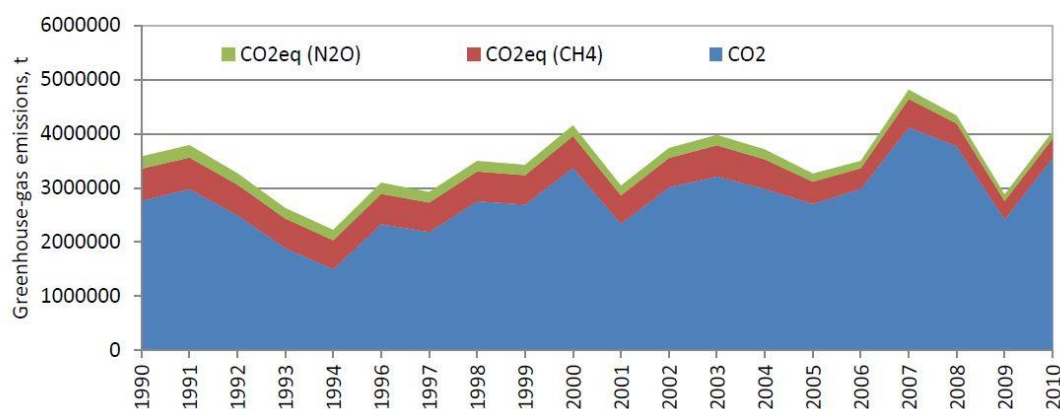


Figure 15 Greenhouse-Gas Emissions 1990-2010³²

In 1998 the GHG emissions already reached those from 1990 (the baseline year). In 1998-2008, there was an evident growing trend, as a result of energy consumption in virtually all sectors other than industry. The last year observed recorded, as a result of

³² Ibid

the global economic crisis, a new decline in industrial production and consumption. A detailed overview of GHG emissions is presented in the NCCS.

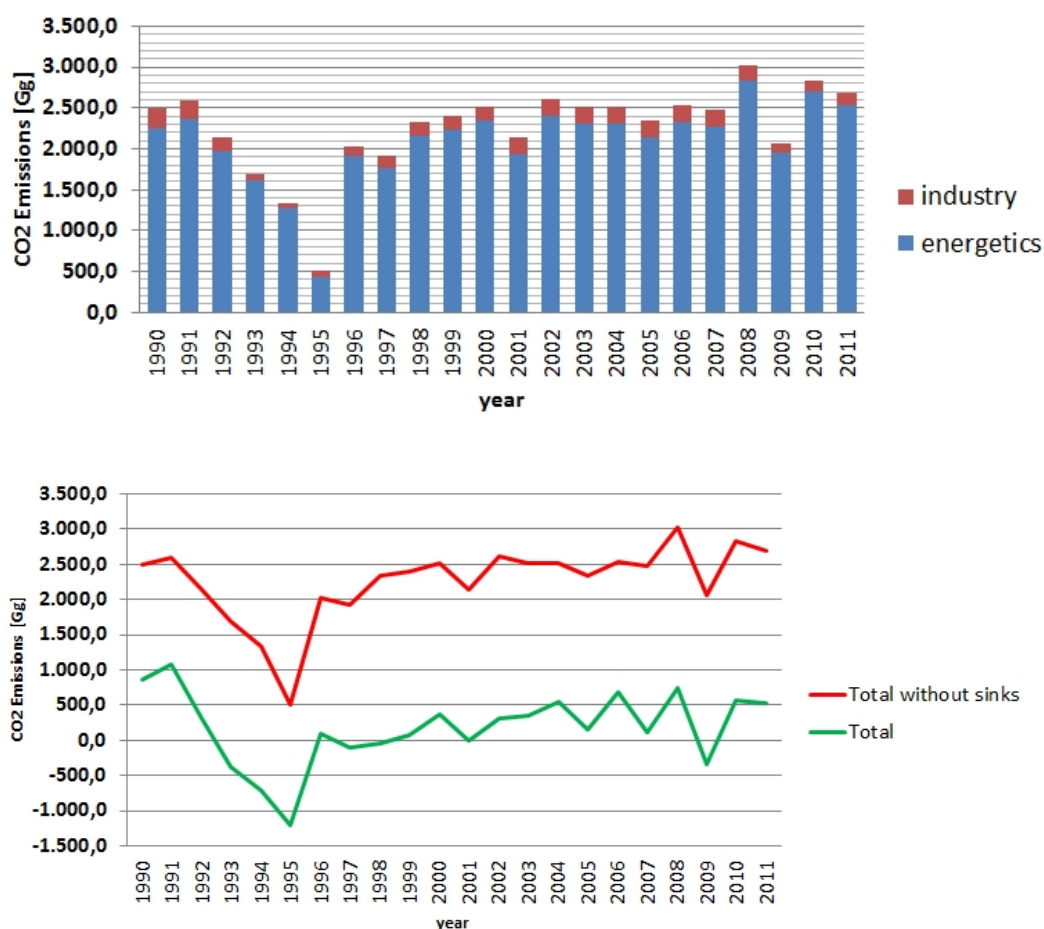


Figure 16 CO₂ emissions in Montenegro³³

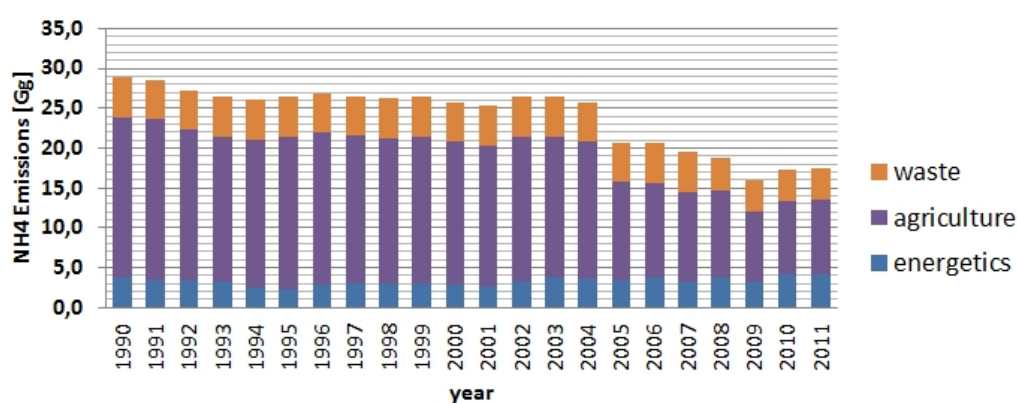


Figure 17 CH₄ emissions in Montenegro³⁴

³³ Second National Communication on Climate Change to the United National Framework Convention on Climate Change (UNFCCC), Ministry of Sustainable Development and Tourism, 2015

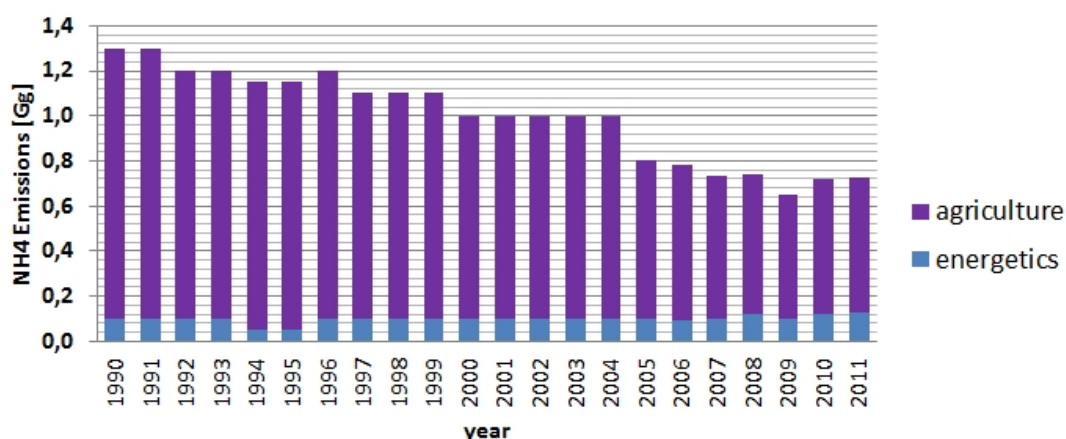


Figure 18 N₂O emissions in Montenegro³⁵

Detailed figures on GHG emissions in Montenegro can be found in the NCCS.

Environmental infrastructure

Water and sanitation

According to available data, 65-70% of the population is supplied with water via water supply systems of municipal centres and important local centres, while just a little over 30% of the population in rural areas is supplied via local water supply systems and individually from water wells, by construction of groundwater draw wells or construction of cisterns for rainwater collection.

Water supply systems mainly serve cities and other urban, suburban and rural settlements in their area. Urban water supply system includes 40 city areas, 174 suburban and rural settlements (in total 214 settlements).

60% of the urban population (37% of the total population) discharges wastewater into the sewage network. Wastewater from the Primorje (coastal) region discharges into the sea through submarine outfalls, also without pre-treatment.

Irrigation applies only to 2,000 ha. All previously derived irrigation systems were never brought to function and a substantial part of them is degraded. This situation leads to unintended use of tap water.

Biophysical environment

The dominated land cover class in Montenegro is broad-leaf forest that occupies 26% of the territory. Almost 80% of Montenegro is covered by semi-natural and forest areas. Agricultural land occupies 16%, wetlands or water 3.4% and artificial areas only 1% of the national territory.³⁶

³⁴ Drugi nacionalni izvještaj Crne Gore o klimatskim promjenama ka Okvirnoj Konvenciji o Klimatskim Promjenama Ujedinjenih Nacija (UNFCCC) (NACRT), Ministarstvo održivog razvoja i turizma, 2014

³⁵ Ibid

³⁶ DIKTAS Protection and Sustainable Use of the Dinaric Karst Transboundary Aquifer System – Montenegro Country Report, 2012

Biodiversity and protected areas

Biodiversity

Since there is no official, widely accepted classification of ecosystems, the National Biodiversity Strategy defines the following typical ecosystems, habitats and geological formations.

Table 12 Ecosystems and habitats in Montenegro

Ecosystems	
Mountain ecosystems	<ul style="list-style-type: none"> • high mountainous area of the continental part of Montenegro • dominant peaks: Durmitor (2523 m), Komovi (2461 m), Prokletije (2,536 m), Sinjavina (2,277 m), Bjelasica (2,037 m) • coastal mountains: Orjen (1,893 m), Lovcen (1,749 m), Rumi (1,586 m) • major habitat types: alpine pastures, rocky walls and cliffs, bare land with sparse vegetation and gullies
Forest	<ul style="list-style-type: none"> • the surface covers the largest area (54%), while 45% take up natural forests
Steppe	<ul style="list-style-type: none"> • rare, mostly on alluvial soil (Cemovsko field, Karabuško, Tusk and Dinoško field and lower parts of the river canyons Pipe)
Freshwater ecosystems	<ul style="list-style-type: none"> • wetlands mainly in the plains and on the coast • Skadar Lake (the largest lake, great biodiversity- particularly important presence of a large number of relict and endemic species) • Šasko Lake • cold high mountain glacial lakes in the north of Montenegro, especially in the framework of NP Durmitor, Biogradska gora and Prokletije
Sea	<ul style="list-style-type: none"> • more than 300 species of algae, 40 species of sponges, 150 species of crustaceans, 340 species of molluscs, 400 species of fish, 3 species of sea turtles and 4 species of dolphins • in order of importance for biodiversity the Boka Kotorska Bay and the mouth of Bojana
Habitats	
Coastal habitats	<ul style="list-style-type: none"> • rocky cliffs, natural sand beach and 8 smaller islands • Big Ulcinj beach-the sand dunes present a unique halophytic / saline vegetation • on the southern slopes of the coastal mountains the typical Mediterranean vegetation of maquis and garrigue are developed • the lower parts and the shore- saline vegetation and cultivated land (olives and orchards) • Tivat Solila and Ulcinj solana- significant for stay and wintering birds
Caves	<ul style="list-style-type: none"> • Lipska Cave and Đalovića Cave • pits are among the deepest in the Balkans (Jama at Vjetrena hills and Durmitor, Duboki do in Lovćen)
Canyons	<ul style="list-style-type: none"> • partly influenced by the Mediterranean climate (Morača canyon and Cijevna) • partly influenced by the cold continental climate (Tara river canyon, remains of Piva and Komarnica canyons, gorges like Ibarska, Tifranska and Đalovića)
Karst	<ul style="list-style-type: none"> • at altitudes above 1,000 masl • characteristic vegetation of bushes

The state of biological diversity in Montenegro has been monitored, even though to a very limited extent, since 2000 within the National Environmental Monitoring Programme. By generalizing the results obtained through the Programme, it was stated that negative consequences were mostly present in water ecosystems and forests. In

2005, additional threats to dry grassland ecosystems (the Zeta and Bjelopavlićka Plain) and ecosystems of salt pans were stated (hinterland of Velika Plaža in Ulcinj).³⁷

Due to the type of activities that are planned within the NCCS and their potential negative impacts, the specific interests in the Study regarding biodiversity are the Morača river and Skadar lake areas (related to the HPP Morača issues) and Pljevlja (related to the TPP Pljevlja- 2nd block)

The general data of the Morača river biodiversity was taken from the SEA for the Detailed Spatial Plan (DSP) for HPPs on the Morača River (2010, COWI).

The **Morača River** area is an important migratory corridor between the Skadar Lake area and Podgorica Valley with their Submediterranean character in the south and more mountainous, Dinaric north. Many of the plant species are of Mediterranean-Submediterranean character, but due to great diversity in height and vertical zonation also numerous Central European and mountainous species of South Europe are present. Moreover, Morača River Canyon is a refuge for some species of Mediterranean and steppe character that require less oscillation in climatic factors.

A total of 933 plant species from 498 genres and 107 families were recorded in the Morača River catchment area. Invertebrates in Morača area were poorly researched so far. A total of 30 fish species were found so far in the Morača River area, 8 of these being listed on the International Union for the Conservation of Nature (IUCN) Red list. The fish fauna of Morača is very peculiar because it contains fish species both of the Adriatic as well as of the Danube River basin; moreover, for some species with a center of distribution in Albania, Morača is the northernmost boundary of their distribution. There is no detailed information on sections of the Morača River that are important spawning areas. The salmonid species are migratory and to a different extent dependent on the connection between the upper and lower Morača catchment. The area is rich with large mammals, as well as numerous species of smaller predators. There are also numerous bird species, especially birds of prey. Most of them have a protected species status and are listed in annex I of the Birds directive, species of European Conservation Concern (SPEC), Emerald species according to the Bern Convention or under other Conventions.

Skadar Lake is an extremely important area in terms of biodiversity and especially as an important point at migratory routes of birds. It is high in biodiversity due to several factors:

- Two major zoogeographic areas meet here: the Palaearctic region (Europe, Asia, the Mediterranean and North Africa) and the Palaetropic region (Africa). As a result occasionally African bird species and winter migratory bird species of West Siberia can be spotted.
- In the past, especially during glaciations, it functioned as a refuge for several species. As a result, today some relict and endemic animal and plant species are met in the area.
- High variations of water input and water levels, resulting in intermittent character of the lake. The result are vast wetland areas, especially on the north side and south of Virpazar, including humid forests and floodplains, which also function as spawning grounds, refuges and breeding habitats for various species.

Willow forests (*Salicetum albae*) are the most abundant forests around the lake, mainly on the northern shore and in the flooding area. Other forests are quite degraded and remain present only in a few degraded stands.

³⁷ National Biodiversity Strategy with the Action Plan for the period 2010-2015, Draft, July, 2010

About 257 species of invertebrates are known in the area; however, it must be noted that invertebrate groups have not been well researched although they play an important part in the food chain. Skadar Lake is very rich in amphibians and reptiles, including endemic and endangered species; 51 species were listed so far. Fish fauna of Skadar Lake is highly diverse due to an extensive network of rivers and streams, favourable spawning grounds and good communication with the sea. Most of the species are cyprinid, but the species vary from highland cold-water fish species to warm freshwater fish species as well as several marine species. Fish fauna of Skadar Lake has a high level of endemism. About 10 species are commercially exploited, representing more than 95% of the total fresh water fishery in Montenegro. Although it is karstic and has characteristics that would classify it as oligotrophic, the biomass production in general and thus also fish biomass production of Skadar Lake is much higher, thus closer to eutrophic lakes.

