Under the aegis of the
BLACK SEA ECONOMIC COOPERATION ORGANIZATION

BSEC

Energy View of BSEC Countries 2015

Special Edition on Climate Change Policy Trends

PROMITHEAS THE ENERGY AND CLIMATE CHANGE POLICY NETWORK

National and Kapodistrian University of Athens
KEPA

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SEVENTH FRAMEWORK PROGRAMME

PROMITHEAS
The Energy and Climate Change Policy Network

"Energy View of BSEC countries: Special Edition on Climate Change Policy Trends" is published in the frame of PROMITHEASnet activities. This edition is based on the reports prepared in the context of PROMITHEAS – 4 EU FP7 project (G.A. no.265182).

PROMITHEAS – 4 was a three (3) - year project, with full title "*Knowledge transfer and research needs for preparing mitigation / adaptation policy portfolios*". Twelve (12) beneficiary countries (ten from the Black Sea Economic Cooperation (BSEC) region, Estonia and Kazakhstan) developed national policy mixtures regarding their national climate change policies and composed relevant reports, with evaluation of policy mixtures and conclusions.

The national reports of this edition are based on the PROMITHEAS – 4 reports.

PROMITHEAS is an Energy and Climate Change policy network. It aims to promote cooperation between EU and BSEC relevant institutions and through this, to enhance bonds of scientific cooperation, knowledge transfer and dissemination, to contribute in economic issues relevant to its contents and through this, to regional stability and economic development.

The PROMITHEAS network consists of institutions from Albania, Armenia, Azerbaijan, Bulgaria, Estonia, Georgia, Hellas, Kazakhstan, Kyrgyzstan, Moldova, Romania, Russia, Serbia, Turkey, Ukraine and Uzbekistan. It was initially financed through BSEC Project Development Fund and includes twenty-five institutions. It covers all the BSEC and most of the Central Asia countries, while it remains continuously open to new participants.

The PROMITHEASnet activities include, apart from the present edition, the publication of the "Energy View of BSEC countries" (with a special edition on Climate Change policies), the scientific bilingual (English – Russian) journal "Euro – Asian Journal of Sustainable Energy Development Policy", a bi-monthly newsletter disseminated to more than 170 countries worldwide, special reports, workshops, seminars, annual international conferences, etc.

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Message by Secretary General of BSEC-PERMIS

Energy and environment protection are essential elements for the sustainable development of the BSEC Member States and, consequently, major areas of action of the ***Black See Economic Cooperation*** Organization (**BSEC**) – an organization established 23 years ago with the purpose to promote a lasting and closer cooperation among the States in the region. This region is at the cross-roads of energy transportation routes and has a major role to play in ensuring the energy security not only of the States in the region, but of many other States in Europe and in neighboring areas.

In this context, a significant part of efforts by the ***International Permanent Secretariat*** (**PERMIS**) of BSEC are focused on the development of the BSEC regional cooperation in Green Energy.

The issues of Climate Change and of Sustainable Development are acknowledged as challenges of high importance for the BSEC Member States, which in the strategy document endorsed by the BSEC Summit held in Istanbul in 2012, the ***BSEC Economic Agenda***, envisage taking gradual steps for transforming the BSEC Region into a model for Clean Energy by the year 2050.

BSEC has been actively participating in the international policy dialogue, particularly through the series of yearly International Scientific Conferences on Energy and Climate Change, organized by *Promitheas* Network, directed by the Energy Policy and Development Centre (KEPA) and hosted by the National and Kapodistrian University of Athens. The results of this participation contributed significantly to bringing our Member States closer and to providing valuable inputs to our activities aimed at enhancing the regional cooperation in the fields of energy and environmental protection. More specifically, these results offered valuable feedback in informing and facilitating our Member States to engage in the development of their own low-carbon pathways, in the context of the expected agreements of the 21st Yearly Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) in Paris.

The new edition of the "Energy View - 2015" is illuminating where BSEC Member States stand today and what still needs to be accomplished in the areas of energy and environment protection. At the same time, it constitutes a useful instrument in planning investments and promoting regional policies in the wider region for the years to come. For all the above reasons we hail the publication of this updated edition, as we are confident that it will further facilitate the effective cooperation among BSEC Member States in fields of crucial importance to all our people.

Istanbul, November 2015

Ambassador Michael B. Christides
Secretary General of BSEC PERMIS

Message by the Coordinator of PROMITHEAS-4

Climate Change defines the key challenge of 21st century for the human spicy.

The exponential increase of human population and the associated use of fossil fuels for their economic development lead to GHG emissions that threaten the survival of humans on earth.

After years of bitter accusations and endless negotiations among developed and developing countries, COP21 of UNFCCC in Paris aspires to conclude with a legal binding document capable to limit the increase of mean atmospheric temperature to 2^{o}C relevant to preindustrial era.

To that aim most of the countries have communicated to UNFCCC their Intended Nationally Determined Contributions (INDCs) where they have described their conditional or unconditional pledges to participate in the global efforts to achieve the 2^{o}C target, sometime during this century.

UNFCCC[1] underlines that although following the least cost 2^{o}C scenario, the global average per capita emissions are expected to decline by 8 and 5% by 2030 compared with levels in 1990 and 2010, while aggregate GHG emissions indicated in INDC are expected to be higher by 8.7 $GtCO_2eq$ in 2025 and by 15.1 $GtCO_2eq$ in 2030.

Provided that COP21 will conclude successfully, the time period up to 2020 is expected to be consumed for the preparatory actions that will define the policies and measures capable to achieve global carbon neutrality sometime between 2055 and 2070 and shrink to net zero total global GHG emissions between 2080 and 2100, in order to stay within the 2^{o}C trajectory[2] which means that the available CO_2eq budget to consume, from 2012 onward is less than 1000 $GtCO_2eq$.

Following a BAU approach, global GHG emissions would rise to about 59 $GtCO_2eq$ in 2020, resulting an estimated gap of 8-10 $GtCO_2eq$ from emission levels consistent with the 2^{o}C target for this year while the relevant estimations shows 68 $GtCO_2eq$ in 2030 and 87 $GtCO_2eq$ in 2050 indicating that global emissions are not expected to peak and much more to be reduced as to reach carbon emissions neutrality unless robust reduction policies will be implemented.

The global community has to make and implement urgent decisions concerning the timeframe when the GHG emissions will peak and the trajectory will follow to achieve carbon neutrality since the higher the emissions level in the near term, the higher the level of negative emissions needed later in the century as compensation. Postponing stringent emission reductions now will cause additional costs and higher risks in the future while the feasibility of these measures is still uncertain without having a clear understanding of the associated social, economic or even environmental consequences.

Although the communicated INDCCs cover 86% of global emissions in 2010, aviation and maritime transportation are not included; at the request of the Subsidiary Body for Scientific and Technological Advice (SBSTA 42), the International Civil Aviation organization (ICAO) and the International Maritime Organization (IMO) have submitted

[1] Synthesis report on the aggregate effect of the INDCs, UNFCCC/CP/2015/7
[2] The emissions gap report 2014, UNEP

two reports covering their intentions and contributions to confront climate change[3]. The two reports will be considered under the agenda item on methodological issues under the Convention by SBSTA 43, which will be held from 1-4 December 2015 in conjunction with the 21st session of the Conference of the Parties (COP 21)[4]. Mechanisms and procedures related to trade and investments are not included in a clear and consistent way, although the active and efficient involvement of the World Trade Organization (WTO) remains crucial for the implementation of any relevant international agreement.

Member countries of the Black Sea Economic Cooperation Organization have communicated INDCs with varying tables of contents, procedures and ambitions. As in the rest communicated INDCs the authors provide their national policies but they fail to take the advantage of the BSEC procedure for developing relevant synergies for challenges with regional characteristics especially for adapting their societies to already emerging threats like river floods and forest fires.

The outcomes of a three (3) years effort to develop mitigation policy mixtures for ten (10) countries of BSEC show that there is an enormous potential for cooperation, especially in the fields of *energy efficiency, RES and decentralized energy production*. Such activities could be easily linked with the financing instruments of international banks like EBRD, provided that BSTDB could be convinced to undertake a more active role as an intermediary bank.

We enter a period of structural transformations in the energy sector and the development of new global markets associated with the trade of carbon emissions. New opportunities and new jobs are already emerging in these fields. BSEC can play a decisive role in accelerating these transformations in the region with the active involvement of the academic community that can contribute in developing and disseminating the necessary know how and the market stakeholders that recognize the opportunity window in the various areas of green economy.

The Energy Policy and Development Centre (KEPA) of NKUA continuing its efforts to mobilize and motivate policy makers, market players and academia to get engaged in these "green transformations" communicates this volume, published under the aegis of BSEC, that reflects the outcomes of an FP7-EU financed project, PROMITHEAS-4, and undertakes the opportunity to express its sincere gratitude to BSEC-PERMIs for the provided support during the three years of its execution.KEPA looks forward to promote regional cooperation in the frame of the already existing initiative of "BSEC- Green Energy network" while it explores the means for securing international financing for offering consultations services to the member states of BSEC upon their request.

Finally, it announces that a new publication with an aggregated analysis of INDCs communicated by the BSEC countries under the light of the conclusions of COP21 will be communicated in the coming months of 2016.

The editor

Prof. Dimitrios Mavrakis
Coordinator of PROMITHEAS-4

[3] UNFCCC/FCCC/SBSTA/2015/MISC.5
4 http://climate-l.iisd.org/news/icao-imo-report-to-sbsta-on-aviation-and-maritime-fuel-emissions/

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Dr. Lulin RADULOV, Black Sea Regional Energy Centre

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Mr. Marlus TARANU, Institute of Power Engineering - Academy of Sciences

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Prof. Anca POPESCU, Institute for Studies and Power Engineering

Mrs. Anna BARDICI, Institute for Studies and Power Engineering

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Prof. Alexander ILYINSKY, Financial University under the Government of the Russian Federation

Serbia

Prof. Dejan IVEZIC, Faculty of Mining and Geology - University of Belgrade

Dr. Marija ZIVKOVIC, Faculty of Mining and Geology - University of Belgrade

Mr. Aleksandar MADZAREVIC, Faculty of Mining and Geology - University of Belgrade

Turkey

Prof. Bilgin HILMIOGLU, TUBITAK Marmara Research Centre

Mrs. Nuray Guler AKALIN, TUBITAK Marmara Research Centre

Mr. Deniz SARI, TUBITAK Marmara Research Centre

Ukraine

Prof. Evgenij INSHEKOV, Energy Saving and Energy Management Institute - Kiev Polytechnic University

Ms. Mariia KOKORINA, Energy Saving and Energy Management Institute - Kiev Polytechnic University

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Abbreviations

Abbreviation	Full name
AAU	Assigned Amount Unit
ADB	Asian Development Bank
AHP	Analytical Hierarchy Process
AKBN	National Agency of Natural Resources
AMS	Acronym of combination of AHP, MAUT and SMART
BAU	Business As Usual
BSEC	Black Sea Economic Cooperation organization
BSTDB	Black Sea Trade and Development Bank
CDM	Clean Development Mechanism
CEC	Commission of the European Communities
CER	Certified Emission Reduction
CHP	Cogeneration of Heat and Power
CIS	Commonwealth of Independent States
COP	Conference of Parties
EBRD	European Bank of Reconstruction and Development
EC	European Commission
EE	Energy Efficiency
EEA	European Environmental Agency
EFTA	European Free Trade Association
EIB	European Investment Bank
ENP	European Neighborhood Policy
ERE	Albanian Energy Regulator
ERU	Emission Reduction Unit
ETS	Emission Trading Scheme
EU	European Union
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FITs	Feed In Tariffs
FYROM	Former Yugoslav Republic of Macedonia
GC	Green Certificate
GDP	Gross Domestic Product
GEF	Global Environment Fund
GHG	Greenhouse Gas
GIS	Green Investment Scheme
GWh	Gigawatt-hour
HES	Hydro Energy System
HPP	Hydro Power Plant
ICT	Information and Communications Technologies
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
kWh	Kilowatt-hour
LEAP	Long-range Energy Alternatives Planning
LHPP	Large Hydro Power Plant
LPG	Liquefied Petroleum Gas
LULUCF	Land Use, Land Use Change, Forestry
M/A	Mitigation/Adaptation
MAUT	Multi-Attribute Utility Theory
MoEAC	Ministry of Economic Affairs and Communications
MoEF	Ministry of Environment and Forestry
MoU	Memorandum of Understanding

MW	Megawatt
MWh	Megawatt-hour
NC	National Communication
NEIA	National Environmental Investment Agency of Ukraine
NPP	Nuclear Power Plant
NRES	New Renewable Energy Sources
OECD	Organisation for Economic Co-operation and Development
OPT	Optimistic
PES	Pessimistic
PJ	Petajoule
PPA	Power Purchase Agreement
PV	Photovoltaics
RCP	Representative Concentration Pathways
RES	Renewable Energy Sources
RES-e	Electricity from RES
SAARE	State Agency for Alternative and Renewable Energy Sources
SEE	South East Europe
SEI	Stockholm Environment Institute
SHPP	Small Hydro Power Plant
SIEPA	Serbia Investment and Export Promotion Agency
SMART	Simple Multi-Attribute Ranking Technique
SUDES	Sustainable Development in the Energy Sector
TES	Thermal Energy System
toe	Tonne of Oil Equivalent
UCTE	Union for the Coordination of the Transmission of Electricity
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Committee for Europe
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
VAT	Value Added Tax
WTO	World Trade Organization

Methodology

This edition is based on the National reports of twelve (12) countries concerning the development and assessment of climate change Mitigation/Adaptation policy mixtures in the framework of EU funded project PROMITHEAS-4. A common methodology was followed for the development of these reports.

The general framework of two out of the four Representative Concentration Pathways (RCP) that the Intergovernmental Panel on Climate Change (IPCC) had been working on regarding emission scenarios and possible socio-economic development pathways, that of RCP3-PD and RCP8.5, was taken into consideration for the PROMITHEAS-4 scenarios. These pathways were selected for the following reasons:

- RCP3-PD and RCP 8.5 represent the lower and upper limit of emission scenarios respectively. Their possible socio-economic development pathways lead to these different greenhouse gas (GHG) concentrations in the atmosphere. Under the first pathway global temperature is expected to increase by +2,0-2,4ºC, while CO_2 emissions in 2050 need to be reduced compared to year 2000 by -85% to -50% (Hoegh-Guldgerg H., 2010). On the diametrical point, RCP8.5 is expected to lead to a global temperature increase by +4,9 – 6,1ºC, while GHG emissions will increase by +90% to +140% until 2050 (Hoegh-Guldgerg H., 2010).
- RCP3-PD requires stringent climate change policies to limit emissions and full participation of all countries (van Vuuren P. Deylef et al., 2011a; 2011b). However, emerging economies argue that they can not proceed in an international agreement for climate change and commit to quantitative GHG emission reduction targets unless the undertaken mitigation efforts secure economic growth and do not halt or restrict their efforts for such a priority. Under this emission scenario, the respective developed Mitigation/Adaptation (M/A) policy mixtures for the emerging economies that participate in PROMITHEAS-4 allowed the understanding of the dynamics of such options.
- RCP 8.5 represents a socio-economic development pathway which is fossil fuel intensive. This pathway fits the situation of the emerging economies of PROMITHEAS-4 since they had in 2009 high fossil fuel energy consumption (as a percentage of total) from 54,1% (Albania) to 99,0% (Kazakhstan)[5].

The three scenarios that were developed were: the Business-As-Usual (BAU), the Optimistic (OPT) and the Pessimistic (PES). RCP 8.5 was used for the development of the PES scenario and RCP3-PD for that of OPT since each one represented the lower and upper limit of emission scenarios respectively. Each scenario assumes a different policy mixture.

The objectives of the BAU scenario were: i) reduction of GHG emissions that the country is able to achieve through its implemented climate change policies (compared to the amount of GHG emissions of a previous year[6]); ii) adaptation of the country to the already observed climate change impacts. The policy mixture for this scenario was structured by the national Mitigation/Adaptation (M/A) policy instruments that were set into force before 31 December 2010. This scenario was served as the reference against which the outcomes of the other two were compared.

The objectives of the OPT scenario were: i) maximum reduction of GHG emissions that the country is able to achieve (compared to those of a previous year or to those of BAU for a certain year in the future) through stringent climate policies; ii) adaptation of the country to mild climate change impacts. It assumes an enhanced M/A policy mixture that the country may implement up

[5] Albania – 54,1%, Armenia – 68,4%, Azerbaijan – 98,2%, Bulgaria – 73,1%, Estonia – 83,4%, Kazakhstan – 99,0%, Moldova – 91,3%, Romania – 76,3%, Russia – 90,2%, Turkey – 89,9% and Ukraine – 80,0%. http://data.worldbank.org/indicator/EG.USE.COMM.FO.ZS.

[6] The availability of the historical data determined the selection of the previous year for each country.

to 2050 by supporting: i) the introduction of efficient technologies in almost all sectors targeting to the maximum reduction of GHG emissions ie maximum exploitation of the national potential in Energy Efficiency (EE) and Renewable Energy Sources (RES); ii) the necessary infrastructure for adaptation towards the minimum – in size and extent - expected climate change impacts. Specifically, this policy mixture consists of: i) the already implemented M/A policy instruments (included in the policy mixture of BAU); ii) the M/A policy instruments that the country had set into force after 1 January 2011; iii) additional measures, stated in national strategic and development plans and possible ones in line with the EU climate change policy that were adjusted to needs and priorities of the examined country.

The objectives of the PES scenario were: i) the minimum reduction of GHG emissions that the country is able to achieve (compared to those of a previous year or to those of BAU for a certain year in the future) through its implemented and already planned climate change policies; ii) the adaptation of the country to unfavorable climate change impacts. This scenario concerns a restricted M/A policy mixture that the country may implement up to 2050 considering minimum exploitation of the national potential in EE and RES and by facing the worse expected impacts of climate change. Only the technological options and the sectors with the highest national potential in EE and the most promising for the country types of RES were taken into account. The policy mixture consists of: i) the already implemented M/A policy instruments (included in the policy mixture of BAU); ii) the M/A policy instruments that the country had set into force after 1 January 2011 (described in OPT policy mixture) and iii) no other additional policy instruments apart from those already decided to be implemented and in line with the EU climate change policy; the EU policy instruments were adjusted to the needs and priorities of the country under this scenario.

For the development of the scenarios, key assumptions about the evolution of the most important drivers were also determined, following a common approach and, in parallel, considering the special characteristics of the examined countries. The time evolution of population was based on projections of the Department of Economic and Social Affairs of the United Nations (UN, 2011) and that of national real GDP was based on projections of the International Monetary Fund (IMF) (IMF, 2012). The use of “GDP real” over “GDP nominal” was preferred for removing the effect of inflation and being able to compare the outcomes among all countries. The growth of total energy demand of a national economic sector was linked to the growth of the real GDP.

The historical data for each country were sought from national and international official sources. The objective was to find data for 1990-2010. Due to the specificity of each country and the lack of data, the time horizon was 2000-2010 for most of the countries. Information and data about national policy instruments were also collected.

For each country a LEAP dataset was prepared representing the energy system of the country along with historical data. The respective assumptions for three scenarios were inserted into the dataset. After running this dataset, results on environmental performance, final energy demand, electricity generation, etc. for each policy mixture were available. LEAP, developed by SEI’s U.S. Center, is an integrated modeling software tool, widely used for energy policy analysis and climate change mitigation assessment (SEI, 2012). The outcomes of LEAP dataset along with official information were used for the evaluation of each one of the three policy mixtures.

Each policy mixture was evaluated for its performance under the criteria/sub-criteria of the AMS method. AMS is developed for evaluating climate policy instruments or relevant policy mixtures and is the combination of three standard multi-criteria methods: the Analytical Hierarchy Process (AHP), the Multi-Attribute Utility Theory (MAUT) and the Simple Multi-Attribute Ranking Technique (SMART). The outcomes of this evaluation indicated the weaknesses and the strengths of each policy mixture and concluded with the most effective policy mixture for each country according to its national framework.

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Albania

Country profile

Albania is a parliamentary democracy, established under a constitution renewed in 1998, with elections held every four years. It formally applied for EU membership on 28 April 2009. Free-market reforms have opened the country to foreign investment, especially in the development of energy and transportation infrastructure.

It is located in Southeastern Europe, with 28.748 km^2 area, of which 70% is mountainous. It borders with Montenegro to the Northwest, Kosovo to the Northeast, Former Yugoslavic Republic of Macedonia to the East, and Hellas to the South and Southeast, while it has coast on the Adriatic Sea to the West and on the Ionian Sea to the Southwest.

The population is 2.831.741 people and the capital city is Tirana. The currency is the Albanian Lek and the official language is the Albanian.

Location Map

National climate change policy

Albania became part of the United Nations Framework Convention on Climate Change (UNFCCC) in January 1995 and ratified the Kyoto Protocol in December 2004[7]. As a non-Annex I Party to the Kyoto Protocol, the country does not have obligatory GHG emission reduction target (UNFCCC, 2012).

Albania is one of the six countries (Albania, Bosnia and Herzegovina, Bulgaria, Greece, Romania and the Former Yugoslav Republic of Macedonia) that together with the European Commission (EC) have signed (Minister of Public Economy and Privatization ***Mr. Ylli Bufi***) the "Declaration of Intent for the establishment of a competitive Regional Electricity Market in South Eastern Europe" (Thessaloniki, 1999) (Annex I) and also the signatory (Minister of Public Economy and Privatization ***Mr. Mustafa Muci***) of the "MoU for the establishment of a competitive Regional Electricity Market (REM) in South Eastern Europe" (Athens, 2000) (Annex II), which are the origins of the Energy Community in the area.

Albania signed the Treaty that establishes the Energy Community of Southeast Europe and EU in May 2006 and has accepted the obligation to implement the Energy Community acquits. Under this framework the country applies EU directives related to the use of Renewable Energy Sources (RES) and the promotion of energy efficiency. For the implementation of Directive 2009/28/EC the respective RES target for year 2020 is calculated at 36% (IPA, EPU-NTUA, 2010).

Mitigation

The existing mitigation policy instruments, until 31 December 2010, cover the three sectors of buildings, transport and energy (Table 1).

[7] Law No. 9334 dated 16.12.2004 on: "Ratification of Kyoto Protocol (KP) from the Republic of Albania"

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings	Energy management	Performance standards (energy audits, metering of energy consumption, energy efficiency standards) (Law No. 9379/2005 and Law No. 10119/2009)
	Energy efficiency	Energy Building Code - Building isolation requirements (Law No. 8937/2002)
	Energy management	Economic instruments (Subsidy, tax rebates, loans) (Law No. 9379/2005)
	Energy efficient appliances	Energy labeling for appliances (Law No. 9379/2005 and Law No.10113/2009)
Industry	-	-
Transport	Fuel switch	Regulatory standards (use of biofuels) (Law No. 9876/2008)
	-	Economic instruments (Carbon fee) (Law No. 9975/2008)
Energy	Promotion of RES technologies	Economic instruments - Subsidy (Feed-in-tariffs, tax exemptions) (Law No. 8987/2002, Government Decree No.27/2007)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Albanian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Albanian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
0,33	0,22	0,07	-0,26	-0,56	-0,56	-0,75

Albania continued to grow faster than other countries in the region during year 2011 but it experienced a slowdown in economic activity in the second half of 2011 and early in 2012 largely due to the weak performance of its key EU markets, Hellas and Italy. Albania's strong trade, investment and remittance ties to these countries are likely to continue to hold back growth in the coming year, while public debt is close to the statutory limit of 60% of GDP, limiting fiscal options. GDP growth in 2010 was mainly driven by foreign demand since exports of goods rose by 63%, spurred mostly by exports of electricity (EC, 2011). This was due to a rebound in energy prices combined with full capacity production from local hydropower generation, while domestic demand remained weak (EC, 2011). Real GDP continued slowing down in the second quarter of 2011, growing by 0,5% year on year, after the revised annual rate of growth of 3,8% in the previous quarter (EC, 2011).

The International Monetary Fund (IMF) provides projections for the Albanian GDP until 2017 (Table 2) (IMF, 2012; 2011)[8].

[8] http://www.imf.org/external/pubs/ft/weo/2012/01/pdf/tables.pdf

Table 3: Projections for the Albanian GDP (IMF, 2011).

Year	2011	2012	2013	2017
Annual percent change of GDP (%)	2,0	0,5	1,7	2,5

Business-As-Usual scenario

The policy mixture of the BAU scenario consisted of the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31 December 2010 (Table 1). This policy mixture does not include a Law oriented specifically to the promotion of RES since Directive 2009/28/EC on RES was not transposed, while Directive 2001/77/EC was partially transposed into the existing legislature. The lack of a regulatory framework in combination with weak and/or very restricted support mechanisms/incentives – FITs refer only to hydro - were the main barriers for RES technology deployment in Albania (USAID, 2009). Existing administrative burden (complex authorization procedures, non-transparent regulations, insufficient bureaucracy and corruption) and the absence of rules for the cost of connection to the grid or for grid reinforcements were hampering the integration of new RES producers (UNECE, 2010). There was no progress regarding the implementation of Albania's biofuels target.

No progress was made in the area of energy efficiency. There are no adaptation policy instruments.

Optimistic scenario

The policy mixture of this scenario is synthesized by:

i) the already implemented M/A policy instruments (included in the policy mixture of BAU);

ii) the M/A policy instruments that the country had set into force after 1 January 2011 and iii) additional policy instruments. These were either planned (official expressed intention) or possible ones based on the officially recorded disadvantages of the Policy instruments of the BAU policy mixture.

iii) For the latter category of policy instruments, future EU climate change policy instruments were taken into consideration and were adjusted according to the needs and priorities of the examined country.

After 1 January 2011, only one Law was set into force. Law No. 10458 amended Law No. 9975 and set new carbon fees on fuels. Transposing Directive 2009/28/EC on RES will be performed with the development of the updated Energy Law which still remains as draft (UNDP Albania, 2012).

These additional policy instruments were:

- Financial policy instruments for RES (FITs for all RES types, green certificates, tax and custody duty exemptions, Clean Development Mechanism).
- Regulatory policy instruments for EE for the building sector (energy performance standards for buildings and appliances).
- Regulatory, financial and dissemination policy instruments for EE in the transport sector (use of biofuels, subsidies, change in transport modes, awareness campaigns).
- Regulatory policy instrument for promoting biofuels in the agricultural sector.
- Regulatory and dissemination policy instruments for adaptation in water management (regulations for flood risk and prevention).
- Regulatory policy instruments for adaptation in forest management (protection actions).

Pessimistic scenario

The policy mixture of this scenario was synthesized by: i) the already implemented M/A policy instruments (included in the policy mixture of BAU); ii) the M/A policy instruments that the country had set into force after 1 January 2011 (described in OPT policy mixture) and iii) additional policy instruments.

The additional policy instruments were only:

- Financial policy instruments for RES (FITs for the most promising RES types, tax and custody duty exemptions, Clean Development Mechanism (less compared to OPT policy mixture)).
- Regulatory policy instruments for EE for the building sector (energy performance standards for buildings and appliances).
- Regulatory, financial and dissemination policy instruments for EE in the transport sector (use of biofuels, subsidies, change in transport modes).
- Regulatory policy instrument for promoting biofuels in the agricultural sector.

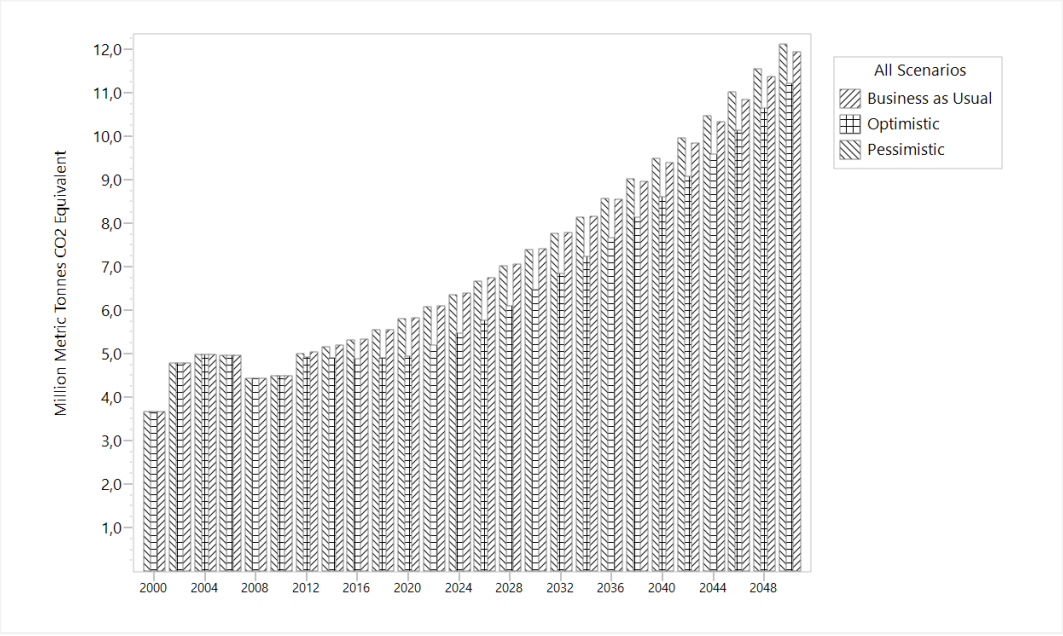
Results

The policy mixtures occuring from the implementation of the three scenarios, as outcomes of the Long range Enregy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per category.

It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanidng of the required adaptation measures, in order to implement the selected policy mixtures.

CO_2 emissions

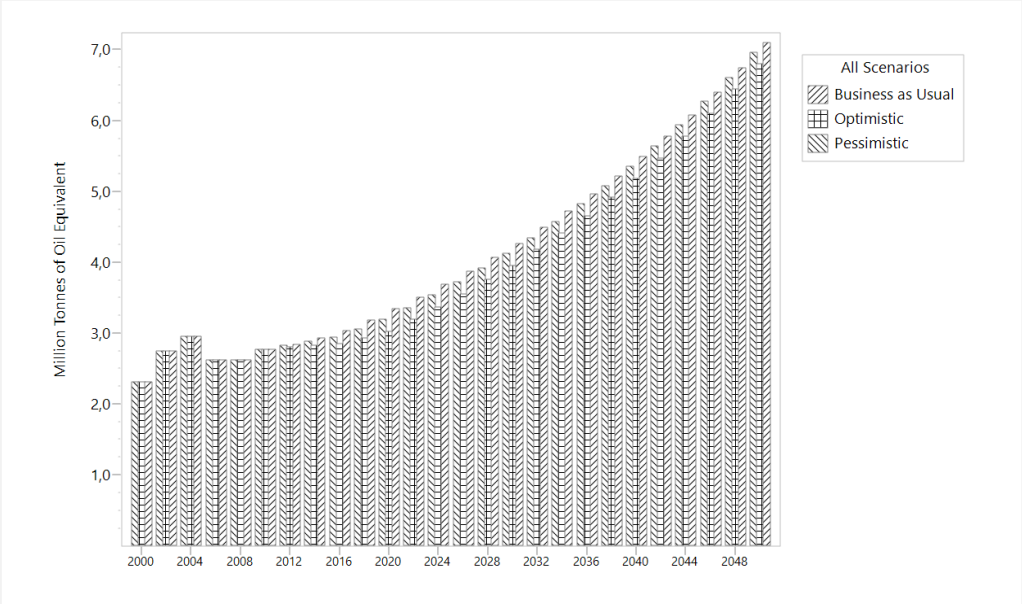
The currently implemented Albanian mitigation policy has two main components: i) penetration of RES and ii) support to energy efficiency. There are no policy measures for GHG emissions reduction or any adaptation policy instruments. According to LEAP, the best scenario occurs to be the Optimistic, since it includes the more efficient policy instruments combination.



Graph 1: CO_2 emissions for 3 scenarios.

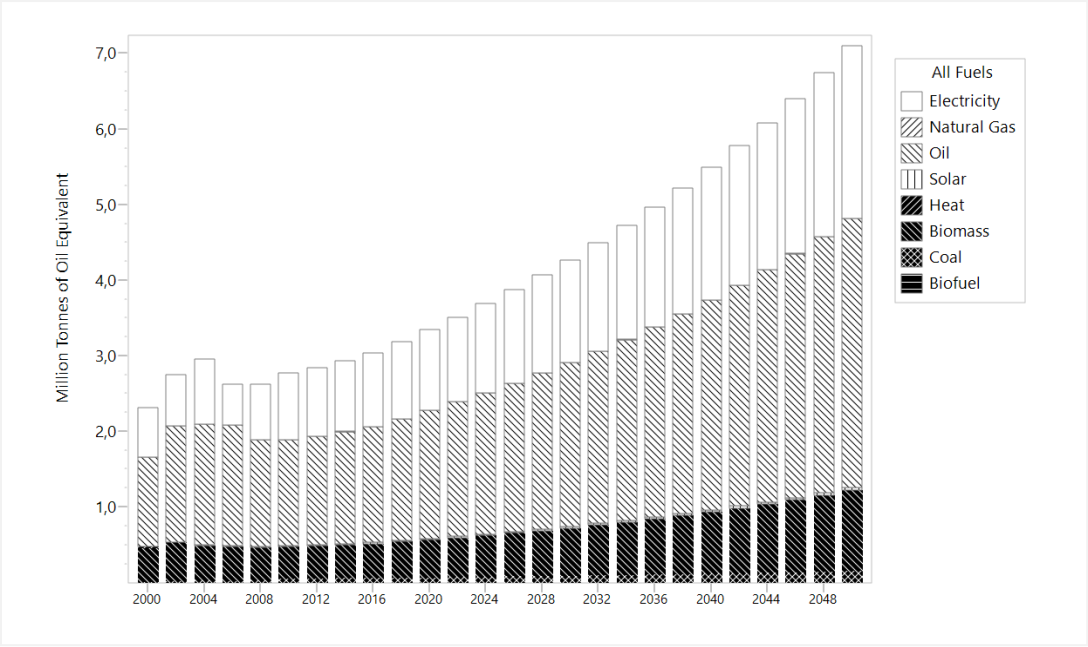
Final energy consumption

Albania's future projections of the final energy consumption appear in the graph below, presenting the highest energy consumption by applying the BAU scenario parameters and the lowest by applying the Optimistic scenario parameters.



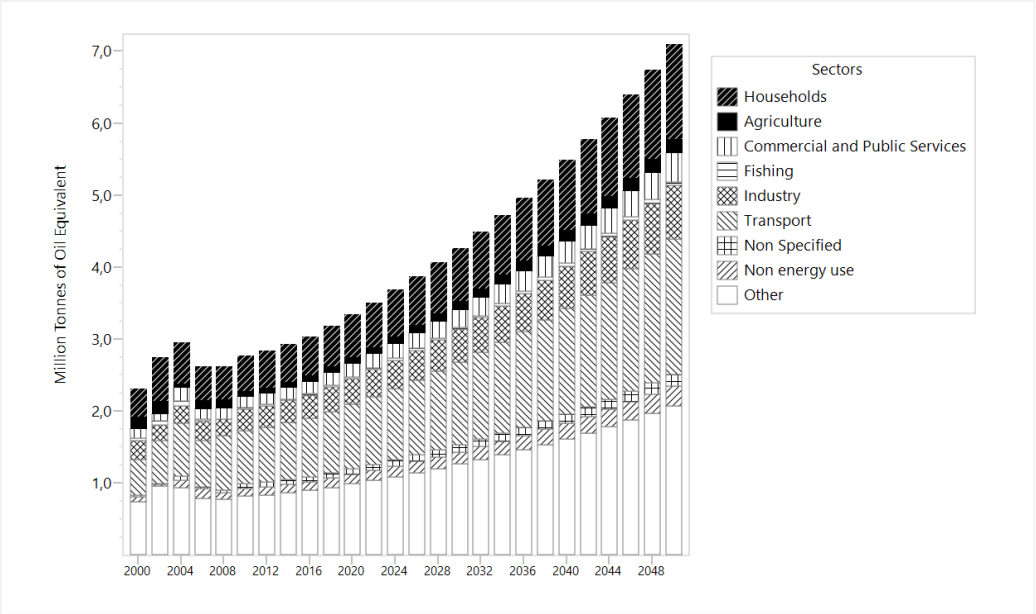
Graph 2: Final Energy Consumption for three (3) scenarios.

Analyzing the Business As Usual scenario, the use of oil products and electricity shows a constant increase up to 2050. After 2025, coal and renewables are expected to have an increase of their use, although the use of renewables is expected to account for the smallest percentage, along with natural gas.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

The sector in BAU scenario whose final energy consumption appears to increase the most is Transport, followed by Households. The final energy consumption of industry also increases, but in a smaller scale, together with Commercial and Public Services.