Skadar Lake is an important area for birds because of good nesting and colonisation conditions and its location along migratory routes. Mammals in the Skadar Lake area are poorly researched; so far 50 species were found in the area, with only a few species such as the otter (*Lutra lutra*) strongly linked to the water habitat and most of the species living in the hilly areas to the Southwest of the lake. Bats are one of the mammal groups that are especially abundant around the lake (Royal Haskoning, 2006).

According to the baseline studies made for the SEA for the DSP for TPP- 2nd block there are not many published data on the biodiversity of Pljevlja area. Dominant habitats of the area are meadows, pastures and anthropogenic habitats such as yards, fields, and ruderal species along the roads). Forest elements occur sporadically, usually in the form of small stands between the meadows and along yards. Forest vegetation in the surrounding area is represented by mixed oak woods, oak- hornbeam woods, pine woods etc. The biodiversity of fauna (birds, amphibians, mammals etc.) is relatively high although poorly researched. The aquatic flora and fauna of the river Vezišnica is threatened by the thermal power plants. The River Vezišnica had the worst water quality results from 2009-2012 because of its proximity to the TPPs and wastewater discharges in Pljevlja.³⁸

Protected Areas

The national network of protected areas covers 1,250 km² or 9.04% of the territory of Montenegro. According to available data (source: MSDT, January 2015), there are five national parks: "Biogradska Gora", "Durmitor", "Lovćen", "Skadar Lake" and "Prokletije". In addition to national parks in Montenegro there are more than 47 protected areas under the following categories: nature reserves (650 ha); nature monuments - cliffs, caves, pits, plant communities, individual dendrological facilities, beaches, city parks, memorial parks, botanical reserves, botanical gardens (13,638 ha); areas of special natural features (354.7 ha); and municipal level protected areas (15,000 ha).

The international protected areas include the river system of the Tara river (M&B UNESCO Biosphere Reserve), NP Durmitor with the Tara Canyon (UNESCO Natural and Cultural Heritage List), the NP Skadar Lake and Salt Pans in Tivat (Ramsar and IBA site) and Kotor - Risan bay (Municipality of Kotor, UNESCO Natural and Cultural Heritage List).

The Emerald network in Montenegro has 33 sites.

³⁸ Montenegro Environmental Performance Reviews, Third Review, UNECE, 2015

Landscape

Landscape diversity of Montenegro was formed as a combination of dynamic natural conditions and traditional use of space. The basis of landscape is highland relief, water surfaces and climatic conditions. All together directly or indirectly affect the type and density of land cover. Early mentioned natural conditions in combination with historical and cultural aspects and other anthropogenic factors result in cultural landscape variable values.

Montenegrin landscape can be divided into two major sections: the coastal area and the highland hinterland. The coastal area is characterized by contrasts between the sea and the rugged coastline. There is a high degree of horizontal and vertical dynamics and landscape characteristics are, besides relief, characterized by Mediterranean green cover, settlements and infrastructure. Often the cause of landscape degradation is illegal and uncontrolled construction. In the hinterland the main landscape feature is dynamic mountainous or hilly relief with the occasional appearance of karst fields or canyons. A significant landscape unit is also Skadar Lake in the southeast. Besides many valuable natural landscapes, there is frequent appearance of cultural landscapes, mostly in the vicinity of settlements.

Montenegro has not developed a unique landscape basis, which would be the basic document of identification and evaluation of the landscape. Nevertheless, there are several divisions in the landscape units and types.³⁹ The Spatial Plan of Montenegro mentions the following divisions according to: biogeographical-ecological analysis (10 units), natural characteristics of the area and anthropogenic elements (21 units) and ambient values (11 units).

The division by ambient zones is perhaps the best illustration of landscape features of Montenegro. The basis for the distribution is natural conditions combined with anthropogenic elements.

Table 13 Landscape units of Montenegro by ambient zones

(1) Coastal zone	(7) Zones of economic forests and lawns
(2) Catchment area of Skadar Lake	(8) Karst basin and plateaus
(3) Larger river valleys in lower parts	(9) Coastal mountains
(4) Larger river valleys in mountain parts	(10) Subalpine and alpine mountains
(5) Valleys of upstreams of lowland rivers	(11) Large canyons
(6) Valleys of upstreams of mountain rivers	

³⁹ Spatial plan of Montenegro, 2008.

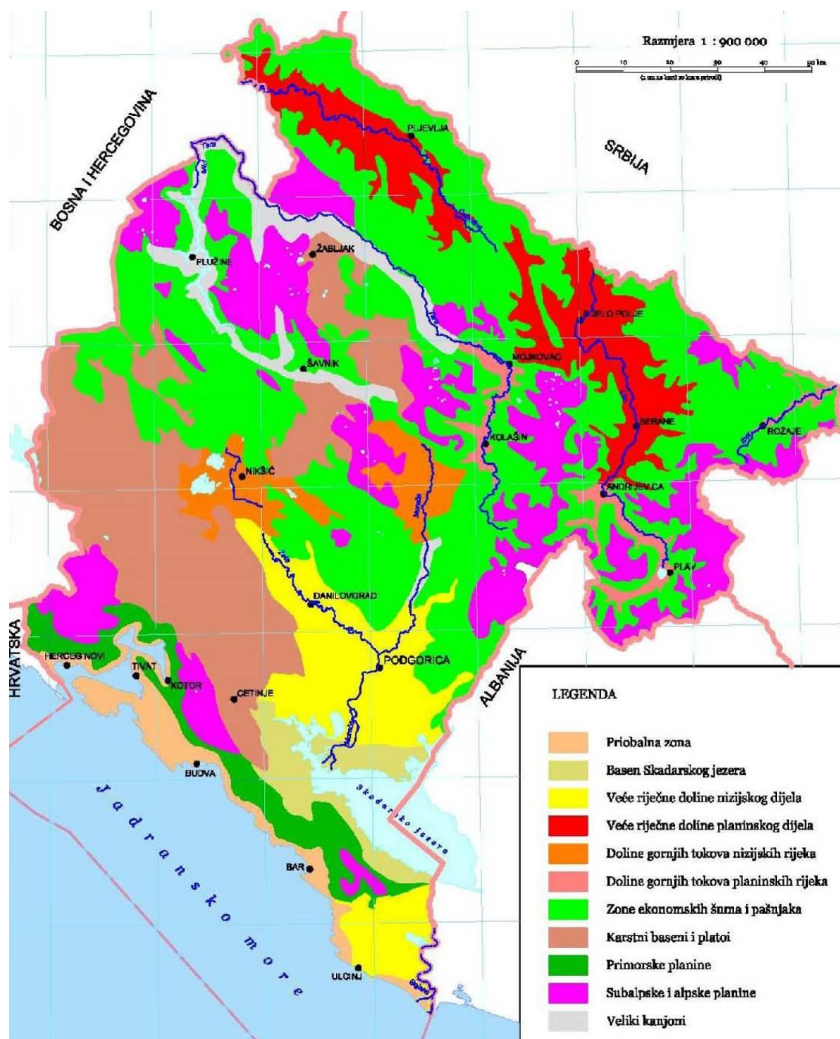


Figure 19 Ambient zones of Montenegro (Source: Spatial Plan of Montenegro (2008))

Hydrological network

Surface waters

The main hydrographic characteristic of Montenegro is the existence of two nearly equal watershed areas: the Black Sea basin and the Adriatic basin. 47.5% of Montenegrin territory belongs to the Adriatic basin and 52.5% to the Black Sea basin.

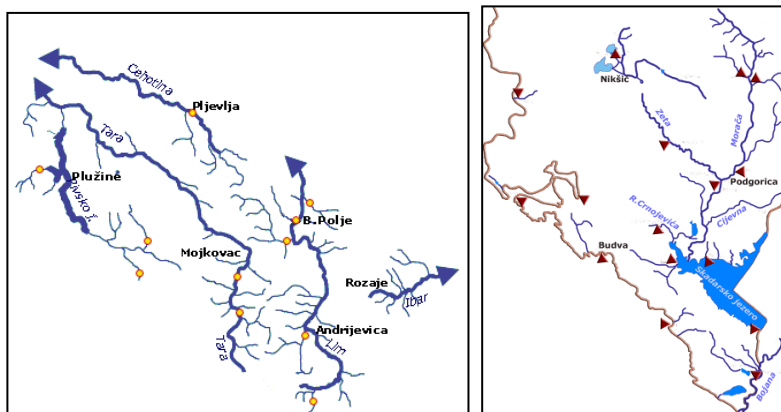


Figure 20 Black Sea and Adriatic Sea basin areas (Source: Institute of Hydrometeorology and Seismology of Montenegro)

The drainage divide between the two major watershed areas is located south of the highest mountain peaks and wreaths, which are situated in the Black Sea basin. Both watersheds are abundant with water. Most of Montenegro's surface area is build-up of karst without permanent watercourses, with numerous sinkholes where water is drained underground toward watercourses or the Adriatic Sea.

Major watercourses in the Black Sea watershed are: Piva, Tara, Čehotina, Lim as watercourses in Drina basin and Ibar in Zapadna Morava basin. Major rivers in the Adriatic Sea watershed are: Morača, Zeta, Rijeka Crnojevića and Cijevna, which all drain towards Lake Skadar, and from there waters are drained further by the Bojana river towards the Adriatic Sea.

Watercourses in continental karst are drained underground through sinkholes and they efflux in the Adriatic and Black Sea river basins or under surface of the Adriatic Sea in the coastal area. Part of these waters discharge underground toward neighbouring territories (Trebišnjica in Bosnia and Herzegovina and Konavle in Croatia). A large number of Montenegrin watercourses are of torrential character.

Lakes in Montenegro are relatively numerous, whereby the largest are located in the plains in the south of Montenegro.

Floods

In Montenegro the areas most threatened by floods are around Lake Skadar, in the downstream area of the Morača River, and along the Bojana River. In addition, large floods also occur in the Lim basin (Polimje) from Gusinje to Zaton, at Kolašin and Mojkovac, and in the valley of the Čehotina River at Plevlje. In significance, the damage caused to karst fields cannot be overlooked. In this respect, floods are most frequent on the plains of Cetinje and Nikšić.

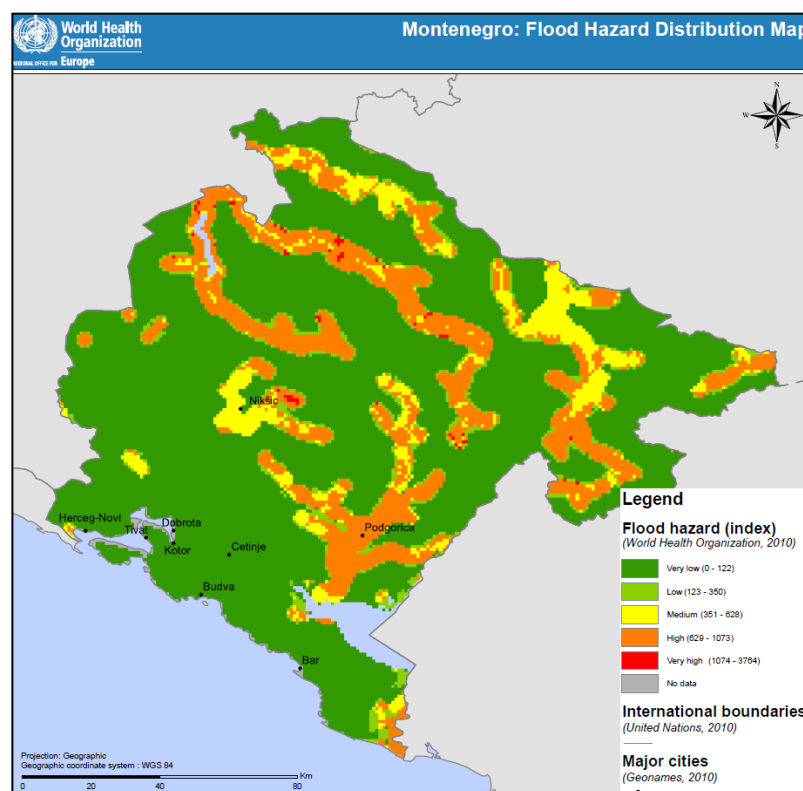


Figure 21 Flood hazard distribution map (Source: World Health Organization)

Virtually all Montenegrin rivers are torrential in character. This means that there exist significant differences in the flow rate, causing torrential waves and large accumulations of material. Torrential waves present a threat to settlements, traffic routes, agricultural, forest and other lands.

Ecological status of rivers

Due to the river water quality, the most polluted rivers are:

- *the Ćehotina River downstream of Pljevalje and Vežišnica.* Waste water is the main pollution source, due to which the river is classified as of “low” or “very low” quality.
- *the Morača River downstream of Podgorica.* The hydrological regime of this river is favourable and, therefore, the water quality has improved in comparison with previous years. However, an increased rate of ammonium and total coliforms has been noticed downstream of Podgorica.
- *the Ibar River downstream of Rožaja.* As regards the water quality downstream of Rožaj, close to Bać, the river does not belong even to the third class in view of its parameters, such as the content of ammonium, nitrites, phosphates, and total and faecal coliforms.

Other polluted rivers are:

- the Lim River. The water quality has been assessed as good in view of many parameters. However, the microbiological state of the river may be described as “poor” or “very poor” due to an increased concentration of faecal and total coliforms found downstream of Berane and Bijelo Polje;
- the Zeta River is of poor quality only when it comes to total coliforms, at the Suklov Most station (upstream of the discharge of wastewaters at Nikšić) and at Danilovgrad.

As to the saprobic composition, all rivers belong to the second class, except the Ćehotina River, which belongs to the third class downstream of Pljevlja.

Ecological status of lakes

Plav Lake and Black Lake (Crno jezero) enjoy of “high” and “good” water quality, with the exception of NH_4 and total coliforms, which belong to the class of “poor” quality.

Lakes Skadar and Plav are particularly threatened by discharges of polluted urban wastewaters, causing slow accumulation of nutrients in the ecosystem. In the northern part, Skadar Lake is protected by a wide belt of wetlands; nevertheless, increased eutrophication can be expected in the long run.

Groundwater

Generally, groundwater in the territory of Montenegro flow in two directions: to the south in the Adriatic Sea basin and to the north in the Black Sea basin. Simplifying the basic characteristics of major deposits of aquifer water at specific hydrogeological units, the following regions can be considered: littoral karst; Polje, plateau and high mountains; and karst of the inner Dinarides.

Primary water-bearing areas of interest to the public water supply of urban and major rural settlements, large industrial plants, as well as for irrigation of large surfaces, are represented with pebbles, gravel-sand and sandy deposits of the Quaternary – glacio-fluvial and alluvial sediments of inter-granular porosity, and carbonate rocks of the Late Palaeozoic, Mesozoic and Tertiary - limestone, dolomitic limestone and dolomite with fracture-cavernous porosity.

Permeable deluvial and glacial sands, gravel and larger blocks in places are spread on a small area with accumulations of groundwater, which are significant only for individual water supply, and are not included in the basic water-bearing areas.

Aquifers are spread on a small area with very limited accumulations of groundwater. The exceptions are broken karst in the Budva-Bar area of the Montenegrin coast.

Practically impermeable rocks act as a waterproof Shelf or Watertight side and hanging barrier, which have prevented or directed movement of groundwater from aquifers.

Accumulation of groundwater in some fault zones empty on numerous springs, which are used for water supply. Some springs in the coastal karst zone are saline.

Groundwater quality⁴⁰

Groundwater in Montenegro provides about 92% of total water supply. Overall, the quality of groundwater in Montenegro in natural conditions in most parts of the year (exception of coastal aquifers affected by saline intrusion) corresponds to the first class.

On the mainland, natural water quality at almost all sources of groundwater has been affected by the dominant anthropogenic influences as the result of inadequate sanitary protection and inadequate sanitation of the watershed area.

Water from Zeta valley aquifers belong to Class A, and water from some wells is used today for drinking without any treatment. Wells in Vranj and Drešaj are mostly contaminated and wells in Mitrovići (near Cijevne) and Farmacima are in the best condition.

Water from wells in Vranj has a constant very high concentration of nitrates. This is a result of the impact of fertilisers, as there is also high content of potassium (up to 30 mg/l).

Drinking water quality⁴¹

Most of the water intakes do not have legally prescribed sanitary protection zones, only the immediate sanitary protection zone. The distribution network of most of the city's water supply is very old. Disinfection of water is not carried out continuously in the whole of the city water supply system.

In most municipalities of Montenegro health safety of drinking water is at a satisfactory level, but special attention must be paid to sanitary protection zones.

Coastal waters (sea)

The coastal waters of Montenegro can be divided into the Bay of Kotor and the open sea. The Bay of Kotor delves into the mainland about 28 km. The bay is branched and bordered with steep mountains. Its surface area is about 90 km². Along the bay coast, particularly in Kotor-Morin-Risan part there are river estuaries as well as fresh water submarine springs.

The open coastline is relatively poorly indented with several bays, coves and with a small number of islands and cliffs. The largest part of the coastline is open and mostly exposed to the effects of the Mediterranean Sea. In addition, the littoral is exposed to the effect of large watercourses (river Bojana).

The open waters of south Adriatic Sea are characterized with greatest depths (depth of 1,230 m is registered southwest of Budva).

⁴⁰ Source: Report on the State of the Environment in 2013, the Agency for Environmental Protection, Podgorica, 2014.)

⁴¹ Ecoremediation Strategy in Montenegro with the Action Plan for the period 2014-2020, the Ministry of Sustainable Development and Tourism, 2014

Quality of coastal waters

In the coastal region, analyses of the state of the environment have revealed deterioration of bathing water quality on several locations in the Bay of Kotor and in the open sea areas of Ada Bojana, Velika Plaža, Mala Plaža, Port Milena, Sutomore and Bečići. At Boka Kotorska, eutrophication is evident in inner bays (blooming of phytoplankton in the Bays of Kotor and Risan), while the central bays (Tivat and Herceg Novi) are at risk. Along the open-sea coast there are indications of eutrophication, particularly at Plavi Horizonti and Buljarica, although much less evident than in the bay. Along the coastline there are indications of eutrophication but it is much less significant than the process in the Bay.

Air quality

In accordance with the Regulation on the establishment of a network of measuring points for monitoring air quality ("Official Gazette of Montenegro", 44/10 and 13/11), the territory of Montenegro is divided into three air quality zones (Table 14).

Table 14 Air quality zones of Montenegro

Air quality zone	Municipalities in the Zone
Air quality maintenance zone	Andrijevica, Budva, Danilovgrad, Herceg Novi, Kolašin, Kotor, Mojkovac, Plav, Plužine, Rožaje, Šavnik, Tivat, Ulcinj and Žabljak
Northern Zone where it is necessary to improve air quality	Berane, Bijelo Polje and Pljevlja
Southern Zone where it is necessary to improve air quality	Bar, Cetinje, Nikšić and Podgorica

Air quality is mainly affected by industrial activity and emissions resulting from the combustion of fuels in large and small furnaces, and internal combustion engines. In addition to emissions, concentrations of air pollutants depend on geographic and climatic characteristics. This is mostly reflected on the concentration of PM particles, which is the biggest problem for the air quality in Montenegro, especially in Pljevlja and Nikšić. High concentrations and a large number of exceeded permitted daily mean concentrations are most pronounced during the heating season, mainly due to the use of solid fuels (coal and wood). The air quality assessed in terms of the concentration of SO₂, NO₂ and O₃ is within the prescribed threshold limit value, with no major concentration variations on an annual basis.

Soils

Montenegro is a relatively small county, but is nevertheless characterized by a great diversity of geomorphological phenomena. Over **40%** of the country is situated on altitudes higher than 1,000 metres, and approximately **15%** on altitudes higher than 1,500 metres.

The most important soil types in Montenegro are: Eutric Cambisols on limestone and Dystric Cambisols - Dystric Leptosols in the northern and middle part of the country, Fluvisols, Ferralic Cambisols and Stagnic Fluvisols - Mollic (Vertic) Gleysols in South-Eastern, Lithic Leptosols - Dystric Cambisols in South-western and Ferralic Cambisols and Lithic Leptosols in the coastal part⁴².

Main environmental challenges regarding soil protection and enhancement in Montenegro are connected to rural depopulation and deterioration of abandoned farms,

⁴² Protić, N., Martinović, Lj., Miličić, B., Stevanović, D., Mojasević, M. (2005): The Status of Soil Surveys in Serbia and Montenegro, European Soil Bureau, Research Report No. 9, p. 299

poor infrastructure, holding size and land tenure, insufficient investments in rural development and improvement of agricultural production, poorly regulated market and weak links between primary production and the processing industry⁴³.

8. Outline of alternatives

As indicated in the *Note on the implications of draft 4 (May, 2015) of the NCCS for the findings of the scoping phase*, and due to the nature of the NCCS, it was considered that it was not relevant for the SEA to identify strategic level alternatives. Instead, the SEA considers available lower-level alternatives (sub-options) to optimise the NCCS's environmental performance and provide recommendations for further steps in decision-making or implementation of the proposals contained in the NCCS. These are elaborated upon under each key issue discussed below.

9. Analysis of impacts and opportunities

9.1 Key issue 1: Potential impacts associated to TPP Pljevlja

Context

Although the commissioning of TPP Pljevlja II is not indicated as part of the NCCS Action Plan, it is referred to in Chapter 5 as part of the WEM and WAM scenarios and thus considered an integral component of the scope of the NCCS. In reality such action will be undertaken under the EDS. Some of the main recommendations of the EDS regarding TPPs are to complete the reconstruction and revitalization of existing TPP Pljevlja I, to ensure sufficient quality of data for making investment decisions regarding the construction of the power plant and expansion of the coal mine's capacities for the needs of TPP Pljevlja I and TPP Pljevlja II, but also to construct TPP Pljevlja II (with possible extraction of heat to satisfy the heating requirements of the town of Pljevlja).

The EDS envisions the development of the district heating system for Pljevlja town as a slow developing project that would last about 20-25 years. The first phase would be a biomass fired district heating system using existing boilers on biomass in the woodworking industry facility Vektre Jakić, while the long-term solution would be co-generation in the second block of TPP Pljevlja II. According to information obtained during consultation the first phase is not considered an option anymore due to various reasons, so the co-generation is the only option remaining. The EDS recommends the development of a study on the heating system for Pljevlja (to supply about 70% of the population) and to develop the heating system of Pljevlja in case of construction of TPP Pljevlja II using co-generation for this block.

Under the 'existing measures' scenario, the NCCS addresses two situation regarding TPP Pljevlja:

- Existing (and only one) TPP Pljevlja I—limited operating hours (20,000 working hours) in the time horizon 2018-2023⁴⁴, and operation at half capacity from 2024 onwards, after investing in the plant to meet the emission limit values set out in Part 2 of Annex V to Directive 2010/75/EU.
- TPP Pljevlja II - commissioning in 2020.

⁴³ Ibid, p. 23

⁴⁴ According to EnC Ministerial Decision D/2013/05/MC-EnC of 24 October 2013: On the implementation of Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants.

As 'additional measures' the NCCS foresees retirement of the coal plant (TPP Pljevlja I - out-dated and polluting, which in 2023 will be 43 years old) and participation in the EU-ETS (considered "cap-and-trade", starting from 2020 onward for both TPPs, according to the reformed EU-ETS rules for 2021-2030, with a goal of a declining 2.2% cap).

In the sensitivity analysis for energy and energy industries sectors, the NCCS notes *TPP Pljevlja as the only source of GHG emissions in the energy industry sector of Montenegro. It is characterised by constant yearly electricity production over the years, and its production does not depend on the GDP growth rate. According to the present situation, it is expected that the plant will operate at full capacity until 2018, when it starts to operate under the following regime: 5000 working hours during 2019 and 2020, and 2500 working hours from 2021-2023. Thereafter, what will happen to the plant is uncertain, and three possibilities arise:*

- *The plant will operate with half capacity until 2030 – included within the WEM scenario as the recommendation of the EDS;*
- *The plant will be closed because of low financial feasibility of investing in the technology for the treatment of flue gases necessary for obtaining the operation permit – Sensitivity scenario 1 (the same as WAM);*
- *The plant will operate at full capacity until 2030 after investment in the technology for treatment of flue gases in order to fulfil the requirements required for the operation permit – Sensitivity scenario 2⁴⁵.*

The total GHG emission in 2030 according to Sensitivity scenario 2 is greater than the total GHG emission in the same year according to the WEM scenario by 31.6%, and almost double of the total GHG emission in 2030 according to the WAM scenario.

Under additional measures, the NCCS also promotes an increase in the share of supply in total energy needs for space heating from district heating systems.

Potential impacts and opportunities

The first unit of TPP Pljevlja was built as a condensing TPP of 210 MW and was put into operation in 1982. The TPP was working with reduced power generation of 170-190 MW around 1,000 GWh until its reconstruction. After the reconstruction of the turbines in 2009, its new installed capacity was 218.5 MW. The TPP burns coal from Pljevlja coal mine and consumes about 1.35 million tons of coal per year.

Due to the Decision on construction, it was planned to build the second block, but this did not happen, although during the construction of block I over 30% of common facilities and infrastructure had been finalised. The lifespan of TPP Pljevlja I was planned to reach 25 years. However, its operational life has been extended to 2025 after an environmental and technological modernization of the existing TPP Pljevlja I in 2009 and 2010.

Two main environmental concerns regarding TPP Pljevlja are water pollution of River Vežišnica, caused by discharge of untreated wastewater and air pollution from stack emissions of CO₂, CO, SO₂, NO_x, PM₁₀, PM_{2.5}, etc. In addition to the stack emissions, TPP Pljevlja indirectly affects air quality through the emission of water vapour from the cooling towers, which contributes to the suspended particles that are retained in the lower atmosphere. This indirect impact should not be neglected even if the particles consist of non-polluting materials, as these particles significantly contribute to the frequency of fog.

⁴⁵ In compliance with the Industrial Emissions Directive (2010/75/EU)

During the past few years, air quality monitoring was established on a few locations in Pljevlja. The main cause of the high levels of pollution in Pljevlja were found to be suspended dust particles of PM₁₀ and PM_{2.5} primarily from the coal mine, but also from individual boiler furnaces (5,000 in Pljevlja town and its near surrounding area), and dispersal of dust from transport vehicles, as well as dispersal of dust from the existing Maljevac landfill. The results were shown in the Air Quality Plan for Pljevlja Municipality⁴⁶ and in accordance to the results mitigation measures were prescribed. These include modernization of the existing TPP Pljevlja, in line with the adopted legislation to extend the operation of the existing block to 2025, in order to reduce levels of air pollution and other environmental segments to prescribed limits. Namely, it is necessary to carry out a complete environmental remediation of the first block of the power plant in accordance with the adopted environmental protection programme for TPP Pljevlja (e.g. collection and treatment of wastewater, modernization in transport of slag and ash disposal at the new location, design of the new ash and slag dumps and rehabilitation of the existing Maljevac landfill). All of these actions are covered by the Detailed Spatial Plan for TPP 2nd block (DSP TPP 2nd block). An SEA for the DSP TPP 2nd block was prepared (Draft for Public Consultation, 2015), which includes a very comprehensive and detailed analysis of the current state of air quality, including air dispersion modeling. The SEA results confirmed that TPP Pljevlja is not the dominant source of pollution in the Municipality of Pljevlja, but that other point-sources and non-point-sources substantially contribute to the pollution of the area. Given the size of the TPP Pljevlja stack (250 m) and the pollution distribution and transport model it is expected that the impact of emissions from the stack should be felt at greater distances. Key sources of pollution in the Pljevlja area are identified by determining the percentage share of total emissions, and taking into account those sources whose cumulative contribution amounted to 80% of total emissions. Summing up the results from an analysis of key emission sources it was concluded that the key sources of air pollution in Pljevlja are:

- The coal mine:
 - exploitation in the context of NO_x, PM₁₀ and PM_{2.5} emissions
 - handling and transportation in the context of PM₁₀ and PM_{2.5} emissions
- Heating in household and services sectors in terms of SO₂, PM₁₀, PM_{2.5} and benzo(a)pyrene emissions
- Transport vehicles in terms of NO_x emissions.

The NCCS considers the commissioning of TPP 2nd block as a mitigation measure in order to reduce GHG emissions. This could be reached by using BAT technologies (fluidized bed combustion (FBC)) which provides greater energy efficiency (40%) and includes desulphurization (94%), de-nitrification (SNCR plant- NO_x <150 mg/Nm³) and dust removal efficiency. The TPP 2nd block also includes other systems that will improve the environmental conditions in the surrounding area by methods such as recirculation and purification of water in the technological process, and its reuse, where this is possible and practical. In this way, there would be a closed water circuit within TPP 2nd block without discharge of wastewater, except the water from the removal of sludge from the cooling system, the quality of which is not disputed, and meets the requirements for discharge into watercourses. The SEA for DSP TPP 2nd block considers all these issues and presents mitigation measures. The next phase will be an EIA for the project level and mitigation measures should be more specific and detailed.

⁴⁶ Should be in compliance with Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

The TPP 2nd block project envisages construction of thermal stations (with nominal power of 75 MW) to ensure thermal energy for district heating of the city of Pljevlja. The co-generation system would have a positive impact on air quality in the Pljevlja area due to:

- Elimination of local emissions from a large number of scattered, smaller sources (as the current situation with 5,000 individual boiler furnaces is one of the main reasons of decreased air quality); and, possibly,
- improvement of microclimatic conditions during the heating season by recovering and leveraging the heat that would otherwise be wasted in power production, and therefore decreasing the amount of water vapour emitted from the cooling towers.

Thus, the source for the district heating system is going to be ensured in TPP 2nd block area by the investor, but the obstacles that could occur in developing the district heating system are:

- The fact that the heat distribution network in the Pljevlja area is not developed and, according to the EDS, it should be developed and financed by the local community. During the consultation process information was obtained that the local community is planning to use IPA Funds for financing this project.
- The preparation of project documentation is still incipient. The main design for the distribution network is old (from the 1990s) and was based on a former population projection (the number of inhabitants has reduced by 22% in 2011 in relation to 1991).
- The costs and thus willingness of people to switch from coal to a central heating system. By now, a detailed financial analysis has not been carried out and the opinions obtained during the consultation process are divided.

Local authorities should start to take certain steps as soon as possible to speed up the preparation of project documentation for the construction of the heat distribution network, because it is only by solving the district heating in the area of the town of Pljevlja that there can be a positive impact on air quality.

The other concern is related to air quality in the period of time when both blocks may work simultaneously. The SEA for the DSP TPP 2nd block made a mathematical model for three possible scenarios:

- Current situation: polluting emissions substances in quantities as in 2010 and 2011 from TPP block I (up to 2017);
- TPP block I after remediation + TPP 2nd block (2018-2025);
- TPP 2nd block (after 2025).

The mathematical pollutant dispersion model in the case of simultaneous operation of the repaired block I and the new TPP 2nd block indicates that the expected concentrations in the ambient air are much lower as a result of the reduction of the total emissions from the TPP. After 2025, when only the new TPP 2nd block will be working, an additional reduction of SO₂, NO_x and particulate matter ambient air concentrations is expected. The contribution of TPP 2nd block will not worsen the level of environmental pollution during the simultaneous operation only in case that emissions from the TPP block I are reduced.

According to these conclusions it is important that the NCCS ensures that the period of simultaneous operation is as short as possible, and that it is only a temporary solution for the purpose of satisfying energy needs.