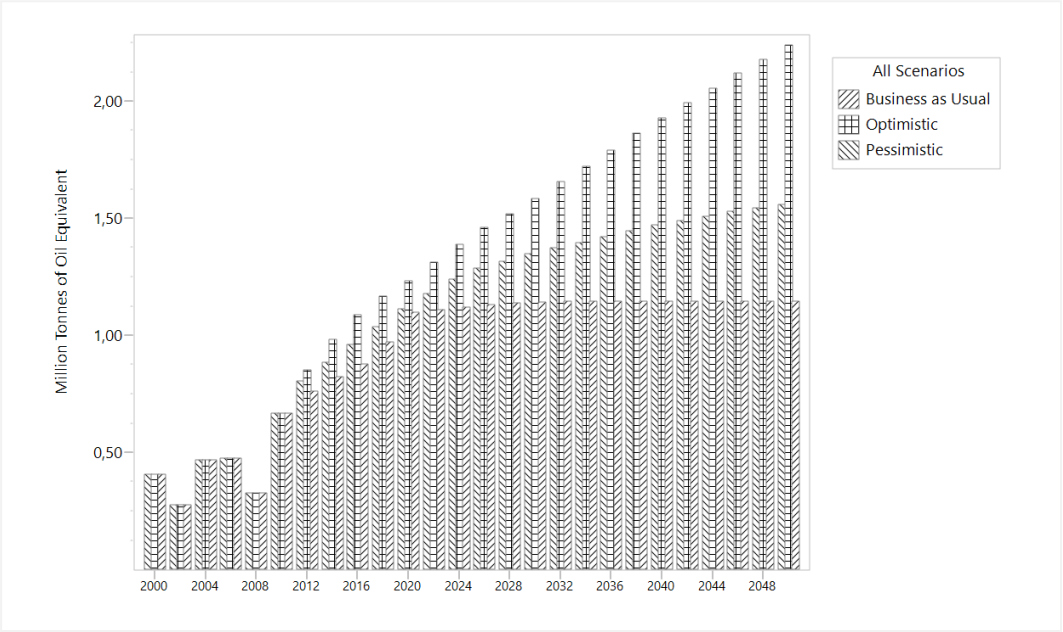


Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

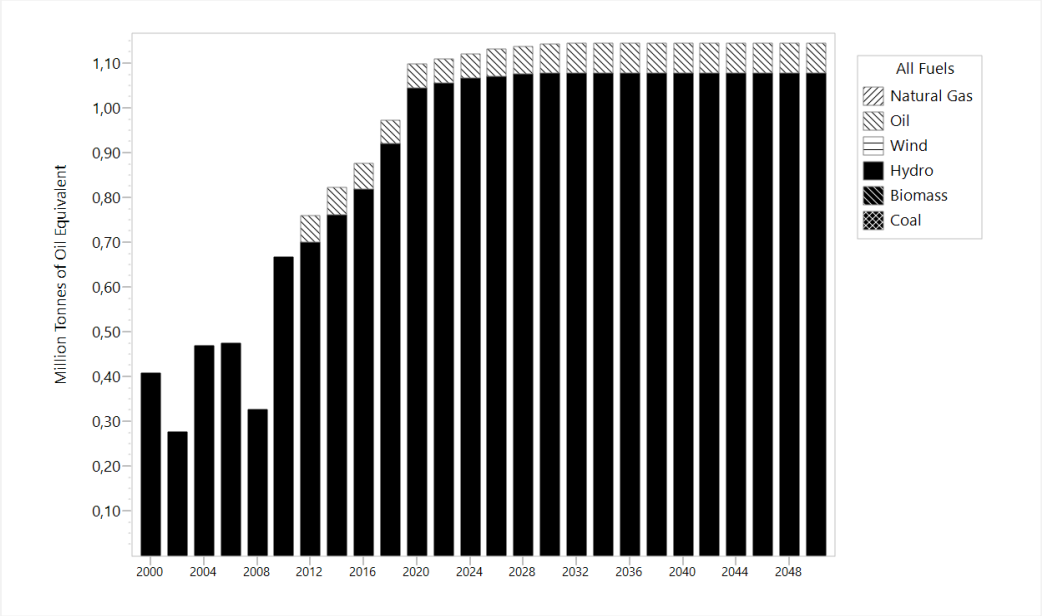
The LEAP results of electricity generation for three (3) scenarios are shown in Graph 5. For OPT scenario, hydropower installed capacity is assumed to reach the amount of 2900MW by 2050 taking into account that until now only one third of its potential is used. Also, the installed capacity of small scale hydro is assumed to increase to 300MW by 2020. For this scenario the maximum foreseen capacities of hydropower plants will be added in the system to meet the needed requirements. Also, maximum foreseen capacities of wind, oil, gas, and biomass power plants will be added in the system to meet the energy demand.

Electricity generation for the PES scenario will be based on the same technologies as OPT, but with less installed capacities.



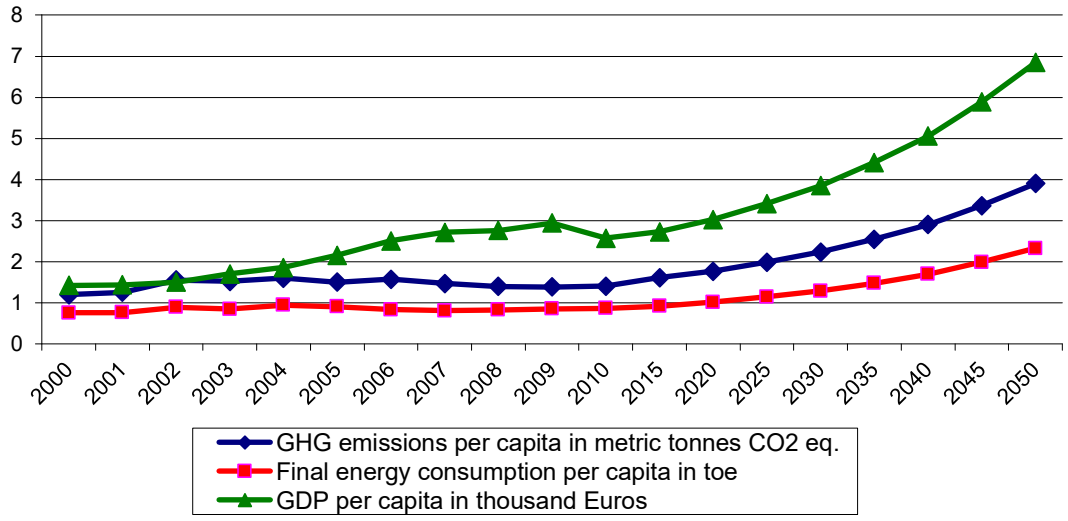
Graph 5: Electricity generation in the three scenarios.

Electricity is produced mainly from hydro power plants. About 90% of the installed capacity is in the Drini river area (ERE, 2011). For the BAU scenario several capacities of hydropower plants will be added in the system, while no modernization of the existing plants is planned. The only thermal power plant in Albania has installed capacity of 97 MW. It is based on combined cycle, but it isn't cost-efficient with the current prices of the imported oil (Diesel no.2) (ERE, 2011). For this scenario the assumption is that this plant will be operational and no other thermal power plant capacities will be added in the system.



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

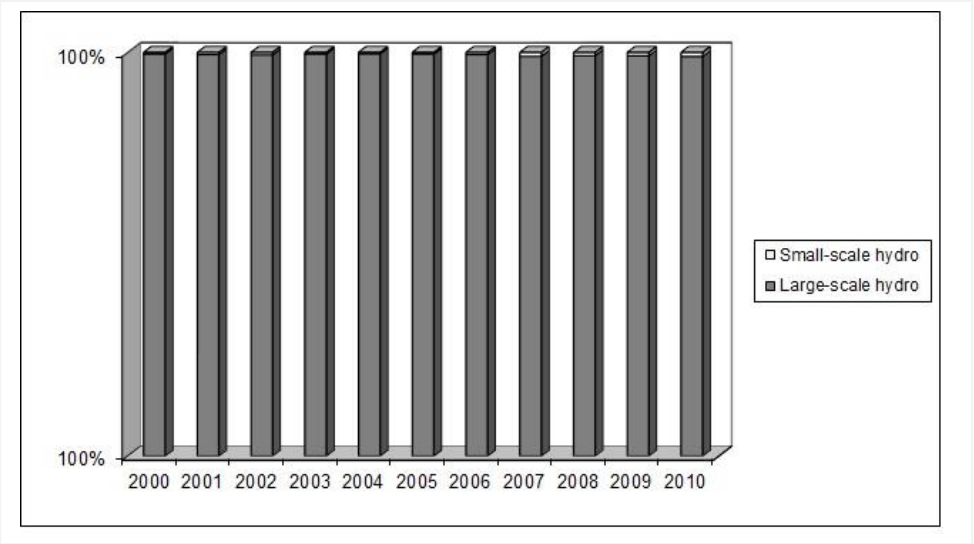


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they are increased. The growth is higher for the GDP per capita.

RES production per technology

In Albania, electricity is generated exclusively from large scale hydropower plants and an insignificant proportion of small-scale hydropower plants (<0,002%).



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

According to the AMS outcomes, the OPT policy mixture was evaluated as the most effective one compared to the other two.

The BAU policy mixture will lead to the largest amount of GHG emissions followed very closely by the PES policy mixture.

The policy mixture of BAU is characterized by low political acceptability, especially in terms of cost efficiency and equity. The OPT policy mixture has higher political acceptability, especially in terms of cost efficiency compared to the other two.

The BAU policy mixture performs better compared to the other two in feasibility of implementation, due to better performance under implementation network capacity and administrative feasibility. The PES policy mixture is characterized by relevant high feasibility of implementation, especially in the administrative feasibility. Regarding the feasibility of implementation, the financial feasibility and the implementation network capacity do not appear to perform sufficiently (to be ready) for the suggested in the OPT scenario policy mixture.

Given the above, the mitigation/adaptation policy portfolio which characterizes the Optimistic scenario is the one to achieve most of the goals of the climate change policy of Albania.

Nevertheless, the success of this policy portfolio requires a more effective and capable implementation network.

Policy Trends

Levels of Greenhouse Gas (GHG) emissions in Albania are about four to five times lower than average international levels. This is because a high percentage of electricity is produced by hydropower, but also because energy consumption per capita is low and industrial productivity has continued to fall (AEA, 2012).

Albania signed the "Declaration of Intent for the establishment of a competitive Regional Electricity Market in South Eastern Europe" (1999) and the Treaty that establishes the Energy Community of Southeast Europe and EU in May 2006. Under this framework the country will

apply EU directives related to the use of Renewable Energy Sources (RES) and the promotion of energy efficiency.

The majority of mitigation efforts are focused in the energy sector (transport, manufacturing, construction, energy industries, etc.) (UNFCCC, 2009).

Concerning the energy efficiency policy instruments, those are focused on the energy performance of the buildings and the labelling of appliances.

In 2003, the Council of Ministers approved the Energy Building Code establishing the minimum technical norms of heat conservation in buildings, which were mandatory for all new buildings (AKBN, 2002). The Energy Efficiency Law (2005) contained specific provisions regarding the energy audits for certain categories of consumers, energy labelling for household electrical appliances, creating the energy efficiency fund, offering subsidies, tax rebates, loans, energy efficient tariffs, metering the energy consumption, end use energy efficiency in the public sector etc. (Energy Community, 2011). The respective law required a number of secondary legislation to be adopted for its enforcement, but no such secondary legislation was developed and adopted (Ministry of Economy, Trade and Energy, 2005). Obligations were defined for the publishing of information regarding consumption of energy and of other essential resources, particularly by means of labelling and information, concerning certain types of household appliances, allowing the consumer to choose more energy-efficient appliances for home-use (Government of Albania, 2009).

Despite the above, there was no progress in the area of energy efficiency. The government approved a National Energy Efficiency Action Plan for the period 2011-2018 but the legal framework and inter-institutional distribution of responsibilities for its implementation has yet to be established (European Commission, 2011). In 2014, the new Law on Energy Efficiency remains to be adopted (Co-PLAN, 2013).

Concerning transport, which is among the greatest GHG emitters in Albania, in 2008 excise tax relief was applied for biofuels used in transport till 2018 and exclusion of custom duties and VAT was implemented for equipment and machineries used for biofuel production plants, equipments and materials used by farmers for production of crops for biofuel production, facilitating the promotion of biofuels (Government of Albania, 2008). Nevertheless, there was no progress regarding the implementation of Albania's biofuels target.

Trying to promote electricity from RES (RES-e), in 2007, the Feed-in-tariff (FIT) scheme and Power Purchase Agreements (PPA) were introduced. In this framework, the Public Supplier is obliged to purchase the electricity from new small-scale hydropower plants (SHPP) with installed capacity till 10 MW with a long-term PPA. The electricity price for these plants is unique and calculated by Albanian Energy Regulator (ERE) (AKBN, 2007).

Feed-in tariffs apply only on hydro power and no standard long-term PPA has been adopted by the ERE for power producers using other types of RES (ERE, 2010), excluding RES technologies like solar, wind or biomass, whose potential is significant in Albania (UNECE, 2010). Due to its geographic position in the Mediterranean Sea Basin, Albania has significant potential in hydro, wind, and solar energy. The current dependence of the country on hydropower for almost all of its electricity creates difficulties when water flows are low (AEA, 2012).

The country has a significant potential in fuel wood that can be used for energy in households and large scale power plants (UNECE, 2010). However, the lack of policy instruments for forestry management along with extensive cut has already led to significant deforestation with potential long-term impact on the climate and on the environment (UNECE, 2010).

A Law oriented specifically to the promotion of Renewable Energy Sources (RES) does not exist in the legislature of the Republic of Albania. Transposing Directive 2009/28/EC on RES is performed within the development of the updated Energy Law, which was introduced in 2013 Law No. 138/2.05.2013 (Official Gazette No. 83, 20.05.2013) (UNDP Albania, 2012; IRENA, 2013). It handles the following issues: i) Builders are required to adhere a minimum share of

solar thermal heat for certain building types[9]; ii) Solar thermal systems and components are exempt from custom tariffs and VAT (Co-PLAN, 2013); iii) Producers of electricity from RES are provided with priority dispatch (IRENA, 2013).

For the restriction of GHG emissions, in 2008, carbon fees were introduced for the use of both for imported and domestically produced petrol, benzol and gasoil. It concerns mainly transport vehicles. In 2011, the fees increased and included also coal, mazut, kerosene, and petroleum coke.

In order to decrease the GHG emissions, Albania considers CDM as a priority, focusing mainly on projects that concern RES and LULUCF and secondarily the energy demand side and the waste sector. The CDM projects, that are considered as potentially viable and of significant priority for Albania, concern the reforestation of an area of 6272,36 ha on abandoned agriculture land, using more capable species to absorb the CO_2 and fast growing species and the construction of three hydro power plants (UNFCCC-CDM, 2012a; 2012b). Concerning the Framework of Various Approaches, there are no registered NAMAs at the UNFCCC or the Ecofys database[10].

The future climate scenario for Albania predicts increased temperatures, decreased precipitation and reduction of water resources and arable land (GEF, 2006). Water resources play a key role in the economy of Albania: about 97% of the total electricity production is generated from hydro-power plants[11]; and about 50% of the cropland is irrigated producing about 80% of agriculture output (World Bank, 2003). Agriculture is one of the most important sectors of the Albanian economy with approximately in 2006 a 21% share of the GDP (Ministry of Agriculture, Food and Consumer Protection, 2007).

Nevertheless, no adaptation measures are implemented in Albania.

Conclusions

- Concerning the energy efficiency policy instruments, those are focused on the energy performance of the buildings and the labelling of appliances and are restricted only to those that are in compliance with the EU directives, as Albania participates in Energy Community.
- There is not a law that promotes specifically the penetration of RES. Although a FIT scheme combined with PPAs is implemented, it promotes only the small-scale hydropower plants, excluding RES technologies like solar, wind or biomass, whose potential is significant in the country.
- The CDM projects are considered as potentially viable and of significant priority for Albania. They concern reforestation and the construction of hydro power plants.
- Although water resources play a key role in the economy of Albania (electricity generation and agriculture) and are vulnerable to climate change, no adaptation measures are taken.

[9] http://solarthermalworld.org/content/albania-new-energy-law-shows-countrys-strong-commitment-solar-thermal
[10] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=2 and http://www.nama-database.org
[11] In 2007, a drought in the Drin's watershed led to severe electricity shortages and blackouts, affecting businesses and citizens (World Bank, 2009).

Intended Nationally Determined Contribution (INDC) of the Republic of Albania

Intended Nationally Determined Contribution (INDC) of the Republic of Albania following decision 1/CP.19 and decision 1/CP.20

This document presents Albania's Intended Nationally Determined Contribution following decision 1/CP.19 and decision 1/CP.20 of the United Nations Framework Convention on Climate Change (UNFCCC), which invited Parties to communicate the UNFCCC Secretariat their INDCs, with the aim to achieve the ultimate objective of the UNFCCC as set out in Article 2 of the Convention.

Albania is a developing country with a per capita GDP of 10 thousand USD. It's total greenhouse emissions are relatively low (8,4 M tons in 2009, of which roughly 60% is of the CO_2 emissions) it is aiming to take its fair share from the efforts to avoid dangerous climate change. The country has unique emission profile as its electricity generation is based on renewable source generation at currently, with hydro power providing dominant part of it. Unfortunately, this hydro power capacity is vulnerable to climate change impacts. The unique electricity mix of Albania is positive in the sense that electricity system is on a level of decarbonisation what other countries aim for only on the long term, but it also means that there is limited opportunity for further policies and measures in this sector to reduce emissions. Maintaining the low greenhouse gas emission content of the electricity generation and decoupling growth from increase of greenhouse gas emissions in other sectors are the primary drivers of the country regarding mitigation contribution as its INDC. Having high uncertainty of data regarding non CO_2 greenhouse gases results that Albania is to provide its INDC regarding CO_2. If data quality of non-CO_2 greenhouse gases improves, Albania intends to expand its INDC to other greenhouse gases as well.

The INDC of Albania is a baseline scenario target: it commits to reduce CO_2 emissions compared to the baseline scenario in the period of 2016 and 2030 by 11.5 %. This reduction means 708 kT carbon-dioxide emission reduction in 2030.

The emission trajectory of Albania allows to have a smooth trend of achieving 2 tons of greenhouse gas emissions per capita by 2050, which can be taken as a target for global contraction and convergence of greenhouse gas emissions. In the following additional information is provided regarding the INDC in order to facilitate clarity, transparency and understanding.

Mitigation contribution of GHG emissions	
Type	Baseline scenario target: a reduction in GHG emissions relative projected future emissions
Gases covered	Carbon Dioxide (CO_2)
Target year	2030
Baseline	Business As Usual scenario of emissions projections based on economic growth in the absence of climate change policies, starting from 2016
Sectors covered	The INDC covers the following sectors of the greenhouse gas inventory: • Energy • Industrial processes
Planning process	Planning process of the INDC included the review of available data and modelling work applicable to greenhouse gas reduction pathway as well as consultations with government stakeholders as well as with the public. The scenarios for the INDC were developed taking into consideration draft of the 3rd National Communication of Albania and all available scenario development work related to greenhouse gas emissions. Within the preparation process of the INDC it became clear that significant data uncertainty exist regarding the emissions of greenhouse gases other than CO_2 and in sectors outside of sectors covered by the INDC. Improvements were made on existing modelling work and the scenarios presented are result of this work.
Participation in international market mechanism	Albania intends to sell carbon credits during the period until 2030 to contribute to cost-effective implementation of the low emission development pathway and its sustainable development. Albania foresees that for the utilization of international market mechanism is conditional on having effective accounting rules developed under the UNFCCC to ensure the environmental integrity of the mechanisms.
Fairness, equity, ambition and Means of Implementation	
Fairness, equity and ambition	Albania is a developing country, highly vulnerable to the effects of the climate change. National emissions of the greenhouse gases represent only 0,017 % of global emissions and the net per capita GHG emissions Albania was 2.76 tCO_2e which is less the a quarter of emissions of high-income countries. . Albania will take into account the ultimate objective of the UNFCCC in its future development and committed to decouple greenhouse gas emissions from its economic growth and embarks on a low emission development pathway.

	The INDC submitted by Albania is fair and ambitious because it aims to secure limited increase of its greenhouse gas emissions while it the country pursues a strong economic development pathway. Moreover, the pathway allows on long term for the convergence of Albania's per capita emissions to the 2 ton/capita level.
Means of implementation	The results of the preparation of the INDC will be reflected in the Third National Communication of Albania and also will form the basis of the Environmental and Climate Change strategy which is in preparation. Development of the strategic directions for energy and transport sectors will take into consideration the INDC. Coordination of activities in relation to the strategy is foreseen to be coordinated by the Ministry of Environment which is the chair of the inter-ministerial body on Climate Change. Albania also transposes and implements parts of the EU legislation, including legislation on climate change and builds capacity for its implementation which supports its ability to reduce greenhouse gas emissions. Albania is a contracting party of the Energy Community Treaty which aims to extend the EU internal energy market to South East Europe and beyond on the basis of a legally binding framework. The overall objective of the Energy Community Treaty is to create a stable regulatory and market framework which also includes legislation aiming to reduce greenhouse gas emissions.
Key Assumptions	
Metric Applied	The metric used for the GHG emissions is the Global Warming Potential on a 100 year timescale in accordance with the IPCC's 2nd Assessment Report
Inventory methodology	IPCC 2006 Guidelines
Approach to accounting for agriculture, forestry and other land uses	Greenhouse gas emissions and removals from agriculture, forestry and other land uses are currently not included in the accounting. Emissions and removals from these sectors can be included in the INDC at a later stage when technical conditions allow for that.

Having relatively high uncertainty regarding emission data in the LULUCF sector and non-CO2 greenhouses gas emissions and removals Albania reserves its right to review its INDC until 2020 upon the availably of more accurate data and improved technical conditions regarding land use, land use change and forestry as well as non-CO_2 greenhouse gases and include it in its nationally determined contribution.

If the agreement or related COP decisions are amended before their entry into force in such a way that they include rules or provisions that in effect alters the assumptions under which this INDC has been developed, Albania reserves the right to revisit the INDC.

Albania requests the UNFCCC Secretariat that this submission is published on the UNFCCC webpage and that our INDC is included in the synthesis report to be prepared by the Secretariat.

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Armenia

Country profile

The Republic of Armenia is a sovereign, democratic, social and legal state. The President of the Republic is the head of the state[12]. According to the Constitution of Armenia, the President is the head of government and of a multi-party system. Executive power is exercised by the government, while legislative power is vested in both the government and the parliament. Between 1920 and 1991, Armenia was part of the Soviet Union. The modern Republic of Armenia became independent in 1991.

Armenia is located in the South Caucasus region of Eurasia, covering an area of 29.743 km^2. Located at the crossroads of Western Asia and Eastern Europe, it borders with Turkey to the west, Georgia to the north, Azerbaijan to the east, and Iran and the Azerbaijani exclave of Nakhchivan to the south.

The terrain is mostly mountainous, with fast flowing rivers and few forests. The climate is highland continental.

The population in Armenia is 3.262.200 (2010) with increasing rate. The official language is the Armenian, and the currency is the Armenia Dram. The capital city of Armenia is Yerevan, one of the world's oldest continuously inhabited cities.

Location Map

National climate change policy

Armenia ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 14 May 1993 which entered into force on 21 March 1994. The Kyoto Protocol was ratified by the Government of Armenia on 25 April 2003 and entered into force on 16 February 2005.

As a non-Annex I Party to the UNFCCC, Armenia does not have quantitative commitments for reducing GHG emissions.

The further development of the Armenian climate change policy will be determined by: i) the acceptance of Armenia as an Observer to the Energy Community and ii) the cooperation with EU under the European Neighbourhood Policy (ENP). The present ENP Action Plan for Armenia was signed on 14 November 2006 and covers five years (EC, 2012).

On 7 October 2011, Armenia became an observer under the Energy Community Treaty (EC, 2012). As an Observer Armenia will be informed about the energy policy of the participating States and of the EU, get closer to the EU acquis, relevant rules and their applications, have access to different cooperative tools and instruments (Ministry of Foreign Affairs of the Republic of Armenia, 2011). Armenia will be able to develop, according to its national options and needs, the policy framework for promoting Renewable Energy Sources and Energy Efficiency.

[12] http://www.parliament.am/parliament.php?id=armenia&page=2&lang=eng

Mitigation

In the context of its mitigation efforts, Armenia focuses on the energy sector and supports the promotion of RES and of Energy Efficiency. The respective policy instruments are shown in the Table 1.

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings	-	-
Industry	-	-
Transport	-	-
Energy	Promotion of RES	Economic policy instruments (Tariffs)(Energy Law No. 148/2001)
		Economic policy instruments (Emission trading)(Decree N-974N/2006, N 274-N/2008)
	Energy efficiency	Regulatory policy instruments (performance standards-voluntary certification) (Law No 122/2004)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Armenian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Armenian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,10	-0,18	-0,23	-0,30	-0,40	-0,48	-0,54

After the sharp economic decline of the period 1991-1994, during which Armenia had to overcome the difficulties of the transition period, the country ensured economic stability and growth (Republic of Armenia, Ministry of Nature Protection, 2010). For the period 1995-2000 the economic growth amounted to an annual average of 5,4%, while during 2001-2006 the average growth rate was 12,4% (Republic of Armenia, Ministry of Nature Protection, 2010). Structural changes of the economy led to changes in the GDP composition. In 2006, the GDP had the following composition: industrial production – 17,9%, agriculture – 18,1%, construction – 24,5%, services – 32,3% and net taxes -7,2% (Republic of Armenia, Ministry of Nature Protection, 2010).

In 2012, the International Monetary Fund (IMF) provided projections for the GDP of Armenia until 2017 (Table 3) (IMF, 2011; 2012a; 2012b)[13].

Table 3: Projections for the Armenian GDP (IMF, 2012a; 2012b).

Year	2011	2012	2013	2017
Annual percent change of GDP (%)	4,4	3,8	4,0	4,0

[13] http://www.imf.org/external/pubs/ft/weo/2012/01/pdf/tables.pdf

Business-As-Usual scenario

The policy mixture of the BAU scenario includes Mitigation/Adaptation (M/A) policy instruments implemented before 31 December 2010 (Table 1). The respective for this period Armenian climate change policy has two main components: i) penetration of RES in total generation, ii) GHG emission reductions through CDM. Concerning the adaptation policy, there are no implemented policy instruments.

The necessary policy instruments for the promotion of RES and EE are still lacking (EBRD, 2009). Particularly for EE there are no laws. As an incentive the country could establish a higher Feed-In Tariff for net metered power generated from RES that is sent to the grid.

Optimistic scenario

The enhanced M/A policy mixture of the OPT scenario includes:

i) the policy mixture of BAU;

ii) policy instruments set into force after 1 January 2011. No Laws were set into force after this date.

iii) additional policy instruments. These were:

- Financial policy instruments for RES (soft loans, tax exemptions, green certificates, higher Feed-in-tariffs for longer time period).
- Regulatory, financial and dissemination policy instruments for EE for the building and industrial sectors (energy performance standards for buildings, behaviour change using awareness campaigns, training).
- Regulatory, financial and dissemination policy instruments for promoting biofuels and EE in the transport sector (use of biofuels, lower rates/exemptions of import duty, inspections, behaviour change through eco-driving, fuel economy).
- Regulatory and dissemination policy instruments for adaptation in water management (regulations for water supply).

Pessimistic scenario

The PES policy mixture was synthesized by: i) the policy mixture of BAU; ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT) and iii) additional policy instruments which were considered in less sectors and with smaller amount for financial support towards EE and RES compared to those of the OPT.

These additional policy instruments were:

- Dissemination policy instruments for promoting biofuels and EE in the transport sector (less use of biofuels compared to OPT, behaviour change through eco-driving, fuel economy).

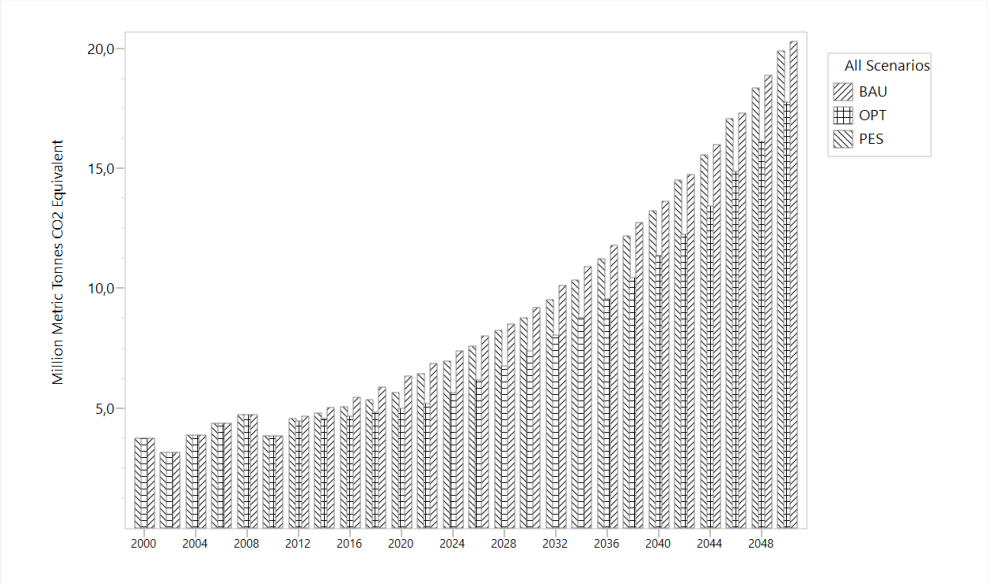
Results

The policy mixtures, which characterize the three scenarios, as outcomes of the Long range Energy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per category.

It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanding of the required adaptation measures, in order to implement the selected policy mixtures.

CO_2 emissions

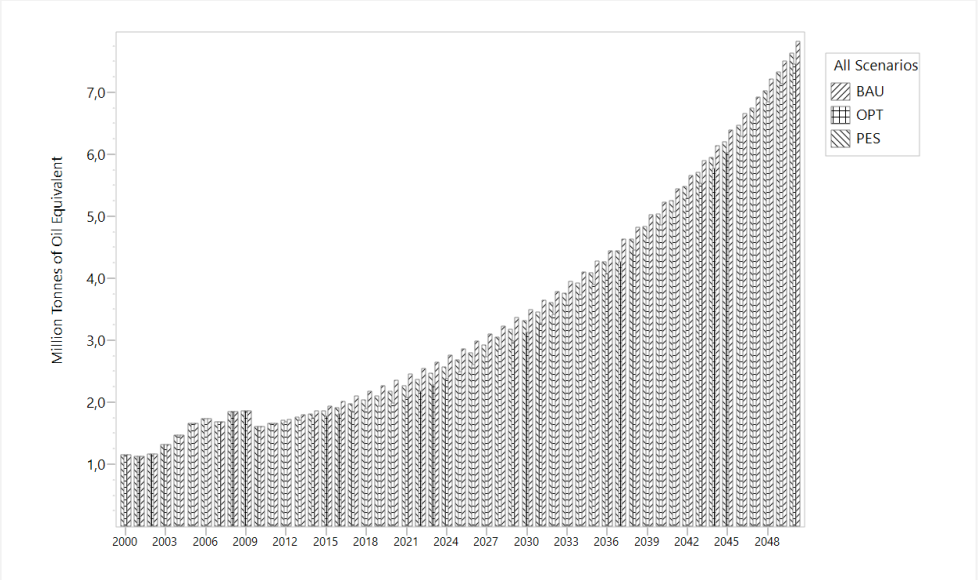
According to the outcomes of the LEAP model for the BAU scenario, in 2020 the GHG[14] emissions will be increased compared to those of year 2005[15] by almost 145%. Based on the outcomes for the OPT scenario, GHG emissions in Armenia will increase by 114% in 2020 compared to those of year 2005 and finally, for the PES scenario, GHG emissions in Armenia will increase by 129% compared to those of year 2005.



Graph 1: CO_2 emissions for three (3) scenarios.

Final energy consumption

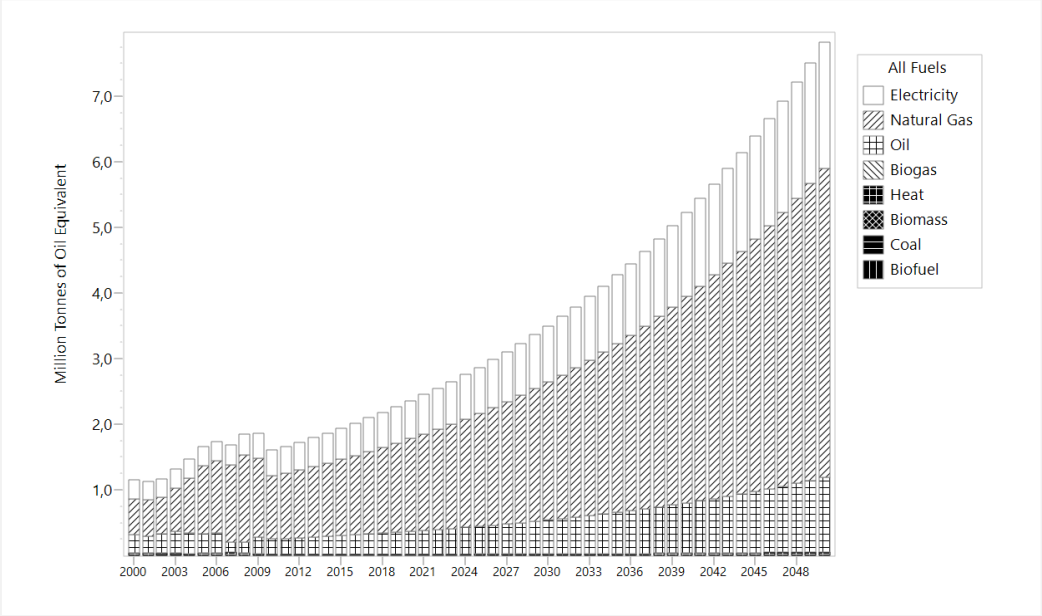
The future projections until the year 2050 present increasing final energy consumption, reaching the highest in BAU scenario. As expected, the Optimistic scenario provides the lowest final energy consumption.



Graph 2: Final Energy Consumption for three (3) scenarios.

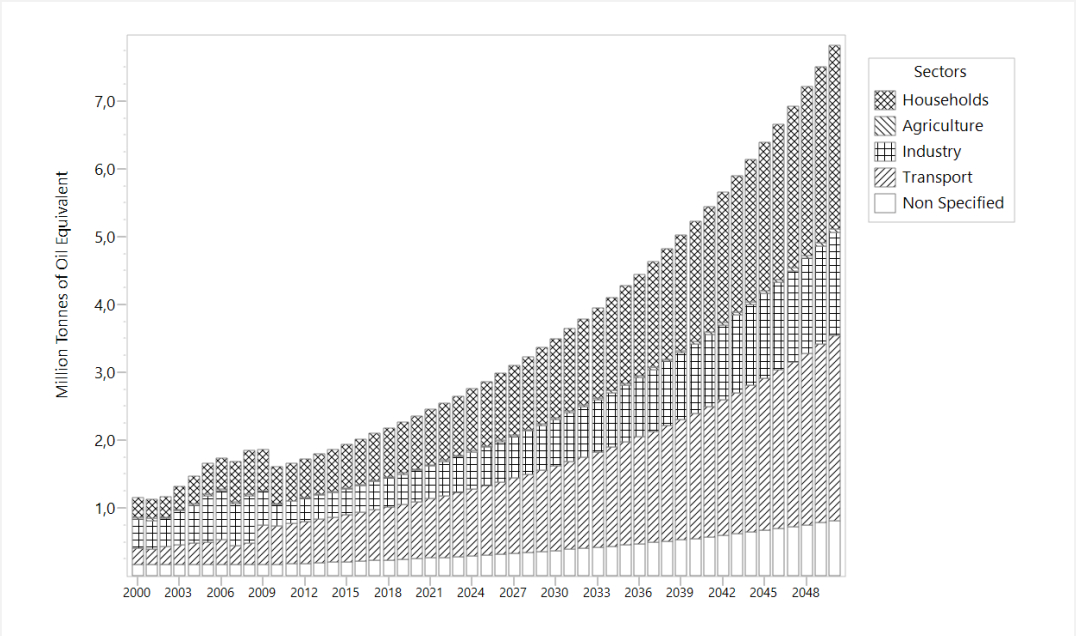
[14] For biofuels the amount of air pollutant was not available in LEAP for all branches.
[15] GHG emission sources which are taken into consideration in this study do not include the "Oil transformation" sector due to missing data. Due to this lack of data there is difference between the official historical data for GHG emissions and those calculated by the LEAP model.

Regarding the trends on the fuel use until 2050, the consumption of natural gas and electricity appear to have an important increase after 2020. Biofuel, biogas, coal and biomass share a very small percentage of the consumed fuels.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

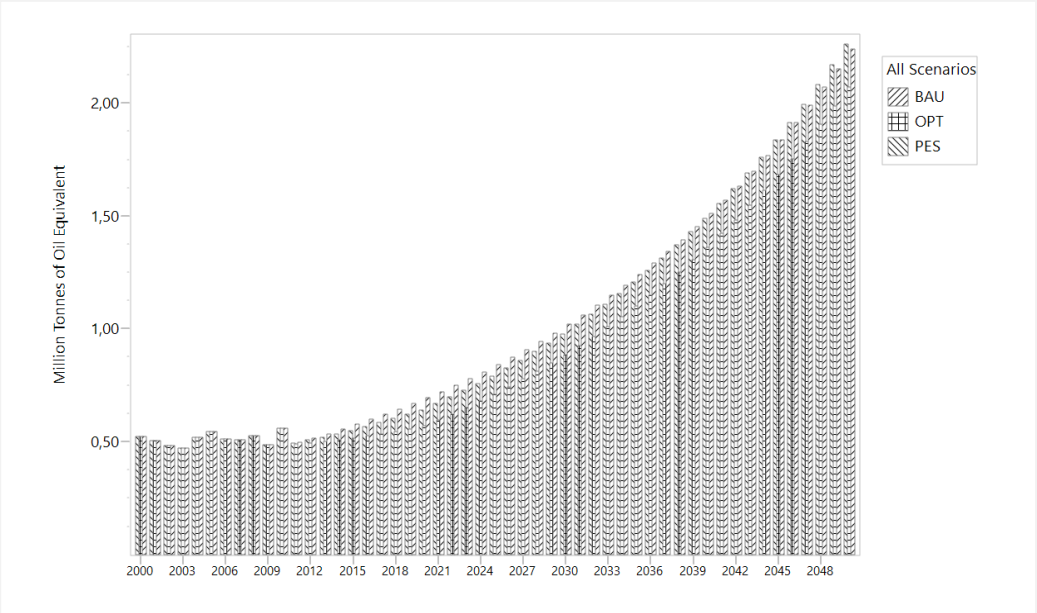
The sectors, in BAU scenario, whose energy consumption appear to increase, are mostly the transport and the households. The final energy consumption of non-specified sectors and industry remains almost stable with small increase, while the agricultural sector constantly holds the smallest percentage of final energy consumption.



Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

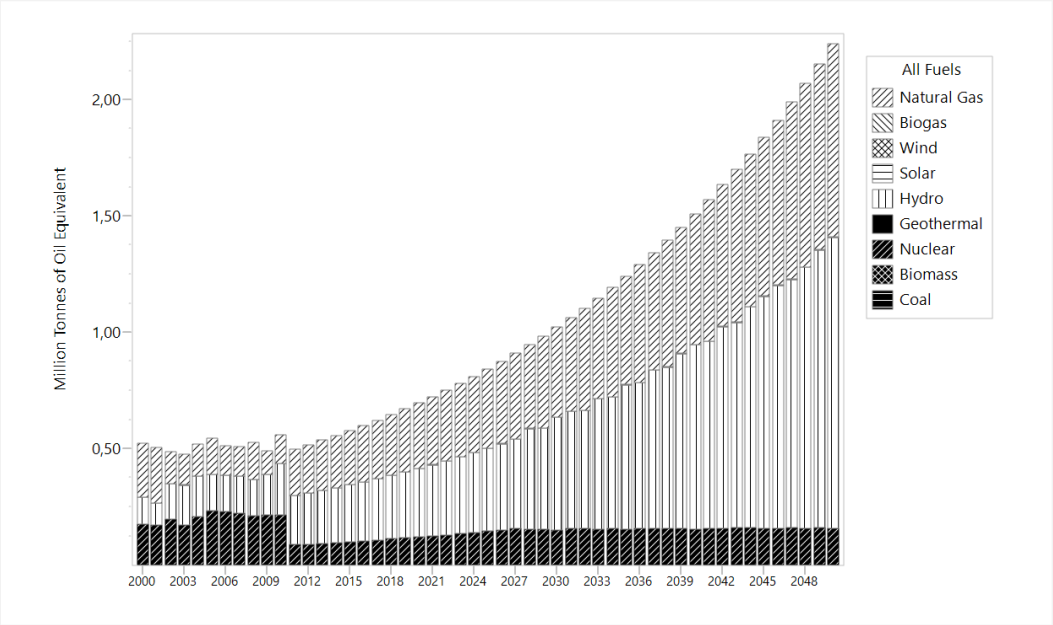
The LEAP results of electricity generation for three (3) scenarios are shown in Graph 5. In OPT scenario, the electricity generation decreases compared to the other scenarios because of the strict energy efficiency measures and the fuel switch in households and agriculture (the share of biomass increased against the share of electricity).



Graph 5: Electricity generation in the three scenarios.

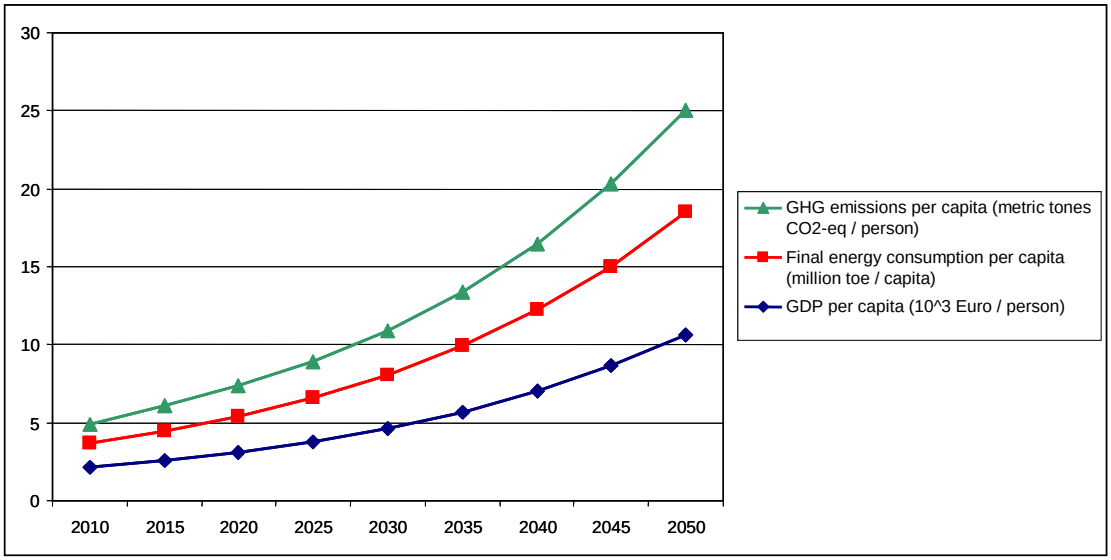
Armenia's electricity system has 3.900 MW of installed capacity, of which only 78% or 3.050 MW is currently operational. Available capacity is low compared to installed capacity because of the age and poor condition of generating plants. The nuclear power plant provides base-load capacity. The hydro power plants provide daily load regulation, while the thermal power plants operate to meet winter peak and to serve base-load for several months in autumn when the nuclear plant goes offline for maintenance and refueling.

The Government of Armenia has negotiated electricity trade agreements with neighboring countries. Armenia negotiated a gas-electricity swap arrangement with Iran under which it exports 3 kWh of electricity in exchange for 1 m^3 of gas from Iran. Since 2010, Armenia has also imported cheap hydropower from Georgia and traded the power to Iran under the gas-electricity swap.



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

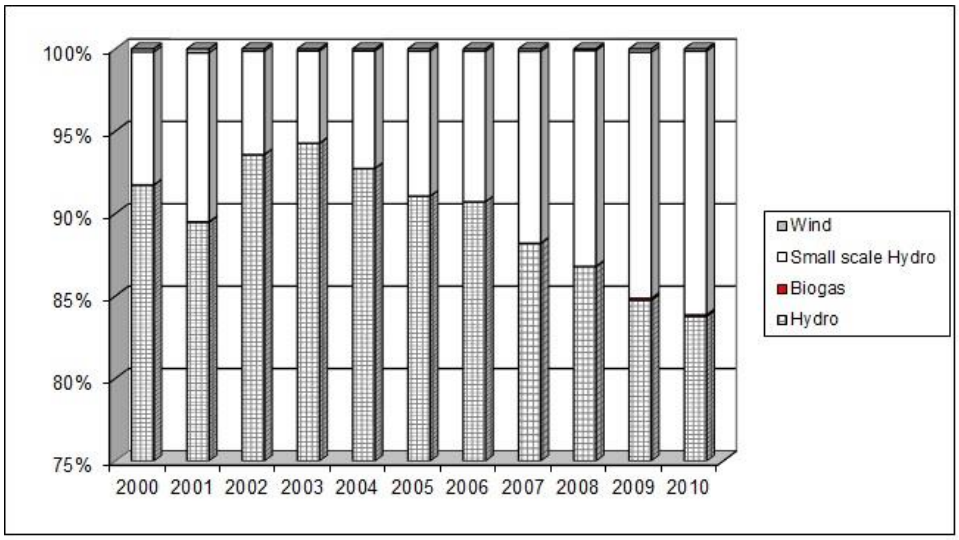


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they are increased. The growth is higher for the GHG emissions per capita.

RES production per technology

In Armenia, the main RES technology for electricity generation is large scale hydro, followed by small-scale hydro, wind (0,15%-0,2% of the total electricity generation from RES) and an insignificant percentage of biogas, which accounts for approximately 0,02% of the total electricity generation from RES.



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

According to the AMS results, the OPT policy mixture was evaluated as the most effective one compared to the other two.

The BAU policy mixture has the largest amount of GHG emissions, followed by the PES.

The policy mixture of the OPT scenario has the best performance in political acceptability since it is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two. It offers a fair distribution of the "climate change" burden among the respective sectors and allows the economic sectors to be more competitive. It offers more flexibility compared to the other two policy mixtures for the target groups in complying with their obligations under the specific policy mixture.

The performance of the BAU policy mixture under the third criterion is best, while that of OPT the worst. The country has established an implementation network that is not able to adjust properly its activities under a more strict policy mixture like that of OPT compared to the BAU one. The country limited national financial resources for the implementation of its supportive policy instruments for RES and energy efficiency.

Given the above, the mitigation/adaptation policy mixture which characterizes the OPT scenario is the one that allows the achievement of most goals of the climate change policy of Armenia.

Nevertheless, the success of this policy mixture requires the encouragement of business investments in RES and energy efficiency projects, the continuous support for establishing an effective and robust implementation network and a more stringent frame for non-compliance.

Policy Trends

Under the framework of the implementation of the EU-Armenia European Neighbourhood Policy (ENP) Action Plan in 2011, developments are expected in the energy and climate change policy areas since the updating of the energy strategy started and a five-year action plan for the implementation of the UNFCCC was adopted (EC, 2012).

In 2004, the first law that supported the development of RES and energy efficiency was set in place, covering the state administration which included activities on standardization (Energy Saving National Standards), Certification (Voluntary Certification of Energy Devices Compliance), statistics (Energy Carrier State Record and Statistics), training and education in the area of Energy Saving and Renewable Energy, and energy saving and renewable energy propaganda. Concerning Armenia's efforts towards energy efficiency, although there are quantified objectives on energy savings for the major end-use sectors, stated in the "National Energy Efficiency Action Plan" (Republic of Armenia, 2010), no policy instruments for energy efficiency are implemented so far.

Although the development of renewable energy sources is considered to be of primary importance for the country (Ministry of Nature Protection of the Republic of Armenia, 2006), the Feed-In-Tariff scheme is the only one policy instrument to promote RES in Armenia.

The first feed-in-tariffs were established for electricity generation from biomass and wind with 15-year duration in 2005 (UNDP, 2010). In 2009, feed-in tariffs (FIT) were established for a small range of RES technologies, which, in 2011, were increased by 12,5% approximately. The higher tariffs are those for electricity generation from biomass and wind, followed by small hydro power plants (EBRD, 2009). Although the country has high estimated potential in solar and geothermal energy (Ministry of Nature Protection of the Republic of Armenia, 2006), no FITs are applied for those technologies. In 2013 the President of Armenia approved the Decree "Energy Security Concept", which prioritizes the use of RES (mainly for utility-scale solar PV and geothermal power (Republic of Armenia, 2014). New FIT prices were set for RES in 2013 (Republic of Armenia, 2014).

Armenia is eligible to use Clean Development Mechanism (CDM) as means to reduce GHG emissions and boost investments. Up to now, there are 6 projects registered by the CDM Executive Board which concern the construction of small scale hydro power plants and biogas power plant, as well as landfill gas capture and power generation. According to decisions of the 17th Session of the UNFCCC Conference of Parties (COP 17), the country is encouraged to build capacity and to be engaged in the new carbon market mechanism (EC, 2012). There are no

registered NAMAs at the UNFCCC or the Ecofys database[16], although in 2013 Armenia had expressed officially the intention for seven NAMAs regarding energy efficiency and RES (UNFCCC, 2013).

Agriculture is an important sector for Armenia since it has a 20% share in the GDP due to direct agricultural production and an additional 10% due to food manufacturing. 71,6% of the national territory is agricultural lands with high dependence on irrigation water from rivers, many of which will suffer large-scale reductions in flow due to climate change impacts (Ministry of Nature Protection of the Republic of Armenia, 2009). Nevertheless, no policy instruments or strategies for adaptation to climate change are adopted.

Conclusions

- Climate change policy in Armenia is extremely weak.
- Although there are quantified targets for energy efficiency in the major end-use sectors, stated in the "National Energy Efficiency Action Plan", no respective policy instruments are implemented.
- The electricity generation in Armenia is based on nuclear power, natural gas and hydro. The only RES policy instrument is the FIT scheme applied for electricity generation and promotes only biomass, wind and small scale hydro, excluding technologies with high estimated potential like solar and geothermal.
- No RES policy instruments are applied for the final energy demand side.
- CDM and the new market mechanisms of UNFCCC could be promising climate change policy instruments. Till now, CDM is not fully utilised.
- Adaptation to climate change is supported neither with policy instruments nor with strategies.

[16] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=8 & http://www.nama-database.org/index.php/By_region

Intended Nationally Determined Contribution (INDC) of the Republic of Armenia

Annex

Intended Nationally Determined Contribution of the Republic of Armenia under the UN Climate Change Framework Convention

1. The Republic of Armenia ratified the UN Framework Convention on Climate Change (UNFCCC) in May 1993 as a developing country not included in Annex I to the Convention.
   In December 2002, Armenia ratified the UNFCCC Kyoto Protocol.
2. The geographical location of the Republic of Armenia (landlocked mountainous country with vulnerable ecosystems), and the country's need to ensure its national security, necessitates the prioritization of climate change adaptation.
3. The Republic of Armenia stated its position on the limitation of greenhouse gas emissions in subsequent national communications to the UNFCCC and in the Republic of Armenia's Statement on Association with Copenhagen Accords:
   1) In relation to low carbon developmentArmenia describes the term 'fairness' by applying the UNFCCC definition of 'common, but differentiated responsibility', which considers the different levels of historical responsibility among countries in contributing to the increase of greenhouse gas concentration in the atmosphere, leading to climate change.
   2) The climate change mitigation actions should not reverse the social and economic trends, but contribute to the socioeconomic development of the Republic of Armenia. These actions must be based on an 'ecosystem approach', which is preferred by the Republic of Armenia, since it allows to maximize the synergies between mitigation and adaptation actions in most sectors of the economy, facilitating fair regional cooperation and contributing to solidarity.
4. Intended Nationally Determined Contributions (INDC):

1.	**INDC underlying principles**	1) Limit global greenhouse gas (GHG) emissions to such a level that the global average temperature does not exceed 2^0C, 2) Ensure distribution of the GHG emissions limitation burden between countries based on the principle of equity, taking into account the rights of present and future generations to use resources, and the equal rights of humans to impact the climatic system. 3) Apply an ecosystem-based approach to mitigation andadaptation actions, giving preference to balanced and combined actions. 4) The Republic of Armenia stays in the status of non–Annex I developing country under UNFCCC, andis prepared to undertakecertain quantitative contribution to limit its GHG emissions growth based on the above mentioned principle of equity, and subject to adequate financial, technological and technical support. 5) The INDC shall be based on the principle of 'Green economy' and be compatible with the social and economic development goals of the Republic of Armenia.

2.	**Mitigation of climate change**	**1) Applieddefinitions** a. GHG emissions limiting volume - the total volume of GHG emissions, which ensures the limitation of an increase in the average global atmosphere temperature to below 2^0C, according to the IPCC Fifth Assessment Report this is equal to 1.000 giga tons (Gt) carbon dioxide equivalent. b. GHG neutral emissions volume - the total annual volume of GHG emissions, which can be fully absorbed by the earth's ecosystems (ocean, land vegetation, soil) and be irreversibly accumulated in the ecosystems (around 11 Gt/year) carbon dioxide equivalent. **2) Calculation basis** a. The 'GHG limitation quantitativeindicator' is calculatedbased on the per capita emissions of the global population, b. For global population consider the fixed estimate as of 1990, equal to 5.3 billion people (3.35 million was the Republic of Armenia's population in 1990), c. The per capita emissions limiting volume on the global level equals to 189 tons/per capita (1.000 Gt/5.3 billion people), d. To set the total aggregate quantitative contribution of the Republic of Armenia under INDC equal to**633 million tons carbon dioxide equivalent**(189 tons per capita x 3.35 millionpeople)fortheperiodof2015-2050 or an annual average of 5.4 tons per capita. In 2010, Armenia's GHG emissions comprised 2.14 tons per capita. The Republic of Armenia strives to achieve ecosystem neutral GHG emissions in 2050 (2.07 tons/per capita annual) with the support of adequate (necessary and sufficient) international financial, technological and capacity building assistance. In case of non-exceeding its total emissions quota (633 million tons) set for the period of 2015-2050 Armenia can credit non-utilized reduction to 'carbon market', or transfer it to the balance of emissions limitation envisaged for the period of 2050-2100. **3) Timeframe** The timeframe for the INDC is 2015-2030, including: a) 2015-2019 – the period of voluntary preparatory contributions. Accept those contributions, beyond the INDC start date in 2020, as «ambitious actions» in accordance with the development index of the Republic of Armenia, stated by forecast "mitigation measures" scenario of the Third National Communication to UNFCCC". The scenario includes commitments undertaken by the city authorities of the country under the Covenant of Mayors. b) 2020-2050 – the period of contribution under the new

UNFCCC agreement.

c) 2030 - interim review of the mitigation regime, taking into account possible changes of indexes mentioned under Para 2, points 2) a and b.

4) The main sectors included in the mitigation contribution are:

a. Energy (including renewable energy and energy efficiency
b. Transport (including development of electrical transport)
c. Urban development (including buildings and construction);
d. Industrial processes (construction materials and chemical production)
e. Waste management; (solid waste, waste water, agricultural waste),
f. Land use and Forestry (afforestation, forest protection, carbon storage in soil)

Consider 20.1 per cent as an optimal forest cover indicator of the territory of the Republic of Armenia according to the Armenia`s First National Communication to UNFCCC (1998) and Government Decision No 1232 of 21 July 2005 "On Adoption of the National Forest Program of the Republic of Armenia". To achieve that indicator by 2050 and consider the obtained organic carbon absorptions and accumulations in the INDC and expand the impact period up that measure till 2100.

Ensure organic carbon conservation, accumulation and storage in all categories of lands through comprehensive measures and include achieved balance in the INDC.

Apply the Nationally Appropriate Mitigation Actions (NAMA) format: as well as national and international Measuring Reporting and Verification (MRV) system for implementation of INDC mitigation component.

5) Greenhouse gases considered:

Define that considered greenhouse gases are:

a. Carbon dioxide (CO_2),
b. Methane (CH_4),
c. Nitrous oxide (N_2O),
d. Hydrofluorocarbons (HFCs)

The emissions and absorption of mentioned gases are calculated in CO_2 equivalent, according to the "global warming potential" defined by IPCC Second Assessment Report ".

3.	**Adaptation to climate change**	Basis and approaches to adaptation: 1) Adaptation strategy and contributions are based on the requirement of the UNFCCC Article 2 "Objective", which stipulates to restrain climate change within timeframe sufficient to allow ecosystems to adapt naturally to climate change. Thus, the natural ecosystems adaptation approach in INDC is considered pivotal for Armenia's adaptation strategy and actions (contributions), and a basis for the development of the national adaptation plan. 2) The Republic of Armenia embraces the ecosystem approach for adapting to climate change. The approach is in harmony with the environmental policy of the country, can ensure synergy with other international environmental conventions and treaties, will lay the ground for inter-sectoral coordination, and will support establishment of cross-border cooperation and solidarity environment. 3) Adaptation activities will be prioritized based on the most vulnerable sectors to climate change: a. Natural ecosystems (aquatic and terrestrial, including forest ecosystems, biodiversity and land cover) b. Human health c. Water resource management d. Agriculture, including fishery and forests e. Energy f. Human settlements and infrastructures g. Tourism
4.	**Technology transfer**	Ensure adequate technological assistance and create a favorable environment for technology development and transfer. Establish institutional mechanisms to overcome barriers for the introduction of innovative technologies for climate change mitigation and adaptation, including strengthening the system of legal protection of intellectual property right. Ensure an open and transparent system of technology introduction and transfer as a contribution to the INDC, such as through the cooperation and experience exchange with "Climate Technology Center and Network" (CTCN) and through the establishment of a similar mechanism in the country (ArmCTCN).
5.	**Capacity strengthening**	Strengthen the operations of Intergovernmental Council on Climate Change, established by the Decision No 955 of the Prime Minister of the Republic of Armenia of 02 October 2012 and its Working Group. Establish consistent process for professional training and education on climate change-related issues, as well as enhance cooperation at the international and regional levels.
6.	**Finance**	Develop an appropriate legislative and institutional framework for adequate financial assistance. For this purpose a targeted financial mechanism consisting of two components should be created to

		finance climate change mitigation and adaptation projects: 1) The first – internal (domestic) climate revolving civil fund, to be replenished on permanent base by allocations from environmental fees, ecosystem service fees, including "carbon taxing". 2) The second –external (international) financial mechanisms with resource provision following the principle of additionality, such as the Green Climate Fund, the Adaptation Fund, the Global Environmental Facility, bilateral and multilateral funds, and other sources. The emerging financial mechanism will: a. Create realistic and operational grounds for establishment and development of the reliable public- private partnership (PPP), b. Ensure the right of future generations to 'use climate resources'.
7.	**Transparency**	Transparency of mitigation and adaptation actions will be ensured through: 1) The introduction of national and international MRV system, 2) Open and accessible information system, participatory process. The open and transparent cooperation between public service providing bodies and civil society organizations ensured through establishing and strengthening effective legal incentives.

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Azerbaijan

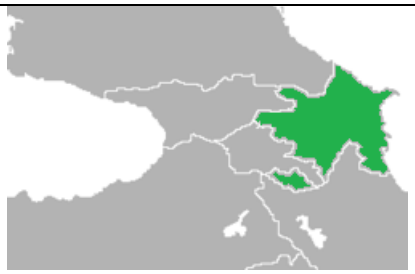
Country profile

Azerbaijan is a presidential republic. The Legislative Authority is exerted by the National Assembly (Milli Mejlis).

With an area covering 86,600 km^2, Azerbaijan is the largest country in the Caucasus region, located at the crossroads of Western Asia and Eastern Europe. It is bounded by the Caspian Sea to the east, Russia to the north, Georgia to the northwest, Armenia to the west and Iran to the south. The exclave of Nakhchivan is bounded by Armenia to the north and east, Iran to the south and west, while having a short borderline with Turkey to the northwest.

The population is 9.356.500 (2013) and the official language is the Azerbaijani, which belongs to the Turkic language family. The capital city is Baku and the currency is the Azerbaijani Manat.

Location Map



National climate change policy

Azerbaijan ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995 and the Kyoto Protocol in 2000. As a non-Annex I Party to the UNFCCC, Azerbaijan does not have quantitative commitments for reducing GHG emissions. The country has not undertaken so far any quantitative objectives for Renewable Energy Sources (RES) or for Energy Efficiency (EE).

The Azeri climate change policy will be probably developed in cooperation with EU. Azerbaijan, as a key strategic energy partner for EU, both as a producer and transit country, received as assistance, 14 million € budget support programme to reform its energy market and legislative framework, improve EE and promote new and renewable energy sources (EC, 2012; EC, 2010). All these on the basis of the defined priorities under the European Neighboring Partnership (ENP) Action Plan and the Memorandum of Understanding (MoU) (aimed at establishing a partnership on energy between Azerbaijan and the EU and signed in Brussels on 7 November 2006). The harmonization of the Azeri legislation with EU law is also an important component of their cooperation, initiated by signing the MoU on Strategic Partnership between the European Union and Republic of Azerbaijan in the field of Energy in 2007 (UNECE, 2011). The EU legislation has been studied and taken into account when drafting new legislation. Many EU directives in environmental areas have already been translated into Azeri language (UNECE, 2011). In 2010 Azerbaijan confirmed at high political level its commitment and policy priority to engage the country more forcefully into the development of RES (notably wind, solar and hydro) and of EE (EC, 2010).

Azerbaijan is encouraged to fully implement the Cancun and Durban agreements and in particular plan a low carbon development strategy including updated information on targets or actions that it will implement (EC, 2012).

Mitigation

Azerbaijan has implemented a limited number of climate change policy instruments which concern only the sectors of transport and energy (Table 1).

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings	-	-
Industry	-	-
Transport	Energy efficiency	Regulatory standards (emission limits of cars (Decree No. 45/2010))
		Economic instruments (tax exemptions)
Energy	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Presidential Decree No. 341/2005, Resolution of the cabinet of Ministers No. 247/2005)
	Energy efficiency	Tradable permits (Presidential Decree No. 727/2005)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Azeri population is expected to increase for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Azerbaijani population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
1,19	0,96	0,64	0,43	0,34	0,33	0,09

The Azerbaijani economy has completed its post-Soviet transition into a major oil based economy (with the completion of the Baku-Tbilisi-Ceyhan Pipeline). Azeri GDP grew 41,7% in the first quarter of 2007, possibly the highest of any nation worldwide (RBC, "CIS Statistics Committee reveals average GDP growth", 2007). Azerbaijan is considered as one of the most dynamic and strongest economies in the Commonwealth Independent States (CIS) region and a leading regional investor (UN, 2011). The country reached the 55th position (out of a total of 142 countries) in the 2011-2012 Global Competitiveness Index, outperforming all its CIS neighbors (UN, 2011).

Azerbaijan produced 8 billion AZN - GDP, in January-February of 2012, up by 0,5% from the previous year (CESD, 2012). GDP in the non-oil sector grew by 7,1% to 42,6%, while GDP in the oil and gas sector declined by 4,5% (CESD, 2012). 60,5% of GDP has fallen to the share of industry, 2,5% to agriculture, hunting and forestry (an increase of 2,8% compared to previous year), 5% to transport (increase by 1,6%), 5% to construction, 6,9% to wholesale and retail trade, repair of motor vehicles, household appliances and personal items (increase by 9%), 1,3% to hotel and restaurant services (17,7% increase), 1,6% to the Information and Communications Technologies (ICT) sector (14,1% increase), 11,3% to social and other sectors (CESD, 2012).

The International Monetary Fund (IMF) provides projections for the Azeri GDP until 2017 (Table 3) (IMF, 2012)[17].

[17] http://www.imf.org/external/pubs/ft/weo/2012/01/pdf/tables.pdf

Table 3: Projections for the Azerbaijan GDP (IMF, 2011).

Year	2011	2012	2015	2017
Annual percent change of GDP (%)	2,8	2,5	0,9	3,1

Business-As-Usual scenario

The policy mixture of the BAU scenario contained the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31 December 2010 (Table 1). The respective for this period Azeri climate change policy has only one main component, the promotion of RES. There are no specific obligations to purchase renewable energy, only defined tariffs exist for the generating companies so as to sell energy in the wholesale market The adaptation climate policy concerns water management with only one policy instrument implemented, that of water fees.

Optimistic scenario

The enhanced M/A policy mixture of the OPT scenario was synthesized by:

i. the policy mixture of BAU;

ii. the M/A policy instruments that were set into force after 1 January 2011. No Laws relevant to climate change policy were issued. Only the State Agency for Alternative and Renewable Energy Sources (SAARE) under the Ministry of Industry and Energy was established by the Presidential Order on "Preparation of State Strategy on Use of Alternative and Renewable Energy Sources for 2012-2020" (issued on 29.12.2011).

iii. additional policy instruments, which were:

- Financial policy instruments for RES (subsidies, tax exemptions).
- Regulatory policy instruments for EE of the building sector (building code, energy efficiency standards for households, thermal isolation requirements).
- Regulatory and financial policy instruments for EE in the energy and industrial sector (energy efficiency standards, emission limits, subsidies, tax exemptions).
- Dissemination policy instruments for the agricultural sector (awareness campaigns).

Pessimistic scenario

The PES scenario had a restricted M/A policy mixture that was synthesized by:

i. the policy mixture of BAU;

ii. the M/A policy instruments set into force after 1 January 2011 (described in the OPT policy mixture) and

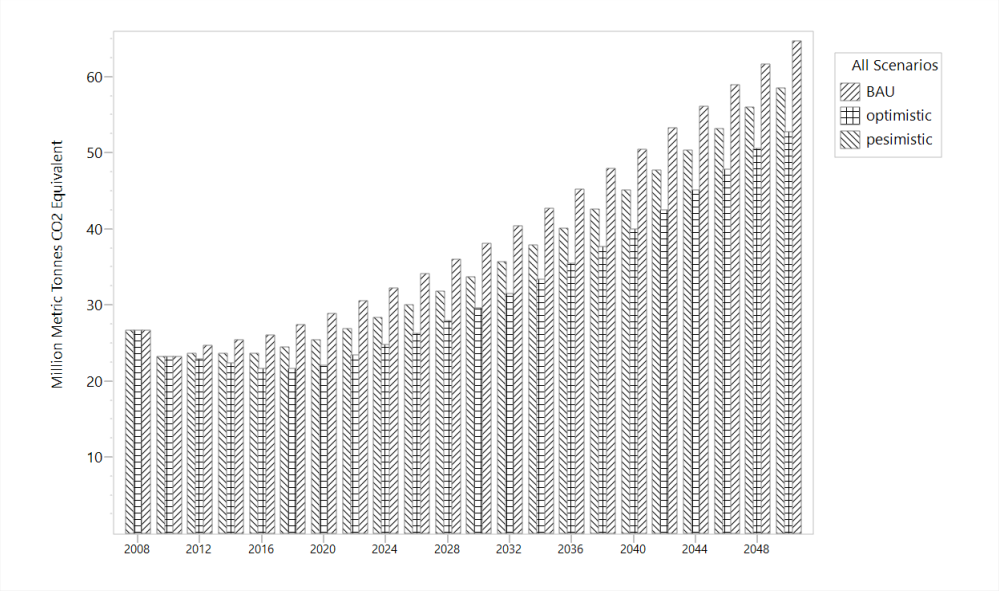
iii. additional policy instruments which were only:

- Regulatory policy instruments for EE of the building sector (building code, energy efficiency standards for households, thermal isolation requirements).

Results

CO_2 emissions

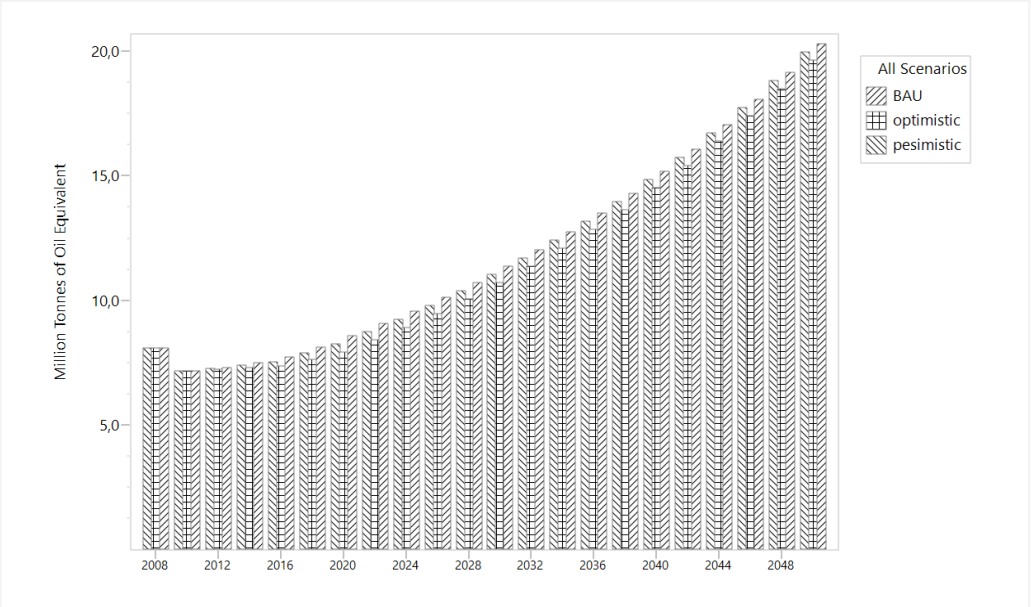
According to the outcomes of the LEAP model, the scenario with the highest reduction of CO_2 emissions is expected to be the OPT, when compared with the PES and the BAU.



Graph 1: CO_2 emissions for three (3) scenarios.

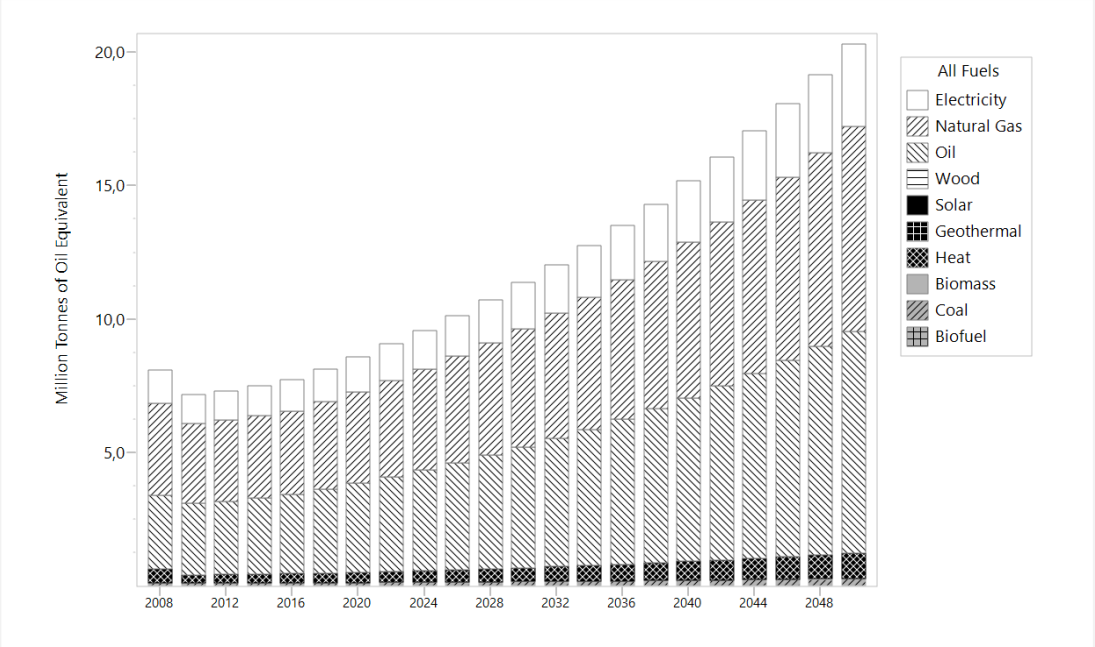
Final energy consumption

The future projections, until year 2050, present a steady increase of the final energy consumption. The BAU scenario is expected to have the highest levels of consumption, while the PES will result to less final energy consumption compared to BAU. The OPT scenario has the lowest final energy consumption out of the three scenarios.



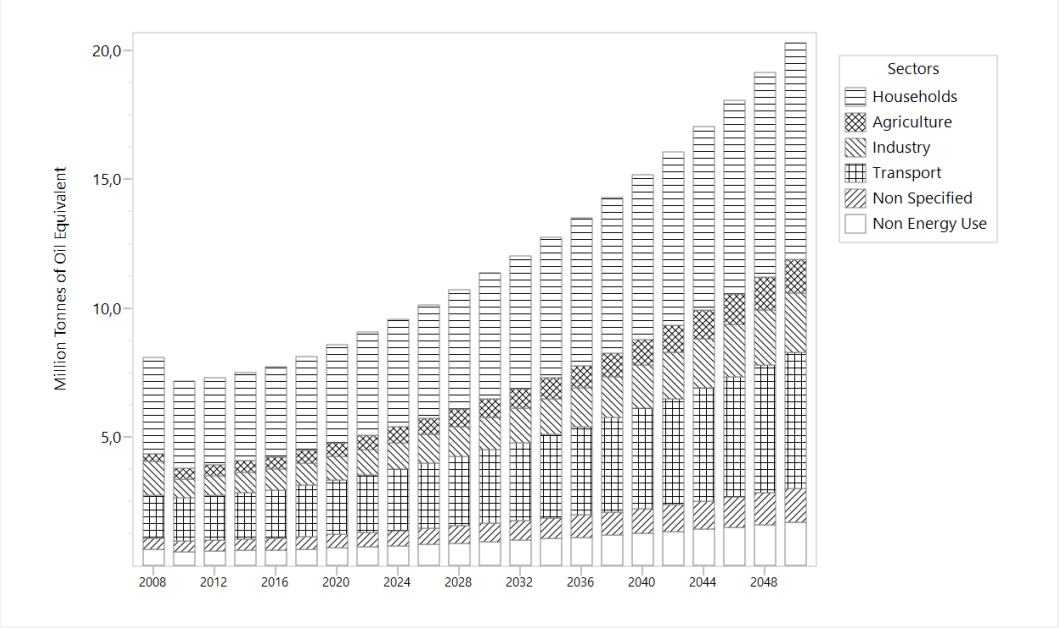
Graph 2: Final Energy Consumption for three (3) scenarios.

For the final energy consumption per fuel of the BAU scenario, the fuels with the higher increase of use are oil and natural gas. Electricity increases but in smaller scale.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

The sectors, in BAU scenario with the highest increase in final energy consumption are households and transport. Final energy consumption increases for industry and agriculture but with lower rate; same situation for non specified and non energy use sectors.

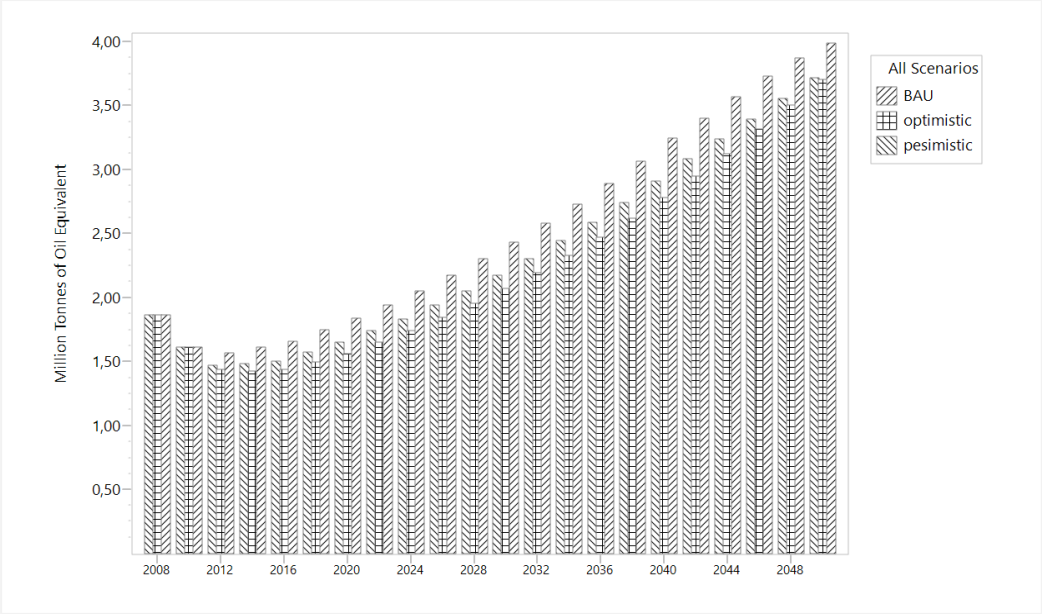


Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

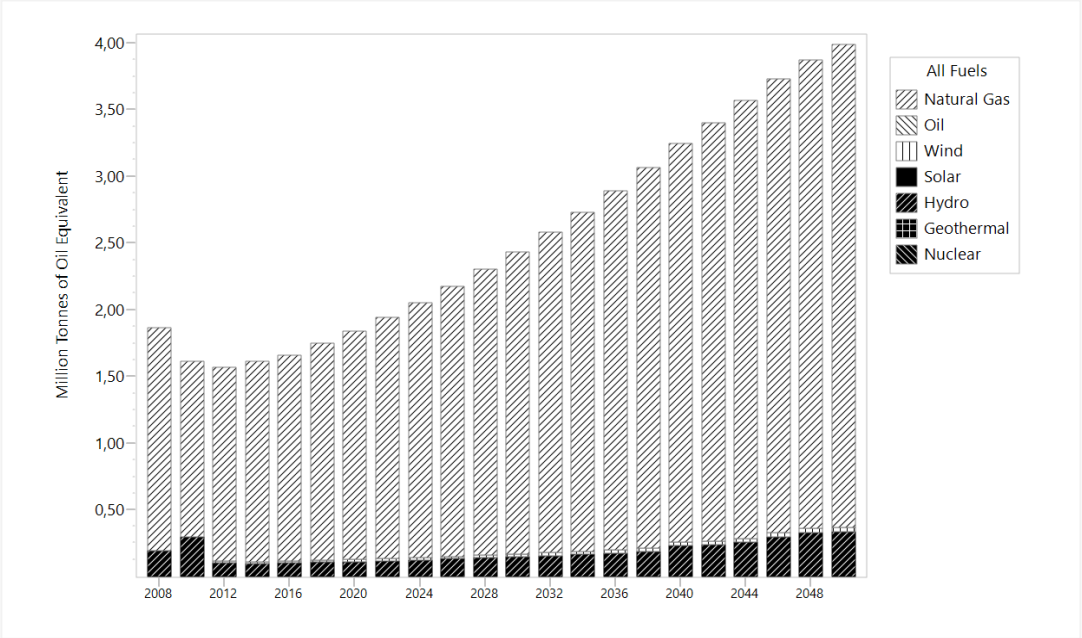
The LEAP results concerning electricity generation for the three (3) scenarios are shown in Graph 5.