9.2 Key issue 2: Potential impacts associated with HPP Morača

Context

That NCCS notes hydropower potential for reduction of greenhouse gases in Montenegro and makes several direct and indirect references related to future promotion of hydropower generation in the country. The proposals themselves are not specific, they however warrant special attention given possible environmental impacts and risks associated to the planning of hydropower development in Montenegro.

In its overview of the main technologies, emission reduction potentials and costs (Table 28, p. 222) the NCCS notes significant potential of especially large hydropower plans – see the excerpts from Table 28 presented below.

Table 15 TNA Overview of the main technologies, emission reduction potentials and costs

Subsector/Technology	Objective	Mitigation Potential MtCO ₂ /25yr	Estimated Total Cost M€/25yr
SUB - SECTOR: ENERGY SUPPLY			
Small	420 GWh/yr (92 MW installed capacity); 10-15% of total supply	11.05	230
Large hydropower plants	487 MW	64.66	1,400
Solar Photovoltaic Panel	50 MW	0.60	200
Solar Thermal Plants	50 MW	0.96	250
Plasma Gasification	70 MW	2.83	1,200

The NCCS itself - in its Action Plan (Table 51, p. 388) under item 6 - foresees 30% increase in wind and hydropower generation, along with several biomass energy demonstration facilities. Since there are currently no plans for either serious wind power or biomass energy generation, our assessment assumes that most of the energy generated should come from large hydropower plants.

This would also correspond with NCCS reference to Montenegro's EDS, which foresees construction of several new large hydropower plants, including a system of several successive reservoirs on the Morača River. In the following section we will therefore deal with the possible environmental implications of this proposal.

Issue presentation

The EDS proposes generation of hydropower on Morača River. The consideration of environmental impacts of this proposal made within the SEA of the EDS (undertaken in February 2014) appear limited as it focused primarily on a possible Morača cascade with four HPPs and did not assess other possible alternatives. This SEA concluded that high adverse impacts might arise with regard to biodiversity, cultural heritage, infrastructure and landscape. Due to lack of data on biodiversity, it was recommended to undertake a detailed investigation of biodiversity before development of the proposed HPPs.

The SEA for the EDS did take into account the possible impact on changes in microclimatic conditions, but did not adequately consider impacts of climate change on the future water regime. Climatic changes over the coming century are likely to include higher temperatures, lower precipitation, and a greater risk of floods, droughts, heat waves and forest fires. According to the model predictions, during the 2071-2100 period, the flow of the Morača River through Podgorica will be reduced by 31% compared to the climatic normal for the 1961-1990 period, possibly compromising

hydropower production at this location. During the consultation phase of this (NCCS) SEA, it was found out that this model was made only on a general level; the real model cannot be quantified because of limited availability of input data. Whereas some changes in water availability could occur, the important factors are hydro-meteorological extremes - higher rainfall intensities in one period and prolonged waterless periods.

Furthermore, Montenegro belongs to a region that is particularly prone to natural hazards. The Morača dams lies within Seismic Zone VIII and the risk of higher earthquake magnitude rises in a southerly direction downstream where some of the reservoirs are planned. The seismic risks need to be considered due to the fact that Podgorica is located downstream of the reservoirs.

The SEA recommends mainly general project level mitigation measures for proposed HPPs with the cascade and does not give any recommendations for the consideration of additional alternatives that could have lower impacts on the environment.

Based on the EDS, the Government of Montenegro has in 2010 formally proposed a Detailed Spatial Plan for four multipurpose accumulations on the Morača River (DSP), which proposes a cascade of four dams with associated hydropower generating plants – see Figure 22 below. The largest most upstream regulating reservoir was proposed at Andrijevo and it would feed progressively downstream to the run of river HPPs of Raslovici, Milunovici and Zlatica. The overall installed capacity of the scheme would be 238.4 MW with an estimated generation of about 700 GWh/year. Associated with the DSP are a further 11 reservoirs in the upper catchment area that can have further potential for small-scale hydropower generation. These upper catchment reservoirs were only developed to a preliminary level and no formal decisions were proposed regarding their construction.



Figure 22 Outline Map of the DSP Area, Source: COWI (2010)

The DSP – because of its likely significant impacts on the environment – has been subject to an SEA process, which has been supported by the Norwegian Water

Resources and Energy Directorate. The SEA has been conducted by COWI consortium⁴⁷ and was subject to consultations with the relevant authorities and the public, and to a review by the MSDT in 2010. Because of the significance of possible risks associated with the DSP, the entire SEA process was stopped in late 2010 and the DSP has been formally withdrawn from decision-making.

The proposed hydropower cascade on Morača River has thus been subject to two contradictory decisions. On one hand, it has been approved through the EDS when only general impacts of the proposal were considered. On the other hand, the detailed proposal for the cascade presented through the DSP for Four Multipurpose Accumulations on the Morača River has allowed a more systematic – but yet not really entirely rigorous (as it may become clear from our comments below) – assessment through its dedicated SEA process, and been withdrawn from decision-making.

Given the stoppage of SEA for the DSP process, it is now uncertain what is the status of decision-making on the cascade. The overall proposal for generating hydropower on Morača River is again proposed in the NCCS, so it needs to be addressed again.

Potential impacts and opportunities

The SEA for the DSP has focused on primary risk factors in:

- The immediate area of the Detailed Development Zones;
- The entire area downstream of the HPPs;
- The Skadar Lake area.

Predicted impacts were related to: biodiversity, hydrology, water quality, cultural heritage, geology/hydrogeology and landscape. The text below presents the main summary conclusions of the SEA Report (COWI, 2010) related to these matters:

Biodiversity

There is high biodiversity within the Morača River valley and its tributaries (especially Mrtvica and Mala Rijeka) as well as in Skadar Lake. The DSP is likely to have an effect on endemic species and, due to the international importance of Skadar Lake, consultation on potential threats and acceptable levels of biodiversity loss have to be conducted in compliance with EU legislation (SEA, EIA, Habitats⁴⁸ and Birds⁴⁹ Directives) and international standards and agreements (i.e. Ramsar and Espoo conventions) during the preparatory phase in order that any necessary mitigation measures can be included in the tender/final design.

Changes in lake level could impact upon the life cycle of fish and migratory bird nesting and further research needs to be undertaken on this subject prior to design approval.

It is very important to include provision for fish ladders within the 3 lower dams of the Morača River to allow fish migration and if possible also for Andrijevo dam. Provision for such installations should be included in the future tender documents for dam

⁴⁷ Information in this summary is largely taken from: COWI (2010) Strategic Environmental Impact Assessment for Detailed Spatial Plan for Hydro Power Projects (HPPs) on the Morača River. Updated Draft Final Report Following Public Debate, December 2010.

⁴⁸ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

⁴⁹ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds

construction. For Andrijevo dam, the latest developments in methods and techniques for fish migration through large dams should be followed closely during the entire project-planning phase and if any of them are feasible they should be integrated into the design.

Fluctuations in inflow of water into Skadar Lake has to be ascertained in order to preserve the wetland habitats and their ecological functions and hence this analysis needs to be undertaken during the more detailed EIA.

The assessment of biodiversity issues was based on data that were available for the SEA project area. However, data on biodiversity in the SEA project area were not reliable and were difficult to use for the assessment. Due to that fact it was recommended that a study on biodiversity protection in the project area should be produced with the purpose of providing the database necessary for producing environmental impact studies for each individual HPP, as well as other infrastructural and construction interventions, including obligatory conservation measures for endangered habitats and species.

Water Quality

Lake Skadar nutrient levels and algae conditions are of medium levels. However, the nutrient inputs to the lake are high and eutrophication could occur if it was not for the large through-flow of water. In addition, other factors may be important, including high sediment inputs during spring, which increase turbidity and therefore also the light conditions in the lake water, inhibiting algae growth in the first part of the summer.

In the summertime, the water quality of the Morača River may improve due to the proposed regulation, since the increased water flow will dilute pollutants. Similarly, in Lake Skadar, the through flow of the lake may increase in the critical growing season and this may reduce the risk of algae blooms.

Other types of pollution in this catchment area include heavy metals and toxic substances from industry, and are not believed to be either improved or worsened by the planned HPPs, the water from the Morača River catchment in the area of the DSP being of excellent quality.

Hydrology

The Upper Morača, where the hydropower plants are planned, contributes to about 32% of the total flow in Morača River and 21 % of the total flow into Skadar Lake.

The combined volume of all four reservoirs is about 340 Mm³, which is less than half the volume of water passing by the hydrological station in Pernica (near Andrijevo).

It will be important to maintain an ecological flow⁵⁰ in the river.

Annual variations in riverine water discharges are rather large, with high water discharges during winter and low in summer. Similarly water levels in Skadar Lake vary considerably, and this sustains a wetland area of about 150 km².

It is likely that the flow in the Bojana and Drim River systems is more important to the water level fluctuations in Skadar Lake than the flow in Morača River, but the latter flow is nevertheless important.

A better understanding of the hydrology of the entire water system needs to be known prior to construction of the dams. All data should be made available by relevant authorities with no exception. This hydrological research needs to be done in order to

assess the importance of the different inflow systems (tributaries, groundwater, outlet river) on the lake water levels. This information will then be incorporated in the EIA, which needs to be undertaken at the time of the detailed design.

If the investor/concessionaire will operate the dams with daily peaking (low flow during nights and high flows during daytime), higher stress on the river biology can be expected. Limitations on such practices should be assessed once more detailed information on operational routines has been provided and included in the EIA.

Reduced flow in winter may help decrease the highest floods and therefore alleviate risk of damage.

Siltation in the reservoirs is expected to reduce sediment transport downstream; this can have both positive and negative impacts and should be assessed during the more detailed EIA.

Climate Change

Although not conclusive, climate change analyses indicates that temperatures may have risen slightly (by less than 0.5°C) in the last 10-15 years; however changes in rainfall (either a reduction or increase) are not conclusive. Modelling recently performed by IHSM has indicated slight changes in microclimate regarding temperature and relative humidity in the vicinity of the reservoirs. Longer-term climate change predictions are more dramatic, with a rise in temperatures of between 2 and 5°C forecast over the next 100 years and with a substantial reduction in rainfall, depending on which scenario is selected.

Landscape

The resulting reservoirs (especially Andrijevo and Zlatica) will have the greatest effect on landscape. A landscape and visual impact assessment has been carried out and with the exception of Andrijevo, visual impacts of the dams are not considered to be significant and the resulting reservoirs could improve the landscape and amenity value of the area.

The assessment results were not concluded with clear recommendations for decision-making, but only with an overview of possible advantages and disadvantages of the DSP proposal.

Figure 23 Summary of Advantages and Disadvantages of the 4 HPPs

Topic	4HPPs OPTION	
	Advantages	Disadvantages
Economic Factors	<ul style="list-style-type: none"> • Current state of KAP semi-closure could eliminate electricity deficit, hence providing more power for export. • Would provide substantial income from power export. • Would reduce foreign exchange deficit. • Would reduce current power deficit. • Improve geo-political status in the region. • Stimulate industrial production and other business opportunities. • Stimulate the local economy. • More opportunities for tourism/amenities. • A strategic water supply is secured which will become increasingly important due to climate change. • Improved transport links. • Opportunities for investment. • Could provide catalyst for improved energy efficiency measures. 	<ul style="list-style-type: none"> • Compensation issues will be problematic. • Increased production will lead to increased demand on services.

Social Factors	<ul style="list-style-type: none"> • Provide short-term and long-term employment opportunities. • Affected people will be properly compensated in terms of land and financial contributions. • Reverse decline in migration. • Improved health care opportunities. • Improved well-being due to improved economy of the area. • Opportunity for improved education. • Potential improvement in fabric of society. 	<ul style="list-style-type: none"> • Stress from fear of living below dams. • Disturbance during construction. • Loss of traditional lifestyles. • Loss of land and housing. • Inundation of graves implies relocation. • Increased demand on existing social services due to worker influx.
Environmental Factors	<ul style="list-style-type: none"> • All reservoirs would provide new habitats for wildlife. • New landscape of lakes created. • Contribution of clean energy. • Morača Monastery and the plateau it overlays will be properly maintained and preserved for the future. • Opportunities for increase in archaeological knowledge due to necessary surveys. • Opportunity to learn more about the flora and fauna of the area due to necessary surveys. • Some downstream benefits from flow regulation such as reduced risks from floods and improved water quality (during summer). • Possible improvements to environment for tourism (water quality). • Improved water supply for irrigation practices in summertime. 	<ul style="list-style-type: none"> • Change in overall flow regime affects flora and fauna downstream as well as upstream (reservoirs acquire lake-like characteristics). • Conservation status of Skadar Lake as a site of international importance (Ramsar site, IPA) can be threatened due to decline/loss of endemic species and habitats for migratory birds. • Daily peaking can affect flora and fauna downstream. • Threat of landslides (Djurdjevine). • Changes to microclimate may affect cultural heritage. • Loss of landscape (especially historical landscape of Morača Monastery). • Loss of locally important bridges (Danilov and Kaludjer- ski).

COWI's general conclusion is that: *'The DSP for 4 HPPs on the Morača River will provide beneficial effects to the whole of Montenegro, through provision of hydropower and by reducing import dependence. Opportunities exist for stimulating the local area and reversing the population decline that has been recently experienced in the region. However, the DSP could also provide some adverse effects mostly to the rare flora and fauna within the region, the extent of which cannot be fully assessed, due to the poor availability of data; hence further research is needed prior to commencement of construction activities.'*

Analysis

This SEA, which investigates a broad range of impacts associated with the NCCS, did not have resources to analyse the detailed impact of the DSP proposal – we are nevertheless surprised with a contradiction between the significance of the risks identified and rather positive conclusion of the SEA process. Actually, some concluding statements in the SEA Report are not convincingly justified and supported by facts and data presented in the SEA report.

Besides the impacts identified, the COWI SEA Report focuses solely on the evaluation of 4 HPPs constituting the core part of the DSP, while omitting to address possible impacts of associated activities indicated in the DSP. There is a lack of clarity in the description of the content of DSP and especially in the specification of the very subject of the SEA. It is obvious from the SEA Report that the DSP includes not only 4 HPPs, but also other proposals – especially 11 upper catchment water reservoirs, tourism development, transport and energy infrastructure, waste management relevant infrastructure etc. It can be stated that implementation of these development activities will significantly affect environmental, social and economic issues – but these impacts are not properly analysed in the SEA Report.

Other concerns relate to:

- Montenegro lacks an overarching strategy for water resources management, which would be in compliance with the EU Water Policy. The draft amendments to the Law on Water recognize the need for a national water management strategy. The 2001 Water Master Plan for the whole country was adopted for the 2001–2011 period and is still applied. HPPs are in accordance with it. However, due to growing water needs for different sectors (energy, agriculture, water supply) and evident climate changes impacts on water resources, the pressures on the watercourses is growing and therefore there is a need to prepare new river basin management plans for the Adriatic and the Black Sea river basin districts, as well as a new water master plan for the whole country. Significant efforts are needed to align national “water legislation” with the EU *acquis* and to implement it. Monitoring networks, river basin and flood risk management plans are still in their infancy.
- A water information system, which would include data about water use and planning, is not yet developed. However, it is planned to develop it through the IPA 2014-2020 Programme. The water information system is essential for good and sustainable water resources management.
- The SEA for DSP HPP Morača recognises that the dams at Morača River are situated in Seismic Zones VII and VIII and the risk of earthquakes with larger magnitudes increases in a southerly direction downstream; as well, there is a zone of potential landslides near Đudevina in the area of Andrijevo. The mitigation measures indicated in that SEA are oriented to ensure adequate investigations. Due to the high probability of accidents it should be emphasised that, in case the project is carried out, landslide remediation should be done before construction.

Alternatives and mitigation measures to be considered

The SEA for DSP HPP Morača gave just a brief review of the 250 masl option (the height of the Andrijevo dam is reduced to 250 masl, all other three dams remain the same with the possibility of introducing another two upstream reservoirs, Grlo and Dubravica).