Electricity generation was based on natural gas and water resources in the BAU scenario. For the OPT scenario small scale hydro, solar and wind energy are added for electricity generation based on the available information about the potential of the country in these RES types. For the PES scenario, less installed capacity of small scale hydro, solar and wind was assumed.



Graph 5: Electricity generation in the three (3) scenarios.

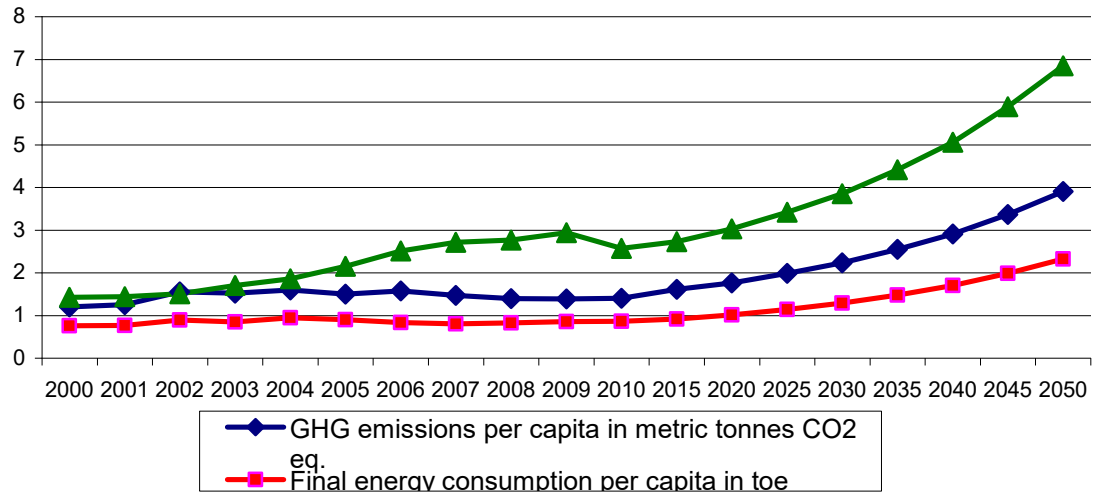
The system comprises of ten (10) Thermal Energy Systems (TESs) and six (6) Hydro Energy Systems (HESs). The thermal-electric stations are of two types: condensation and heating. Retrofitting at the majority of these stations resulted in the reduction of GHG emissions, and similar projects are envisioned for implementation as Clean Development Mechanism (CDM) projects (Ministry of Ecology and Natural Resources, 2010)[18].



Graph 6: Electricity generation per fuel in BAU scenario.

[18] Ministry of Ecology and Natural Resources of the Republic of Azerbaijan, 2010. 2nd National Communication to UNFCCC. Available at: http://unfccc.int/resource/docs/natc/azenc2.pdf

National indicators

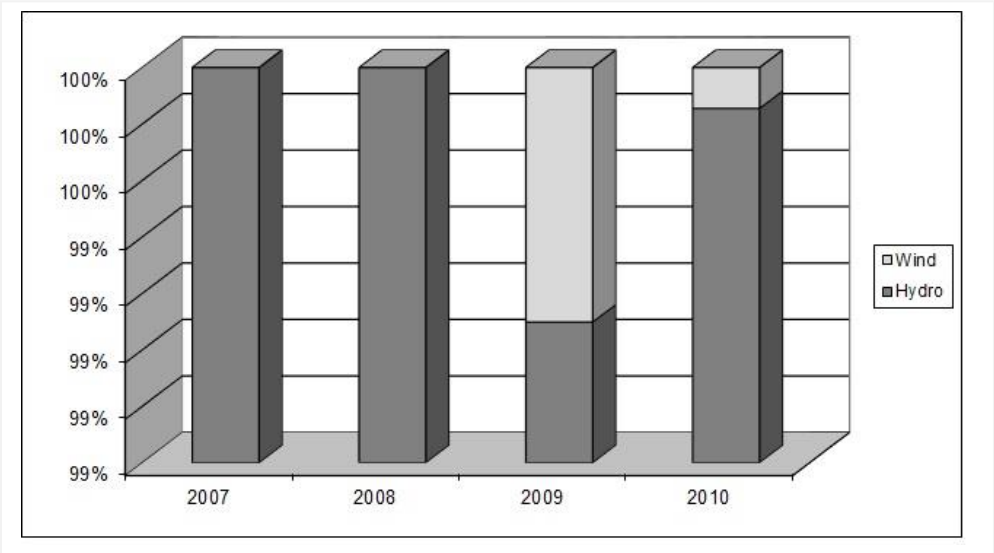


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they are increased. The growth is higher for the GDP per capita.

RES production per technology

In Azerbaijan, the main RES technology for electricity generation is hydro (there are no separate data on installed capacity for small-scale and large-scale hydro plants) followed by wind, whose percentage did not exceed 0,9% of the RES-e. The respective plants were added in 2009.



Graph 8: Technology shares in RES electricity generation in 2007-2010.

Evaluation

According to the outcomes of the AMS method the OPT policy mixture was evaluated as the most effective one compared to the other two.

The OPT policy mixture has the highest direct contribution to the GHG emission reductions, followed closely by that of PES, while the BAU policy mixture has the lowest. The same situation appears in the indirect environmental effects.

The policy mixture of the OPT scenario has the best performance in political acceptability since it is the best cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two policy mixtures. It offers a fair distribution of the "climate change" burden among the respective sectors. Moreover, OPT and partially PES encourage the introduction of innovative technologies, such as biomass, biogas and wind. All the policy mixtures are in the same low level of stringency of non-compliance.

The performance of the three policy mixtures under the third criterion is almost equal. BAU policy mixture appears to be easier to implement, mostly due to the implementation network capacity that already exists, in comparison with the other two. Apart from that sub-criterion, in the other cases, the three policy mixtures are very close.

Given the above, the mitigation/adaptation policy mixture which characterizes the OPT scenario is the one that allows the achievement of most goals of the climate change policy of Azerbaijan.

Nevertheless, the success of this policy mixture requires the demonstated effectiveness of the implementation network, availability of financial resources and a more stringent frame for non-compliance.

Policy Trends

The efforts of Azerbaijan to support and implement international commitments regarding climate change, have been focused on programmes which included activities to identify suitable RES, measures on climate change mitigation and actions for improved climate monitoring; but so far neither a comprehensive mitigation nor an adaptation strategy has been worked out (UNECE, 2011). The current climate change policy includes no schemes or subsidies to encourage energy efficiency and no specific obligations to purchase renewable energy (Energy Charter Secretariat, 2011).

Although the most energy intensive sectors are households and transport, no policy instruments or strategies for the promotion of energy efficiency are in place. The European Bank of Reconstruction and Development (EBRD) intends to continue supporting Azerbaijan's infrastructure development with emphasis on the power sector and energy saving investments (EBRD, 2010). Recently, a draft Law on Energy Efficiency and Improved Energy Effectiveness, was prepared within the framework of the ESIB –INOGATE programme "Promoting reforms in the energy sector of Azerbaijan" (European Parliament and Directorate – General for external policies, Policy Department, 2013).

Concerning the promotion of RES, the "State programme on the use of alternative and renewable energy 2004-2013" expressed the intention to offer incentives for investments in RES, but detailed incentives were not elaborated, leaving a gap in implementing the Programme and attracting investments (UNECE, 2011). In 2011 the new State Agency for Alternative and Renewable Energy announced targets for year 2020: 20% share of renewable energy in electricity and 9,7% share of renewable energy in total energy consumption, but so far, there is not an established market for renewable energy (State Agency for Alternative and Renewable Energy, 2011; Energy Charter Secretariat, 2011). The only RES technologies which are used for electricity generation are hydro and wind. Their output accounts for a very small percentage in the total electricity production.

In 2013 the International Finance Corporation (IFC) endorsed the first loan for RES and EE in Azerbaijan to: i) finance small and medium size enterprises; ii) raise public and business awareness in energy efficiency (European Parliament and Directorate – General for external policies, Policy Department, 2013). The European Investment Bank signed also a framework agreement with Azerbaijan to provide investment for the: i) construction of economic and social infrastructure, and ii) implementation of climate change mitigation and adaptation projects (European Parliament and Directorate – General for external policies, Policy Department, 2013).

In January 2013, the country announced its intention to raise more than 7 billion USD for RES investments by 2020, and increase total RES capacity to 2.000 MW (i.e. 20% of national overall power needs) (European Parliament and Directorate – General for external policies, Policy Department, 2013).

Concerning CDM projects, only four Azeri CDM projects were registered until the beginning of 2013 (UNEP Riso, 2013[19]). The country has focused mainly on attacting foreign investment in the Caspian region for its oil and gas sectors since it is emerging as one of the Caspian region's most important exporters of oil and natural gas (US Yearbook, 2009). Until now, Azerbaijan has attracted large investments for these sectors due to a favorable operating environment for investors (EBRD, 2010). No registered NAMAs at the UNFCCC or the Ecofys database[20].

As far as the adaptation to climate change is concerned, there is no climate change adaptation policy or strategy so far. Although the water resources are limited in Azerbaijan, compared to other countries located in South Caucasus, affecting agriculture, only one related policy instrument is implemented concerning water fees (Spurgeon J. et al., 2011; UNECE, 2011).

Conclusions

- The current policy mixture does not promote effectively investments for RES. There is only limited installed capacity of hydro and wind power plants for electricity generation.
- Oil and natural gas are the dominant fuels in the primary energy consumption of the country.
- There are no policy instruments for supporting energy efficiency in any sector.
- The legislative and administrative frameworks for CDM projects need improvements.
- Azerbaijan lacks of a comprehensive climate change policy both for mitigation and adaptation.

[19] http://www.cdmpipeline.org/
[20] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=11

Intended Nationally Determined Contribution (INDC) of the Republic of Azerbaijan

INFORMATION

to the United Nations Framework Convention on Climate Change (UNFCCC) on the Intended Nationally Determined Contribution (INDC) of the Republic of Azerbaijan

As a developing country, Republic of Azerbaijan believes that the climate change is a potential threat for humanity and supports the adoption of a new Global Agreement on climate change to be applied to all Parties in the 21st Conference of Parties to the UNFCCC to be held in Paris late 2015.

By 2030 the Republic of Azerbaijan targets 35% reduction in the level of greenhouse gas emissions compared to 1990/base year as its contribution to the global climate change efforts.

Approaches and principles applied for defining the contributions:

Compliance with national conditions and historical responsibility

By communicating its INDC to the UNFCCC, Azerbaijan confirms the importance of a new agreement in the field of climate change and expresses its solidarity with the countries that are most vulnerable to climate change.

Azerbaijan believes that the exchange of information between the Parties on the INDC will assist in streamlining joint efforts aimed at the prevention of global temperature increase above 2°C as it is stated in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), as well as further promote the principles of justice by taking into account the potential and national circumstances of the Parties and their capacity.

When Azerbaijan was part of the former Soviet Union environmental concerns were neglected for the sake of industrial development.

The Armenia-Azerbaijan conflict resulted in the occupation of 20% of the territory of Azerbaijan by Armenia and the inflow of a million refugees and Internally Displaced Persons (IDPs). In addition, the conflict inflicted heavy damage on the environment of Azerbaijan. 1.7 million hectares of land that currently remain under Armenian occupation are comprised of 595.6 thousand hectares of agricultural land, 247.4 thousand hectares of forest area and 10.1 thousand hectares of farmland. 247.352 hectares of forest area, including 13197.5 hectares of rare and valuable forests, 152 natural monuments and 5 geological objects located in the occupied territories have been destroyed. Large scale arsons regularly committed by the Armenian military forces in the occupied territories seriously damage environment and livelihoods in adjacent districts as well as in the entire region. The inflicted damage amounts to billions of US dollars.

The principle of justice and ambition, obstacles and risks

As a developing country Azerbaijan is highly vulnerable to the effects of climate change. National greenhouse gas emissions account for only 0.1% of global emissions, while per capita gas emissions for 2010 equal 5.4 tons of CO_2 equivalent.

Despite the existing challenges, as a developing country Azerbaijan, has already provided its contribution to the global efforts to cope with climate change and has chosen its development direction towards low emission development that requires more financial resources. Therefore, the submitted INDC presents a highly **ambitious commitment.**

The increase of the population of Azerbaijan by approximately 1.1% or 100 thousand people per year projected in the official national statistics will increase the demand for energy and other natural resources. This represents one of the main challenges for the reduction of GHG emissions.

In addition, constraints for the implementation of the present INDC and specific risks for the country could be listed as follows:

- The remaining occupation of the 20 % of the territory of Azerbaijan and consequently problems of one million refugees and IDPs, massive plunder of natural resources and other wealth, as well as extermination of flora and fauna in the occupied territories;
- Declining prices of oil in the global markets.

The Intended Nationally Determined Contribution of Azerbaijan

Base year	1990
Emissions per base year	Total emission 73.331 Gg CO_2 equivalent *(excluding LULUCF)*; Net emission 69.641 Gg CO_2 equivalent *(including LULUCF)*
Time framework	2030
Covered sectors	Energy, agriculture, waste, LULUCF
Covered gases	CO_2, CH_4, N_2O, HFC, CF_4
Considered emissions reduction	35% reduction at total emissions level compared to the base year. Total emissions reduction for 2030 compared to the base year: 25.666 Gg CO_2 equivalent *(excluding LULUCF)* 24.374 Gg CO_2 equivalent *(including LULUCF)*
Methodology used for GHG inventory	In the course of GHG inventory, the revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories were used.
Adaptation element	In order to reduce vulnerability of Azerbaijan towards climate change impacts, it is considered to develop relevant adaptation measures for decreasing or minimizing the losses that may occur at national, local and community levels per sector.

Mitigation

Energy sector

Development of legislative acts and regulatory documents on energy, the implementation of awareness activities on energy efficiency, the replacement of existing technologies in electricity and thermal energy production with modern technologies, the reconstruction of the distribution networks and transmission lines, the implementation of isolation works and application of modern lighting systems.

Oil and gas sector

- Application of new and modern environmental-friendly technologies in the oil and gas processing, production of fuel in line with EURO-5 standards in a new refinery complex by 2019 and strengthening the capacity of the staff;
- Modernization of gas pipelines, gas distribution system and other measures to decrease losses up to 1% by 2020 and ensure the volume of reduction in compliance with international standards by 2050;

- Based on adopted strategy, accumulation of gases emitted to the atmosphere during oil-gas production, prevention of gas leakages during oil-gas processing and at distribution networks.

Residential and Commercial Sectors

Massive use of control and measurement devices in electrical, heat energy and natural gas systems, application of energy-efficient bulbs, use of modern energy-saving technologies in heating systems, as well organization of public awareness programs on energy use.

The use of alternative and renewable energy sources

Development and application of technical and normative legal documents on the use of alternative and renewable energy sources based on conducted assessment, acceleration of works to supply of renewable energy for the heating system for the population, enhancement of use of innovative technologies, construction of small hydro power plants (HPPs) on small rivers, irrigation canals and water basins, as well as, use of biomass, solar power, electric and heat energy, wind power, heat pumps and geothermal energy in all sectors of economy.

Transport sector

Use of environmentally friendly forms of transport, enhancement of the use of electric vehicles at public transportation, electrification of railway lines and the transition to alternative current system in traction, improvement and expansion of the scope of intellectual transport management system, development of metro transport and increase of a number of metro stations, elimination of traffic jams due to the construction of road junctions and underground and surface pedestrian crossings.

Agricultural sector

Collect methane gas from manure of livestock and poultry, use of alternative sources of energy and modern technologies.

Waste sector

Develop modern solid waste management system at big cities of the country.

Land Use, Land-Use Change, and Forestry (LULUCF) sector

Plant new forest areas, water and land protecting forest strips (windbreaks), urban and roadside greenery as well as further improve the management of pastures and agricultural lands.

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Bulgaria

Country profile

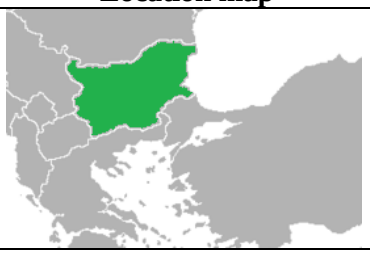
Bulgaria is a parliamentary republic in Southeastern Europe. The National Assembly (Parliament) has 240 seats; members are elected for four-year terms.

Situated in the Southeast part of the Balkan Peninsula, it shares borders with Hellas and Turkey to the South; the Former Yugoslav Republic of Macedonia and Serbia to the West. The River Danube separates the country from Romania to the North, while its natural eastern border is the Black Sea. In total, Bulgaria covers an area of 110.994 km^2, characterized as mountainous, except for the Danube lowland in the north.

The climate is temperate. Bulgaria has a dynamic climate, due to its location at the meeting point of Mediterranean and continental air masses and the barrier effect of its mountains.

The population in Bulgaria is 7.364.570 people (2011). The capital city is Sofia, the official language is the Bulgarian, and the currency is the Bulgarian Lev.

Location map



National climate change policy

The Bulgarian Parliament ratified the Kyoto Protocol on 17 July 2002. According to Annex B of the Kyoto Protocol, in the period 2008-2012, Bulgaria had to reduce its annual greenhouse gas emissions by 8% compared to the base year 1988 (5th National Communication of Bulgaria, 2010). Bulgaria, as an EU Member State, is committed to the EU climate change policy targets, which were announced by the European Commission on 23 January 2001 and adopted by the EU Parliament on 17 December 2008. These targets are: aggregate reduction of at least 20% Greenhouse Gas (GHG) emissions compared to year 1990, 20% reduction of primary energy consumption compared to 2020 projections and 20% share of renewable energy sources in EU energy consumption by 2020 (20-20-20).

Bulgaria is one of the six countries (Albania, Bosnia and Herzegovina, Bulgaria, Hellas, Romania and the Former Yugoslav Republic of Macedonia) that together with the European Commission (EC) have signed (President of State Agency for Energy Resources ***Mr. Ivan Shiliashki***) the "Declaration of Intent for the establishment of a competitive Regional Electricity Market in South Eastern Europe" (Thessaloniki, 1999) (Annex I) and also the signatory (President of State Agency for Energy Resources ***Mr. Ivan Shiliashki***) of the "MoU for the establishment of a competitive Regional Electricity Market (REM) in South Eastern Europe" (Athens, 2000) (Annex II), which are the origins of the Energy Community in the area.

Mitigation

In order to achieve its mitigation targets, Bulgaria has implemented policy instruments that support energy efficiency and RES in different sectors such as buildings, industry and energy.

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Sector	Technological options	Policy instrument
Buildings	Energy management	Performance standards (energy certificates, mandatory audits) (Act SG 49/2007 – Act SG 102/2009, Act SG 117/1997)
	Energy management	Subsidy (Act SG 117/1997)
	Energy efficient appliances	Energy labeling for appliances (Ordinance SG 65/2006 – SG 4/2007)
Industry	Energy management	Performance standards (energy certificates, mandatory audits) (Act SG 49/2007 – Act SG 102/2009)
	Energy efficiency	Tradable permits (Act SG 91/2002)
	Best available technologies	Regulatory standards (combined type) (MC 238/2009 - SG 80/2009)
Transport	-	-
Energy	Promotion of RES technologies	Regulation standards (Certification of RES) (Act SG 10/2009-SG 85/2010)
	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Act SG 49/2007, Act SG 62/2007, Act SG 107/2007)
	Energy efficiency	Tradable permits (Act SG 91/2002)
	Best available technologies	Regulatory standards (combined type) (MC 238/2009 - SG 80/2009)

Adaptation

Concerning its adaptation objectives, the Bulgarian government has implemented policy instruments concerning water management.

Table 2: Implemented policy instruments for adaptation until 31 December 2010.

Sector	Technological option	Policy instrument
Water management	-	Regulation standards (Command & Control) (Act SG 67/1999)

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Bulgarian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 3).

Table 3: United Nations projections for the Bulgarian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,66	-0,71	-0,78	-0,85	-0,82	-0,82	-0,90

The annual percent change of the Bulgarian real GDP for the period 2012 – 2017 is shown in Table 4.

Table 4: Projections for the Bulgarian GDP (IMF, 2012).

Year	2011	2012	2013	2017
Annual change of GDP (in %, constant prices)	1,7	0,8	1,5	4,5

Business-As-Usual scenario

The policy mixture of the BAU scenario includes policy instruments implemented before 31 December 2010 (Table 1). This policy mixture focuses on: i) the penetration of RES in electricity generation and transport sector, ii) the support for energy efficiency in buildings and industrial systems; iii) the GHG emission reduction through emission trading (EU-ETS, Joint Implementation (JI), and Green Investment Scheme (GIS)). Concerning the adaptation policy, the main instrument is the preliminary assessment of flood risks and the respective prevention measures, if needed.

The implemented policy instruments (FITs, certification of origin, and regulations for grid companies) stimulated only the use of RES in electricity generation and transport, but not heating. The incentives for RES-e were so high, that the applications for new RES installations by 2010 were comparable to the total installed capacity of the country.

Optimistic scenario

The enhanced M/A policy mixture of the OPT scenario was synthesized by:

i. the policy mixture of BAU;

ii. the M/A policy instruments set into force after 1 January 2011. This was the Act SG 35 on "Energy from Renewable Sources" which was amended with Act SG 54. The new Act introduced measures presented in the National Renewable Energy Action Plan. More specifically: regulatory policy instruments for RES and EE (Quotas in combination with existing FITs, labeling of products related to energy consumption, requirements for at least 15% of heating and cooling demand in the building sector covered from RES technologies, use of biofuels and mixing of traditional fuels with biofuels).

iii. additional policy instruments, which were:

- Regulatory policy instruments for RES: fuel switch for heating and cooling in all public buildings by 2020.
- Economic policy instruments for RES and EE: financial resources from Emission Trading Schemes used for investments (soft loans, support schemes in building and industrial sectors, tax incentives).
- Regulatory policy instruments for EE: performance standards for lighting and buildings, energy efficiency audits for residential, agricultural and transport sector.
- Dissemination policy instruments for the transport sector aiming to behavioural change (eco-driving, change of travel mode).
- Regulatory policy instruments for adaptation in agriculture, water and forest management.

Pessimistic scenario

The restricted M/A policy mixture of the PES scenario was synthesized by: i) the policy mixture of BAU; ii) the M/A policy instruments set into force after 1 January 2011 (described in OPT policy mixture) and iii) No additional policy instruments as in the OPT policy mixture. The M/A policy instruments that were set into force after 1 January 2011 were considered as adequate to fulfill the objectives of this scenario.

Results

The policy mixtures of the three scenarios, as outcomes of the Long range Enregy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per category.

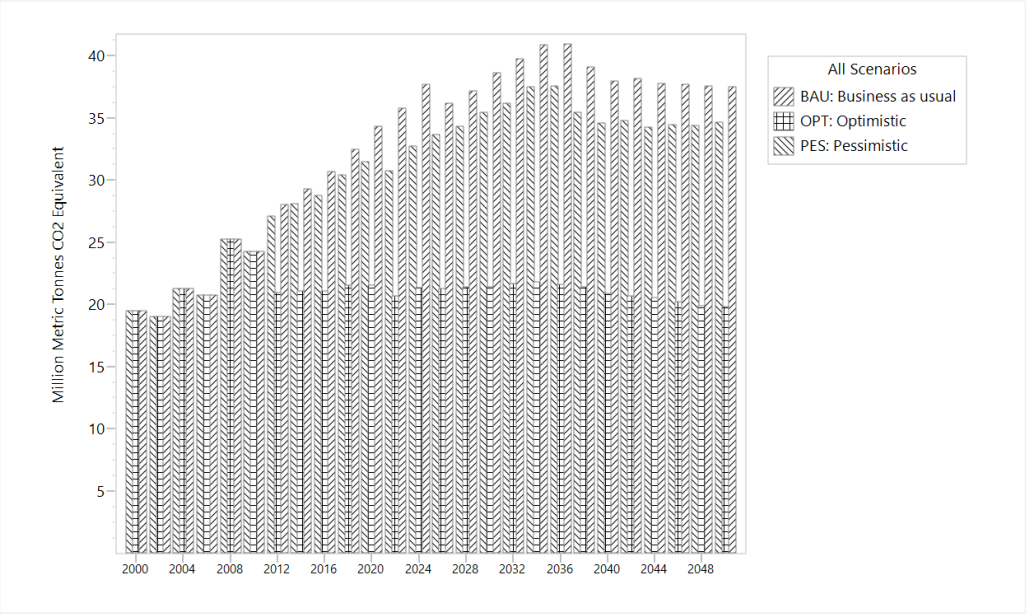
It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanidng of the required adaptation measures, in order to implement the selected policy mixtures.

CO_2 emissions

According to the outcomes of the LEAP model for the BAU scenario, GHG emissions in Bulgaria will increase by 17,5% in 2020 and by 54,4% in 2050 compared to the year 1992[21].

[21] 1992 is considered the base year in this report, since data were not available before this year. Moreover, the GHG emission sources which are taken into consideration in this study do not include land use change and forestry and the

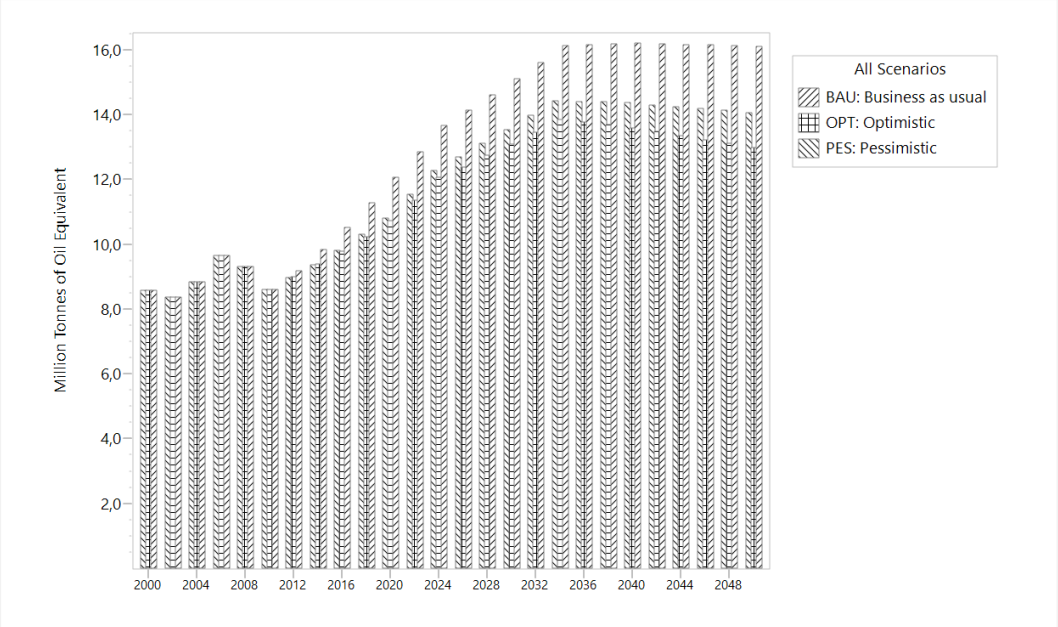
According to the OPT scenario, GHG emissions in Bulgaria will decrease by 13,25% in 2020 and by 33,26% in 2050 compared to the year 1992. Finally, according to the outcomes of the LEAP model for the PES scenario, GHG emissions in Bulgaria will decrease slightly (by 0,03%) in 2020 and will increase by 10% in 2050 compared to the year 1992.



Graph 1: CO_2 emissions for three (3) scenarios.

Final energy consumption

Bulgaria's future projections of the final energy consumption appear in the graph below, presenting high energy consumption by applying the BAU scenario parameters, while impressive difference and much less consumption is observed by applying either the Pessimistic or even better, the Optimistic scenario parameters.

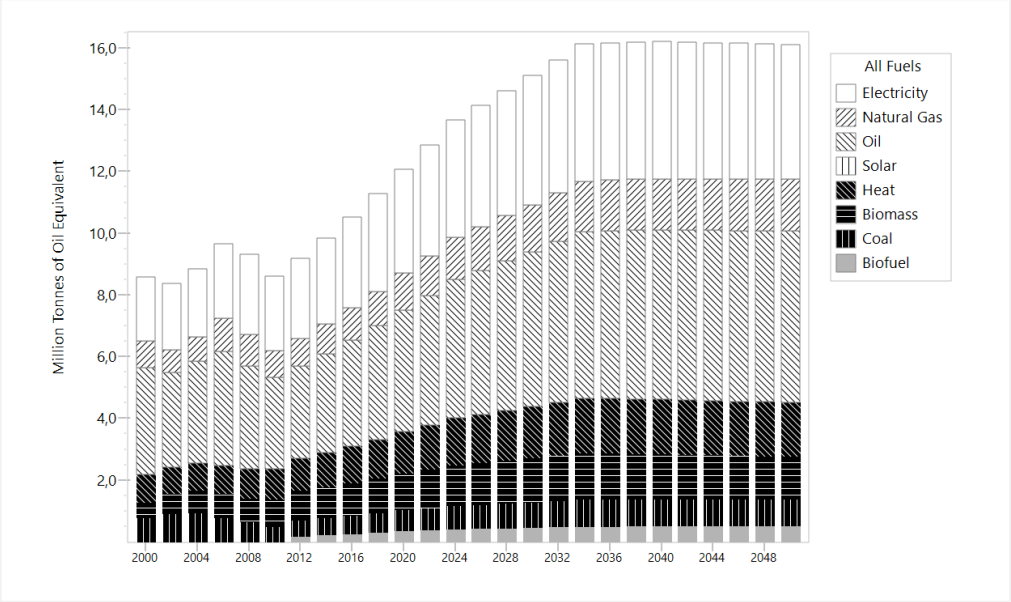


Graph 2: Final Energy Consumption for three (3) scenarios.

industrial processes due to missing data. They are mostly those related to the mitigation policy measures which are implemented.

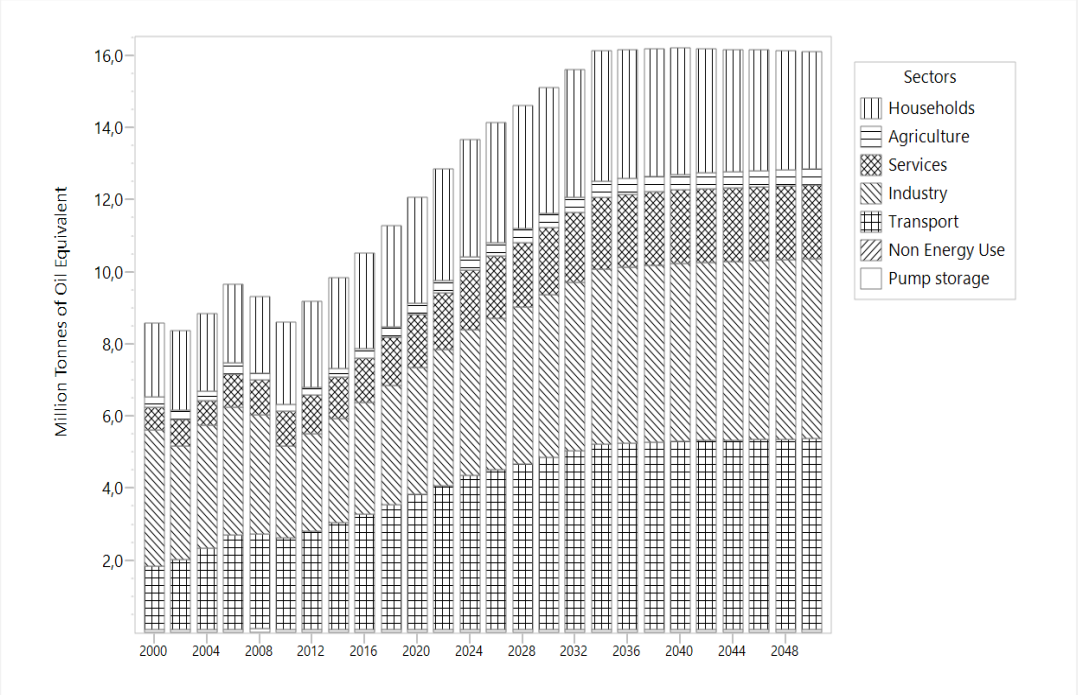
Analyzing the Business As Usual scenario, the use of natural gas, oil and biomass is increasing up to 2050.

Regarding the trends on the fuels use until 2050, oil use is expected to increase. Electricity, already occupying a large percentage of the mix, will remain one of the two (together with oil) major fuels in use.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

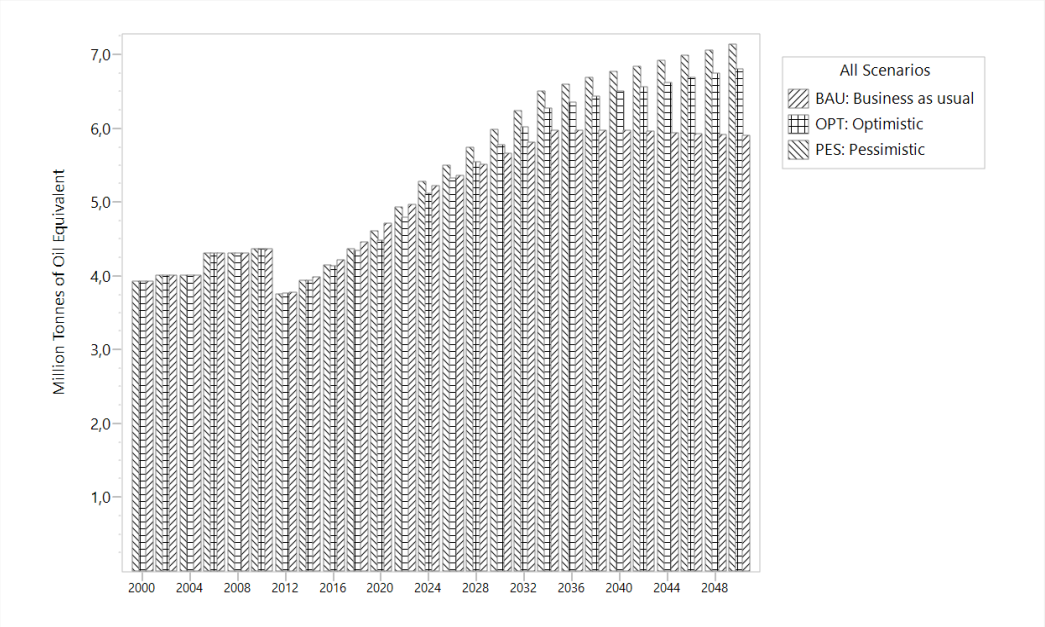
In BAU scenario, the sector that shows the highest increase of energy consumption is industry, followed by households and transport.



Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

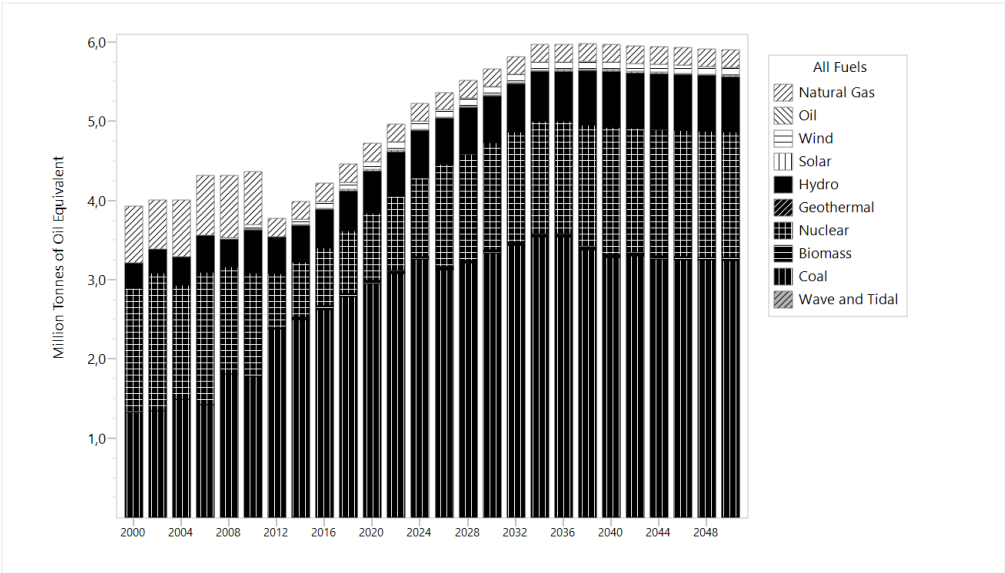
The LEAP results of electricity generation for three (3) scenarios are shown in Graph 5. The electricity generation is higher in OPT and PES scenarios mainly due to the increase of electricity in the fuel mix of the transport sector.



Graph 6: Electricity generation in the three scenarios.

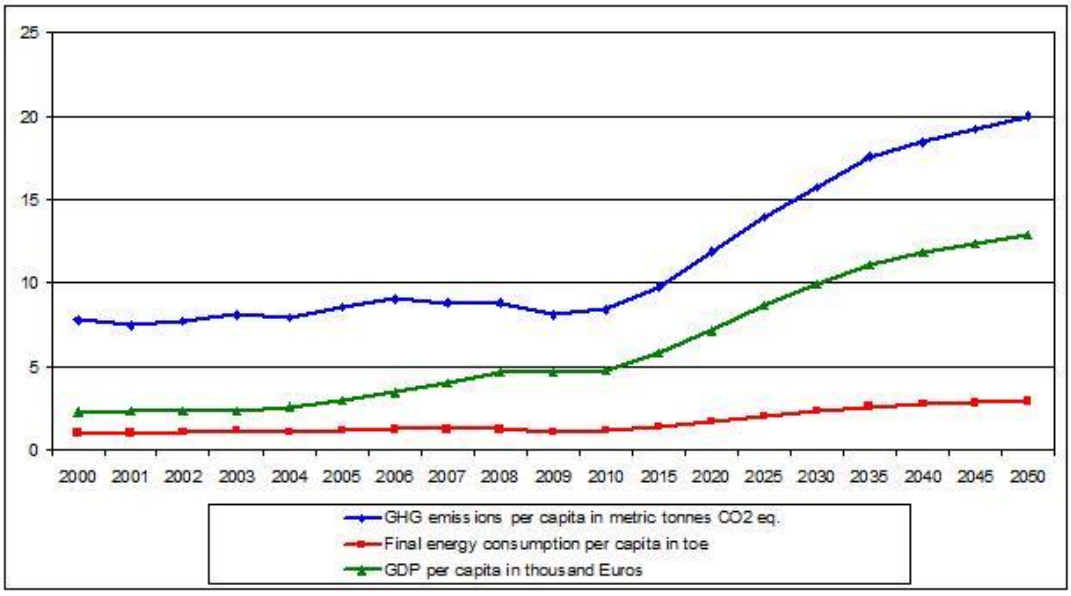
In BAU scenario, it is assumed that:

- by 2020 the renewable energy capacities develop as specified in the National Renewable Energy Action Plan (NREAP, 2011) and after 2020 these capacities remain unchanged.
- the nuclear capacities develop in the following way: in 2021 a new capacity of 1000 MW enters into exploitation (the planned 7th block of Kozloduy NPP); the two currently operating reactors of NPP Kozloduy will be phased out, but immediately replaced by new reactors with the same capacity (1000 MW each).
- all other capacities and their efficiency are assumed to remain at their 2010 level.



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

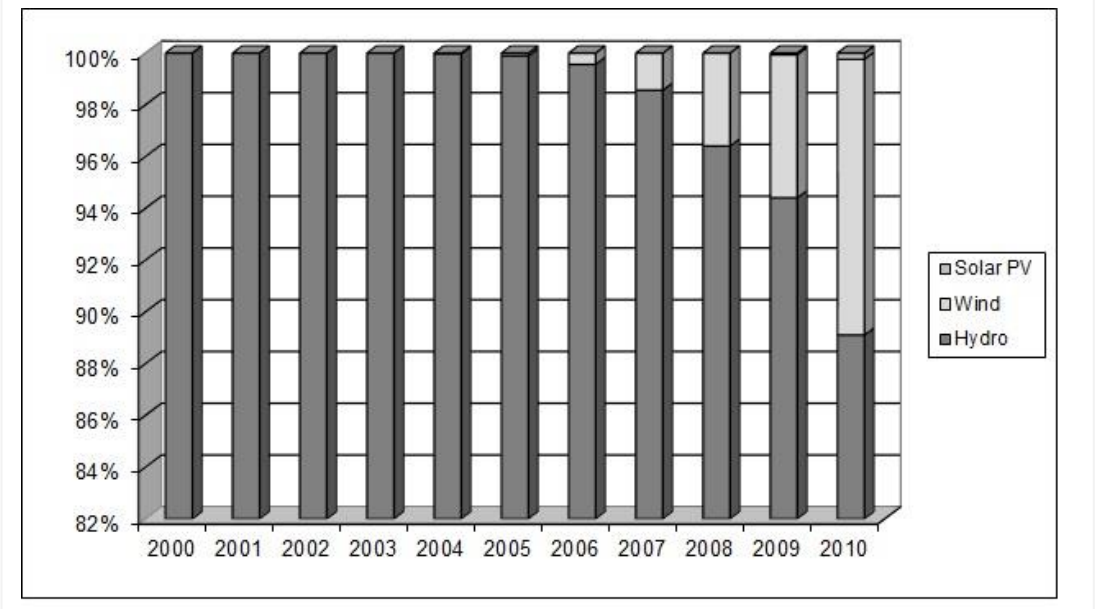


Graph 7: Trends of national indicators (BAU scenario).

GHG emissions per capita and GDP per capita increase after year 2015, while the final energy consumption per capita remains almost stable.

RES production per technology

In Bulgaria, the main RES technology for electricity generation is hydro (there are not separate data on installed capacity for small-scale and large-scale hydro plants), followed by wind and photovoltaics.



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

According to the AMS results the Bulgarian OPT policy mixture was evaluated as the most effective one compared to the other two.

The BAU policy mixture is characterized by the highest final energy consumption and the worst environmental performance, compared to the other two, which results from the limited number of mitigation and adaptation policy instruments. PES is characterized by moderate environmental performance while OPT has the lowest amount of GHG emissions and the lowest energy consumption.

The policy mixture of the OPT scenario is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two. It offers a fair distribution of the "environmental" burden among the respective sectors. OPT and partially PES encourage the introduction of innovative technologies, such as wind offshore, passive buildings, electric vehicles and promotes indirectly research. In BAU, innovations are not directly encouraged.

The implementation network (the governmental and national entities that will implement the policy instruments) provides a wide range of relevant information freely available at websites, brochures, events, etc. and responds to requests. Since BAU includes a lower number of and relatively simpler policy instruments, it will require less institutional changes compared to the other two policy mixtures. The changes included in OPT and PES would require reallocation of responsibilities within the pertinent authorities, amendment of the legislation, control and measurement, which would be a challenge for the existing implementation network, since most of the new policy instruments concern RES and EE, where the required capacity is relatively high.

Given the above, the Mitigation/Adaptation policy portfolio which characterizes the Optimistic scenario is the one to achieve most of the goals of the climate change policy of Bulgaria.

Nevertheless, the success of this policy portfolio requires the effectiveness of the implementation network and a more stringent frame for non-compliance.

Policy Trends

Bulgaria, being an EU Member State is committed to contribute to the EU climate policy targets (20-20-20) and to transpose EU Directives into national laws. Therefore, Bulgarian climate change policy is closely linked with EU policy.

The Energy Strategy of the Republic of Bulgaria 2020 (Energy Strategy, 2011) specifies that the energy intensity of the national GDP is by 89% higher than the EU average (measured by gross domestic energy demand per unit of GDP and taking into account the parity of purchasing power) – 302 toe/MEUR05 compared to 160 toe/ MEUR05 in the EU. The high energy intensity is a barrier to the competitiveness of the Bulgarian economy and therefore the improvement of energy efficiency is a key priority.

In this context, the Bulgarian Energy Efficiency Fund (BgEEF) was established in order to provide soft loans, financial guarantees and technical assistance for energy efficiency projects. The existing policy instruments focus on the building and industrial sectors, introducing mandatory audit, certification for the actual energy consumption and energy management systems. Mandatory control of specified hot water boilers and air conditioning systems in buildings and (if needed) implementation of energy efficiency measures are required. Buildings with certificates of energy efficiency classes "A" and "B" are exempted from property tax for a period of up to 10 years (depending on the certificate class and the availability of renewable energy in the buildings). Labeling of home appliances is also set. The new Energy Efficiency Act

came into force on 12 March 2013 (published in State Gazette No. 24/12.03.2013) and introduced Directive 2010/31/EC about the energy performance of buildings[22].

Currently, among the end-use sectors, the transport sector is the most energy-intensive one. The energy demand of transport sector was increasing gradually from 2004, followed by the industrial sector. However, there are no policy instruments that promote energy efficiency for this sector. The only policy instrument, focused on this sector, refers to the mandatory selling of conventional fuels mixed with biofuels.

Concerning RES promotion, the current policy instruments refer to electricity generation and transport sectors and, after 2012, the heating/cooling activities in buildings, which have a large share in final energy consumption.

Power plants are the main source of GHG emissions in the country. Concerning the electricity sector, obligatory purchase of electricity from RES (RES-e) and Cogeneration of Heat and Power (CHP) and feed-in-tariffs for those technologies since 2008 were implemented. The higher prices concern photovoltaics, CHP, biomass, wind and secondly small-scale hydro power plants. However, till 2010, the financial incentives failed to boost RES electricity generation. These tariffs were combined with quotas after 2012. On 17 June 2013 the Supreme Administrative Court of Bulgaria revoked the grid access fee for the RES-e producers (Eclareon and Eco-Logic, 2014). The fee was imposed by a decision of the State Commission on Energy and Water Regulation[23].

Amendments to the Renewable Energy Act were introduced through the Law "on the State Budget of the Republic of Bulgaria for 2014" (published in State Gazette, No. 109 /20.12.2013)[24] and were effective from 1 January 2014. They concerned: i) Limitation of the volume of produced electricity purchased at FIT; ii) Introduction of a fee to the producers of electricity by solar PV plants and wind power plants.

Concerning Joint Implementation projects, the Bulgarian Government has signed Memorandums of Understanding with the Governments of the Netherlands, Austria, Switzerland, Denmark, Japan, Sweden, France, as well as with the European Bank for Reconstruction and Development (MoEW, 2011). No priorities were mentioned in the relevant official documents for JI. For the time being, the registered projects focus on fuel switching (natural gas instead of oil), installation of hydro, biomass and wind plants and energy efficiency activities in industrial sector. There is a large potential to utilize biomass as an energy source in Bulgaria.

The Environment Protection Act (EPA, 2012) regulates the Green Investment Scheme in Bulgaria. The Act guarantees that the income from AAU will be invested in projects reducing GHG emissions.

Concerning the adaptation policy, the only instrument concerns the assessment and management of flood risks. The assessment includes development of water maps, detailed description of past floods, and assessment of potential floods in the future.

According to the 5th National Communication (NC) of Bulgaria to the UNFCCC, the most vulnerable sectors due to climate change appear to be the agricultural and forestry sectors since the country seems to be at higher drought risk in the future. More specifically, increased risk (in the occurrence, intensity and level of impact) and vulnerability to soil droughts are expected in Bulgaria for the 21st century (5th NC, 2011). Apart from the two aforementioned sectors, the energy and the water management sector will be also affected. Despite of these effects, the Third National Action Plan for Climate Change 2013-2020 (3rd NAPCC, 2012) does not include any adaptation measure until 2020.

[22] http://www.buildup.eu/publications/39121
[23] http://www.pvgrid.eu/national-updates/bulgaria.html
[24] http://www.kpmg.com/BG/en/IssuesAndInsights/ArticlesPublications/Newsletters/Legal/Documents/2014-01-Important-amendments-to-the-Renewable-Energy-Act-effective-from-1-January-2014.htm

Conclusions

- The policy instruments concerning energy efficiency are focusing on building and industrial sectors, excluding the transport sector, which is the most energy-intensive end-use sector.
- Concerning RES promotion, policy instruments focused on transport and heating/cooling activities are also set.
- Although financial and regulatory policy instruments are set concerning the penetration of RES in electricity generation, the RES production was limited till 2010.
- Apart from the assessment and management of flood risks, other adaptation policy instruments are not foreseen.

Intended Nationally Determined Contribution (INDC) of Bulgaria

Bulgaria, being an EU Member State is committed to contribute to the EU climate policy targets (20-20-20) and to transpose EU Directives into national laws. The Bulgarian INDC is that of the EU which is presented under the chapter for Greece.

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United Nations, Department of Economic and Social Affairs, 2011. World Population Prospects – The 2010 Revision, Volume I: Comprehensive Tables. Available at: http://esa.un.org/unpd/wpp/Documentation/pdf/WPP2010_Volume-I_Comprehensive-Tables.pdf

Georgia

Intended Nationally Determined Contribution (INDC) of Georgia

GEORGIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION
SUBMISSION TO THE UNFCCC

Georgia is pleased to communicate its intended nationally determined contribution (INDC), elaborated by the Ministry of Environment and Natural Resources Protection of Georgia in close cooperation with the key ministries and other relevant stakeholders involved in the consultations process.

Introduction

Georgia is fully committed to the UNFCCC negotiation process with a view to adopting a global legally binding agreement at the Paris Conference in December 2015 applicable to all Parties in line with the below 2°C objective.

The dissolution of Soviet Union and the collapse of centrally planned economy in early 90s caused significant reduction in national greenhouse gases (GHG) emissions (lowest value 8,799 $KtCO_2eq$ in 1995). According to the Third National Communication of Georgia to the UNFCCC, GHG emissions from Georgia in 2011 constituted 16,036 $KtCO_2eq$ which is 34% of 1990 emissions level (47,975 $KtCO_2eq$).

Economic growth will be accompanied by increase in GHG emissions (if no efforts are made to reduce GHG emissions associated). Therefore, it is important to undertake efforts to substantially limit this increase by boosting investments in low carbon technologies throughout the country.

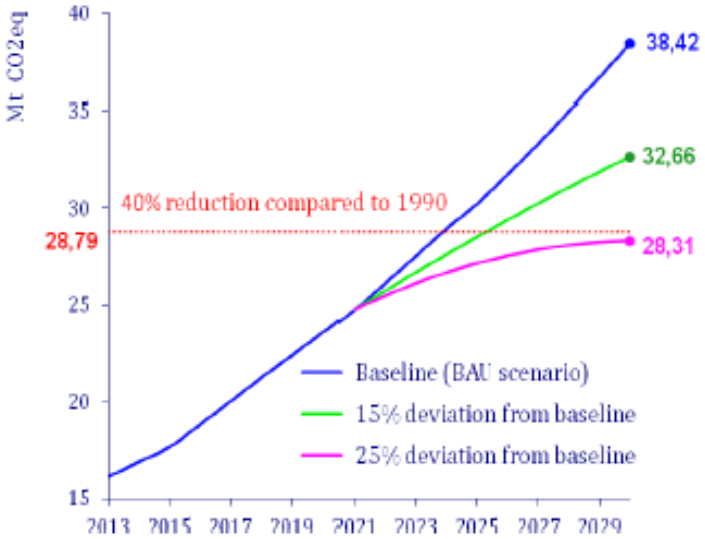
In 2010 Georgia acceded to the Copenhagen Accord and declared that *"Georgia will take steps to achieve a measurable, reportable and verifiable deviation from the baseline scenario (below "business as usual" levels) supported and enabled by finance, technology and capacity-building".*

The Government of Georgia acknowledges and appreciates the role of international support in Georgia's efforts to mitigate climate change, namely the support of the US Government in the development of a Low Emission Development Strategy (LEDS) and the support of the European Union and the Government of Germany in preparation of the INDC. The preparation of LEDS was launched in 2013 and is expected to be finalized in 2016. Georgia's INDC is largely based on currently available results achieved during the LEDS preparation process. The final LEDS and the mitigation actions specified therein will become key instrument in achieving Georgia's GHG emission reduction target.

Intended nationally determined contribution (INDC) of Georgia

The Lima Conference invited all Parties *"to communicate their intended nationally determined contributions well in advance of the twenty-first session of the Conference of the Parties in a manner that facilitates the clarity, transparency and understanding of the intended nationally determined contributions."*

Georgia plans to unconditionally reduce its GHG emissions by 15% below the Business as usual scenario (BAU) for the year 2030. This is equal to reduction in emission intensity per unit of GDP by approximately 34% from 2013 to 2030. The 15% reduction target will be increased up to 25% in a conditional manner, subject to a global agreement addressing the importance of technical cooperation, access to low-cost financial resources and technology transfer. This is equal to reduction of emission intensity per unit of GDP by approximately 43% from 2013 to 2030. The 25% reduction below BAU scenario would also ensure that Georgian GHG emissions by 2030 will stay by 40% below the 1990 levels.



In line with the *Lima Call for Climate Action*, in particular its paragraph 13, the following quantifiable information is hereby submitted:

Intended Nationally Determined Contribution of Georgia	
Party	Georgia
Type	Deviation from baseline, business as usual scenario
Coverage	All sectors excluding LULUCF
Sectors	• Energy • Industrial processes • Agriculture • Waste Information on GHG emissions reduction targets for the forestry sector of Georgia is given in Annex 1.
Scope	All greenhouse gases not controlled by the Montreal Protocol: • Carbon Dioxide (CO2) • Methane (CH4)

	• Nitrous Oxide (N2O) • Hydrofluorocarbons (HFCs) • Perfluorocarbons (PFCs) • Sulphur hexafluoride (SF6)
Base Year	2013
Period	1 January 2021- 31 December 2030
Reduction level	Georgia plans to unconditionally reduce its GHG emissions by 15% below the Business as usual scenario (BAU) for the year 2030. This is equal to reduction in emission intensity per unit of GDP by approximately 34% from 2013 to 2030. The 15% reduction target will be increased up to 25% in a conditional manner, subject to a global agreement addressing the importance of technical cooperation, access to low-cost financial resources and technology transfer. This is equal to reduction of emission intensity per unit of GDP by approximately 43% from 2013 to 2030. The 25% reduction below BAU scenario would also ensure that Georgian GHG emissions by 2030 will stay by 40% below the 1990 levels.
Pre-2020 mitigation actions	Georgia plans to finalize its Low Emission Development Strategy in 2016, which will detail pre-2020 mitigation actions. In addition, Government of Georgia is in process of drafting its first National Energy Efficiency Action Plan (NEEAP) that will be finalized by the end of spring 2016. The NEEAP will document the plans for implementation of energy efficiency measures which have significant mitigation potential for the period before 2020 and beyond. It is envisaged that the most intensive pre-2020 mitigation action in Georgia should be the voluntary reduction of GHG emissions committed by thirteen self-governing cities and municipalities joining the EU initiative "Covenant of Mayors" (CoM). Further facilitation of this initiative will significantly contribute to post -2020 implementation processes. Three Nationally Appropriate Mitigation Actions (NAMA) are under preparation and, in case of international support, are expected to be implemented prior to 2020. They are expected to be a basis for subsequent larger-scale mitigation actions for the post-2020 period. These NAMA activities include: • Gender-sensitive NAMA for sustainable energy in rural areas; • NAMA for Low Carbon Buildings in Georgia; • Vertically Integrated NAMA (V-NAMA) for the Urban Transport Sector. All above mentioned pre-2020 mitigation actions have been taken into account while calculating the BAU scenario.
% of Emissions Covered	100%
Planning Process	Georgia will support its mitigation target with comprehensive national climate change policy. The first step will be the finalization of the LEDS. In addition, Georgia plans to develop an action plan "climate 2021-2030" (intended to be finalized in 2018) which will define the legal instruments, activities, methods and other relevant issues.

	The legislative proposals, national programs and domestic legally-binding acts to implement 2030 climate target will be influenced by Georgia-EU association process and the planned membership in the European Energy Community.
Fair and ambitious	Georgia's INDC is fair and ambitious because despite the fact that national GHG emissions of Georgia represents only approximately 0.03% of global emissions, Georgia is committed to contribute in joint efforts to combat climate change by transforming its economy to low carbon and climate resilient pathway The INDC is Georgia's first quantified international commitment to mitigate climate change. The main share of mitigation actions will be implemented with national resources, in an unconditional manner. Only conditional measures will require international support.
Metric Applied	GWP 100y values published in IPCC SAR (CO2e): • CO2=1 • CH4 = 21 • N2O = 310
Methodologies for Estimating Emissions	• Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. • 2006 IPCC Guidelines for National Greenhouse Gas Inventories • Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories

Adaptation

Climate change and its adverse impacts on ecosystems and economy pose severe threats to Georgia's sustainable development. Unique geographical location, complex dissected relief, land cover diversity and specific climate, containing almost every type of climatic zones, set conditions for wide variety of negative consequences of climate change in Georgia: (a) due to sea level rise and other factors Black Sea has affected certain areas of land, destroyed and/or damaged houses and infrastructure along the coast; (b) in highlands, growing frequency and intensity of floods, flashfloods, landslides and mudflows have caused a huge amount of damage in the economy; (c) due to decreased rainfall and enhanced evaporation semi-arid regions in Eastern Georgia are under the threat of desertification; (d) more frequent and intensive heat waves have affected human health; (e) rising temperatures, changes in precipitation patterns, reduced water availability, forest fires, pests and diseases have worsen the growth and productivity of forests. (f) Rising temperatures, increased winds and reduced water availability have significantly declined agricultural productivity.

In case of a 2^0C or higher increase in global warming, effects will become more severe in the future. This will create an extra burden on the development of society. Accordingly, adaptation to the adverse impacts of climate change is one of the main priorities for the Government of Georgia. The National Adaptation Plan will be prepared in order to further advance the implementation of adaptation actions. The main objective of the Government of Georgia is to improve country's preparedness and adaptive capacity by developing

climate resilient practices that reduce vulnerability of highly exposed communities. In this regard, Georgia takes steps to integrate climate risk and resilience into core development planning and implementation.

Georgia's agricultural sector plays a key role in the country's economy. Georgian farmers are going to fulfill a principal role in providing one of the fundamental needs of society: a safe, secure, and affordable food supply. This underlines the importance of the relationship between climate change impacts on agriculture and food security. During last decades negative consequences of climate change have drastically reduced agricultural productivity. For example, severe drought in 2000 has reduced the production of cereals close to zero; due to the prolonged drought almost 400,000 hectares of agricultural lands have been damaged. Within the last decade the occurrence of droughts in Eastern Georgia increased, the severe droughts have been observed every year accompanied with high temperatures (40-42°) doubling the frequency of the occurrence of the intense droughts in the region.

For the adaptation of agricultural sector to the expected climate change, wide range of measures is planned. Those include, but are not limited to the following: (a) research and development of emergency response plans for agriculture dealing with droughts, floods, etc; (b) Introduction of innovative irrigation management and water application techniques; (c) implementation of various site specific anti-erosion measures; (d) establishment of information centers for farmers that provides guidance on adaptive management of agriculture; etc.

A complex mountainous topography makes the country more prone to the climate extremes and related events. Georgia is vulnerable to natural hazards including floods, flash floods, droughts, landslides, avalanches, and mud flows. Many of these extreme events have been recorded in the last two-three decades, the most recent one happening on the 13th of June 2015 in Tbilisi. The flash-flood was distinctive not only due to the high casualty (19 people dead and huge economic loss (around 100 million USD) but reconnecting to the fact that it was characterized by 9 different types of hydro-meteorological and geological extremes, occurring simultaneously within a very limited area. These weather extremes additionally result in changing of the hydrology of rivers, posing a serious impact on continuous water availability for drinking, irrigation and energy. Establishment of Early warning systems for climate related extreme events is considered as priority measure by the Government of Georgia.

Sea level rise impacts are projected to induce multiple negative consequences in coastal zone of Georgia. It is imperative to assess and implement adaptation measures in order to minimize economic losses. Combination of various coastal zone protection technologies are recommended by the second "Technology Needs Assessment" report of Georgia to prevent the significant damage caused by the Black Sea level rise. According to the National communications of Georgia to the UNFCCC costs of the coastline adaptation program is estimated about 600 million USD. In absence of adaptation measures the estimated losses only in the tourism sector will reach about 2 billion USD by 2030. Due to very high social costs involved, priority will be given to the integrated coastal planning and management instruments, rather than investments in coastal erosion abatement only.

Without international support Georgia is unable to cope with adverse effects of climate change. "Lima Call for Climate Action" (Decision 1/CP.20) *"Urges developed country Parties to provide and mobilize enhanced financial support to developing country Parties for ambitious mitigation and adaptation actions".*

According to the expert judgment estimated economic losses without adaptation measures during 2021-2030 will be about 10-12 billion USD, while adaptation measures will cost within 1.5-2 billion USD. Accessing finance that allows Georgia to adapt to the impacts of climate change is crucial. To estimate required financial support the following pre-2020 activities are planned: (a) prioritize selected adaptation policies and measures based on national circumstances and identify associated financial needs; (b) evaluate domestic sources of finances; and (c) determine need and sources for external financial support.

Georgia needs international support for the development and transfer of technologies to increase its adaptive capacity. In this regard technologies for the protection of coastal infrastructure; technologies for sustainable water management; sustainable agricultural technologies; and technologies for sustainable forest management are prioritized.

The implementation of adaptation actions for the period 2021 – 2030 requires the continuous development and strengthening of Georgia's capacities, in particular: (a) national capacity to develop adaptation strategies; (b) policy makers capacity for climate change adaptation planning; (c) capacity of communities to reduce their vulnerability to adverse impacts of future climate hazards; (d) capacity of national health system institutions, to respond to and manage long-term climate change-sensitive health risks.

It is fundamental to incorporate a gender- and human rights-sensitive approach in adaptation planning capacity building, prioritizing the most vulnerable sectors and regions in order to reduce social inequality and the gap between women and men rights.

Annex 1

Forests

Climate change adverse impacts pose severe threats to Georgia's forests. Rising temperatures, changes in precipitation patterns, reduced water availability, increased frequency of forest fires, as well as pests and disease outbreaks have reduced carbon sequestration ability of forests.

There is no reliable inventory data on most forest resources of Georgia. The last nation-wide forest inventory was conducted in early 1990s. According to the expert judgment, on 600,000 ha, which are declared for timber production forests (about 22% of Georgia's forest area), timber and fuel-wood extraction has significantly exceeded the respective annual allowable cut over the last two decades. In 2014, the forest resources assessment of the pilot area - Borjomi-Bakuriani Forest District shows the reduction in forest biomass by almost 20% over the past 15 years. However, it is premature to draw conclusions on the state of Georgia's forests based on the results obtained for one forest district covering only 45,000 hectares.

The Georgian Government prioritizes three options for climate change mitigation activities in forestry sector: (a) establish Sustainable Forest Management (SFM) practices; (b) conduct afforestation/reforestation and assist natural regeneration; and (c) expand the protected area.

Unconditional commitment

Georgia is committed to:

- Strongly support CO_2 reduction in one pilot area, the Borjomi-Bakuriani Forest district (currently the only forest district where carbon emissions have been quantified) by at least 70% between 2020 and 2030, by strengthening law enforcement and introducing SFM practices. It is estimated that this measure will lead to an overall emission reduction of at least 1 million tonnes of CO_2 over a period of 10 years in this district covering 45,000 hectares;
- Implement afforestation/reforestation activities on already identified 1,500 ha of degraded lands by 2030;
- Assist natural regeneration of forests through different silvicultural methods on 7,500 ha by 2030 in order to restore natural forest cover.

Conditional commitment

- In case of external financial and technical support, the country commits itself to afforest/reforest up to a total of 35,000 hectares, as well as supporting relevant activities to assist natural regeneration in identified areas needing afforestation / reforestation until 2030;
- If Georgia receives substantial financial and technical support for the development of forest inventories and remote sensing, as well as the development of internationally recognized practices for SFM and carbon monitoring for the identified forest districts

(covering up to 250,000 ha of forest lands) the country commits itself to support the sustainable management of forests with estimating measures leading to an overall carbon sequestration up to 6 million tons of CO_2 on these lands over a period 2020-2030. These forest lands include the forest district of Akhmeta (covering up to 70,000 ha) where the first set of locality/site-specific criteria and indicators (C&I) for SFM will be selected/tested and implemented. The objective is to gain relevant expertise for further development of the C&I for SFM in the rest of identified forest lands to achieve the nation-wide development of SFM practices, thereby support the carbon sequestration;

- With financial support from international sources to set up an adequate infrastructure and assure effective planning for management of the additional protected areas during 2020-2030, country commits itself to expand the protected area from 0.52 million ha to 1.3 million ha (about 20% of Georgia's territory) comprising at least 1 million ha of forests.

Greece

The Paris Protocol – A blueprint for tackling global climate change beyond 2020[25]

Executive Summary

According to the latest findings of the Intergovernmental Panel on Climate Change (IPCC), without urgent action, climate change will bring severe, pervasive and irreversible impacts on all the world's people and ecosystems. Limiting dangerous rises in global average temperature to below 2°C compared with pre-industrial levels (the below 2°C objective) will require substantial and sustained reductions in greenhouse gas emissions by all countries.

This global transition to low emissions can be achieved without compromising growth and jobs, and can provide significant opportunities to revitalise economies in Europe and globally. Action to tackle climate change also brings significant benefits in terms of public well-being. Delaying this transition will, however, raise overall costs and narrow the options for effectively reducing emissions and preparing for the impacts of climate change.

All countries need to act urgently and collectively. Since 1994, the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) have focused on this challenge, resulting in more than 90 countries, both developed and developing, pledging to curb their emissions by 2020. However, these pledges are insufficient to achieve the below 2°C objective[1]. For these reasons, in 2012, the UNFCCC Parties launched negotiations towards a new legally binding agreement applicable to all Parties that will put the world on track to achieve the below 2°C objective. The 2015 Agreement is to be finalised in Paris in December 2015 and implemented from 2020.

The progress made at the recent climate conference in Lima brings a robust agreement in Paris within reach. Most importantly, it was decided how countries should formulate and communicate their proposed emission reduction targets well in advance of the Paris conference. A first full draft text of the 2015 Agreement was also developed, reflecting the positions of all Parties on all the elements under negotiation.

Well ahead of the Lima conference, the EU continued to show leadership and determination to tackle climate change globally. At the European Summit in October 2014, European leaders agreed that the EU should step up its efforts and domestically reduce its emissions by at least 40% compared to 1990 by 2030. This was followed by announcements of China and the US. In Lima, EU Member States pledged about half of the initial capitalisation of US$10 billion to the Green Climate Fund (GCF) to assist developing countries. Within the EU, a new investment plan was adopted. This will unlock public and private investments in the real economy of at least €315 billion over the next three years (2015-17). These investments will help modernise and further decarbonise the EU's economy.

This communication responds to the decisions taken in Lima, and is a key element in implementing the Commission's priority of building a resilient Energy Union with a forward-looking climate change policy consistent with the President of the Commission's political guidelines. This communication prepares the EU for the last round of negotiations before the Paris conference in December 2015.

[1] United Nations Environment Programme - "The emissions gap report 2014. A UNEP synthesis report"

[25] European Commission, 2015. Energy Union Package - Communication from the Commission to the European Parliament and the Council – The Paris Protocol – A blueprint for tackling global climate change beyond 2020 {SWD(2015) 17 final}. Brussels, 25.2.2015 – COM(2015) 81 final.

In particular this communication:

- translates the decision taken at the European Summit in October 2014 into the EU's proposed emissions target - its Intended Nationally Determined Contribution (INDC) to be submitted by the end of the first quarter of 2015;

- proposes that all UNFCCC Parties submit their INDCs well in advance of the Paris conference. China, the US and other G20 countries, as well as high and middle-income countries should be in a position to do so by the first quarter of 2015. Greater flexibility should be provided to Least Developed Countries (LDCs);

- sets out a vision for a transparent and dynamic legally binding agreement, containing fair and ambitious commitments from all Parties based on evolving global economic and geopolitical circumstances. In aggregate these commitments - based on scientific evidence - should put the world on track to reduce global emissions by at least 60% below 2010 levels by 2050. Should there be a gap in the level of ambition set in Paris, this should be addressed by devising a work programme starting in 2016 working closely with the GCF to identify additional action to reduce emissions;

- proposes that the 2015 Agreement should be in the form of a Protocol under the UNFCCC. Major economies, in particular the EU, China and the US, should show political leadership by joining the Protocol as early as possible. It should enter into force as soon as countries with a collective total of 80% of current global emissions have ratified it. Under the new Protocol, climate finance, technology development and transfer, and capacity building should promote universal participation and facilitate the efficient and effective implementation of strategies to reduce emissions and adapt to the adverse effects of climate change;

- underlines that the International Civil Aviation Organisation (ICAO), the International Maritime Organisation (IMO) and the Montreal Protocol should act to effectively regulate emissions from international aviation and shipping and the production and consumption of fluorinated gases before the end of 2016;

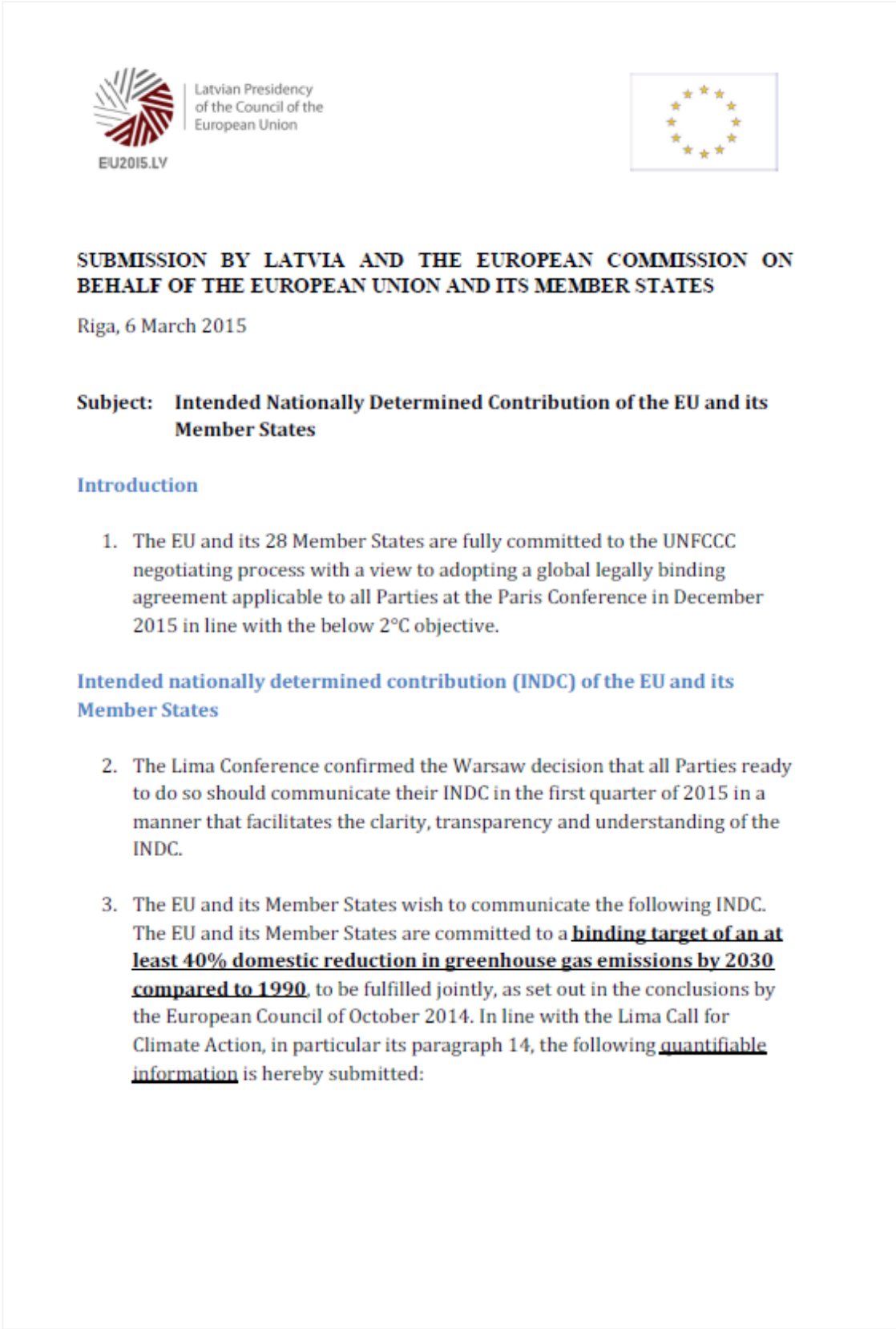
- highlights how other EU policies such as, trade, scientific research, innovation and technological cooperation, economic and development cooperation, disaster risk reduction and environment could reinforce the EU's international climate policy; and

- is complemented by a climate diplomacy action plan jointly developed by the European External Action Service and the Commission. The action plan is aimed at scaling up EU outreach and building alliances with ambitious international partners in the run up to the Paris conference.

Some aspects of this communication are set out in further detail in the accompanying Staff Working Document.

Intended Nationally Determined Contribution (INDC) of Greece

Greece an EU Member State is committed to contribute to the EU climate policy targets (20-20-20) and to transpose EU Directives into national laws. The Hellenic INDC is that of the EU.



Latvian Presidency of the Council of the European Union

EU2015.LV

SUBMISSION BY LATVIA AND THE EUROPEAN COMMISSION ON BEHALF OF THE EUROPEAN UNION AND ITS MEMBER STATES

Riga, 6 March 2015

Subject: Intended Nationally Determined Contribution of the EU and its Member States

Introduction

1. The EU and its 28 Member States are fully committed to the UNFCCC negotiating process with a view to adopting a global legally binding agreement applicable to all Parties at the Paris Conference in December 2015 in line with the below 2°C objective.

Intended nationally determined contribution (INDC) of the EU and its Member States

2. The Lima Conference confirmed the Warsaw decision that all Parties ready to do so should communicate their INDC in the first quarter of 2015 in a manner that facilitates the clarity, transparency and understanding of the INDC.

3. The EU and its Member States wish to communicate the following INDC. The EU and its Member States are committed to a **binding target of an at least 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990**, to be fulfilled jointly, as set out in the conclusions by the European Council of October 2014. In line with the Lima Call for Climate Action, in particular its paragraph 14, the following quantifiable information is hereby submitted:

ANNEX

Intended Nationally Determined Contribution of the EU and its Member States	
Parties	EU and its Member States (Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom) acting jointly
Type	Absolute reduction from base year emissions.
Coverage	Economy-wide absolute reduction from base year emissions.
Scope	All greenhouse gases not controlled by the Montreal Protocol: Carbon Dioxide (CO_2) • Methane (CH_4) • Nitrous Oxide (N_2O) • Hydrofluorocarbons (HFCs) • Perfluorocarbons (PFCs) • Sulphur hexafluoride (SF_6) • Nitrogen trifluoride (NF3)
Base Year	1990.
Period	1 January 2021- 31 December 2030.
Reduction Level	At least 40% domestic reduction in greenhouse gas emissions by 2030.
% of Emissions Covered	100%.
Agriculture, forestry and other land uses	Policy on how to include Land Use, Land Use Change and Forestry into the 2030 greenhouse gas mitigation framework will be established as soon as technical conditions allow and in any case before 2020.
Net Contribution of International Market Based Mechanisms	No contribution from international credits.