Our consultations with relevant stakeholder conducted as part of the SEA for the NCCS have revealed that, given the range of environmental risks associated with the proposed four HPPs, there are also other options for the HP cascade. These include an alternative that assumes only 2 cascades: Andrijevo and Zlatica- 2 cascades in the canyon being replaced by a hydro-technical tunnel between Andrijevo and Zlatica.

The SEA of the NCCS has not been able to obtain information on the detailed design of these new HPPs, and hence cannot comment on their possible environmental risks. It is however clear that even these proposals may cause some potential significant impacts, such as: geological risk, draining the canyon due to redirecting water to the hydro-technical tunnel and thus adverse impact on biodiversity, ground water regimes, etc.

Conclusions

Considering the ecological importance of the Morača River and Skadar Lake, possible risks of the hydropower cascade and the fact that DSP proposal has been withdrawn from decision-making after review of its accompanying SEA, we suggest to treat the generic proposal for development of hydropower (assuming it deals with the potential HP cascade on Morača River) made at the NCCS with a great degree of caution.

9.3 Key issue 3: Opportunities associated to solar power production

Context

As part of ‘existing measures’ the NCCS considers development of solar energy in the household and services sectors. It also notes that a small amount of solar energy could be included as a measure to substitute coal and LPG used for heat generation in the

industry sector. The NCCS recognizes that the feasibility of this approach is not very realistic.

Under point 7 of Action Plan, the NCCS foresees a 20% increase in micro-generation such as solar PV systems and solar hot water systems for residential use. Industrial 20% substitution of coal and LPG fuel with solar thermal and traditional biomass is not specified.

The EDS envisages the construction of a certain number of solar PV plants, but at the same time it states that a more significant share of solar energy in the energy balance cannot be expected. Therefore, introduction of photovoltaic systems in the EDS is identified as an affirmative approach. Dynamics and expected annual electricity generation from solar PV power plants is planned to reach 16.5 GWh (about 10 MW of peak power) by 2020, and 52 GWh by 2030 (30 MW of peak power).

The by-laws on electricity generated from RES allow for the establishment of a “feed-in tariff” for electricity produced from PV systems that are installed on buildings or other structures. The EDS sees that mechanism as one that could encourage final consumers of electricity, especially in the construction sector to install small generation systems and deliver electricity to the network. However, up till now not one project has been completed. Some of the reasons are that it is difficult to get loans to cover the initial investment costs and also because the current system encourages solar power to be used only within the respective facilities but does not facilitate selling of the power to the grid.

Given the number of sunny days in Montenegro, the EDS allows for the possibility that, if there is interest of the investors for production of electricity from large PV plants, but without obligation of guaranteed purchase of electricity under feed-in tariffs, the construction of such plants in accordance with available spatial and power constraints and preconditions will be enabled. The produced electricity can be exported and can be used to achieve the national target for RES in the importing country in accordance with Directive 2009/28/EC on RES.

Up to now, only the Capital, Podgorica and the Municipality of Budva require in their spatial plans for new buildings to have solar panels. The city of Podgorica also identified areas for the construction of solar plants outside the built area.

Unlike the projects related to the installation of PV systems and distribution of electricity in the energy system, which so far has not been successful, much more has been done in the area of installation of solar collectors and the use of solar energy for heating. Some of these projects are:

- The ME in cooperation with partners - United Nations Environment Program (UNEP) and the Italian Ministry of Environment, Land and Sea - has implemented the MONTESOL project, which aims to establish an attractive and sustainable financial mechanism for obtaining loans for household installed solar collectors. Project objectives for MONTESOL refer to the following: significant economic and energy savings, loans to install solar systems at a 0% interest rate, ensuring the participation of financial institutions with reduced risk when entering a new segment of the market, creating a market for solar energy and contribution to lower emissions.
- “Solar energy in the tourism sector of Montenegro” (SOL THERM) is a project implemented by the Montenegro centre for energy efficiency (MCEE). The project is promoted by a donation of the *Deutsche Gesellschaft für International Zusammenarbeit* (GIZ) provided by the Government of the Federal Republic of Germany. The project aims to improve the information base for investment in the tourism sector for solar thermal installations, and through this activity, to encourage investments to save energy and avoid the emission of greenhouse gases.

One of the conclusions of the project is that, *“Based on the available capacity of the hotel sector, the average energy needs for hot water in the hotel sector can be predicted to 50.6*

GWh per annum, calculated on the basis of standard hot water consumption of 100 l/day/person. If the total of these energy needs for DHW (domestic hot water) is 70% provided by solar collectors, annual production would amount to 35 GWh/year of thermal energy, which would largely reduce the energy deficit by 30% during summer and replace electricity consumption, partly also in fuel oil used for the heating of hot water, as well as allowing reduction of carbon dioxide emissions by 0.2 million tons per year."

Potential impacts and opportunities

Although the NCCS identifies the use of solar energy as a climate change mitigation measure, and some demonstration projects and efforts already took place, it is obvious that more specific mechanisms should be promoted to enhance the positive impacts and success in the promotion of solar power. Since the already started activities are related to residential and service use, emphasis should be put on those sectors, and preparations to create institutional and other preconditions for the industrial sector should commence. The obstacles that could occur during implementation are related mainly to cost and therefore willingness of the population to install such facilities:

- Despite that a "feed-in tariff" mechanism is in place and some projects promoting financial mechanisms for obtaining loans for installing household solar collectors are in place, these have not been very successful. The main reason that came out during the consultation process is that maintenance costs are still high;
- In addition to the above, the power grid is still insufficient so investors would also need to finance the infrastructure to connect to the power grid.

Potential impacts on habitats and biodiversity could be expected in case of construction of PV power plants on un-built areas. Since the "feed-in tariffs" are foreseen only for PV systems that are installed on buildings or other structures, it is assumed that such cases will be prioritized. To avoid creating unnecessary occupation of un-built areas it is necessary to firstly and primarily encourage maximum usage of roofs, buildings and already built areas. Only when that use is optimized, it should be followed by take-up of new and un-built areas. Through the development of local energy plans and spatial plans, in addition to parameters such as the global solar radiation, distance from energy networks and public roads, orientation and slope of the terrain, it is necessary to also take into account environmental criteria⁵¹, including natural and cultural values, especially rare, endangered and protected habitat types and biodiversity.

9.4 Key issue 4: Opportunities associated to biomass energy production

Context

Up until now biomass was not used for electricity generation in Montenegro. The NCCS, in its Action plan under item 6, foresees several biomass energy demonstration facilities. That is also in accordance with the EDS, which assumes a rather moderate scenario of construction of biomass power plants.

Under 'existing measures' the NCCS assumes a gradual introduction of modern biomass and natural gas as a replacement of fuel oil in cogeneration systems, where heat is necessary for industrial process. The amount of cogeneration heat is planned to be 20% of all heat used in the manufacturing sector at the end of the planned period. Modern

⁵¹ e.g. according to the Habitat Directive (92/43/EEC) and Birds Directive (2009/147/EC)

biomass represents 20% of fuel used for cogeneration at the end of the planned period. By implementation of the specified measures all of the electricity produced is to be used in industry and will decrease the amount of electricity supplied from the public grid. Biomass co-firing or conversion is foreseen as 'additional measures'.

The EDS mainly promotes use of biomass for district heating, which is an important topic in Montenegro due to air quality problems in cities in the north of the country with a high share of individual boilers (mostly on coal, but also on woody biomass).

Potential impacts and opportunities

According to CETMA study- Renewable Energy Resource assessment for Montenegro (2007), Montenegro has great potential for the use of biomass for electricity generation, primarily from the forestry sector and, to a lesser extent, from agriculture. As one of the weaknesses in current biomass utilization, the EDS refers to uncontrolled use of biomass: uncontrolled deforestation, inefficient use of biomass for heating water and for space heating, unexploited possibilities of using biomass for production of fuel wood or biomass for district heating.

Regarding biomass utilization for electricity generation, there were 2 planned projects- in the municipalities of Pljevlja and Berane. The project in Pljevlja is not going to be carried out although the analysis of the data on logging in Pljevlja municipality and the required consumption of wood residue for the operation of the CHP plant at planned capacity in this municipality showed that the necessary amounts of wood raw material for the CHP plant can be secured. Regarding the CHP plant in Berane, the analysis showed that the factory is not in the position to supply the CHP plant with the necessary amounts of wood residue from its own concession amounts, and will have to buy a part of wood raw material from sawmills in this and the surrounding municipalities (Andrijevisa, Plav, Rožaje).

According to National Renewable Energy Action Plan to 2020 Montenegro⁵² currently has no intention to use arable land for energy purposes. Regarding use of biogas, one energy authorisation was issued by the ME for construction of a biogas power plant with a 526 kW capacity using poultry waste for electricity production. Besides the feed-in tariff for electricity produced from biogas there is no policy promoting the use of biogas.

More effort was made in the extraction of biomass from forests for heating purposes, such as feasibility studies for northern parts of Montenegro, reconstruction of public buildings- mainly schools, etc. Under the FODEMO project, in 2010, MARD and LUX-DEV prepared the study 'Opportunities, challenges and current progress with developing woody biomass markets in Montenegro'. The general conclusion of that Study is *that a lot has been done in the area of identifying potentials of woody biomass and its quantitative and qualitative value in Montenegro, but in practice there are no serious projects or examples of its significant usage for energy purposes yet. The reasons are numerous, where beside the ones of financial nature, it is necessary to highlight the ones referring to the limited and insufficient knowledge and a lack of sufficient intersectoral cooperation.* The Study also gives a recommendation in order to accelerate the

⁵² Pursuant to the template envisaged by the Renewable Energy Directive 2009/28/EC- Decision 2009/548/EC

development of the wood fuels market in Montenegro targeting on environmental and energy policies.

Through the FODEMO project, preparation of the Action Plan of using woody biomass in Montenegro is ongoing⁵³. Within this Action Plan very detailed analyses of the current state of utilization of woody biomass and of the main obstacles in the implementation of biomass use were provided. The obstacles occur at the following levels:

- Institutional, such as: inefficient use of funds from foreign grants and credit lines as a result of the lack of a single government authority under whose jurisdiction would be all of these funds and from which to direct the activities; the high cost and long time to collect required paperwork for permits, etc.
- Economic, such as: the impact of existing regulations on the economic viability of production, transport and use of woody biomass. In this regard, a special obstacle to further development of the biomass market in Montenegro is the treatment of sawdust and other residues in the wood industry in the Law on Waste Management, etc.
- Exploitation of woody biomass, such as: insufficiency in the district heating systems or public building heating facilities that would use wood chips as the main energy source produced from forest wood waste. Therefore, a certain amount of forest wood waste still remains in the forest and is not used for the energy needs of buildings.
- Financing.
- Knowledge and competence.

In accordance to the results of the analysis, recommendations are given under the 6 objectives:

- To increase the importance of forestry through the optimization of wood biomass production from forests in Montenegro;
- Education of producers and users of wood biomass, as well as companies engaged in the sale and installation of heating systems;
- Networking producers of wood biomass;
- The establishment of district heating systems on wood biomass;
- The development of a State policy on biomass;
- Monitoring the use of biomass.

Implementing the measures under the Action Plan for using woody biomass in Montenegro should lead to achieve intended actions under the NCCS. Since Montenegro has not developed a pellet production industry, special attention should be given to optimising the use of wood residue from Montenegrin forests and from the wood industry. This could also directly support rural development.

To achieve the NCCS's objectives, the biggest opportunity for biomass utilization lies in establishing district heating systems on woody biomass, especially in public buildings. In the current situation in some cities, public buildings such as hospitals and schools are located at short distance from each other, and each of them has an individual heating system using different type of fuels. The municipalities in the northern part of Montenegro (Kolašin, Pljevlja, Žabljak etc.) have the greatest potential. As it was already mentioned in Section 9.1 above, district heating in Pljevlja town is planned from co-generation in TPP 2nd block. The municipalities of Berane and Kolašin expressed their interest in the use of biomass and, according to the availability of biomass resources,

⁵³ The revised Final Report is prepared in June 2014.

there are similar opportunities for the municipalities of Zabljak, Plužine and others in the northern part of the country.

The EDS emphasizes the role of local authorities in taking the initiative to identify good projects on use of biomass. Regarding the introduction of new technologies, the importance of using cogeneration and high-efficiency cogeneration is also emphasized at the local level. In addition, local authorities need to prepare local energy development plans in accordance with the Law on Energy. Therefore, it is important to strengthen the role and capacities of local authorities in the northern area on developing local energy development plans and promoting district heating systems on biomass.

9.5 Key issue 5: Opportunities associated to waste-to-energy power production

Context

Draft NCCS

The draft NCCS makes many references to the role of management of agricultural waste and municipal waste in GHG emissions. Under section 7.4.2, dealing with full implementation of the ODS and F-gases regulations it also partly addresses hazardous waste management.

Most attention to waste management is given in Chapter 5.2.8, which is devoted to Waste Sector Scenario Projections. The projections are based on the following assumed set of measures envisaged by the draft National Waste Management Strategy (draft awaiting adoption since Feb 2013):

- construction of regional sanitary landfills with recycling centres;
- reducing the volumes of waste produced as a result of introducing primary selection and recycling;
- reducing the organic waste fraction in solid municipal waste.

Building on these assumptions, the draft NCCS suggests in its Figure 122 that the general trend in GHG emissions from the waste sector is one of a significant decrease in emissions, due in a large part to the adoption of existing and additional measures (WEM & WAM) in the sector as well as adoption of a national waste strategy, policies and measures.

NCCS Figure 122 - Municipal Waste Management GHG Emissions CO₂eq to 2030.



However, this graph is questionable, as it is highly improbable that GHG emissions from waste will reduce to nearly zero by 2030.

Assumptions behind the WEM scenario

The above trajectory projected by the NCCS assumes that existing measures (WEM) for the waste sector will be implemented:

- reduction of waste volumes through primary selection and recycling,
- reduction in the amount of disposed biologically degradable waste,
- construction of regional sanitary landfills with recycling centres, and
- installing a piped network system for landfill gas collection, as well as flaring of landfill gases.

With regards to the above measures we can note the following: recycling of plastics and paper will reduce energy production of incineration, whereas recycling of glass and metal has no impact on direct emissions from waste; with regards to landfill gas collection, literature shows that efficiency of such systems is highly variable (in the 30%-85% range of landfill gas production). There are various factors that will influence efficiency; newly operated landfills will take a few years to start LFG production, and LFG systems in new landfills will not reduce emissions from old uncontrolled dumps.

One of the measures being promoted in the processing industry is encouraging use of industrial wood waste, in addition to fossil fuels, as a fuel for co-generation. The draft NCCS predicts that all these measures should in 2025 result in a total reduction of GHG emissions in this sector to circa 28% compared to the baseline scenario.

Assumption behind WAM scenario

In order to calculate the GHG reduction potential of WAM measures, the draft NCCS suggests to consider implementation of “waste-to-energy” plants for municipal solid waste as an additional measure that could be used instead of waste disposal to landfill. The draft NCCS also notes that the waste to energy approach combined with CHP is the most effective method as it reduces waste landfilling (a significant source of GHG emissions) and it also supplies some renewable source of electricity. It also suggests that anaerobic digestion combined with CHP could be considered also an alternative to landfilling.

The overall GHG reduction potential of the WEM and WAM options for waste management are presented in NCCS Table 27, which shows increase (+) or decrease (-) in CO₂eq emissions with WEM and WAM, over the period 2020 to 2030. The draft NCCS concludes that the WAM approach – including interventions in the waste sector (waste-to-energy facility) could have a significant impact in reducing GHG in addition to WEM and the influence of forestry and LULUCF.