Planning Process	Domestic legally-binding legislation already in place for the 2020 climate and energy package. The existing legislation for land use, land-use change and forestry (EU Decision 529/2013) is based on the existing accounting rules under the second commitment period of the Kyoto Protocol. Legislative proposals to implement the 2030 climate and energy framework, both in the emissions trading sector and in the non-traded sector, to be submitted by the European Commission to the Council and European Parliament in 2015-2016 on the basis of the general political directions by the European Council, taking into account environmental integrity.
Fair and ambitious	The target represents a significant progression beyond its current undertaking of a 20% emission reduction commitment by 2020 compared to 1990 (which includes the use of offsets). It is in line with the EU objective, in the context of necessary reductions according to the IPCC by developed countries as a group, to reduce its emissions by 80-95% by 2050 compared to 1990. Furthermore, it is consistent with the need for at least halving global emissions by 2050 compared to 1990. The EU and its Member States have already reduced their emissions by around 19% on 1990 levels while GDP has grown by more than 44% over the same period. As a result, average per capita emissions across the EU and its Member States have fallen from 12 tonnes CO2-eq. in 1990 to 9 tonnes CO2-eq. in 2012 and are projected to fall to around 6 tonnes CO2-eq. in 2030. The emissions in the EU and its Member States peaked in 1979.
Key Assumptions	
Metric Applied	Global Warming Potential on a 100 year timescale in accordance with the IPCC's 4th Assessment Report.
Methodologies for Estimating Emissions	IPCC Guidelines 2006 and IPCC 2013 KP Supplement.
Approach to accounting for agriculture, forestry and other land uses	Comprehensive accounting framework, activity or land-based approach, for emissions and removals from land use, land-use change and forestry.
Coverage	
Sectors/Source Categories	• Energy o Fuel Combustion ▪ Energy industries ▪ Manufacturing industries and construction ▪ Transport ▪ Other sectors ▪ Other

	○ Fugitive emissions from fuels ▪ Solid fuels ▪ Oil and natural gas and other emissions from energy production ○ CO_2 transport and storage • Industrial processes and product use ○ Mineral industry ○ Chemical industry ○ Metal industry ○ Non-energy products from fuels and solvent use ○ Electronic industry ○ Product uses as substitutes for ODS ○ Other product manufacture and use ○ Other • Agriculture ○ Enteric fermentation ○ Manure management ○ Rice cultivation ○ Agricultural soils ○ Prescribed burning of savannas ○ Field burning of agricultural residues ○ Liming ○ Urea application ○ Other carbon-containing fertilisers ○ Other • Waste ○ Solid waste disposal ○ Biological treatment of solid waste ○ Incineration and open burning of waste ○ Wastewater treatment and discharge ○ Other • Land Use, Land-Use Change and Forestry set out in Decision 529/2013/EU ○ Afforestation, reforestation ○ Deforestation ○ Forest management ○ Cropland management ○ Grazing land management ○ Or equivalent land-based accounting using UNFCCC reporting categories ○ Other categories/activities elected by the EU and its Member States as Parties to the Kyoto Protocol and its Doha Amendment.

Follow up

4. The EU and its Member States urge all other Parties, in particular major economies, to communicate their INDCs by the end of March 2015 in a manner that facilitates their clarity, transparency and understanding.

5. The EU and its Member States request the UNFCCC Secretariat to publish the INDC of the EU and its Member States on its website and to take it into account when preparing the synthesis report on the aggregate effect of the INDCs communicated by Parties.

6. The EU and its Member States look forward to discussing with other Parties the fairness and ambition of INDCs in the context of the below 2°C objective, their aggregate contribution to that objective and on ways to collectively increase ambition further.

Moldova

Country profile

The Republic of Moldova is a parliamentary republic. The President is elected by the Parliament, holding the role of Head of the State, while the Prime Minister is the Head of Government.

On 27 August 1991, the Republic of Moldova became an independent and sovereign State. In July 1994, the new constitution of Moldova was adopted and in July 2000, the Parliament passed an amendment to the Constitution according to which, Moldova became a parliamentary republic. A strip of Moldova's internationally recognized territory on the east bank of the river Dniester has been under the de facto control of the breakaway government of Transnistria since 1990.

Moldova lies in the central part of Europe in the north-eastern Balkans. Moldova occupies an area of 33.843,5 km^2. On the North, East and South, Moldova is surrounded by Ukraine, and on the West it is separated from Romania by the Prut River[26].

The climate is moderately continental. The average annual temperature increases southward from around 8-9°C in the north to around 10-11°C in the south. The average annual precipitation varies between 600-650 mm in the north and the centre and 500-550 mm in the south and the southeast.

The population is estimated to be 3.559.500 people (2012). The capital city is Chișinău and the currency is the Moldovian Leu. The official language is the Romanian, while the Russian, the Ukrainian and the Gagauz are official regional recognized languages.

Location Map

National climate change policy

Moldova ratified the Kyoto Protocol on 13 February 2003 (the official date of ratification was 22 April 2003). As a non-Annex I Party, the Republic of Moldova has no commitments to reduce GHG emissions under the Kyoto Protocol (2nd NC to UNFCCC, 2009). However, the country submitted a voluntary emission reduction target for the Copenhagen Accord in 2009 that was included in its Appendix II. The country expressed its willingness to undertake mitigation measures leading to no less than a 25% reduction of its total national GHG emissions by 2020 compared to the base year (1990) level[27].

In December 2009 the Energy Community Ministerial Council decided on the accession of Moldova[28]. Now, Moldova is a contracting Party[29] to the Treaty that established in May 2006 the Energy Community of Southeast Europe and EU and has accepted the obligation to implement

[26] http://www.moldova.md/en/
[27] http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/moldovacphaccord_app2.pdf
[28] http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY
[29] Law 117-XVIII of 23.12.2009 for an Accession of Republic of Moldova to the Energy Community Treaty (Ministry of Economy of the Republic of Moldova, 2012)

the EU acquis. Under this framework the country will apply directives related to the use of RES and the promotion of energy efficiency.

As a member of the Energy Community and for the implementation of Directive 2009/28/EC the respective RES target for year 2020 was calculated initially at 10%[30] (IPA Energy and Water Economics, 2010).

Mitigation

In the context of its mitigation efforts, Moldova has implemented policy instruments only for the energy sector, as shown at the table below.

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings	-	-
Industry	-	-
Transport	-	-
Energy	Promotion of RES technologies	Regulation standards (Methodology - Guarantees of origin) (Regulation – ANRE Decisions No. 321/2009 and No. 330/2009)
	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Law No. 160-XVI, 2007)
	Energy management	Performance standards (energy certificates,) (Law No. 142/2010)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Moldovan population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Moldovan population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,68	-0,56	-0,58	-0,79	-0,84	-0,84	-0,69

Due to the global economic crisis in 2009 industrial production declined by 21%, agricultural output declined by 10%, investment halved and private consumption fell by 8% (BSTDB, 2011; European Commission, 2010). At the end of year 2010, the largest share of employment was attributed to the state services (public administration, health, education, etc) (24% of total employment), followed by agriculture (22%), trade and catering (20%), industry (13%), transport and communications (6%), and construction (5%) (BSTDB, 2011). In 2011 there were positive signs for the Moldovan economy since the industrial production increased by 7,4%, agriculture by 4,6% and transportation by 16,8% (PWC and MIEPO, 2012). The International Monetary Fund (IMF) provided GDP estimates for the country up to 2016 (Table 3).

Table 3: Projections for the Moldavian GDP (IMF, 2011).

Year	**2011**	**2012**	**2013**	**2016**
Annual percent change of GDP (%)	4,5	4,8	5,0	4,5

[30] Proportion of energy from RES in electricity, heat and transport sectors (IPA Energy and Water Economics, 2010).

Business-As-Usual scenario

The policy mixture of the BAU scenario consists of the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31st December 2010 (Table 1). The respective for this period Moldovan climate change policy has three main components: i) penetration of RES in the national energy mix, ii) support to increase energy efficiency; iii) GHG emission reductions through CDM. Concerning the adaptation policy, there are no relevant implemented policy instruments.

For RES the existing legislation partially transposes the requirements of Directive 2001/77/EC, while the Biofuel Directive 2003/30/EC needs to be further reflected in the Law on Renewable Energy (Republic of Moldova, 2012). Investments in RES facilities based on foreign assistance[31] were made mainly in biomass and solar for heating production (SNC, 2009). Hydropower and one small (100kW) power plant on biogas are the only RES utilized for electricity generation and registered in the Official Moldova Energy Balance. Despite the published "Methodology on renewable tariff calculation"[32], RES were not promoted. Individual solar thermal building systems and small solar photovoltaic roof maintained units[33] were the only projects established (MoSEFF, 2011). Both the RES and biofuels sectors are in early stage and effective support schemes need to be enacted in order to stimulate their growth (Republic of Moldova, 2012).

The legislation for energy efficiency is more declaratory than operational (United Nations, 2009).

Optimistic scenario

The enhanced M/A policy mixture of the OPT scenario includes:

i) the policy mixture of BAU;

ii) policy instruments set into force after 1 January 2011. These were: i) Law on Regulating Entrepreneurial Activity through licensing (No. 34-36, issued on 18.02.2011, amending Law No. 451-XV which was issued on 30.06.2001). This law concerns investments for RES due to the creation of free zones. ii) Law "Decreasing the energy consumption through energy efficiency and RES usage" (approved on 01.01.2011) which is partly in line with the Renewable Energy Sources Directive (2009/ (SEC(2011) 1028).

iii) additional policy instruments. These were:

- Financial policy instruments for RES (FITs, subsidies).
- Regulatory, financial and dissemination policy instruments for EE for the building and industrial sectors (energy labelling, energy performance standards for buildings, behaviour change using awareness campaigns, training, voluntary agreements, tradable permits).
- Regulatory, financial and dissemination policy instruments for promoting biofuels and EE in the transport sector (use of biofuels, performance and technological standards, soft loans, tax exemptions, behaviour change through eco-driving, fuel economy).
- Financial and dissemination policy instruments for EE in the agricultural sector (subsidies, awareness campaigns).
- Regulatory policy instruments for adaptation in water and forest management.

[31] http://www.undp.md/presscentre/2012/Biomass_23July/index_rom.shtml
[32] Methodology for the determination, approval and application of tariffs for the electricity generated from renewable sources and for bio-fuel. Official Monitor No 45-46 from 27.02.09
[33] http://ieasm.webart.md/data/m71_2_170.pdf

Pessimistic scenario

The policy mixture of the PES scenario was synthesized by: i) the policy mixture of BAU; ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT scenario) and iii) additional policy instruments which were considered in less sectors and with smaller amount for financial support towards EE and RES compared to those of the OPT.

These additional policy instruments were:

- Financial policy instruments for RES (FITs, subsidies).
- Regulatory policy instruments for EE for the building and industrial sectors (energy labelling, energy performance standards for buildings).
- Regulatory, financial and dissemination policy instruments for promoting biofuels and EE in the transport sector (use of biofuels, performance and technological standards).

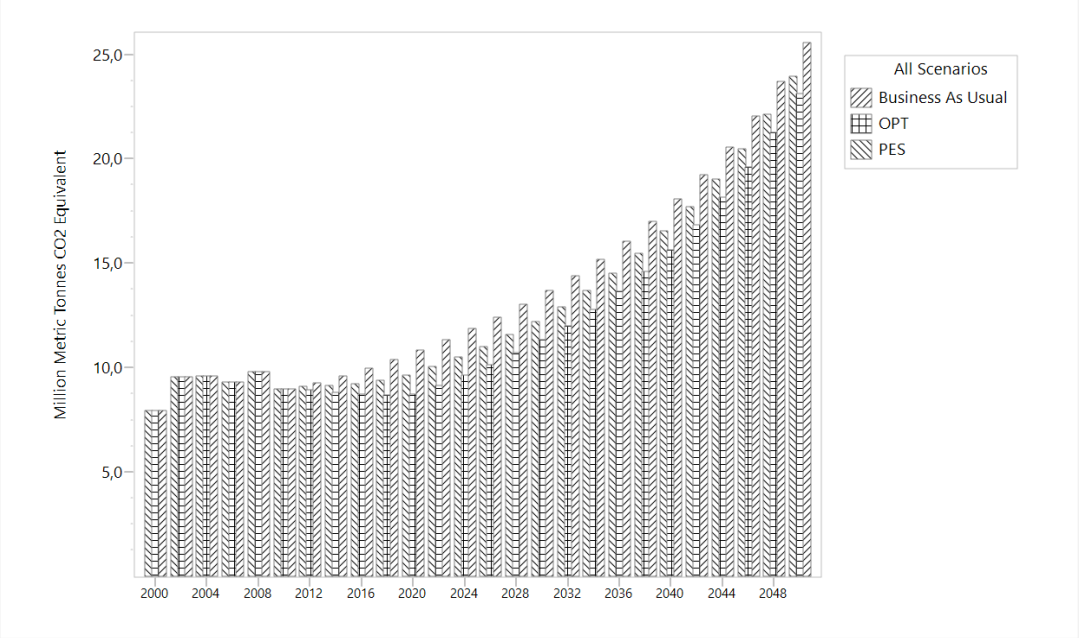
Results

The policy mixtures which characterized the three scenarios, as outcomes of the Long range Energy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per category.

It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanidng of the required adaptation measures, in order to implement the selected policy mixtures.

CO_2 emissions

According to the outcomes of the model LEAP, for the BAU scenario in 2020 the GHG emissions are approximately 11 $MtCO_2eq$[34], for the OPT scenario the GHG emissions in 2020 are 8,7 $MtCO_2eq$, which is less compared to those of the BAU scenario and finally, for the PES scenario GHG emissions are 9,6 $MtCO_2eq$ (more than OPT, less than BAU).



Graph 1: Moldova - CO_2 emissions for three (3) scenarios.

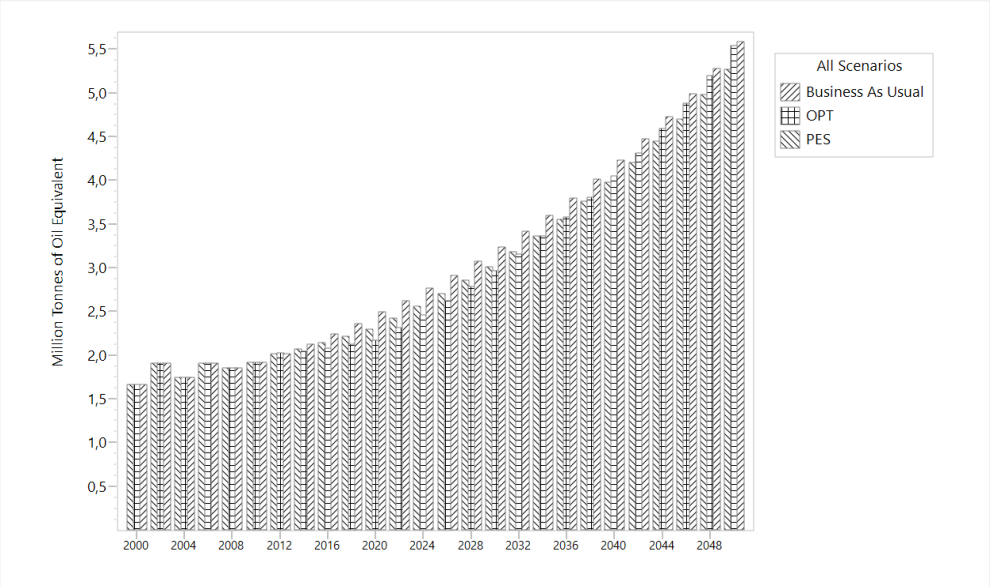
[34] GHG emission sources which are taken into consideration in this study do not include land use change and forestry, waste management and the whole spectrum of industrial processes due to missing data. They are mostly those related to the mitigation policy measures which are implemented.

Final energy consumption

Moldova's future projections of the final energy consumptions appear in the Graph 2.

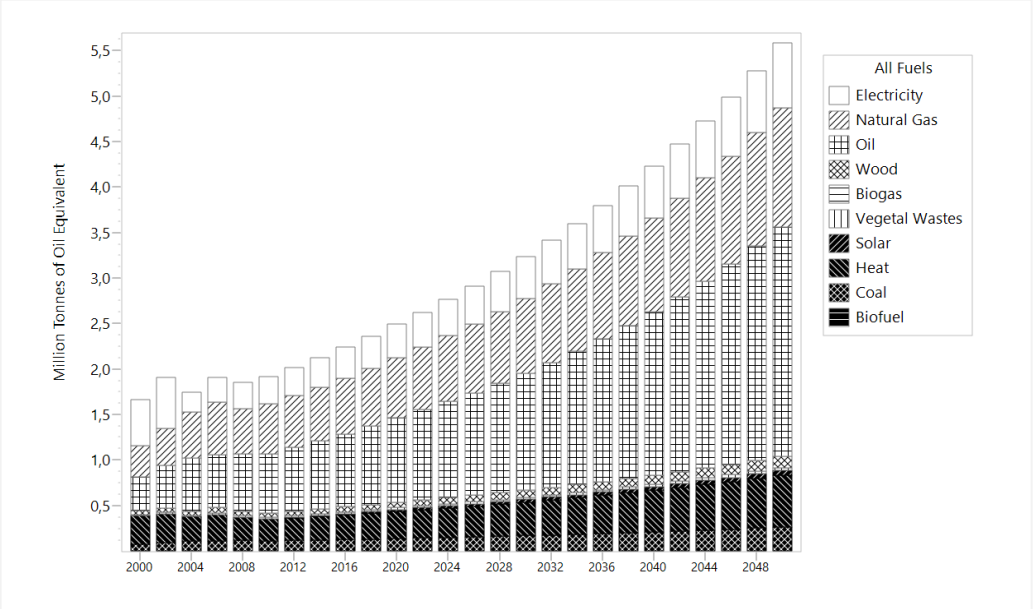
In short – term, the application of BAU scenario parameters gives the highest final energy consumption, while the lowest (best) is achieved by the application of OPT scenario parameters.

However, this situation changes in the long – term projection, since it is expected that in 2035 if no additional measures are taken or the policy mixtures does not involve some changes, the PES scenario will be the one with the lowest (best) final energy consumption.



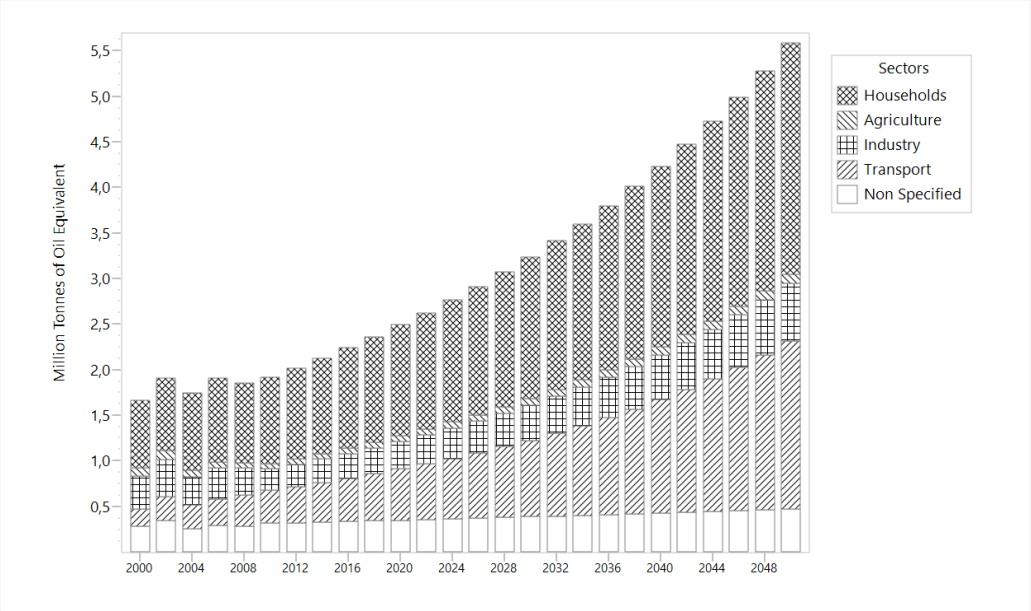
Graph 2: Final Energy Consumption for three (3) scenarios.

Analyzing the Business As Usual scenario, oil use and natural gas use appear to have a continuous increase up to 2050.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

The sectors in BAU scenario whose energy consumption appear to increase the most are the households and the transport, followed by non-specified sectors, while the final energy consumption of agriculture and industry remain almost stable.

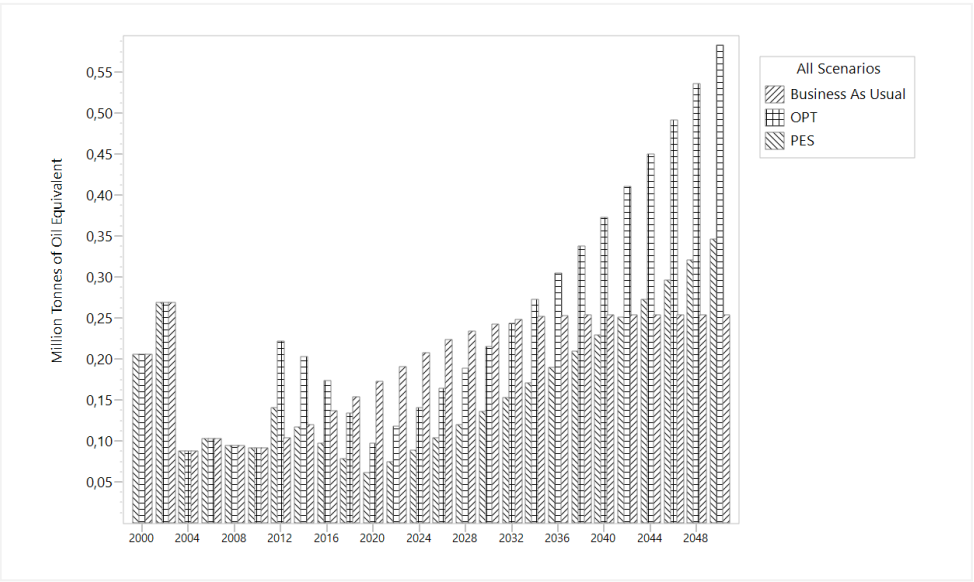


Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

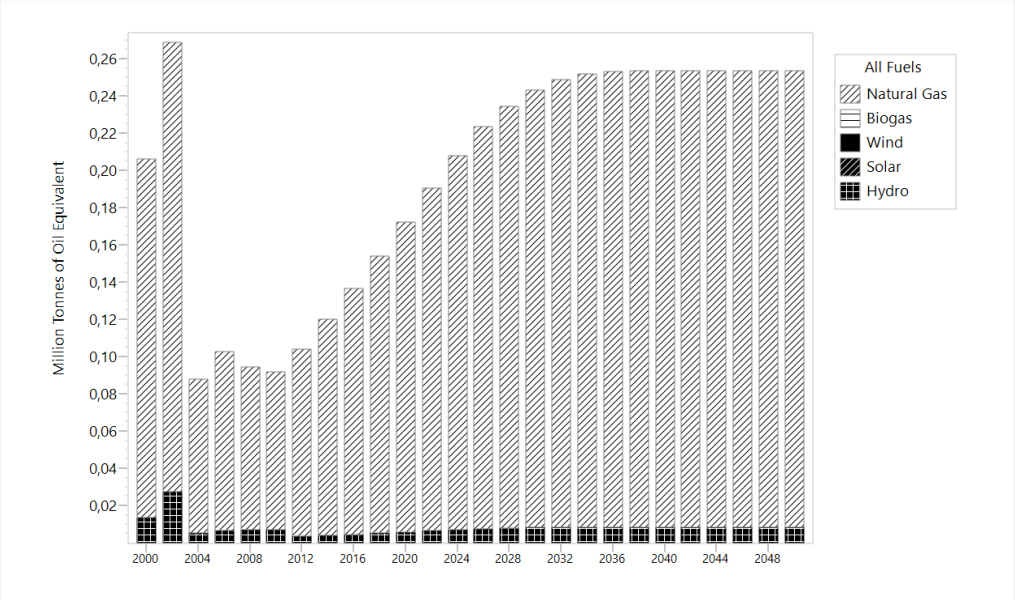
The LEAP results of electricity generation for three (3) scenarios are shown in Graph 5.

In BAU scenario, no new installed capacities are assumed. In OPT scenario is assumed that the share of RES in the electricity generation will be the following: Wind – 600MW by 2050; Solar – 600MW by 2050 and Biogas – 50MW by 2050. The total efficiency of the thermal power plants of the new combined cycle will not be less than 80% and the electrical efficiency 45-50% (NEEP, 2011). In PES scenario, the RES share is less than that assumed for OPT, the total efficiency of the thermal power plants is assumed to be 70% and the electrical efficiency 42%.



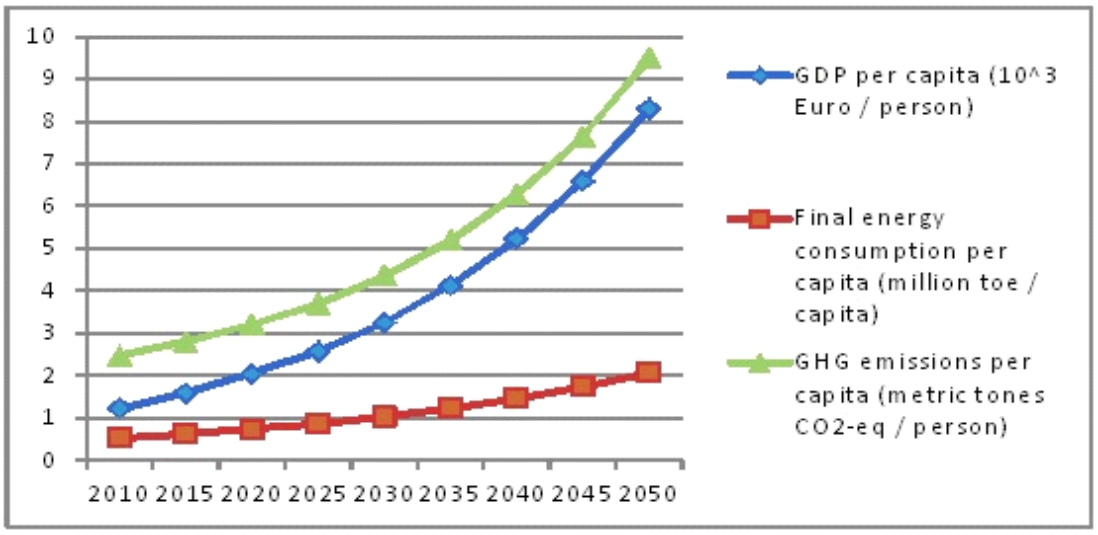
Graph 5: Electricity generation in the three (3) scenarios.

The country is a net energy importer with only 3% of demand for primary energy coming from domestic sources (Ministry of Economy of the Republic of Moldova, 2012). 97% of the national energy needs is imported.



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

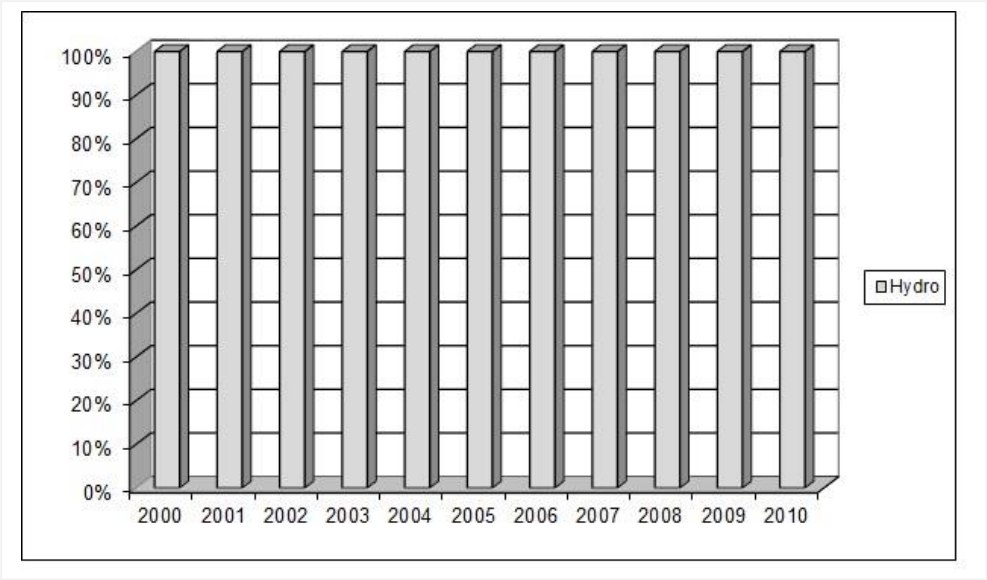


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they are increased. The growth is higher for the GHG emissions per capita.

RES production per technology

In Moldova, the only RES technology for electricity generation is hydro (there are not separate data on installed capacity for small-scale and large-scale hydro plants).



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

According to the AMS results, the OPT policy mixture was evaluated as the most effective one compared to the other two.

The policy mixture of the BAU scenario will drive to the largest amount of GHG emissions and to the lowest indirect environmental effects. On the contrary that of the OPT scenario demonstrates lower GHG emissions and higher indirect environmental effects due to the higher shares of biomass and biofuels in the total energy mix of this scenario.

The policy mixture of the OPT scenario has the best performance in political acceptability since it is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two policy mixtures. It offers a fair distribution of the "climate change" burden among the respective sectors. Moreover, OPT and partially PES encourage the introduction of innovative technologies, such as solar, biomas, biogas, but do not promote research. In BAU, innovations are not encouraged.

The implementation network (the governmental and national entities that will implement the policy instruments) does not provide the relevant information for climate change policy issues in none of the three policy mixtures. It is copying with the currently implemented policy mixture, but it fails to respond properly in the cases of OPT and PES. This is justified by the fact that BAU includes a limited number and relatively simple policy instruments, but the other two have a larger number of policy instruments, the majority of which require a more capable implementation network.

Given the above, the Mitigation/Adaptation policy mixture which characterizes the OPT scenario is the one that reaches sufficiently the targets of the climate change policy of Moldova. Nevertheless, the success of this policy mixture requires the demonstrated effectiveness of the implementation network and a more stringent frame for non-compliance.

Policy Trends

The national efforts to reduce GHG emissions in the context of the voluntary emission target are oriented primarily to increasing energy efficiency and secondary to the penetration of RES in the gross final energy consumption.

Energy efficiency (EE) is one of the priorities for the national economy and for the energy sector and has been named a key objective under the EU-Moldova ENP Action Plan (Objective

66). The decision of promoting technologies and approaches for the achievement of energy savings was dictated by the main weaknesses of the Moldovan energy sector. These are: i) the lack of indigenous energy resources (97% of national energy needs are imported); ii) the excessive dependence (100%) on natural gas imported from a single supplier; iii) the low level of implemented RES projects; iv) the lack of adequate power transmission lines and the poor condition of most energy infrastructure (Energy Strategy up to 2020). Additionally, due to the rising profile of Moldova as a transit country for energy supplies to the Balkan region the three main pillars for its energy policy are hierarchically: energy efficiency, renewable energy and diversification of supplies (EC, 2011). These three main directions are reflected in the "National Development Strategy of the Republic of Moldova 2012-2020[35]" which was approved by the Parliament. It is estimated that a well-planned and concerted implementation of an energy efficiency program in Moldova could reduce the financial impact of the energy sector on the GDP by 1,6-1,7% per year, starting with 2009 (United Nations, 2009). Recently, the country has set an intermediary energy savings target of 9% compared to the 2009 baseline by 2016 (National Energy Efficiency Action Plan for 2013-2015, 2013).

Despite the significance that energy efficiency has for the country, there is only one implemented Law specifically for such issues until now (Law No. 142, issued on 02.07.2010)[36]. A basic regulatory and institutional framework has been put in place, but additional secondary legislation, specifically Energy Service Regulations, national and local EE Programs and Plans, National RE Action Plans, energy auditing regulations, etc. need to be developed to ensure its actual implementation (Republic of Moldova, 2012).

The situation is expected to change since Moldova became an Energy Community member[37], and, thus, the country will apply EU directives related to the promotion of EE and the use of RES (Decision No 2010/02/MC-En-C of 24 September 2010 updated the acquis by amending Decision 2009/05/MC-En-C of 18 December 2009 (Ministry of Economy of the Republic of Moldova, 2012)). In 2012 the Ministry of Regional Development and Construction elaborated both the draft Law for Energy Efficiency in buildings[38] and the Moldova Road Map for energy efficiency in the buildings[39]. They are in the process of public consultation and are oriented to transpose Directive 2010/31/EU.

On the contrary, when compared to the legislative framework for EE, RES are more supported. The existing legislation for RES and biofuels partially transposes the requirements of Directive 2001/77/EC, while the Biofuel Directive 2003/30/EC needs to be further reflected in the Law on Renewable Energy (Republic of Moldova, 2012). Transposition of new Directive 2009/28/EC on promotion of the use of energy from RES is required. This is subject to transposition in 2012, as pre-conditioned by the Energy Budget Support offered by EU Delegation within 2011-2014. Both the RES and biofuels sectors are in early stage and effective support schemes need to be enacted in order to stimulate their growth (Republic of Moldova, 2012).

According to the Decision of the Ministerial Council of the Energy Community D/2012/04/MC-EnC, article 4, adapting Annex I, Part A to Directive 2009/28/EC, the country has the target of 17% energy from RES in gross final consumption in 2020 (National Renewable Energy Action Plan of the Republic of Moldova for 2013-2020, 2013). The sectoral targets that

[35] http://www.cancelaria.gov.md/libview.php?l=en&id=1051&idc=360

[36] http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=343683

[37] In December 2009 the Energy Community Ministerial Council decided on the accession of Moldova (http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY) Moldova is a contracting Party to the Treaty that established in May 2006 the Energy Community of Southeast Europe and EU and has accepted the obligation to implement the Energy Community acquis (Law 117-XVIII of 23.12.2009 for Accession of Republic of Moldova to the Energy Community Treaty (Ministry of Economy of the Republic of Moldova, 2012))

[38] http://www.particip.gov.md/proiectview.php?l=ro&idd=345

[39]http://www.google.md/url?sa=t&rct=j&q=eficienta%20energetica%20a%20cladirilor%20moldova&source=web&cd=6&cad=rja&ved=0CFQQFjAF&url=http%3A%2F%2Fwww.cnp.md%2Fen%2Fworking-groups%2Feconomic-development%2Fitem%2Fdownload%2F805&ei=-YEvUIWvIcnCswanwYGQDQ&usg=AFQjCNFIEHb2D38lOS_4XEfjxUONAiWmaQ

support this overall target are: 10% of RES in electricity by year 2020; 10% of RES in transport by year 2020 and 27%share of RES-Heating & Cooling by 2020 (National Renewable Energy Action Plan of the Republic of Moldova for 2013-2020, 2013).

Moldova is making efforts to prepare and approve further Clean Development Mechanism (CDM) projects[40]. Because of the high energy intensity there are opportunities for development and promotion of such projects, mainly in: reduction of electricity losses; high efficient lamps' installment; CHP capacity expansion; local CHP refurbishment; electricity produced by RES (mainly: wind, solar, biogas); landfill waste treatment in biogas with further electricity production. No registered NAMAs at the UNFCCC or Ecofys database[41],[42] .

The country lacks of adaptation climate change policy, although it is already experiencing climate change impacts, particularly in the agricultural sector which is the dominant sector of employment in Moldova. During the past two decades, this sector faced droughts, soil erosion and wind, thunder storms and heavy rain falls, hail, spring frosts and floods (UNDP, 2009). Actions for adaptation are required also taking into consideration the fact that there is a high proportion of vulnerable poor[43] that will suffer more due to the impacts of climate change (EC, External Relations Directorate – General, 2011).

Conclusions

- Promoting energy efficiency in all sectors is crucial for the country, but there are not yet policy instruments for supporting such issues in any sector.
- The current policy mixture does not promote effectively investments for EE and RES.
- The legislative and administrative framework for CDM projects needs to be improved.
- Moldova lacks of policy instruments for adaptation to climate change, although it already faces climate change impacts particularly in the agricultural sector.

[40] http://ec.europa.eu/world/enp/pdf/country/2011_enp_nip_moldova_en.pdf
[41] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=142
[42] http://www.nama-database.org/index.php/By_region
[43] With a GDP per capita of 1000€ per annum, about 30 % of the population of Moldova ('the poorest country in Europe') live in absolute poverty and 4,5 % live in extreme poverty (EC, External Relations Directorate – General, 2011). That is why social spending thus remains a major component of public expenditure.

Intended Nationally Determined Contribution (INDC) of the Republic of Moldova

Government of the Republic of Moldova

Republic of Moldova's Intended National Determined Contribution

1. Introduction

The Republic of Moldova is fully committed to the UNFCCC negotiation process towards adopting at COP21 a protocol, another legal instrument or an agreed outcome with legal force under the Convention, applicable to all Parties, in line with keeping global warming below 2°C.

The Republic of Moldova hereby communicates its Intended Nationally Determined Contribution (INDC) and the accompanying information to facilitate clarity, transparency, and understanding, with reference to decisions 1/CP.19 and 1/CP.20.

Regarding the invitation to consider undertakings in adaptation planning, the Republic of Moldova has included in Annex 1 to INDC the information on adaptation contained in its draft Fourth National Communication currently under preparation, as well as in the Republic of Moldova's Climate Change Adaptation Strategy covering the period up to 2020 and the Action Plan on its implementation, approved recently by Governmental Decision No. 1009 as of 10.12.2014.

2. Republic of Moldova's Intended National Determined Contribution

The Republic of Moldova intends to achieve an economy-wide unconditional target of reducing its greenhouse gas emissions by 64-67 per cent below its 1990 level in 2030 and to make best efforts to reduce its emissions by 67 per cent.

The reduction commitment expressed above could be increased up to 78 per cent below 1990 level conditional to, a global agreement addressing important topics including low-cost financial resources, technology transfer, and technical cooperation, accessible to all at a scale commensurate to the challenge of global climate change.

In line with Lima Call for Climate Action, in particular its paragraph 14, the following quantifiable information is hereby submitted:

A) UP-FRONT INFORMATION ON MITIGATION

Intended National Determined Contribution	
Quantifiable information on the reference period	**Base Year**: 1990. **Total Emissions in Base Year**: 43.4 Mt CO_2 eq (without LULUCF) and 37.5 Mt CO_2 eq (with LULUCF). These data are provisional and will be defined on biennial basis through inventory submissions.
Timeframes and periods of implementation	Time frame of the commitment is from 1st January 2021 to 31st December 2030. Its achievement will be tracked periodically through the Republic of Moldova's Inventory of Greenhouse Gas Emissions and Sinks.
Type of contribution	Absolute reduction from base year emissions.
Coverage of contribution	Economy-wide absolute reduction from the base year emissions. The geographic coverage is the same as the country's geopolitical boundary (including the administrative territorial units on the left bank of Dniester river). Republic of Moldova intends to account for 100 percent of national greenhouse gas emissions and removals for the base year as published in the Republic of Moldova's Greenhouse Gas Emissions and Sinks, on a net-net basis.
Scope: inclusion of gases and sectors	**Gases Covered**: all greenhouse gases not controlled by the Montreal Protocol – Carbone Dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6), Nitrogen trifluoride (NF_3). **Sectors covered:** energy; industrial processes and product use; agriculture; land use, land-use change and forestry; and waste.
Reduction level	The Republic of Moldova is committed to an unconditional target of a 64-67 per cent reduction of its greenhouse gas emissions by 2030 compared to 1990 levels. The 64 per cent reduction corresponds to a self-sufficiency power system development scenario, while the 67 per cent reduction allows for a 30 per cent import of electricity. The reduction commitment could increase up to 78 per cent reduction below 1990 level conditional to a global agreement addressing important topics, including access to low-cost financial resources, technology transfer and technical cooperation commensurate to the challenge of global climate change.
Planning processes	Relevant legislative acts for the INDC implementation are required and will be considered being approved on Parliamentary level. By mid-2016, a draft Low Emission Development Strategy (LEDS) of the Republic of Moldova for the period up to 2030 will be developed. After consultations at the national level, the Low Emission Development Strategy of the Republic of Moldova until 2030 will be subject to approval by the Government by end of 2016. The LEDS is expected to be fully in line with the provisions of the European Union and the Republic of Moldova Association Agreement signed on 27th of June 2014 and any other relevant national legislation.