SECTOR EMITTERS	2020	2030	INCREASE / DECREASE CO ₂ eq EMISSIONS	% REDUCTION ACHIEVED BY WAM 2030
Total Energy Sector WEM	3391.779	3864.325	+472.546	33
Total Energy Sector WAM	3272.437	2596.66	-675.777	
Fugitive WEM	39.55119	47.04508	+46.083	32
Fugitive WAM	39.41567	28.8384	-10.577	

Manufacturing WEM	768	768	0	36
Manufacturing WAM	627	490.6	-137	
Agriculture WEM	422.6288	449.6	+26.97	
Agriculture WAM	422.6288	449.6	+26.97	
Forestry sinks WEM	-2445	-2598	-153	
Forestry sinks WAM	-2445	-2598	-153	
Municipal waste management WEM	50	5	-45	
Municipal waste management WAM	50	5	-45	
Total GHG emission WEM	4632.408	5086.925	+454.517	30
Total GHG emission WAM	4372.066	3541.86	-830.206	
WAM				
Forestry	-2445	-2598	-153	
Energy sector	3272.437	2596.66	-675.777	
Manufacturing	3899.437	3087.26	-812.177	
Agriculture	4322.066	3536.86	-785.206	
Municipal waste management	4372.066	3541.86	-830.206	

The draft NCCS notes that no sensitivity analysis has been performed for GHG emission assessments for the waste sector and recognizes that there is considerable scope for improvement as regards uncertainty of estimated emissions of CH₄ from solid waste expressed as CO₂ equivalent.

New draft of the National Waste Management Plan of Montenegro

The NCCS elaboration considers the draft National Waste Management Plan of Montenegro (NWMP), which was drafted in 2014 but not approved. In the meantime, a new draft NWMP was made available for public consultations in June 2015 and submitted for formal approval in early July 2015. This new draft NWMP suggests the following options:

- Alternative proposal NWMP - option 1: This option recommends that 5 waste management regions with 5 sanitary landfills be constructed - it includes 2 existing landfills in Podgorica, Ulcinj/Bar and proposed landfills in Bijelo Polje, Nikšić and Herceg Novi. This option has great similarities with the WEM scenario for waste management considered in the NCCS.
- Alternative proposal NWMP - option 2: This option recommends that 3 waste management regions with 3 sanitary landfills be constructed - it includes 2 existing landfills in Podgorica, Ulcinj/Bar and one proposed landfill in Bijelo Polje for the north region area. This option implies longer transport routes but it can nevertheless be treated generally as the WEM scenario for waste management considered in NCCS – the only difference would be increased demands for transport of waste to only three landfills and resulting increase of GHG emissions.
- Alternative proposal NWMP - option 3: This option recommends 1 waste management region which would cover the entire country and it would also include a thermal waste treatment plant (waste-to-energy plant), which would most likely be located in Nikšić. This proposal bears the features of the WAM scenario for waste management.

The new draft MWMP has been subject to an SEA process and produced an SEA report⁵⁴, which we comment on in the section below.

Potential impacts and opportunities

This section provides a short comparison of the main implications of both options – landfilling (WEM scenario) and waste-to-energy (WAM scenario). We will focus on two aspects: GHG reduction potentials and other environmental impacts as identified by the SEA process.

GHG reduction potentials

According to the 1st National Communication on Climate Change of Montenegro, the uncertainty in emission factors for Solid Waste Disposal is 400%, whereas for the EU Member States the uncertainty in emission factors for solid waste is 21%. Indeed, the uncertainties in this assessment appear rather extensive and they even increase further as one considers possible reductions of GHG emissions under the WAM scenario, which assumes one centralized waste-to-energy plant.

First of all, the calculation of potential GHG reduction emissions under WAM should consider the fact that one centralized waste-to-energy plant will need to be supplied by waste transported from all municipalities, some of which will be over 100 km away from the waste-to energy facility. Such transport of waste will generate GHG emissions that should be taken into consideration.

Secondly, the WAM scenario should not automatically assume that the waste-to-energy facility would generate combined heat and power, since use of CHP in Montenegro may be impaired by the lack of demand for heat by industry and by the limited infrastructure for central heating. Hence, any calculation of GHG reduction potential of the WAM scenario should be rather based on conservative assumptions and take the above factors into account.

Other Environmental Impacts

The SEA Report for the new draft NWMP provides a detailed assessment of possible proposed facilities and their cumulative impacts. It concludes that:

- The least risky alternative proposal is Alternative Option 1 which includes two rather unproblematic proposals for sanitary landfills in Bijelo Polje and Nikšić and one potentially problematic sanitary landfill proposed in Duboki Do. This system is characterized by transport of waste on relatively short distances. The option includes the possibility of a limited risk of accidents both on-site and during transport. The only problematic proposal is the location of Duboki Do, to be implemented as the last possibility within this option and only after clarification of all uncertainties related to a possible conflict situation involving the sanitary protection zones in the area. If possible serious risks of pollution of the water supply system of the Morinje springs are confirmed, it will be necessary to look for alternative locations for the sanitary landfill area of Herceg Novi.
- A risky proposal is the Alternative Option 2, which includes many of the same features as Option 1 but does not include the location of the sanitary landfill Budoš (Nikšić), which is considered unproblematic. This option involves greater transport requirements that are associated with higher risks during waste transport. Therefore, the strategic assessment ranked this option as second favorable.

⁵⁴ Agreco. 2015. Strategic Environmental Assessment for Waste Management Plan of Montenegro, Final version, July 2015.

- The most risky proposal is Alternative Option 3, which includes a centralized facility for thermal waste treatment (waste to energy plant) in Nikšić. Since more detailed information on this potential project is still missing at this moment, this option may, at best, be characterized as having moderately significant adverse risks in terms of air, soil and water quality, as well as significant risks associated with the transport of waste. This plant is very vulnerable when it comes to potential incidents in the management of the facility, which can easily lead to an accident with serious consequences; as well, heat demand will be limited in Montenegro and centralized distribution of heat requires expensive networks.
- Option 3 may have an adverse effect due to a number of possible accidents (during operation of the plant, during disposal of residual waste after the thermal treatment and the transport of waste over long distances). Moreover, a centralized solution will make the whole waste management system of Montenegro reliant on continuous and uninterrupted operation of one single thermal waste treatment plant and it is impossible to predict what could happen in case of a shutdown of the thermal waste treatment plant due to routine maintenance, or as a result of possible accidents or incidents, or due to other factors (such as economic, legal, etc.) Taking into account all the risks, it is recommended to approach this option with extreme caution.

Conclusions

The team for the SEA of the NCCS has independently reviewed the SEA study for the NMWP and concluded that with regard to environmental risks, the landfilling alternative options 1 and 2 (WEM scenario) are indeed less risky than the waste-to-energy option (WAM scenario).

In this regard, our study comes to the same conclusion as the draft NCCS which on page 204 concludes that ‘The most preferred option for Montenegro is the diversion of biodegradable waste away from landfill⁵⁵ for reuse as compost or anaerobic digestion’. In this regard, we suggest keeping this conclusion in the NCCS.

9.6 Key issue 6: Potential impacts associated to wind power production

Context

The NCCS, in its Action Plan under item 6, foresees a 30% increase in wind and hydropower generation, along with several biomass energy demonstration facilities. According to the EDS, the use of wind energy for electricity production is expected to be about 12% of the total amount of RES (most of RES- 70%- would be from hydro energy from large HPPs and 5% from biomass)⁵⁶.

Apart from the construction of wind farms according to the Strategy with power lines for their connection to the transmission and distribution network, the EDS also recommends continuing research work and studies for the possible development of offshore wind farms.

Potential impacts and opportunities

There are currently only two planned wind farms (Možura, Krnovo) with a total wind potential of 271 GWh. No further wind farms are planned at the moment, although the

⁵⁵ In compliance with Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (“Landfill Directive”).

⁵⁶ The calculation of use of RES for electricity production was made using the model according to the methodology of the Directive 2009/28/EC28 and for the purpose of calculation of the national target for utilization of energy from RES (NTRES).

EDS promotes an additional 165 GWh of produced electricity by 2030. Few investors now undertake local air movement measurements in order to check the feasibility of possible projects. Concrete locations are not known at the moment.

Based on the study Renewable Energy Resource Assessment, Republic of Montenegro⁵⁷, the most interesting areas for wind energy exploitation, are:

- Coastal areas – with high wind speeds of over 6 m/s on average, and
- Hills around Nikšić, with average wind speeds in the range of 5.5-6.5 m/s.

There are no plans to develop offshore wind farms before 2030, but the ME has started research on this.

The main risk for the environment from wind farms is connected to biodiversity, especially to birds and bats and their migration corridors, but also landscape. Therefore, when planning the location of wind farms, Important Bird Areas (IBAs) and areas inhabited by bat colonies should be avoided, as well as areas of outstanding landscape value. The SEA for the EDS assessed the impact of wind farms Možura and Krnovo and proposed general mitigation measures such as:

- When designing the wind farms it is important to establish that the areas are not sensitive ecological sites.
- Pre-surveys should be conducted to ascertain the above. In particular there is a need to evaluate the amount of avian and bat use in the area (including the locations of active nesting sites, colonies, roosts and migration corridors) and establish an adequate buffer zone if present.

Although the SEA for the EDS covered the main environmental risks regarding wind farms, it is not clear whether those recommendations were for the strategic or project level. When planning potential locations for future wind farms (on-shore and off-shore), it is important to ensure the strategic approach that considers not only wind potential, electric network system and infrastructure network, but also possible environmental risks (with special attention on birds, bats and landscape values).

In addition to the impacts that are considered in the SEA for the EDS, the EIA procedures were carried out for both wind farms. Although the sites are situated near the IBA sites (Možura wind farm is near IBA Bojana Delta, Skadar Lake, etc.; Krnovo wind farm is close to the proposed National Bio-corridor), upon completion of ornithological research it was concluded that the birds do not use the stated location for nesting or in search of food, or as migration routes. Thus, both locations are acceptable in terms of environmental protection.

⁵⁷ CETMA, Renewable Energy Resource Assessment, Republic of Montenegro, 2007.

9.7 Key issue 7: Opportunities associated to the promotion of sustainable transport

Context

The NCCA addresses climate change mitigation in the transport sector through the promotion of: alternative fuelled vehicles (e.g. electric, hybrid); development of an electric cars charging network; options for different transport modes; BAT for fuel primary storage to control volatile organic compound (VOC) emissions; truck loading facilities using BAT and retail stations for biofuels (measure No. 8). It also seeks to have 5 hydrogen-powered buses in the country (measure No. 11); enhance efficiency of maritime, rail, air and off-road transportation (measure No. 14); and inclusion of climate change in the transport sector's long-term planning (measure No. 22).

The 'additional measures' considered in the analysis of GHG emissions include a number of other measures, touching on aspects such as increasing share of buses in intra-city transport, increasing use of public transport, introducing CNG buses in public transport, fuel efficiency standards, vehicle fuel efficiency, and promoting eco-driving, amongst others. Unfortunately various of the latter measures are not clearly reflected in the NCCS's Action Plan.

Various initiatives for sustainable urban transport at the municipal level have arisen. Due to the density of population, the most relevant areas are the city of Podgorica and the coastal towns. In the case of Podgorica, it concentrates about 30% of the national population; in the case of coastal towns, the rapidly growing and strong seasonal characteristics of tourism are multiplying traffic during the summer, creating major congestion problems on coastal roads.

In the case of the coastal area, contributing factors are the absence of bypasses forcing the transit traffic to pass through the city centres and the Kamenari-Lepetane ferry connection over Kotor Bay as additional bottlenecks for road transport from Herceg Novi to Tivat and Budva. The use of private cars is likely to remain the preferred and proportionally growing travel mode by the majority of visitors arriving from neighbouring countries, meaning that associated environmental impacts are more likely to increase in the near future by new roads attracting new tourists to enter Montenegro by car over longer distances.⁵⁸

In spite of the existing initiatives, there is generally a low awareness at the institutional level on sustainable transport. For example, in Kotor the focus is still primarily on the promotion of new roads with little attention to the promotion of alternatives such as promoting a shift in transport culture away from vehicles, use of bicycles, or provision of parking spaces outside the city centre.

In the case of the city of Podgorica, public transport faces various challenges in the context of sustainable development. Public transport by bus has been privatised and is currently under three private companies. The buses are generally old units (between 6 and 37 years) and companies find it difficult to replace them as various bus lines are not

⁵⁸ UNDP Centre for Sustainable Development

financially feasible. The abundance of cheap taxis (some of them irregular) further exacerbates the challenges faced by the bus companies (a trip by bus costs 70 € cents, whereas a taxi ride would often cost 1€ and rarely exceed that amount by a large percentage).

The municipality of Podgorica has developed initiatives to enhance the public transport system, including local level regulations (e.g. Decisions on public transport). As well, the municipality adopted (February 2014) an urban plan until 2025, adopting principles of sustainable development for transport, including the construction of cycling lanes along the river and along most of the main roads. Other aspects include the construction of parking spaces for bicycles, promoting the habit of walking and using the railway to get out of the city.

Some of the challenges faced in the city of Podgorica are slowly being tackled, whereas others (e.g. availability of finances for replacement of bus units) seem to be stagnant.

In the coastal area different initiatives have arisen in the last few years, for example (to name just a sample):

- Perast sustainable transport initiative (supported by the Italian Government), which transformed the high street into an 'eco-touristic' zone restricted to traffic in the summer, providing parking space outside the city centre, introducing electric cars and a bike-sharing programme;
- Construction of a cable car from Kotor to Cetinje (planned, with support from the Central European Initiative Fund of the EBRD);
- Promotion of more effective use of railways, inland waterways and maritime transport, including an increase in the capacity of ferries in Boka-Kotorsta Bay as a sustainable alternative to road connection and the possibility of introducing a seasonal ferry line on the Bar-Boka-Kotorska Bay route providing a similar service to bus traffic (under the Government Transport Development Strategy of 2008);
- An initiative (under study) to use solar powered catamarans for maritime public transport in Boka Kotorska.⁵⁹

UNDP is also promoting the preparation of Local Sustainable Mobility Plans as part of its project "Towards Carbon Neutral Tourism", including small investments such as bicycle racks, logistic platforms, cycle paths and bus stops as well as policy measures such as improvement of local transport policies, reorganisation of transport decision-making groups, coordination with public transport concessionaries on public transport rearrangements and implementation of intelligent urban transport solutions (e.g. car pooling, park & ride system).

Potential impacts and opportunities

The NCCS correctly identifies the transport sector as a sector that offers important opportunities to contribute to climate change mitigation. However, the measures proposed, in spite of being very valid, still allow scope to make a larger contribution by the State level to local level sustainable transport.

⁵⁹ Ibid

There is scope for the NCCS to promote more specific mechanisms to enact changes at the local level, such as awareness raising on sustainable transport at the local level and the use of financial instruments to allow the instrumentalisation of sustainable public transport plans.

9.8 Key issue 8: Potential impacts associated to the promotion of use of agrochemical products

Context

With regards to adaptation to climate change, the NCCS echoes the recommendations made in the Second National Communication to the UNFCCC. These include, for the agriculture sector, “the need for early application of remedies against pests and insects”. This may open a window to the promotion of pesticides, and thus a reason why it was identified as a potential issue.

The NCCS Action Plan, in relation to the objective of equipping farmers to better manage GHG emissions from crop and livestock production, indicates that regulations are implemented “that focus on crop, livestock and soil management, in particular the integrated management of mineral nitrogen fertilisers to avoid application, the attendant GHG emissions, and the contamination of groundwater”.

Potential impacts and opportunities

Further examination of this key issue has shown that the associated environmental risks are not significant. Agricultural production in Montenegro is very small and use of agrochemicals is at a very low level. Water quality is monitored and has not been found to be polluted due to agricultural runoff. Furthermore, regulations are in place (and in line with EU requirements) for the control of agrochemicals and their application. The Phytosanitary Directorate has elaborated a voluntary Codex on Good Agricultural Practices (GAP), which complements Rule Books 45/2014 and 29/2014 on sustainable use of plant products and on application of fertilisers, as well as the provisions in the Law on fertilisers. The GAP Codex is being promoted by the advisory service for plant production.