Intended National Determined Contribution	
Fair and ambitious	The Republic of Moldova's approach to considering fairness and ambition is to assess how its INDC contributes to meeting the ultimate objective of the Convention, of achieving stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. National commitments are well in line with the emissions pathways towards 2050 that correspond to keeping global warming below 2°C compared to pre-industrial levels. It is worthwhile to note that fairness considerations in the national perspectives include various aspects and no single indicator on its own can accurately reflect fairness or a globally equitable distribution of countries' efforts. It is further important to note that the evolving nature of a country's circumstances is to be reflected in the fairness consideration: • Responsibility is reflected in a country's past, current and future greenhouse gas emissions. Total emissions, as well as per capita emissions, are to be considered. The Republic of Moldova's responsibility in terms of greenhouse gas emissions is low. In 2013, the Republic of Moldova emitted 12.8 Mt CO_2 eq (without LULUCF) and 12.7 Mt CO_2 eq (with LULUCF), which is less than 0.03 per cent of current world's emissions. Total and net per capita emissions were less than half of the world's average (3.2 tCO_2 eq/capita vs 6.4 tCO_2 eq/capita (reference), respectively 3.1 tCO_2 eq/capita vs 6.8 tCO_2 eq/capita respectively)[1]. Also, the Republic of Moldova has a low level of historic emissions, of about 0.05 per cent (without LULUCF) and/or of about 0.04 per cent (with LULUCF), since 1990. • The capacity to contribute to solving the climate change problem is closely related to the ability to invest in appropriate mitigation measures. Hence, one aspect of capacity is to take into account the GDP growth level and GDP per capita in fairness considerations. In this context, it is worth mentioning that within 1990-2014 period, the Real GDP decreased in the Republic of Moldova by 29 per cent, from 9.8935 to 6.9881 billion 2010 US$, while the real GDP per capita decreased by 14 per cent, from 2,261.9 to 1,950.2 2010 US$[2]. • The mitigation potential and abatement costs are other core aspects in considering a fair contribution of a country. The greenhouse gas intensity ("CO_2 emissions per GDP") indices decreased considerably within 1990-2013 period in the Republic of Moldova, from 4.4 to 1.9 kg CO_2 per real GDP 2010 US$ (without LULUCF), or by 56.4 per cent; and, from 3.8 to 1.9 kg CO_2 per real GDP 2010 US$ (with LULUCF), or by 56.8 per cent respectively. These values are still among the highest within the transition economies

[1] CAIT 2.0 WRI's Climate Data Explorer: <http://cait.wri.org/profile/Moldova>
[2] United States Department of Agriculture Economic Research Center International Macroeconomic Data Set: <http://www.ers.usda.gov/data-products/international-macroeconomic-data-set.aspx>.

Intended National Determined Contribution	
	from the Central and Eastern Europe and reveal a high mitigation potential to achieve the Republic of Moldova's reduction targets. But, in order to reach the conditional target of up to 78 per cent reduction of its greenhouse gas emissions by 2030 compared to 1990 levels, appropriate international financial support approximately equal to US$ 4.9-5.1 billion, i.e. about US$ 327-340 million per year until 2030, is needed; the support needed will be in addition to the domestic allocations to cover the required abatement costs. This support will allow adjusting the development pathway of the Republic of Moldova towards a low-carbon economy, thus moving towards progressive decoupling of carbon emissions from economic growth and ensuring a decent level of Real GDP per capita, equal to 4,483 US$/capita in 2030, which will still be approximately one-tenth of EU 28 average, forecasted to be US$ 43,516/capita[3] in 2030. As stated above, along with the international financial support for covering the abatement costs, the country will also need assistance in form of technology transfer and capacity building.
Key assumptions and methodological approaches	**Metrics applied:** The Republic of Moldova intends to use 100-year Global Warming Potential (GWP) values to calculate CO_2 equivalent totals. The Republic of Moldova intends to report emission totals using the Fourth Assessment Report values, and will consider future updates to GWP values from IPCC. **Methodologies for estimating emissions:** IPCC Guidelines 2006. **Approach to accounting for agriculture, forestry and other land use:** the Republic of Moldova intends to include all categories of emissions by sources and removals by sinks, and all pools and gases, as reported in the National Inventory of Greenhouse Gas Emissions and Sinks; to account for the land sector using a net-net approach; and to use a "production approach" to account for harvested wood products which is consistent with IPCC guidance. The Republic of Moldova may also exclude emissions from natural disturbances, as consistent with available IPCC guidance. There are material data collection and methodological challenges to estimate emissions and removals in the land sector. In compliance with IPCC Good Practice, the Republic of Moldova will continue to improve its land sector greenhouse gas reporting, which will involve the update of its methodologies. **Contribution of international mechanisms:** The Republic of Moldova may use bilateral, regional and international market mechanisms to achieve its conditional 2030 target, subject to robust systems that deliver real and verified emissions reductions. The unconditional INDC commitment will be met through domestic actions, although these would assist cost-effective implementation. In order to avoid GHG emissions' double counting, an appropriate robust national MRV system will be put in place in the period of 2016-2017. It will cover the GHG emissions accounting from international bunkers and CDM projects as well, delivering real and verified emission reductions.

[3] United States Department of Agriculture Economic Research Center International Macroeconomic Data Set: <http://www.ers.usda.gov/data-products/international-macroeconomic-data-set.aspx>.

B) CLARIFYING INFORMATION ON MITIGATION ASPECTS IN THE REPUBLIC OF MOLDOVA

The Republic of Moldova's share in global greenhouse gas emissions is less than 0.03 per cent. In 2013, total and net greenhouse gas emissions of the Republic of Moldova equalled 12.8 Mt CO_2 eq (with LULUCF) and 12.7 Mt CO_2 eq (without LULUCF) (see table 1) and total and net per capita emissions were less than half of the world average (3.2 tCO_2 eq/capita vs 6.4 tCO_2 eq/capita, and 3.1 tCO_2 eq/capita vs 6.8 tCO_2 eq/capita respectively).

Table 1: Greenhouse Gas Emissions and Sinks Trends in the Republic of Moldova within 1990-2013 period, Mt CO_2 equivalent

	1990	1995	2000	2005	2010	2011	2012	2013
1. Energy sector	34.5213	11.7222	6.6728	8.4684	9.6473	9.8255	9.4690	8.4046
2. Industrial processes	1.8420	0.4784	0.2702	0.5605	0.5594	0.6011	0.6227	0.6726
3. Solvents	0.1261	0.0346	0.0288	0.0675	0.0612	0.0689	0.0759	0.0666
4. Agriculture	5.0639	3.2844	2.2899	2.3588	2.1007	2.0865	1.6400	2.1267
5. LULUCF	-5.8866	-1.0294	-1.3922	-0.3754	-0.6571	-0.4296	-2.4704	-0.0976
6. Waste	1.8655	1.9044	1.4690	1.2978	1.5707	1.5597	1.5567	1.5658
Total (without LULUCF)	**43.4188**	**17.4240**	**10.7307**	**12.7530**	**13.9394**	**14.1417**	**13.3642**	**12.8363**
Net (with LULUCF)	**37.5322**	**16.3946**	**9.3385**	**12.3776**	**13.2823**	**13.7120**	**10.8939**	**12.7387**

In 2013, about 65.5 per cent of the total national direct GHG emissions originated from Energy Sector. Other relevant direct GHG sources were represented by Agriculture Sector (16.6 per cent of the total), Waste Sector (12.2 per cent of the total) and Industrial Processes Sector (5.2 per cent of the total). The share of two other sectors (Solvents and Other Product Use and Land Use, Land-Use Change and Forestry Sector) was insignificant, less than 1.0 per cent (see figure 1).

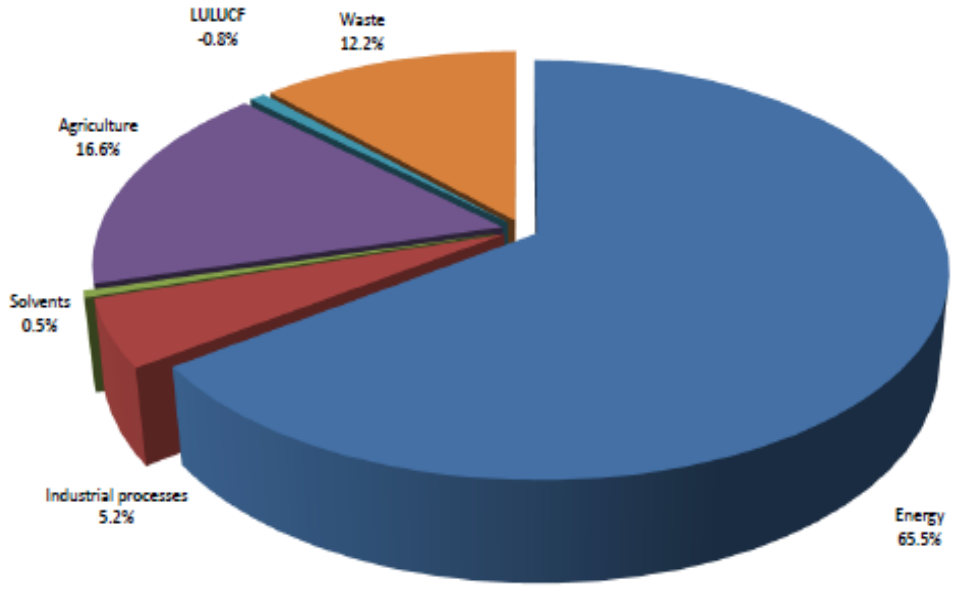


Figure 1: Breakdown of the Republic of Moldova's Total GHG Emissions by Sectors in 2013

In comparison with the 1990 year level, by 2013 the Republic of Moldova's GHG emissions were 70.4 per cent below 1990 levels (see figure 2).

From table 2, it is obvious that this reduction in GHG emissions over the last 24 years is in full consistency with a decrease in some important socio-economic indicators: population number decreased by 6.8 per cent, the GDP – by 32.2 per cent, the GHG intensity (CO_2eq/GDP) – by 56.4 per cent, the electricity consumption – by 52.3 per cent, the heat consumption – by 82.4 per cent, while the consumption of primary energy resources decreased by 78.3 per cent.

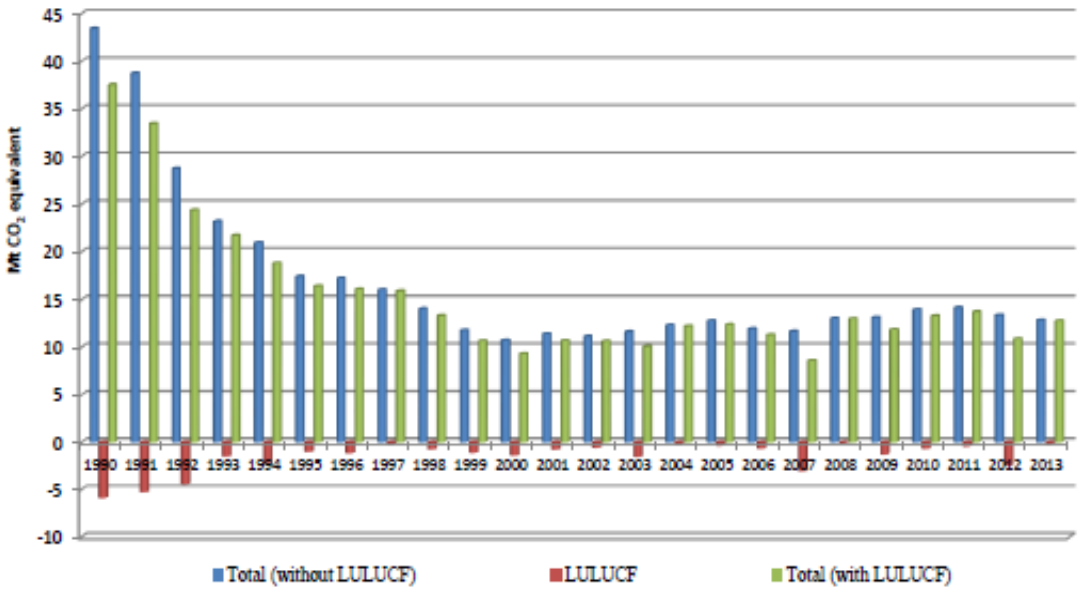


Figure 2: Greenhouse Gas Emissions and Sinks Trends in the Republic of Moldova within 1990-2013 period, Mt CO_2 equivalent

Table 2: Republic of Moldova's total GHG Emissions and Associated Variables, 1990-2013

	1990	1995	2000	2005	2010	2011	2012	2013
Population, million inhabitants	4.3616	4.3479	4.2815	4.1479	4.0817	4.0738	4.0690	4.0647
Change compared to 1990, %		-0.3	-1.8	-4.9	-6.4	-6.6	-6.7	-6.8
Inter-annual change, %		-0.1	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1
Total emissions, Mt CO_2 eq	43.4188	17.4240	10.7307	12.7530	13.9394	14.1417	13.3642	12.8363
Change compared to 1990, %		-59.9	-75.3	-70.6	-67.9	-67.4	-69.2	-70.4
Inter-annual change, %		-17.0	-8.8	3.6	6.1	1.5	-5.5	-4.0
GHG per capita, tons per person	10.0	4.0	2.5	3.1	3.4	3.5	3.3	3.2
Change compared to 1990, %		-59.7	-74.8	-69.1	-65.7	-65.1	-67.0	-68.3
Inter-annual change, %		-16.9	-8.6	4.0	6.3	1.6	-5.4	-3.8
GDP, billion 2010 $US	9.8935	3.9663	3.5229	4.9597	5.8116	6.2068	6.1633	6.7119
Change compared to 1990, %		-59.9	-64.4	-49.9	-41.3	-37.3	-37.7	-32.2
Inter-annual change, %		-1.4	2.1	7.5	7.1	6.8	-0.7	8.9
GHG intensity, kg CO_2 eq/2010 $US	4.4	4.4	3.0	2.6	2.4	2.3	2.2	1.9
Change compared to 1990, %		0.1	-30.6	-41.4	-45.3	-48.1	-50.6	-56.4
Inter-annual change, %		-15.8	-10.7	-3.6	-0.9	-5.0	-4.8	-11.8
Energy imported, million tce	16.703	5.109	2.535	3.123	2.960	3.075	2.918	2.977
Change compared to 1990, %		-69.4	-84.8	-81.3	-82.3	-81.6	-82.5	-82.2
Inter-annual change, %		11.0	-18.0	4.2	5.0	3.9	-5.1	2.0
Energy consumed, million tce	14.269	5.085	2.647	3.257	3.157	3.201	3.068	3.091
Change compared to 1990, %		-64.4	-81.4	-77.2	-77.9	-77.6	-78.5	-78.3
Inter-annual change, %		9.7	-20.2	6.3	6.7	1.4	-4.2	0.7
Electricity produced, billion kWh	15.690	6.168	3.624	4.225	6.115	5.785	5.802	4.491
Change compared to 1990, %		-60.7	-76.9	-73.1	-61.0	-63.1	-63.0	-71.4
Inter-annual change, %		-25.8	-11.8	1.1	-1.3	-5.4	0.3	-22.6
Electricity consumed, billion kWh	11.426	7.022	4.510	5.838	5.257	5.416	5.604	5.449
Change compared to 1990, %		-38.5	-60.5	-48.9	-54.0	-52.6	-51.0	-52.3
Inter-annual change, %		-3.9	-4.4	-3.1	-0.9	3.0	3.5	-2.8
Heat produced, million Gcal	22.212	7.278	3.846	4.830	4.487	4.376	4.239	4.307
Change compared to 1990, %		-65.3	-81.7	-77.0	-78.6	-79.1	-79.8	-79.5
Inter-annual change, %		-3.1	-31.9	11.1	10.1	-2.5	-3.1	1.6
Heat consumed, million Gcal	20.983	6.283	3.358	4.160	3.798	3.764	3.600	3.694
Change compared to 1990, %		-70.1	-84.0	-80.2	-81.9	-82.1	-82.8	-82.4
Inter-annual change, %		-5.6	-29.6	11.6	9.4	-0.9	-4.4	2.6

The significant reduction in the level of socio-economic indicators over the 1990-2013 periods is a consequence of the deep transformation processes common during transition from a centralized economy to a market economy, specifically after the breakup of the Soviet Union and the declaration of the Republic of Moldova's independence on 27th of August 1991.

The country rated among the low-medium income countries in 1990, and it is at present one of the lowest income nations in Europe. Certain economic decline patterns had been registered prior to 1991, but the separation from the USSR has considerably accelerated the process.

The GDP level was decreasing continuously during the period from 1990 to 1999 inclusively, when it fell down to as little as 34 per cent of the 1990 level. The reasons for the economic collapse were numerous. First, the country had been fully integrated in the USSR economic system, and the independence resulted, among other things, in the cessation of any subsidies or cash transfers from the centralized government. Second, the end of the Soviet Era with its well established commercial links has resulted in the emergence of numerous obstacles for free movement of goods, and in access restrictions introduced by the emerging markets. Third, the lack of domestic energy resources and raw materials in the country has contributed considerably to the nation's strong dependence on other former Soviet Republics.

This dependence has affected consumers' capacity to pay for the energy used due to the increased prices of energy resources (ex., from 1997 to 2014 the natural gas tariff increased 13.0 times; electricity tariff increased 6.6 times; gasoline, diesel and liquefied gases prices increased 1.9 times), in the condition when about 95% of energy resources were imported. On the other hand, without applying cross subsidizations policies, the current energy prices have incentivized the population to take strong energy efficiency measures in the Republic of Moldova, which led to a significant decrease of the energy intensity, declining since 2006 with an average annual negative growth of 11.3 per cent.

At the same time, within 2000-2013 period, the real GDP increased by 90.5 per cent, from 3.5229 to 6.7119 billion 2010 US$, while the real GDP per capita increased by 120.0 per cent, from 842.8 to 1,854.1 2010 US$. The considerable real GDP growth achieved since 2000 seems to indicate that the economy is finally developing in the correct direction, although it should be remembered that in 2013 the real GDP reached only 68 per cent of the 1990 year level. It is worth mentioning that from 2000 to 2013, the electricity consumption increased in the Republic of Moldova by 20.8 per cent; the heat consumption – by 10.0 per cent, the consumption of primary energy resources – by 16.8 per cent; while the GHG intensity (CO_2eq/GDP) decreased during the same period by 37.2 per cent, showing the first signs of the decoupling of economic growth from the growth in greenhouse gas emissions, by 19.6 per cent within 2000-2013 periods (see figure 3).

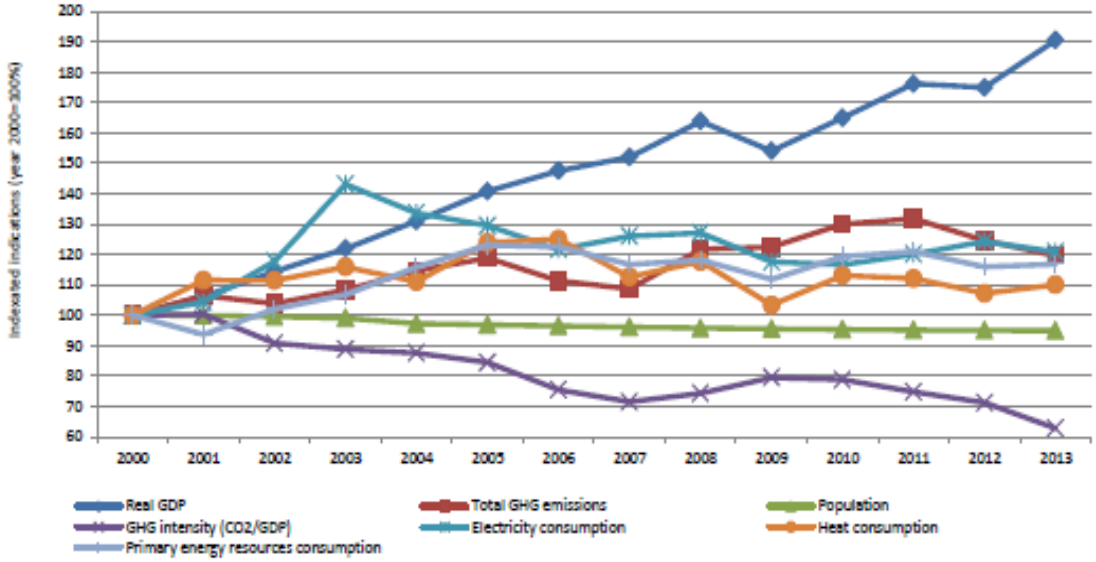


Figure 3: Trends in total GHG emissions and associated variables in the Republic of Moldova within 2000-2013 period

Pre-2020 Mitigation Policy Framework

In 2010, the Republic of Moldova joined the Copenhagen Accord and submitted an emission reduction target to the UNFCCC Secretariat, which is specified in Annex II to this Agreement "Nationally Appropriate Mitigation Actions of the Developing Countries". The target of the appropriate mitigation actions of the Republic of Moldova envisaged in this Agreement represents:

> *"A reduction of no less than 25% of the 1990 level total national GHG emissions has to be achieved by 2020 through implementation of global economic mechanisms focused on the climate change mitigation, in accordance with the Convention's principles and provisions."*

This target was provided without specific nationally appropriate mitigation actions, identified and quantified, or further clarification on the support needed. However, it was recognized that, to achieve this target, significant financial, technological and capacity building support will be needed, which can be provided by UNFCCC mechanisms.

The Environmental Protection Strategy for the years 2014-2023 and the Action Plan for its implementation was recently approved through the Governmental Decision No. 301 as of 24.04.2014[4]. According to this policy document, a 20 per cent GHG emissions reduction compared to the BAU scenario has to be reached in the Republic of Moldova by 2020.

Along with the overall national target, the policy document sets up GHG emissions reduction targets for seven economic sectors:

- power production sector – 25 per cent GHG emissions reduction compared to BAU scenario has to be achieved by 2020;
- buildings, industry and agriculture sectors – 20 per cent GHG emissions reduction compared to BAU scenario has to be reached by 2020;
- transport and waste sectors – 15 per cent GHG emissions reduction compared to BAU scenario has to be achieved by 2020; and
- LULUCF sector – an increase by 25 per cent of the net removals has to be reached by 2020.

The desired reduction of GHG emissions by 2020 of 20 per cent below the BAU scenario level requires decisive actions at the national and sector levels. For instance, considerable abatement contributions are expected to be achieved within the energy sector (533 ktep savings are envisaged from energy efficiency measures and 430 ktep savings from RES implementation covering the energy demand – the policy instruments in place envisage increasing the share of RES in the country's energy balance up to 20 percent by 2020, and covering up to 10 percent of the electricity demand with locally produced renewable energy by 2020).

Post-2020 Mitigation Policies Framework

Relevant legislative acts for the INDC's commitments implementation within 2021-2030 periods are required and will be considered being approved on Parliamentary level.

By mid-2016, a draft Low Emission Development Strategy (LEDS) of the Republic of Moldova for the period up to 2030 will be developed. After consultations at the national level, the Low Emission Development Strategy of the Republic of Moldova until 2030 will be subject to approval by the Government by end of 2016.

Thus, the Republic of Moldova stays committed to and striving for an ambitious international agreement on climate change in line with recommendations by science to maintain average global temperature increase below two degrees Celsius.

[4] <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=352740>.

3. FOLLOW UP

The Republic of Moldova urges all other Parties, in particular major economies, to communicate their INDCs in a manner that facilitates their clarity, transparency and understanding.

The Republic of Moldova requests the UNFCCC Secretariat to publish its INDC on its website and to take it into account when preparing the synthesis report on the aggregate effect of the INDCs communicated by Parties.

The Republic of Moldova looks forward to discussing with other Parties the fairness and ambition of the INDCs in the context of the below 2°C objective, their aggregate contribution to that objective and ways to collectively further increase this ambition.

ANNEX 1

A) UP-FRONT INFORMATION ON ADAPTATION PLANNING

A.I. Climate change trends, impacts and vulnerabilities

The Republic of Moldova is a highly vulnerable country to the adverse impacts of climate change. Over the last 127 years, the Republic of Moldova has experienced changes in temperature and mean precipitation. The country has become warmer, with the average temperature increase greater than 1.0°C.

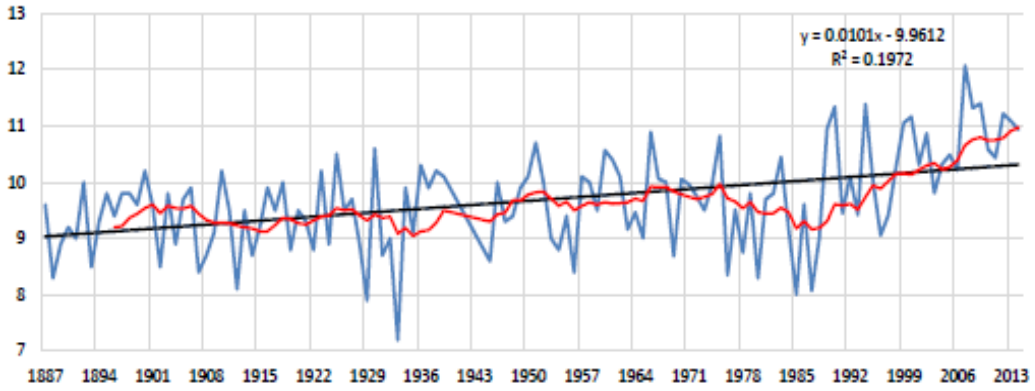


Figure 4: Trends of annual average air temperature change (°C) for 1887-2014: blue (actual course trend), black solid line (linear trend secular course) and red line (10 year moving average trend) at the meteorological station Chisinau, central part of the country

At the same time, the Republic of Moldova has experienced an increased number of extreme weather events, such as droughts and floods. An analysis of national climate data revealed that the frequency of droughts in the Republic of Moldova in a 10-year time span is 1-2 droughts in the Northern part of the country; 2-3 droughts in the Central part and 5-6 droughts in the South. Their frequency is increasing, especially over the last decades. During the 1990-2014 timespan, 10 years were marked by droughts, which reduced significantly the crop yields. In 1990, 1992 and 2003, droughts continued during the entire vegetation period (April-September). The disastrous droughts of 2007 and 2012 affected over 70 per cent of the territory of the country, being the most severe droughts in the entire instrumental record period.

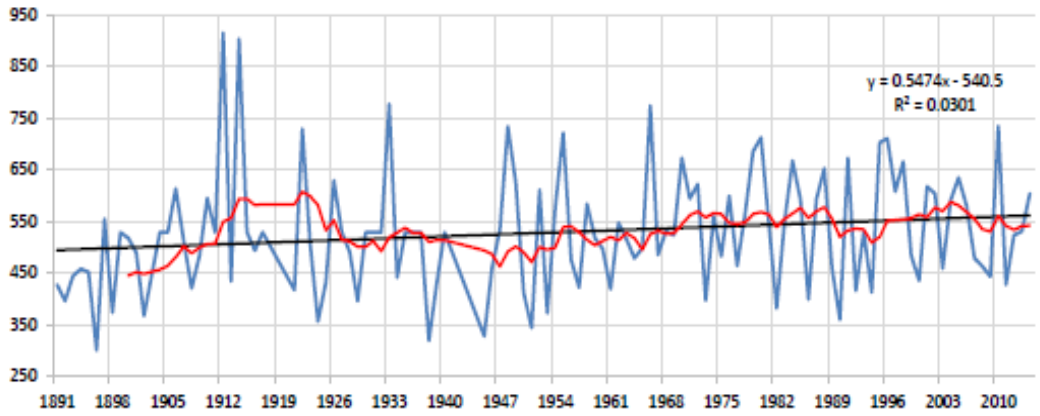


Figure 5: Trends of annual average precipitation (mm) for 1891-2014: blue (actual course trend), black solid line (linear trend secular course) and red line (10 year moving average trend) at the meteorological station Chisinau, central part of the country.

Floods also affect the Republic of Moldova on a recurring basis. In the past 70 years, 10 major floods on the great rivers of the Republic of Moldova (Dniester and Prut) were reported, and three of those occurred already in XXI century (2006, 2008 and 2010). Large floods on the smaller rivers of the country are also quite common.

The socio-economic costs of climate change related to natural disasters such as droughts and floods are significant. Both their intensity and frequency are expected to further increase as a result of climate change. During 1984-2006, the Republic of Moldova's average annual economic losses due to natural disasters were about US$61 million.

The 2007 and 2012 droughts alone caused losses estimated at about US$ 1.0 and 0.4 billion, respectively. The 2008 floods cost the country about US$120 million, and the total damage and losses produced by 2010 floods were estimated at approximately US$42 million.

The patterns of future temperature and precipitation conditions were computed for the Republic of Moldova from the global climate model output gathered as part of the Coupled Model Intercomparison Project Phase 5 (CMIP5).

Twenty one global coupled atmosphere ocean general circulation models (GCMs) were implied in this exercise under the Forth National Communication Project, the projections being made under the Representative Concentration Pathway (RCP) scenarios RCP 2.6, RCP 4.5, and RCP 8.5 available in the IPCC AR5.

The future climatic changes were assessed over the three Agro-Ecological Zones (AEZs) (North, Centre and South) of the Republic of Moldova for the near term (2016–2035), midterm (2046–2065) and long term (2081–2100) given relative to the reference period (1986–2005).

It was revealed that for temperature, the ensemble average changes consistently have the same sign across scenarios and their magnitude increase from the low RCP 2.6 radiative forcing pathway to the high RCP 4.5 and RCP 8.5, as moving into the later decades of the 21st century. The CMIP5 projections reveal warming in all seasons for the three AEZs, while precipitation projections are more variable across scenarios, sub-regions and seasons.

Annual changes for temperatures are very homogeneous over the three AEZs. The rate of warming is higher under RCP 8.5 scenario +4.6°C; medium +2.4°C under RCP 4.5; and smaller +1.3°C under the RCP 2.6 scenario by 2100. The ensemble, driven by RCP 8.5 emission scenario, estimates that the three AEZs will experience the most significant warming during summer from +5.9°C in North up to +6.1°C in South by 2100. The pattern of change derived from the ensemble RCP 2.6 models is quite similar, but the magnitude of change is lower from +1.3 to +1.5°C. The warming would be higher during winter up to +4.6°C in North, in the Centre and South temperature rise will be lower up to +4.2°C according to the RCP 8.5 scenario. The RCP 2.6 scenario reveals less intense warming over the three AEZs, from +1.2 to +1.4°C.

The ensemble projections from the RCP 8.5 forcing scenario show that the three AEZs would exhibit a general annual decrease in precipitation varying from 9.9% in North to 13.4% in South. Controversially, according to RCP 2.6 scenario moderate increase in precipitation from 3.1% in North to 5.1% in South by 2100 is projected. Winters were been estimated to be wetter in the Republic of Moldova by the end of the 21st century. The ensemble projections show the largest increase in precipitation from 4.0% (RCP 2.6) to 11.8% (RCP 8.5) in winter over Northern and the lowest one from 3.0% (RCP 2.6) to 7.4% (RCP 8.5) in Central parts of the country by 2100. The precipitation decrease will be more extended in the three AEZs during summer; the greatest rainfall reduction from 13.2% (RCP 4.5) to 25.1% (RCP 8.5) is projected in Centre and the lowest one from 7.4% (RCP 4.5) to 18.1% (RCP 8.5) in the North of the Republic of Moldova.

A.II. Mid-term adaptation vision, goal and targets

The Republic of Moldova's Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation have been recently approved through the Governmental Decision No. 1009 as of 10.12.2014[5].

The **vision** of the Strategy is to develop and apply *"a mechanism for adaptation to actual and potential climate change impacts, integrated and implemented across all sectors of the national economy so as to reduce vulnerability and increase resilience to the effects of these changes"*.

The **goal** of the Strategy is *'to assure that the Republic of Moldova's social and economic development is less vulnerable to climate change impacts by becoming more resilient'*.

The **general objective** of the Strategy is oriented towards *'increasing the capacity of the Republic of Moldova to adapt and respond to actual or potential climate change effects'*.

The **three specific objectives** of the Strategy are to:

1) Create by 2018 the institutional framework in the field of climate change that would assure the efficient implementation of adaptation measures at the national, sector and local levels.
2) Create by 2020 a mechanism to monitor the climate change impacts, the related social and economic vulnerability and for the management/dissemination of the information on risks and climate disasters.
3) Assure the development of climate resilience by reducing at least by 50% the climate change vulnerability and facilitate climate change adaptation in six priority sectors (agriculture, water resources, forestry, human health, energy and transport) by 2020.

The Action Plan on implementation of the Republic of Moldova's Climate Change Adaptation Strategy until 2020 is treated as 1st National Adaptation Plan (NAP). It is envisaged that the progress made in the area of adaptation to climate change will be determined on a periodic basis and in post-2020 period 4-year based NAPs and Sector Adaptation Plans (SAPs) will be developed and implemented. More detailed information on this issue is provided in section *'A.VI. Monitoring and reporting progress'*.

A.III. Current and planned adaptation undertakings

The Republic of Moldova's Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation is intended to serve as an umbrella strategy that creates the enabling environment for specific sectors and ministries to "mainstream" climate change adaptation and risk management in their existing and future strategies through a series of NAPs and SAPs, supported by a long-term financial strategy that includes national resources and international support to prevent the adverse effects of climate change and maximize the opportunities provided by them.

Specific Objective 1: *Create by 2018 the institutional framework in the field of climate change that would assure the efficient implementation of adaptation measures at the national, sector and local levels*

The specific objective 1 is envisaged be achieved through the following courses of action:

***Action 1.1:** Develop the institutional framework in the field of climate change adaptation*

The Government has to create a strong institutional structure and the environment that would enable advocating for climate change adaptation across all sectors and at all levels of implementation with strengthening technical capacities and leadership for implementation of climate change adaptation measures. Institutional framework for climate risk management is

[5] <http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=355945>.

needed to sustain the capacity to implement specific measures at sector level, based on a reasonable understanding of the risks. In the initial capacity development stage this is reflected in training and awareness rising among decision-makers and technical staff to develop foundational capacity.

Given the fact that the Ministry of Environment does not have a special structure that would develop and promote an effective climate change policy, the capacity building becomes indispensable to this ministry by creating a division specialized in climate policies. Considering the need to integrate climate change aspects in sectorial development policies, climate change units will also have to be created in the line ministries and these institutions shall be provided adequate financial resources.

Building the capacities of governmental institutions to manage and integrate climate change adaptation in sectoral development policies and sustainable practices to be implemented at national and local levels will be initiated at the beginning of the implementation of the Strategy. A training program will be developed and implemented on building the capacity to integrate climate risks and disasters in sectoral policies and sustainable practices related to climate change adaptation methods, adapted to the needs of local and national levels, and sector-specific issues, accordingly.

Action 1.2: Mainstream climate change adaptation in the sectoral policies of national economy

Responding to the risk posed by climate change will require coordinated and focused efforts of the Government in view of promoting policies and measures at national and sector levels to prevent adverse climate change effects. Central Public Authorities will need to amend the existing and/or develop new sectoral strategies and action plans on climate change adaptation to address climate risks as part of the policies and activities planned at sector level.

Mainstreaming climate change risks and adaptation into the national framework requires several steps to assure that information about climate-related risks, vulnerability, and options for adaptation is incorporated into planning and decision-making in key sectors as well as into existing national assessments and action plans.

Broadly speaking, these steps include: understand climate risks and existing knowledge on climate change adaptation; assess institutional and policy implications of key threats posed by climate change; amend the existing and/or develop new sectoral strategies and action plans that are climate-resilient.

To assure the implementation of these policies, actions on identifying funds for adaptation, creating mechanisms for performance coordination and monitoring will be needed. As this process is not linear, it requires that new information on climate risks and adaptation approaches be continuously integration to minimize the impacts.

The implementation of climate change adaptation measures while assuring the sustainable development and economic growth also requires the improvement of the existing legal framework, the development of efficient financial instruments to implement these measures and a change in the behaviour and attitude to consumption mode and generation method.

Thus, the relevant legislative acts will be reviewed to identify fields that do not enable the existing or potential adaptation activities, the legislation will be amended or new legislative and regulatory acts will be developed to assure that legislative and regulatory frameworks facilitate climate change adaptation at all levels, including autonomous adaptation of individuals, communities and private sector.

Action 1.3: Develop the communication and the institutional cooperation in view of implementing adaptation policies

In the spirit of joint action stemming from the general objective, public authorities will establish clear objectives and jointly achieve them, to protect the Republic of Moldova against the negative effects of climate change. They will propose measures and solutions and will implement actions under the leadership, guidance and coordination of the Ministry of Environment, in accordance with the national priorities and the European Climate Change Adaptation Policy and the obligations of the country under the Republic of Moldova-EU Association Agreement (AA) to implement these policies. Following the courses of action set out, decision makers and those who assure its implementation in all priority sectors should cooperate effectively to assure a secure future.

Since governmental institutions cannot assume themselves the responsibility to implement of climate change adaptation measures, the whole society should be ready to respond to requests by going through a transition process of changing attitudes and actions, from a reactive to a proactive approach to a climate change mitigation policy, fully accepted, adopted, implemented, and continuously updated by the Government. Public authorities need to focus on the cooperation with the business community, NGOs and academic/scientific community and combine the expertise and resources to raise the willingness to act. Public authorities need to assure the creation, sharing and dissemination of knowledge, as well as the exchange of best practices in all priority sectors. The development of public-private partnership will encourage for increasing the effectiveness of the approach specific to a field. Regional and international cooperation will be also developed, and as long as the provision of financial resources is limited, collaborative relationships with donor financial institutions will be developed.