9.9 Key issue 9: Potential impacts associated to bioethanol production

Context

In the transport sector the NCCS considers – amongst the ‘existing’ and ‘additional’ measures – the introduction of alternative fuels as a replacement of existing fossil fuels. In its analysis section the NCCS makes a broad reference to alternative fuels, giving as examples biodiesel, hydrogen, compressed natural gas. It is further specified that measures and technologies determined in national documents to reduce GHG emissions include fuels switch in motor fuels (introducing biofuels and hydrogen).

The Fuel Quality Directive 98/70/EC (amended by Directive 2009/30/EC) establishes sustainability criteria to be met by biofuels. Although Directive 98/70/EC has been transposed into Montenegro’s legal system, the amendments are yet to be transposed. These sustainability criteria include not only those related to composition but also their place of origin.

The NCCS states that preliminary studies indicate that production of first generation biofuels (growing crops) is not an option for Montenegro, but it also indicates that small-scale biofuel production using certain waste products (e.g. used cooking oil, residues from the wine production industry) may be an option.

The NCCS action plan is not specific about the domestic production of biofuels, but does promote its use (increasing use of alternative fuels in transport and setting up retail stations for biofuels).

When it comes to the energy sector, the NCCS has to be read hand-in-hand with the Energy Development Strategy to 2030 (EDS), as the EDS is the key policy document for the development of the energy sector. Whereas the NCCS makes some hints to the promotion of introducing bioethanol, the EDS is explicit about it, one of its main recommendations being “introduce biofuels (biodiesel and/or bioethanol according to the Government’s decisions on the basis of the program for development and utilisation of renewable energy sources in accordance with the obligation of the State under the Energy Community and the European Union”. As well, the EDS establishes a goal of achieving 10% of RES contribution on the transport sector consumption through biofuels (and other RES). Furthermore it promotes research on the possibility of producing biofuels in Montenegro “in terms of sustainable development”.

The stakeholders scoping workshop validated that potential production of bioethanol in Montenegro is an issue that requires due attention, especially in relation to its potential environmental impacts.

Potential impacts and opportunities

The main by-products and residues from wine production are grape stalk (generated during vine pruning), grape marc (which includes grape stalks, seeds and skins remaining after grape crushing, draining and pressing), wine lees (which accumulate at the bottom of grape juice or wine fermentation tanks) and winery sludge. Low quality wine, wine lees and grape marc can be used for the distillation of alcohol.⁶⁰ Vinasse is a residual substance from the ethanol distilling process. It is a thick acid liquid containing a mixture of water and organic and inorganic compounds, and a very large BOD in the order of 30,000-40,000 mg/l or even higher.

Unlike the production of ethanol from the sugar manufacturing process, production from wine wastes requires second-generation technology to effect enzymatic conversion of grape skin pomace cellulose into glucose and is still not common practice. It is currently subject of research in various countries to optimise the process, although ethanol distilleries from wine industry waste currently operate (e.g. in South Africa). Nevertheless, management of vinasse – which, apart from being highly polluting, is produced in very large quantities – remains an issue that requires careful attention due to its potential to significantly affect aquatic ecosystems.

Various options are available for vinasse management. The simplest is probably mixture with irrigation waters to partially substitute fertiliser use (fertigation). However, from an environmental point of view, the main constraint is to ensure that vinasse is applied in quantities that match crop uptake of nutrients, minimising run-off into the aquatic system. Other approaches include bio-digestion with heat and energy recovery, and concentration.

The main wine producer in Montenegro is Plantaže, which also has a distillery for the production of brandy. The distillery only operates approximately three months per year,

⁶⁰ Singh-Nee Nigam, P and Pandey, A (eds.) *Biotechnology for Agro-Industrial Residues Utilisation*. Springer.

and the liquid waste produced (vinasse) is discharged into the municipal sewerage system. Plans are in place for the construction of a wastewater treatment plant in order to achieve compliance with Article 80 of the Water Law, although it is unlikely that such a treatment system will bring the organic load down to permissible standards.

For the time being Plantaže does not have any plans for the production of bioethanol, nor has the Government approached them on this possibility leading to the domestic production of biofuels.

In case that bioethanol production moves forward, the corresponding industrial facilities will require an Environmental Impact Assessment (EIA) to ensure that the process will not result in significant impacts on the environment. The Environment Protection Agency (EPA) will review and approve the findings of the EIA as a requirement for the concession of the corresponding development permit. However, the EPA currently does not have the technical capacities to assess the adequacy of any vinasse management options that may be proposed in the project. Likewise, the Ministry of Agriculture and Rural Development (responsible for the regulation of effluent discharges) will need to understand the nature of vinasse and the options available for its treatment.

Capacity building of relevant institutions, primarily the EPA and the MARD on vinasse management would need to be promoted.

10. Recommendations

Potential impacts associated to Pljevlja TPP

- The NCCS to explicit promote the speeding up of the preparation of project documentation and financial analysis for the heat distribution network in Pljevlja area.
- The NCCS could promote the maximum reduction of time under simultaneous operation of TPP block 1 and block 2.
- The NCCS could promote the establishment of financial mechanisms managed at the State level to assist in the shift to district heating system (away from coal).
- The NCCS could specifically promote an awareness raising campaign on the benefits from switching to district heating targeted at local authorities and the general population.

Potential impacts associated to HPP

- The NCCS to be explicit that more alternatives of planned HPPs should be considered and made subject to SEA or EIA processes to ensure that options with least impact on environment are chosen. Impact assessment on the environment should be based on new and relevant data of biodiversity, groundwater regime and possible changes in availability of water due to climate change forecasts.
- Ensure that the design of HPPs considers real seismic risks and geological conditions. Landslide remediation should be done before construction of HPPs.
- The NCCS should promote speeding- up the preparation of new river basin management plans for the Adriatic and the Black Sea river basin districts and a new water master plan for the whole country due to growing water needs for different sectors (energy, agriculture, water supply) and climate changes impacts on water resources. It is essential to establish coordination between MARD and ME with the aim to achieve sustainable use of water resources supplied by the Morača River. When dimensioning the HPP, the other activities planned in the river basin, as well as water demands from other sectors should be taken into account.

Opportunities associated to solar power production

- The NCCS could promote the development of the power grid, as well as establishment of financial mechanism to ensure easy and affordable conditions for connection to the power grid.
- The NCCS could promote capacity building of the local authorities for developing local energy development plans, which would also include the development of the power grid. It is essential to establish good coordination and communication between local authorities and the ME to ensure harmonization with regards to time and financial capacities.

Opportunities associated to biomass power production

- The NCCS could promote capacity building of the local authorities for developing local energy development plans. It is essential to establish good coordination and communication between local authorities and the ME to ensure harmonization with regards to time and financial capacities.
- The NCCS could promote capacity building of the local authorities for developing local energy development plans. It is essential to establish good coordination and communication between local authorities, MoE and MARD to ensure harmonization in regards to time and financial capability.
- The NCCS could promote speeding- up of adoption the Action plan of using woody biomass and implementation of measures recommended by it.
- The NCCS could promote establishment of financial mechanisms that would cover the installation of boilers on woody biomass generated in Montenegrin forests, such as wood chips or the use of waste from the wood industry.

Potential impacts associated to wind power production

- To ensure the strategic approach in planning potential locations for future wind farms (on-shore and off-shore) that consider not only wind potentials, electric network system and infrastructure network, but also possible environmental risks (with special attention on birds, bats and landscape values).

Opportunities to support local sustainable transport

- The NCCS could specifically promote an awareness raising campaign on sustainable transport targeted at local authorities and the general population.
- The NCCS could promote the establishment of financial mechanisms managed at the State level to assist in the shift to sustainable public transport, e.g. credit lines and subsidies to renew bus fleets, to purchase electric or hybrid vehicles, or to purchase bicycles.
- The NCCS could promote the development of sustainable urban mobility plans by local authorities, prioritising coastal touristic areas.

Potential impacts associated to the promotion of agrochemical products

- The NCCS, when promoting the early application of plant protection products, could make reference for this to be in line with the Good Agricultural Practice (GAP) Codex.

Potential environmental impacts of bioethanol production

- The NCCS to explicitly promote the capacity building of the EPA and the MARD (amongst other relevant institutions) on options for vinasse management and regulation of vinasse effluents.
- The NCCS to promote adaptation of regulatory provisions for industrial effluent discharges to ensure they reflect the challenges posed by vinasse management, preferably favouring options that allow energy recovery.

11. Monitoring indicators (to integrate in the NCCS)

Pljevlja TPP

- % of the population switching to district heating system
- km of heat distribution network in Pljevlja
- concentration of SO₂, NO_x, PM₁₀, PM_{2.5} in Pljevlja (using the already established air quality monitoring system)

Solar power production

- % of households installing solar thermal/PV systems
- % of services installing the solar thermal/PV systems
- number of local energy development plans promoting solar thermal/PV systems
- km of new power grid planed and constructed for the purpose of connecting PV systems to it

Biomass power production

- % of public buildings switching to biomass district heating
- % of wood chips and waste from the wood industry used in biomass facilities
- Number of local energy development plans promoting the use of biomass

Local sustainable transport

- Number of buses in the public transport system in Podgorica renewed as a result of instrumentalisation of state level financial instruments to that effect / average age of public transport bus fleet
- % of intra-urban trips using a bicycle
- km of urban cycling lane network
- Elaboration of Guidelines of Sustainable Urban Public Transport

Bioethanol production

- Capacity-building of EPA on vinasse management from the distilling industry completed

Annexes

Annex 1 Stakeholders consulted

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Annex 2 EU legislation with SEA and climate change relevance

Environment

Horizontal legislation

- **Directive 2001/42/EC** of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment
- **Directive 2011/92/EU** of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance
- **Directive 2014/52/EU** of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance
- **Directive 2003/4/EC** of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC
- **Directive 2003/35/EC** of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC
- **Directive 2007/2/EC** of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)
- **Regulation (EC) No 1367/2006** of the European Parliament and of the Council of 6 September 2006 on the application of the provisions of the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters to Community institutions and bodies

Industrial emissions

- **Directive 2010/75/EU** of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Text with EEA relevance).

Air

- **Directive 2008/50/EC** of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Water

- **Directive 2000/60/EC** of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.
- **Directive 2007/60/EC** of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (Text with EEA relevance).
- **Directive 2008/56/EC** of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) (Text with EEA relevance).

Waste

- **Directive 2008/98/EC** of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance).
- **Council Directive 1999/31/EC** of 26 April 1999 on the landfill of waste.
- **European Parliament and Council Directive 94/62/EC** of 20 December 1994 on packaging and packaging waste.

Nature and Biodiversity

- **Council Directive 92/43/EEC** of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
- **Directive 2009/147/EC** of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.

Climate Change

An extensive climate change legislative framework, which supports the policy framework for climate and energy in the European Union, is already in place. It includes different policy areas like Greenhouse Gas Monitoring and Reporting, EU Emissions Trading System, Effort Sharing Decision, Carbon Capture and Storage, Transport/Fuels, Ozone Layer Protection, Fluorinated gases, Forests and Agriculture. Further consultations continue on the preparation of additional legislative proposal on the effort of Member States to reduce their greenhouse gas emissions to meet the European Union's greenhouse gas emission reduction commitment in a 2030 perspective.

The European Union has approved and has become one of the leading partners in the implementation of the main **international agreements** in the field of climate change:

- **Council Decision 94/69/EC** of 15 December 1993 concerning the conclusion of the United Nations Framework Convention on Climate Change.
- **Council Decision 2002/358/EC** of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder.
- **Council Decision 88/540/EEC** of 14 October 1988 concerning the conclusion of the Vienna Convention for the protection of the ozone layer and the Montreal Protocol on substances that deplete the ozone layer.

Greenhouse Gas Monitoring and Reporting

- **Decision 280/2004/EC** of the European Parliament and of the Council of 11 February 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol.
- **Commission Decision 2005/166/EC** of 10 February 2005 laying down rules implementing Decision No 280/2004/EC of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol.
- **Commission Decision 2010/778/EU** of 15 December 2010 amending Decision 2006/944/EC determining the respective emission levels allocated to the Community and each of its Member States under the Kyoto Protocol pursuant to Council Decision 2002/358/EC.
- **Commission Decision 2006/944/EC** of 14 December 2006 determining the respective emission levels allocated to the Community and each of its Member States under the Kyoto Protocol pursuant to Council Decision 2002/358/EC (notified under document number C(2006) 6468).
- **Council Decision 2002/358/EC** of 25 April 2002 concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder.
- **Regulation (EU) No 525/2013** of the European Parliament and of the Council on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change.

EU Emissions Trading Scheme

- **Directive 2003/87/EC** of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.
- **Directive 2004/101/EC** of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.
- **Commission Regulation (EC) No 2216/2004** of 21 December 2004 for a standardised and secured system of registries AMENDED by: Commission Regulation (EC) No 916/2007 of 31 July 2007 and Commission Regulation (EC) No 994/2008 of 8 October 2008 - version applicable until 31 December 2011.
- **Commission Decision 2006/780/EC** of 13 November 2006 on avoiding double counting of greenhouse gas emission reductions under the Community emissions trading scheme for project activities under the Kyoto Protocol pursuant to Directive 2003/87/EC of the European Parliament and of the Council (notified under document number C(2006) 5362).
- **Commission Decision 2007/589/EC** of 18 July 2007 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council amended by Commission Decision 2009/73/EC and Commission Decision 2009/339/EC.
- **Directive 2008/101/EC** of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community.
- **Directive 2009/29/EC** of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.
- **Commission Decision 2009/450/EC** of 8 June 2009 on the detailed interpretation of the aviation activities listed in the Annex I to Directive 2003/87/EC.
- **Commission Regulation (EC) No 748/2009** of 5 August 2009 on the list of aircraft operators which performed an aviation activity listed in Annex I to Directive 2003/87/EC on or after 1 January 2006 specifying the administering Member State for each aircraft operator.
- **Commission Decision 2010/2/EU** of 24 December 2009 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage.
- **Commission Regulation No 82/2010** of 28 January 2010 on the list of aircraft operators specifying the administering Member State.
- **Commission Regulation (EU) No 920/2010** of 7 October 2010 for a standardised and secured system of registries pursuant to Directive 2003/87/EC of the European Parliament and of the Council and Decision No 280/2004/EC of the European Parliament and of the Council.
- **Commission Regulation (EU) No 1031/2010** of 12 November 2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community.
- **Commission Decision 2011/278/EU** of 27 April 2011 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council.
- **Commission Regulation (EU) No 550/2011** of 7 June 2011 on determining, pursuant to

Directive 2003/87/EC of the European Parliament and of the Council, certain restrictions applicable to the use of international credits from projects involving industrial gases.

- **Commission Decision 2011/745/EU** of 11 November 2011 amending Decisions 2010/2/EU and 2011/278/EU as regards the sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage.
- **Commission Regulation No 1193/2011** of 18 November 2011 establishing a Union Registry for the trading period commencing on 1 January 2013, and subsequent trading periods, of the Union emissions trading scheme pursuant to Directive 2003/87/EC of the European Parliament and of the Council and Decision No 280/2004/EC of the European Parliament and of the Council and amending Commission Regulations (EC) No 2216/2004 and (EU) No 920/2010.
- **Commission Regulation 600/2012** of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council (Text with EEA relevance).
- **Commission Regulation 601/2012** of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council.
- **Commission Decision 2012/498/EU** of 17 August 2012 amending Decisions 2010/2/EU and 2011/278/EU as regards the sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage.
- **Decision 377/2013/EU** of the European Parliament and of the Council of 24 April 2013 derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community.
- **Commission Regulation EU No 389/2013** of 5 May 2013 establishing a Union Registry pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Decisions No 280/2004/EC and No 406/2009/EC of the European Parliament and of the Council and repealing Commission Regulations (EU) No 920/2010 and No 1193/2011.

Effort Sharing Decision

- **Decision 406/2009/EC** of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.
- **Commission Decision 2013/162/EU** of 26 March 2013 on determining Member States' annual emission allocations for the period from 2013 to 2020 pursuant to Decision No 406/2009/EC of the European Parliament and of the Council (notified under document C(2013) 1708).

Carbon Capture and Storage

- **Directive 2009/31/EC** of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006
- **Commission Decision 2010/670/EU** laying down criteria and measures for the financing of commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO₂ as well as demonstration projects of innovative renewable energy technologies under the scheme for greenhouse gas emission allowance trading within the Community established by Directive 2003/87/EC of the European Parliament and of the Council.

Ozone Depleting Substances

- **Council Decision 88/540/EEC** of 14 October 1988 concerning the conclusion of the Vienna

Convention for the protection of the ozone layer and the Montreal Protocol on substances that deplete the ozone layer.

- **Regulation (EC) No 1005/2009** of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer (recast) (Text with EEA relevance).
- **Commission Regulation (EU) No 744/2010** of 18 August 2010 amending Regulation (EC) No 1005/2009 of the European Parliament and of the Council on substances that deplete the ozone layer, with regard to the critical uses of halons (Text with EEA relevance).
- **Commission Regulation (EU) No 291/2011** of 24 March 2011 on essential uses of controlled substances other than hydrochlorofluorocarbons for laboratory and analytical purposes in the Union under Regulation (EC) No 1005/2009 of the European Parliament and of the Council on substances that deplete the ozone layer.
- **Commission Regulation (EU) No 537/2011** of 1 June 2011 on the mechanism for the allocation of quantities of controlled substances allowed for laboratory and analytical uses in the Union under Regulation (EC) No 1005/2009 of the European Parliament and of the Council on substances that deplete the ozone layer.

Fluorinated Gases

- **Regulation (EU) No 517/2014** of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006 (Text with EEA relevance).
- **Directive 2006/40/EC** of the European Parliament and of the Council of 17 May 2006 relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC (Text with EEA relevance).
- **Commission Regulation (EC) No 1493/2007** of 17 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the format for the report to be submitted by producers, importers and exporters of certain fluorinated greenhouse gases.
- **Commission Regulation (EC) No 1494/2007** of 17 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the form of labels and additional labelling requirements as regards products and equipment containing certain fluorinated greenhouse gases (Text with EEA relevance).
- **Commission Regulation (EC) No 1497/2007** of 18 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary fire protection systems containing certain fluorinated greenhouse gases (Text with EEA relevance).
- **Commission Regulation (EC) No 1516/2007** of 19 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases (Text with EEA relevance).
- **Commission Regulation (EC) No 303/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases (Text with EEA relevance).
- **Commission Regulation (EC) No 304/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary fire protection systems and fire extinguishers containing certain fluorinated greenhouse gases (Text with EEA relevance).
- **Commission Regulation (EC) No 305/2008** of 2 April 2008 establishing, pursuant to

Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of personnel recovering certain fluorinated greenhouse gases from high-voltage switchgear (Text with EEA relevance).

- **Commission Regulation (EC) No 306/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of personnel recovering certain fluorinated greenhouse gas-based solvents from equipment (Text with EEA relevance).
- **Commission Regulation (EC) No 307/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, minimum requirements for training programmes and the conditions for mutual recognition of training attestations for personnel as regards air-conditioning systems in certain motor vehicles containing certain fluorinated greenhouse gases (Text with EEA relevance).
- **Commission Regulation (EC) No 308/2008** of 2 April 2008 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the format for notification of the training and certification programmes of the Member States (Text with EEA relevance).

Transport/Fuels

- **Directive 98/70/EC** of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC.
- **Directive 1999/94/EC** of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO₂ emissions in respect of the marketing of new passenger cars.
- **Directive 2009/30/EC** of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC.
- **Regulation (EC) No 443/2009** of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO₂ emissions from light-duty vehicles.
- **Commission Regulation (EU) No 1014/2010** of 10 November 2010 on monitoring and reporting of data on the registration of new passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council.
- **Regulation No 510/2011** of the European Parliament and of the Council of 11 May 2011 setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO₂ emissions from light-duty vehicles.
- **Commission Directive 2011/63/EU** of 1 June 2011 amending, for the purpose of its adaptation to technical progress, Directive 98/70/EC of the European Parliament and of the Council relating to the quality of petrol and diesel fuels.

Forestry and Agriculture

- **Decision 529/2013/EU** of the European Parliament and of the Council on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities.

Energy

Renewables

- **Directive 2001/77/EC** of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market.
- **Directive 2003/30/EC** of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport.
- **Directive 2009/28/EC** of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Text with EEA relevance).

Energy Efficiency

- **Directive 2002/91/EC** of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.
- **Directive 2006/32/EC** of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC (Text with EEA relevance).
- **Directive 2010/30/EU** of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products (Text with EEA relevance).
- **Directive 2010/31/EU** of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.
- **Directive 2012/27/EU** of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance.

Annex 3 NCCS impact assessment matrix

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
Components under the NCCS “Action Plan”																				
Energy																				
1. Increase in primary energy savings																				
2. High energy efficiency - generation, transmission, distribution																				
3. High energy efficiency for renovated buildings																				
4. High energy efficiency for all buildings																				
5. Full roll-out of smart grids and smart metering	?																			
6. Significant and highly standardised RES generation (KI 3, 4 and 6)																				
7. Decarbonisation pathway for energy sources that can compete on the market (KI 3)																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
8. High energy savings in transport vehicles (KI 7)																				
9. New regulatory developments focusing on 406 standardisation, infrastructure policy and further research and demonstration efforts in clean and efficient energy																				
10. An increase in the use of ICT in energy and transport and for smart urban applications																				
11. An increase in public acceptance and behaviour towards energy efficiency																				
12. An increase in energy storage via hydrogen through RES sources for application on a large scale, for transport and to manage load demand																				
13. Waste diverted from landfill to recycling and composting																				
14. Methane emissions from landfill (reduction in methane emissions)																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
15. Enhance the efficiency of maritime, rail, air and off-road transportation																				
Agriculture																				
16. Equip farmers to better manage GHG emissions from crop and livestock production																				
17. Ensure sustainable land use planning (note: vague wording)																				
LULUCF																				
18. Inclusion of climate change aspects in the Forest Policy (note: vague wording)																			P	P
19. Revision of forest management recommendations to correspond to climate change																			P	P
20. The evaluation of the impact of climate change included in long-term planning of regional and urban structures																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
Industrial processes																				
21. Inclusion of cc adaptation and mitigation in the long-term surveys of different industrial sectors																				
Buildings																				
22. Climate change included in long-term planning and research activities in the construction sector																				
Transport																				
23. Inclusion of climate change in the transport sector's long-term planning																				
Other																				
23. Anticipatory systems and warning systems for extreme events																				
"Additional Measures" referred to in Ch. 4 and 5																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
Energy Industry																				
24. Retirement of coal plant (TPP Pljevlja I)																				
25. Involvement in EU-ETS																				
26. Biomass co-firing or conversion (KI 4)																				
27. Change dispatch of the existing power generation fleet ("clean-first" dispatch, priority dispatch of renewable)																				
28. Existing TPP Pljevlja I – limited operating hours																				
29. TPP Pljevlja II commissioning in 2020 (KI 1)																				
30. Direct regulation of plants (regulated lifetime limits, regulated phase-out)																				
31. Regulated change in supply/demand balances (fleet-wide GHG emissions performance standard, regulated increase in renewable capacity – renewable generation)																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
41. Installation of NSCR (Non-Selective Catalytic Reduction) in a production plant combustion facility																				
Transport																				
42. Increasing of freight transport using railway for additional 20% re WEM scenario for freight transport																				
43. Increasing share of electrical railway freight transport for additional 10% re WEM scenario regarding share of electrical railway freight transport within total railway freight transport																				
44. Introduction of electric vehicles																				
45. Increasing the share of buses in the total intra-city transport up to 50%																				
46. Increasing the share of passengers using public transport with respect to car transport to 30%																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
47. Introduction of CNG buses in public transport with share of 5%																				
48. Mandatory vehicle fuel-efficiency standards																				
49. Measures to improve vehicle fuel efficiency																				
50. Fuel-efficient non-engine components																				
51. Eco-driving																				
52. Transport system efficiency																				
Residential/Commercial Sectors																				
Residential																				
53. 15% of total energy needed for space heating will be supplied from modern biomass boilers (KI 4)																				
54. 10% of total energy needed for space heating will be supplied from district heating systems																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
55. 20% of total energy needed for space heating will be supplied by natural gas fuelled boilers																				
56. 20% of total hot water needs will be supplied by modern biomass fuelled boilers (KI 4)																				
57. 10% of total hot water needs will be supplied by district heat powered boilers																				
58. 30% of total energy needed for cooking will be used by LPG stoves																				
59. 20% of total energy needed for cooking will be used by natural gas stoves																				
Commercial																				
60. Decrease of specific heat demand per square meter down to 80kWh/m ² year																				
61. 16% of total energy needed for space heating will be supplied from modern biomass boilers (KI 4)																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
62. 18% of total energy needed for space heating will be supplied by natural gas fuelled boilers																				
63. % of total energy needed for space heating will be supplied from district heating systems (note: % not specified in the NCCS)																				
64. 16% of total energy needed for space heating will be supplied from modern biomass boilers (KI 4)																				
65. 18% of total energy needed for space heating will be supplied by natural gas fuelled boilers																				
66. % of total energy needed for space heating will be supplied from district heating systems																				
67. % of other thermal energy use in service sector will be supplied by LPG boilers (substitution of residual oil boilers)																				
68. 50% of total hot water needs will be supplied by SWH systems																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
69. Decrease of specific energy demand used for air conditioning per square meter down to 50kWh/m ² year																				
70. Mandatory building codes and Minimum Energy Performance Standards (MEPS)																				
71. Net-zero energy consumption buildings																				
72. Improved energy efficiency in existing buildings																				
73. Building energy labels or certificates																				
74. Energy performance of building components and systems																				
75. MEPS and labels for appliances and equipment																				
76. Test standards and measurement protocols for appliances and equipment																				
77. Market transformation policies for appliances and equipment																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
78. Phase-out of inefficient lighting products																				
79. Energy efficient lighting systems																				
80. Data collection and indicators																				
81. Strategies and action plans																				
82. Competitive energy markets, with appropriate regulation																				
83. Private investment in energy efficiency																				
84. Monitoring, enforcement and evaluation																				
Industrial processes																				
85. Involvement of KAP plant within EU-ETS scheme																				
86. Better process control of KAP plant (further improvements in reducing length of life of the anode effect, as well as number of other effects)																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
87. Adoption of tighter emission standards in line with EU environmental directives																				
88. Adoption of guidelines set out in the EU IPPC BREF documents																				
89. Increasing adoption of ISO 14000, EMAS, CDMs																				
90. Adoption of new and cleaner technologies in industrial processes																				
91. Installation of NSCR in a production plant combustion facility																				
Solvents sector																				
92. Adopting a proactive approach towards the reduction of the use of solvents in line with EU and international best practice																				
Agriculture sector																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
93. Improvement in cattle stock switch to Holstein breed as more appropriate with regards to methane emissions																				
94. Emphasis on livestock development rather than crops and cereals								?		?	?	?		?					?	
95. Strengthen wine production industry as it is a very positive sector for export																			?	
96. Development of livestock market strategy for halal lamb slaughter for Middle East market																				
97. Emphasis on good animal waste management practices in line with EU veterinarian requirements																				
98. Improved system of animal slurry 7 manure management by construction of bonded impoundments so as to surface groundwater contamination																				
Waste sector																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
99. Implementation of 'waste-to-energy' plants for municipal solid waste, instead of waste disposal to landfill																				
100. Anaerobic digestion combined with CHP can be considered as an alternative to landfill																				
101. Diversion of biodegradable waste away from landfill for reuse as compost or anaerobic digestion																				
Climate Change Adaptation measures																				
Waste resources																				
102. Strengthen the network of measuring stations for hydrology and meteorology monitoring																				
103. Better coordination between Government, Agency for Environmental Protection and IHSM to ensure workings of National Archives for water quality are kept and made available																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
104. Support to relevant agencies in the use of GIS tools and GIS identification of needs concerning the environment																				
105. Harmonise standard data sets, clearly define responsibility and 'ownership' of specific data sets as well as procedures for version control of data and how updated are card filed with the latest data exchanges between institutions																				
106. Study of groundwater and GIS mapping of hydro-geological boundaries of groundwater used for water supply																				
107. Water information system and options to be considered for implementation of better software information system for water/cadastre																				
Agriculture																				
108. Scientific research on the impact of climate change on agriculture and on different crops																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
109. Use varieties and hybrids of different maturity periods, in order to avoid the least favourable parts of the year																				
110. Develop irrigation and drainage systems, in order to regulate the water content in the root system																				
111. Reduced tillage, deep tillage, crop residue cover of the soil surface, the change of density of sowing or planting, in order to preserve a certain amount of moisture in the root zone system																				
112. Early application of remedies against pests and insects																				
113. Change in the use of fertilisers, i.e. quantity and time of application (KI 8)																				
114. Establish a more flexible farming system in order to reduce the consequences of climate change																				
115. National policy on drought management																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
Livestock																				
116. Scientific research on impact of climate change on livestock and regions that are favourable to certain races and types of livestock																				
117. During the process of cattle rearing attention should be paid to those types of livestock that are less sensitive to warmer weather and possible heat stress																				
118. To provide adequate conditions for the cultivation of new climatic conditions and to use new technology that includes the management of nutrition and special attention to ventilation systems, temperature and humidity control in stables																				
119. Organise advisory activities with the aim of educating producers in the application of new technical adjustments																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
120. As prevention or slowing of climate change, it should be proposed to construct tank/pits, digesters on farms for fertiliser production from biomass for use as energy production – composting farm waste																				
121. Provide financial support for research programmes																				
Forestry																				
122. Forest management close to nature – the basic stability of forest stands																				
123. Increasing the share of high natural forests compared to low productive ones																				
124. Natural regeneration as a basic orientation in the cultivation of forests, adequate support with reforestation in the absence of natural rejuvenation																				
125. Use of indigenous tree species in reforestation																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
126. Encourage a mix of forest stands, special attention to the preservation of selection stands of beech, fir and spruce (uneven-aged stands)											?			?						
127. Conservation of forest gene pool, in particular through the protection of key habitats and species, as well as woody plants and animals																				
128. Develop measures to protect forests from forest fires (emphasis on prevention and rapid response in case of fire)																				
129. Work to improve logistics for fire-fighters; road infrastructure, anti-fire lines, remove combustible materials from the forest, forming points with material for fire, intensive control activities in the forests during the dry period																				
130. Establishment of forest order after felling, adequate and timely rehabilitation of burned areas																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
131. Constitution and functioning of the reporting and forecasting services of forest protection, definition of environmental indicators that would point to the current changes in forest ecosystems																				
Coast and Coastal Area																				
Recommendations for size of inundation zone and vulnerability of the coast																				
132. For the present and near future, in terms of flooding zone, apply a scenario that provides a sea level rise of 96cm																				
133. Carry out a vulnerability assessment of areas in terms of expanding coastal detachment																				
Analysis of small river flows																				
134. Further analysis of large water bodies on the coast																				

	Poverty alleviation	Cultural diversity	Social cohesion	Employment	Food safety	Water & Sanitation	Waste management	Landscape	Public health	Soil quality	Biodiversity	Ecosystems	Nature protected areas	Forests	Fisheries	Air quality	Water quality	Water availability	CC mitigation	CC vulnerability
135. Map areas endangered by the great waters, and understand possibilities for organising an observation system on priority streams by hydrological services and relevant municipal departments																				
136. Special attention to be paid to defining the erosive potential of these streams, both for the protection of deposited sediment and the potential impact of sediment on the conservation of beach coastline																				
Health																				
137. Implement bio-meteorological forecasts to provide early warning of a favourable or unfavourable impact on people, especially for chronically ill persons																				
138. Establish an early warning system of heat waves and cold waves																				
139. Make bio-classification of different weather conditions, data collection and archiving																				