The main instrument for strengthening the cross-sector coordination will be Communication Strategy on Climate Change Adaptation, which will establish an effective mechanism to disseminate, among relevant ministries, the information on implementation of climate change adaptation strategies, and as a feedback link inclusive, to have a two-way information flow.

Specific Objective 2: *Create by 2020 a mechanism for monitoring the climate change impact, related social and economic vulnerability, and managing/disseminating the information on climate risks and disasters*

The specific objective 2 will be implemented in three courses of action:

Action 2.1: *Continuous monitoring and research of climate change impacts, related social and economic vulnerability, and periodic updating of climate scenarios*

Continuous monitoring of climate change impacts at the national level allows for identifying the most likely evolution in this field, and providing opportunities for immediate action and decisions at the administrative level. As accurate as possible knowledge on potential climate change effects on economic and social sectors is needed to adopt effective climate change adaptation measures. Research activities need to be implemented on the following priorities:

a) determine the vulnerability of sectors, regions and natural/anthropogenic systems when extreme weather events take place;
b) identify the climate change evolution, as close as possible to the regional and local levels, and develop climate maps to identify at-risk areas in the country to undertake priority actions.
c) develop climate scenarios (average conditions and various extreme weather events) that are based on regional climate models, and assess the uncertainties related to such scenarios;
d) carry out research on climate change impact on sectors, regions and natural/anthropogenic systems.

Action 2.2: Create a climate change database

The Ministry of Environment will coordinate the creation of a national climate change database, acting in this regard jointly with the research institutions, academia, universities and NGOs. This database will contain full information on the evolution of climatic factors such as temperature, rainfall regimen, etc., including their variability, and the occurrence of extreme hydro-meteorological events. To create such a database, all available information will be collected and areas where knowledge and data are missing will be identified. The database will be completed and organized in a systematic manner so as to be easily accessible to stakeholders. The database will be expanded at the local level, as authorities at this level are the ones who often implement measures, which are not part of the central governmental structures' duties. A model of creating this database is the *Clearinghouse Mechanism*, developed at European level, which will be a tool for collecting and disseminating climate change information, data and case studies, and will also help to increase the coordination between the relevant sectoral policies.

Capacity building and strengthening of the national system of statistics collection/monitoring, reporting, to assure adequate management of electronic databases for periodic hydro-meteorological and climate information and other data needed to assess climate risks and impacts, will be considered some of the important elements for assuring the implementation of the national climate change adaptation policy.

Action 2.3: Raise the awareness of all stakeholders on climate change risks and adaptation measures

To implement climate change adaptation policies, the whole society together with public authorities, companies and NGOs, will assure an appropriate level of knowledge about climate change and its expected effects. The awareness on the need to promote climate change adaptation measures will facilitate the needed shift in attitudes and behaviour, and will improve the overall capacity to mitigate climate change effects. Awareness raising actions will be developed based on the need to change the attitudes and behaviour towards the use of natural resources, environmental protection and especially to climate change and the urgency of climate change adaptation actions.

At the same time, inclusion of climate change adaptation issues in the curricula at all levels and in the professional training process plays a very important role in the development of appropriate attitudes, so that young people and children have access to information on disaster and climate risk, appropriate emergency response and long-term adaptation options.

To achieve this goal, an effective awareness campaign will be conducted on climate change adaptation issue, on the potential and the current risks and threats associated with climate change and on the needed preventive actions. Raising the awareness level, disseminating information and proper training are essential elements in the decentralization of the efforts of identifying and implementing specific adaptation measures. The promotion and implementation of the Strategy on communicating climate change impacts and possible responses to them will be of particular importance in this regard, including a public information and awareness campaign through appropriate mass-media.

An early warning system on natural disasters of climatic origin will be created, by providing access for public to data and information needed to assess the climate risks and impacts, as well as the publication of regular monitoring reports as part of the strategy for communication of climate change impacts. By assuring the appropriate level of awareness and sensitivity, obvious behavioural changes are expected in society and at the community level.

Specific Objective 3: *Assure the development of climate resilience by reducing at least by 50% the climate change vulnerability and facilitate climate change adaptation in six priority sectors (agriculture, water resources, forestry, human health, energy and transport) by 2020.*

Climate change adaptation process will take place in different sectors and at different levels (national, regional, local) with a customized approach for each sector/location. As climate change has a different impact across the sectors and at different levels, measures on adaptation to climate change effects will also be different but will respect the same parameters. To provide viable sectoral solutions, adaptation will be mainstreamed in planning the development of the given sector and will be achieved by close cooperation between stakeholders. In this regard, adaptation measures will be mainstreamed in the current sectoral policies, or new Strategies and/or Action Plans for risk mitigation and climate change adaptation will be developed.

Thus, for each relevant sector specific measures will be identified and implemented taking into account:

a) assessment of the current stage (actions undertaken, their results, etc.) and experience gained;
b) general objectives, intermediate objectives and measures to be taken to achieve them;
c) indicators to monitor the progress of their implementation;
d) present and future research needs;
e) available and needed resources;
f) the institutional framework for implementation, and allocation of responsibilities;
g) risk management tools;
h) best practices for the integration of climate change adaptation measures in the development of national policies.

If necessary, the legal framework, regulations and financial instruments will be amended to implement climate change adaptation. Development and implementation of all climate change adaptation measures will be coordinated by the Ministry of Environment and achieved by line ministries.

Action 3.1: Risk Management and Climate Change Adaptation in the Agriculture Sector

1) At the national level it will be necessary to:

a) identify vulnerable areas and subsectors, assess the needs and opportunities of alternative crops, and change varieties as a response to climate change;
b) support agricultural research and experimental production for the selection of crops and development of the best varieties that are better suited to the new climate conditions;
c) improve the capacities for the adaptation to climate change effects through raising the awareness of stakeholders with agricultural advice and essential information on farm management;
d) assure increased investments in efficiency of irrigation infrastructure, aqua-technologies and improvement of water resources management;
e) develop irrigation plans based on a careful assessment of their impact, future water availability and water needs, taking into account the supply-demand balance;
f) create tools for risk and crisis management to cope with the economic consequences of climate related events.

2) At the local/farm level, the following measures are important:

a) adapting of periods during which agricultural activities are carried out;
b) develop technical solutions to cope with extreme weather events, to protect the crops and livestock;
c) improve ventilation and air conditioning systems of livestock farms;
d) choose crops and varieties better adapted to changes in the growing season and to water availability, as well as greater resilience to new climate conditions;

e) crops adaptation by using the existing genetic diversity and new opportunities provided by biotechnology;
f) increase the efficiency of pest and disease control;
g) efficient use of water by reducing water losses, improving irrigation techniques, water recycling and storage;
h) improved soil management by increasing water retention to maintain the soil moisture;
i) landscape management by maintaining landscape elements that provide shelter to livestock;
j) introduce livestock species resilient to extreme temperatures and adapt the nutritional regime of livestock to demands caused by climate change;
k) popularization of new technologies addressing soil structure stability and soil treatment for enlarging the active layer of the root zone for enlarging water uptake;
l) runoff reduction by agronomic practices (no-tillage can reduce water runoff);
m) develop new complex agricultural water management programmes (combining irrigation, fishery and excess inland water management);

3) Other relevant measures will consist in:

a) developing good practice guides for agriculture sector, especially for non-irrigated agriculture;
b) developing and implementing local adaptation action plans (at community level);
c) developing and implementing plans for land improvement that would increase the precipitation likelihood (including afforestation, water surfaces, etc.);
d) use research to combat current vulnerabilities and change crops structure promoting an agriculture less exposed to climate change;
e) encourage crop/farm insurance;
f) improve the availability and applicability of modelling and adaptation options to be used by farmers (provide data and results on the reaction of water resource to possible climate change scenarios, promote the use of GIS technology, etc.);
g) develop infrastructure and technologies needed for local interventions to combat extreme weather events to protect crops and local communities.

*Action 3.2: Risk Management and Climate Change Adaptation in the **Water Resources Sector***

1) To protect water resources of the country against climate change, there is a need to conduct studies that will serve as a basis for climate change adaptation:

a) re-evaluate available water resources for each river basin;
b) determine the projected climate change influence on the maximum, medium and minimum flow of water courses;
c) determine the vulnerability of water resources to climate change;
d) assess water requirements of the major crops in the context of climate change (cross-sectoral studies with agriculture);
e) assess water needs for the main categories of consumption (drinking water, industrial water, domestic water, etc.) in the context of climate change;
f) assess the danger of floods, droughts and water scarcity in the river basins under different climate scenarios;
g) assess potential climate-change-related damages in case of flooding/drought.

2) To assure the availability of water at source in the country taking into account the current and future climate change, the following measures need to be undertaken:

a) build new infrastructure for transforming water resources into socio-economic ones (new accumulation lakes, new inter-basin derivatives, etc.);
b) modify the existing infrastructure to regulate the water flows whose distribution changes over time as a result of climate change (over-increased dam height);

c) design and implement solutions for rain water collection and usage;
d) extend solutions for recharging the ground layers with water;
e) build reservoirs without dams (with water level below the ground level);
f) protect wetlands, allowing thus groundwater recharge and reduce peak discharges downstream;

3) Other potential adaptation actions in water use will be directed to:

a) more efficient water use and conservation through the rehabilitation of water transport and supply/distribution facilities and through technological changes (promote technologies with reduced water consumption);
b) changes in the people's lifestyle (reduce water demand, use recycled water etc.);
c) increase the level of water recycling for industrial needs;
d) change the types of agricultural crops using those adapted to low water demand;
e) develop and implement a system of water prices and tariffs based on the season and available resource;
f) use lower quality water for certain purposes/uses.

4) Measures to be taken at river basin level to assure climate change adaptation:

a) update the directory landscaping and management schemes, so as to take into account climate change effects (decrease in the available water at the source, increase in water demand);
b) apply integrated water management principles for water quantity and quality;
c) introduce, at the stage of designing the accumulation lakes to be built, backup volumes to be used only in exceptional circumstances or creation of accumulation lakes with special operation regimen to supplement the available water resources in critical situations;
d) inter-basin transfers of water to compensate for water shortages in certain reservoirs;
e) set water quality targets and apply water quality criteria to prevent, control and reduce the transboundary impact, coordinate the regulations and issue clearances;
f) improve treatment of wastewater and domestic water;
g) harmonize the regulations on limiting the emissions of hazardous substances in water;
h) identify potentially risky areas.

5) Measures to be taken for flood risk management:

a) select certain local protection works (for some communities and socio-economic structures) instead of large-size protection works;
b) choose regularization of flood path (slowing and reducing floods as they occur) instead of increasing the height of existing dams or building new dams;
c) use the latest methods and technologies for the rehabilitation/construction of dams and carry out protective works in line with local spatial plans;
d) increase the awareness on flood risk among the exposed population (the appropriate response before and after the event, insurance contracts, etc.);
e) measures to protect irrigation infrastructure against flooding;
f) improved flood forecasting and installation of systems to provide dam break alerts;
g) effective collaboration between the Republic of Moldova, Ukraine, and Romania to monitor water discharges, improve weather/flood forecasting and early warning for all downstream countries.

6) Measures to be taken to combat drought/water scarcity:

a) services on monitoring and warning on the decreasing flow/drought at the national level;
b) reduce leakage in water distribution networks;

c) conservation measures and efficient water use (for irrigation, in industry);
d) cooperation with other countries aimed at sharing experiences in combating droughts;
e) plans for priority water supply/setting the hierarchy of water supply restrictions;
f) establish methodologies for drought thresholds and drought mapping;
g) increase water storage capacity;
h) re-assure water quality during drought.

Action 3.3: Risk Management and Climate Change Adaptation in the Health Sector

Actions for improving climate change adaptation in the Health Sector could include:

a) develop integrated assessments of environmental, economic and health impacts of climate change;
b) discuss and design adaptation strategies to be used by the Health Sector;
c) appoint a lead body to coordinate the public health preparedness for and response to climate change; define roles and responsibilities;
d) review and strengthen the existing disease surveillance systems with a view of including further climate-related health outcomes, such as heat-related morbidity and mortality;
e) increase awareness of medical professionals, public and the most vulnerable groups;
f) improved medical access for remote communities and vulnerable groups (e.g., elderly, obese, and disabled);
g) identify, monitor and target risk groups and vulnerable populations;
h) develop treatment protocols for climate-related health problems;
i) provide training and guidance for medical professionals and advice for the public on measures to be taken during extreme weather events, such as heat-waves, flooding and drought;
j) upgrade current education and communication programmes for medical professionals with relevant information on climate change adaptation in health sector;
k) a monitoring system and evaluation mechanism to assess the effectiveness of preparedness and response measures;
l) apply new technology for scientific measurement (e.g. vector borne disease, water quality, climate change, etc.);
m) assessing the risk for the emergence of new, unfamiliar diseases and health impacts;
n) consider the cost and amount of energy and CO_2 emissions used by air-conditioning and advocate alternative cooling methods to the public;
o) increase the international and regional cooperation.

Action 3.4: Risk Management and Climate Change Adaptation in the Forestry Sector

The following climate change adaptation measures could be implemented in the Forestry Sector:

a) revision and development of new important components of the forestry regulatory basis, as integral parts of the forestry regime, focusing on: maintenance and conservation of forestry stations; conservation of forestry genetic resources; ecological reconstruction of forests; certification of forests, forest products and forest management systems;
b) revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, needed for expansion of lands covered with forestry vegetation etc.;
c) development and approval of the regulation on implementation and assuring functionality of the principles of participatory management of public forest resources;
d) increasing the forest cover, including in the climate change context mitigation and biodiversity conservation;

e) development and implementation of projects aimed at planting protection forestry strips (buffer zones) for agricultural lands protection, anti-erosional purpose, and for waters protection;
f) establishment of plantation forests to meet the needs of population in fuel wood for heating, cooking etc.;
g) develop methodologies/technologies to assure forest ecosystems adaptability to climate change.

Action 3.5: Risk Management and Climate Change Adaptation in the Energy Sector

Climate change adaptation measures to reduce losses/risks in the Energy Sector are as follows:

1) *Energy supply*:

a) *Mined resources* (oil and natural gas): replace water cooling systems with air cooling, dry cooling, or recirculating systems; improve design of gas turbines (inlet guide vanes, inlet air fogging, inlet air filters, compressor blade washing techniques, etc.); (re)locate in areas with lower risk of flooding/drought; build dikes to contain flooding, reinforce walls and roofs; adapt regulations so that a higher discharge temperature is allowed; consider water re-use and integration technologies at refineries.
b) *Hydropower*: build de-silting gates; increase dam height; construct small dams in the upper basins; adapt capacity to flow regime (if increased); adapt plant operations to changes in river flow patterns; operational complementarities with other sources;
c) *Wind*: (re)locate based on expected changes in wind-speeds.
d) *Solar:* (re)locate based on expected changes in cloud cover; and
e) *Biomass*: introduce new crops with higher heat and water stress tolerance; substitute fuel sources; early warning systems (temperature and rainfall); support for emergency harvesting of biomass; adjust crop management and rotation schemes; adjust planting and harvesting dates; introduce soil moisture conservation practices.

2) *Energy demand*: invest in high-efficiency infrastructure and equipment; invest in decentralized power generation such as rooftop photovoltaic generators; efficient use of energy through good operating practices.

3) *Energy transmission and distribution*: improve robustness of pipelines and other transmission and distribution infrastructure; burying or cable re-rating of the power grid; emergency planning; and regular inspection of vulnerable infrastructure such as wooden utility poles.

Action 3.6: Risk Management and Climate Change Adaptation in the Transport Sector

The adaptation measures to reduce losses/risks in Transport Sector are outlined as following:

1) In case of *significant variations of temperatures, including heat waves*:

a) develop new, heat-resilient paving materials;
b) greater use of heat-tolerant streets and highways landscape protection;
c) proper design/construction, milling out ruts;
d) shifting construction schedules to cooler parts of day;
e) designing for higher maximum temperatures in replacement or new construction;
f) adaptation of cooling systems.

2) In case of *increases in extreme precipitation events*:

a) develop new, adverse climate conditions-resilient paving materials;
b) overlay with more rut-resilient asphalt;
c) using the most efficient technologies to assure sealing and renewal of asphalt concrete (for example, those that combine impregnation and surface treatment of asphalt concrete and

which, respectively, assures the revitalisation and renewal of bituminous binder quality, reducing the fragility of the upper asphalt layer, increasing its elasticity and flexibility, and its resilience to water and chemicals);

d) wider use of efficient road maintenance methods (*preventive maintenance*: include coatings, repairs, sealing by spraying cationic emulsions, crushed stone seals, sealing cracks with suspensions, etc.; *corrective maintenance*: include patching, repair of surface and surface treatments with sealants);
e) conduct risk assessments for all new roads;
f) improve flood protection;
g) greater use of sensors for monitoring water flows;
h) upgrading of road drainage systems;
i) pavement grooving and sloping;
j) increases in the standard for drainage capacity for new transportation infrastructure and major rehabilitation projects; and
k) engineering solutions, increase warnings and updates to dispatch centres, crews and stations.

A.IV. Gaps and barriers

a) Policy framework

- Lack of effective enforcement presents the key challenge facing implementation of the adaptation action plans; enforcement is specifically critical at the local level;
- Insufficient inter-institutional coordination of the implementation of national policies and strategies;
- Limited awareness on cross-sector-based policies and strategies;
- Systemic level impediments on enhancing the political commitment to address climate adaptation;
- Limited capacities (time, personnel and funding resources) to review and amend and/or develop new national policies and strategies focused on integrating climate change and disaster risk reduction considerations.

b) Coordination mechanisms

- Systemic level impediments to effective use of multi-level and multi-sector climate change coordination mechanisms to address climate change impacts and strengthen adaptive responses;
- Lack of an integrated, comprehensive and efficient monitoring of climate change adaptation implementation;
- Limited number of climate change policies and limited references to them make coordination mechanisms difficult, mainly ad-hoc and project driven;
- Limited use of criteria and indicators to guide and monitor the coordination work;
- Limited capacity of lead agencies to coordinate and promote a higher degree of local level involvement combined with a limited understanding and awareness by local authorities on climate change impacts and adaptation approaches to climate change;
- A link between climate change coordinating mechanisms and other relevant national coordinating mechanisms has yet to be established.

c) Institutional capacities and planning process

- The country still lacks a programmatic approach to addresses multiple sectors and levels of governance; it is envisaged that the next (4 year based) NAP, will address this aspect;
- The lack of an integrated planning process between the central public authority institutions and uncoordinated allocation of financial resources through various national funds;

- Concerns from high-level officials on the implications of following a programmatic approach;
- Limited institutional capacities to design, develop, implement and coordinate a programmatic approach;
- Lack of national policies and strategies that can guide a programmatic approach;
- Lack of a coherent presentation of statistical data between central public authorities;
- Limited technical and staffing capacity in addressing climate change issues;
- Non-coherent system of access to information for central and local public authorities.

d) Mainstreaming climate change adaptation into policies, plans and budgetary processes

- Limited understanding at national and sectoral levels of the concept of mainstreaming and how it can be undertaken;
- Climate change and climate change adaptation are not mainstreamed into national legislation on human health and related social services;
- Limited understanding by policymakers of the looming threat of climate change as a development issue and its links with, and implications for, resource allocation, economic growth and ecosystem services.

e) Technology transfer

- Low skills and knowledge on climate adaptive solutions; lack of advisory services in the context of identifying adaptation measures for different sectors;
- Low level of public-private partnerships in implementing climate change adaption measures;
- Undeveloped market and mechanism to promote technology innovations and adaptive technology transfer;
- Lack of comprehensive climate change and disaster management risks databases;
- Lack of documents of major importance for the territorial planning, such as the National and Regional Spatial Plans, General Urban Plans of the cities; these documents would contribute to the identification of adaptation actions at the local and regional level, and to improving the situation in the context of urban planning;
- Slow reforms and adoption of new technical and normative standards in transport and building sectors (adoption of Eurocodes); and reduced financial allocations for this task;
- Lack of medium to long-term investment planning, with little efforts on prevention adverse impacts of climate change, relying more on post factum removing of adverse effects;
- Inappropriate financial incentives and disincentives for adaptive technology transfer;
- Inadequate rural infrastructure and tenurial arrangements for climate change adaptation.

f) Financing climate change adaptation interventions

- There is no integration of climate change adaptation measures into the national budget;
- No dedicated budget to specific climate change adaptation activities;
- No financial strategy developed for adaptation to climate change;
- No climate indicators incorporated into planning and budgeting framework;
- No contingency budget in specific sectors for adaptation interventions.

A.V. Summary of needs

a) Research and development needs to meet adaptation targets

National research on climate change has to be linked to international research efforts and has to apply the knowledge gained at this level. Experienced research institutes will be encouraged to participate in supporting the development of the national climate change policy. Since most

research institutes conduct studies only on a contractual basis, adequate financial resources are crucial for conducting climate change research, and collaborative relationships will be developed with international financial institutions as long as financial resources remain limited for a long time. A major emphasis will be placed on building the capacities of Working Group members for climate modelling to develop climate models and perform impact assessment studies, for example, by facilitating the exchange of experience and research visits to international climate modelling centres.

It is equally important to monitor the climate change impact and conduct research in *priority sectors* such as: Agriculture, Health, Forestry, Energy, Transport, Water Resources etc.

Agriculture Sector

- Research needs to address not only change in temperature and precipitation and its impacts on agriculture, but also the interaction with hazards, directly or indirectly arising from atmospheric conditions, such as rainfall, flood, frost, drought, hail, heat waves, seasonal shifts (length of growing season, bud break, quality aspects), and changes in pest and disease patterns.
- Crop specific evaluations should be conducted to determine changes in seasonal development, characteristics of production, cultivation methods, etc., under climate change.
- Crop models are required to assess the impacts of climate change and increased atmospheric concentration of CO_2 on various crops, pastureland and livestock.
- Further, crop simulation models need to be interfaced with Geographic Information Systems (GIS) in order that these models can be applied for regional planning and policy analysis.
- In addition, a variety of approaches, such as economic regression models, microeconomic and macroeconomic models, and farm models should be used.

Health Sector

- Quantitative research is required to identify the regions of the Republic of Moldova most vulnerable to the adverse health effects of climate change.
- These areas will require focused adaptation measures, including better health clinics and tools, education of the public in these areas about how they can cope with new health concerns.
- Improved disease burden estimates need to be established, based on latest climate models to estimate:
    - heat-related mortality statistics based on existing mortality and population data at the national level and in key cities of the Republic of Moldova;
    - the impacts of projected changes in climate, taking into account various forms of acclimatization/adaptation; and
    - climate-water and foodborne diseases relationships using panel data on income and health to project cause-specific deaths and disability-adjusted life year (DALY) rates by demographic group.
- Further in depth studies on the socio-economic assessment of climate change in the health sector would be beneficial, including:
    - the health 'damage' costs of climate change under different mitigation scenarios;
    - the costs of preventing death, illness and injury under different mitigation scenarios (i.e. adaptation measures).

Water Resources Sector

- Defining critical thresholds in water resource;
- Improving the capacity to calibrate state-of-the art rainfall runoff models;
- Understanding of the economic and social impacts of climate change on water quantity, supply, and demand including irrigation, drinking-water supplies, recreation/tourism, hydropower and industry, and system losses;
- The capacities of developing and implementing systems of hydro-economic assessment of river basin will be enhanced to assess the further development of water resources and the related sustainable development, such as hydro-electric development, waste treatment and irrigated agriculture;
- Pre-feasibility or feasibility studies for irrigation and land use projects are needed (including from groundwater sources), and should be required to include an assessment of the physical and economic impacts of climate change;
- Assessments and analyses on social, economic and environmental costs and benefits of future adaptations will be performed.

Forestry Sector

- Establishing the climatic thresholds that correspond to the distribution limits of a forest type or species and develop a bioclimatic model to predict future steady-state forest distributions under a range of plausible climate change scenarios;
- Collecting historical analogues and life-history information to estimate how long it might take for the forest boundary to migrate a given distance;
- Calibrating a biogeochemistry model to predict changes in productivity and carbon stocks in each forest type, with and without the effects of elevated CO_2 concentrations;
- Evaluation of adaptive capacity including the inherent adaptive capacity of trees and forest ecosystems and the socioeconomic factors determining the ability to implement planned adaptation measures.

Energy Sector

- Assessing the possible effects (both positive and negative) of climate change on energy consumption:
  - effects of climate warming on energy use for space heating;
  - effects of climate warming on energy use for space cooling;
  - market penetration of air conditioning and heat pumps (all-electric heating and cooling), and changes in humidity;
- Conducting studies possible effects on energy generation and supply:
  - assessment of impact of increase temperatures and droughts on hydro energy potential;
  - impacts of climate change on energy generation from biomass;
  - wind resources changes (intensity and duration); and
  - electricity transmission and distribution;
- Research on efficiency of energy use in the context of global warming, with an emphasis on technologies and practices that save cooling energy and reduce electrical peak load.

Transport Sector

- Examining the long-term impacts of climate change on the Transport Sector in light of climate change projections to determine whether, when, and where the impacts could be consequential, particularly in light of the long planning horizons for transport infrastructure;

- Analysing options for adapting to these impacts, including the possible need to alter assumptions about infrastructure design and operations, the ability to incorporate uncertainty into long-range decision making, and the capability of institutions to plan and act on mitigation and adaptation strategies at the state and regional levels.

The promoted studies on climate change and on the vulnerability to its effects enable better knowledge about sectors, ecosystems and regions that are particularly exposed to climate change, facilitating the identification and promotion of vigorous and effective actions for mitigating the adverse effects of climate change in the country. The findings of these studies will substantiate the adoption of planned adaptation measures and will help to increase the domestic adaptation capacity in line with the achievement of objectives and national sustainable development and environmental protection priorities.

b) Needs for support required to execute current and mid-term adaptation undertakings

The implementation of climate change adaptation objectives needs to be supported by appropriate financial mechanisms. The implementation cost of the Republic of Moldova's Climate Change Adaptation Strategy until 2020 and the Action Plan on its implementation is estimated at about US$ 200 million.

The cost of inaction could be devastating, given the fact that natural disasters alone cause the country an average loss of about US$ 61 million each year. The estimates of future costs and benefits suggest that every euro spent on flood protection would avoid six euros of cost generated by damage.

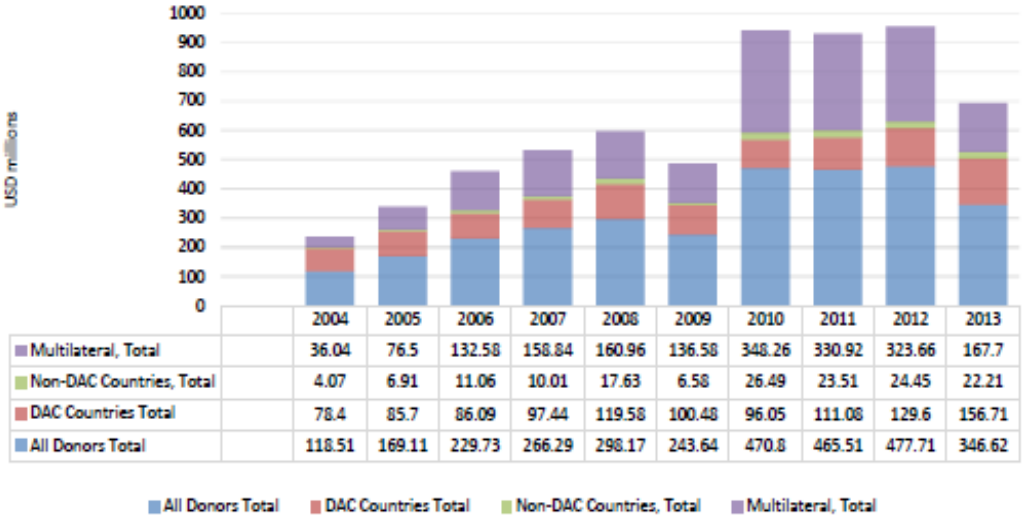
The provision and allocation of adequate financial resources are prerequisites for achieving a successful outcome of the climate change adaptation process. To support climate change adaptation initiatives, both domestic financial resources as well as international ones are required. Domestic financing can be secured both from the state budget and from other financial mechanisms (special funds: National Ecological Fund, National Fund for Regional Development, etc.). They will be important tools for directing the domestic monetary flows in environmental investments, and a means of strengthening the external and domestic financing). Foreign assistance and investments is envisaged to play the most important role in promoting climate change actions in all economic sectors and in catalysing the specific investments that will be needed to assure climate change adaptation in the Republic of Moldova. These investments are linked to a wide range of technologies intended to improve the energy efficiency, use of renewable energy, develop the related road and building infrastructure, and finally adapt to climate change. In this context, the international financial support is needed to implement in full extent the appropriate national and sectorial policies and strategies, or to resolve specific issues in the fields where the climate change impact is significant. Implementation of small and medium-scale pilot and demonstration projects will involve sustainability of external assistance to be received, including through financial mechanisms available under the UNFCCC.

It is anticipated, that the Strategy's objectives will be achieved to a greater extent under the conditions in which the Republic of Moldova gains access to the financial mechanisms of the UNFCCC, specifically to the Green Climate Fund, Special Climate Change Fund, Adaptation Fund and others, in view of implementing adaptation projects in the most vulnerable sectors of the national economy.

c) Summary of recent external support

According to the Organization for Economic Co-operation and Development (OECD) on-line database (see figure 6), Moldova ranks among the top ten countries of Europe that benefit from

external assistance. Also, it was the sixth country in Europe by development cooperation received, with a 5 per cent average of all the assistance provided to the region for 2011-2013.[6]



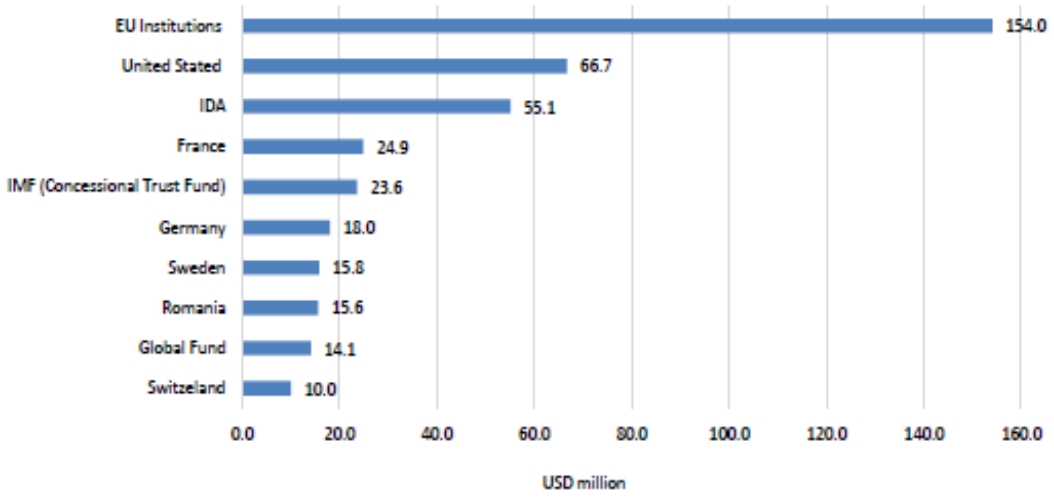
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Multilateral, Total	36.04	76.5	132.58	158.84	160.96	136.58	348.26	330.92	323.66	167.7
Non-DAC Countries, Total	4.07	6.91	11.06	10.01	17.63	6.58	26.49	23.51	24.45	22.21
DAC Countries Total	78.4	85.7	86.09	97.44	119.58	100.48	96.05	111.08	129.6	156.71
All Donors Total	118.51	169.11	229.73	266.29	298.17	243.64	470.8	465.51	477.71	346.62

Source: <http://stats.oecd.org/qwids/>. **Abbreviation used:** DAC countries – OECD Development Assistance Committee countries (29 in total).

Figure 6: Bilateral, Multilateral and Private Donors' aid and other resource flows to the Republic of Moldova according to the International Development Statistics (IDS) online databases

Republic of Moldova's biggest donor since 2007 is the European Union, which started to provide aid to the Republic of Moldova through the European Neighborhood and Partnership Instrument (ENPI), created especially for the countries covered by the European Neighborhood Policies (ENP).

In terms of bilateral aid, the Republic of Moldova's "big league" partners are: USA, Sweden, Austria, Switzerland and Germany, which add to the plethora of smaller (in terms of granted ODA – Official Development Assistance) Eastern European donors – Romania, Poland, Czech Republic, Hungary, Slovakia, Bulgaria, Estonia, Hungary, Latvia, Lithuania, Slovenia, and Turkey. Top Ten Donors of Gross ODA for the Republic of Moldova is presented in figure 7.



Source: <https://public.tableau.com/views/AidAtAGlance_Recipients/Recipients?:embed=n&:showTabs=y&:display_count=no?&:showVizHome=no#1>.

Figure 7: Top Ten Donors of Gross ODA for Moldova, 2012-2013 average, USD million

[6] <http://www.oecd.org/dac/stats/documentupload/5%20Europe%20-%20Development%20Aid%20at%20a%20Glance%202015.pdf>.

In September 2009, the Government of the Republic of Moldova addressed to the donor community with the request for support in implementing the priority reforms for the country's economic growth, specified in the "We are relaunching Moldova" paper. As a result, during the reunion of the Advisory Group "Partnership for Moldova Forum," held in Brussels on 24 March 2010, the donors community committed to allocate to Moldova 1.84 billion euros (0.96 billion in the form of grant, 52% of the total; respectively, 0.88 billion in the form of credits, 48% of the total) for the 2011-2013 period. As a whole, the USA (through the Compact Program of the Millennium Challenge Corporation of the USAID, signed in 2010 in the amount of USD 262 million) has become one of Moldova's main bilateral development partners. The EU commitment and of the EU member states on future allocations have accounted for 40% of the resources promised during the reunion.

Towards the end of 2012, over 70% of the resources provided in the 2010 Brussels reunion had been contracted, through specific projects started in various national economy sectors. In addition, external funds of about 800 million euros have been attracted. Thus, a total amount of 2.6 billion euros were provided to the Republic of Moldova by the donor community in the 2010-2012 periods (by 40% more as compared to the financial commitments made during the Brussels reunion).

In 2012 the donor funds were estimated at about 474 million euros. According to the data of the State Chancery of the Republic of Moldova, the budget of the projects contracted in the reporting period account for about 206 million euros and the disbursements reported by the donors – about 465 million euros (about 98% of the estimated amount). For comparison, in 2007 the disbursements amounted to 266 million euros; in 2008 – 298 million euros; in 2009 – 244 million euros; in 2010 – 470 million euros; in 2011 – 451 million euros. For 2013 and 2014 there are provided 322 million and 213 million euros, respectively.

The manner of cooperation between the Republic of Moldova and the development partners has taken various forms: technical assistance, support for implementing various investment or social projects, the support provided to the budget for implementing sector policies or the support provided for supporting the state's payment balance. The objectives of the cooperation between the Government and its partners are agreed upon and stipulated in the medium-term framework cooperation agreements.

According to the data available for external development assistance, the highest share is held by the assistance with project implementation (75%), followed by sector budget assistance (about 17%), technical assistance, and assistance with maintaining the state payment balance. Given the budgetary constraints and of state debt servicing, the manner of attraction of external resources that is preferred by the Government are grants and/or concessional credits.

The amount of on-going external assistance in 2012, according to the information from the database of the State Chancery, the Republic of Moldova accounted for about 1.1 billion euros in the form of grants and 682.8 million euros in the form of loans. Accordingly, in 2012, the contracted resources were distributed as follows: about 109.4 million euros in the form of grants and 97.1 million euros in loans (EBRD, EIB, WB). The share of active grants in the total amount of external assistance has represented about 62%. For 2012, the grant-credit parity represented 53%, accordingly, 47% of the total amount of external assistance contracted during the year.

By the end of 2012, the Republic of Moldova was implementing 384 projects in various sectors, including 116 projects in governance and civil society, 58 projects in infrastructure and social services, 49 projects in education, 31 projects in agriculture, 29 multi-sectorial projects, 24 projects for private sector development, 19 projects in the environment and 16 projects related to energy generation and supply.

As a total, in 2012, there were launched 98 new projects, with new commitments in the amount of 206.6 million euros in various sectors. For 2013, the estimated amount of external assistance was 314 million euros.

It was quite difficult to estimate the external support allocated to date, specifically for adaptation-related work, as part of these projects and support received is cross-cutting and/or inter-sectorial, covering both mitigation and adaptation aspects.

On November 6, 2014 EU Commissioner for European Neighborhood Policy and Enlargement Negotiations and Prime-minister of the Republic of Moldova signed the Memorandum of Understanding on the Single Support Framework for EU support to the Republic of Moldova for the period of 2014-2017 together with a financing agreement to support the implementation of the Association Agreement (AA) and the Deep and Comprehensive Free Trade Area (DCFTA) – which the Republic of Moldova signed with the EU on 27 June 2014.

The three priority sectors are:

- public administration reform;
- agriculture and rural development;
- policy reform and border management.

The financial assistance for the period 2014-2017 amounts to EUR 410 million and EUR 30 million for DCFTA.

A.VI. Monitoring and reporting progress

The Republic of Moldova's Climate Change Adaptation Strategy until 2020 will be implemented through an Action Plan. To assure the financial support for the activities planned in the Action Plan, such activities will be included in the sectoral strategies for mid-term expenditures and in the annual work plans of institutions involved in this Strategy implementation.

The responsibility for implementing the Strategy rests with all competent institutions identified in the Action Plan.

The National Commission for implementation of mechanisms and provisions of the UNFCCC and of the Kyoto Protocol will coordinate the implementation and will conduct regular assessment of the level of indicators and progress achievement.

The monitoring of the Strategy implementation will be carried out by the Ministry of Environment of the Republic of Moldova, where a subdivision will be designated for that purpose.

Based on the collected and systematized information, it will prepare annual monitoring reports on implementation of the Strategy and will submit them for consideration and approval to the Government.

The monitoring reports to be developed will include information on the implementation of the indicators set in the Action Plan for each action, and every 3 years or as needed progress evaluation reports will be developed as well to assess the impact of activities carried out during the given time and the level of objectives implementation.

As the Strategy was not designed as a linear, but as an iterative process, therefore it will be updated and reviewed periodically, based on the monitoring and evaluation findings, as well as on the updated climate models, and in accordance with the most recent scientific researches.

Towards the end of the Strategy implementation, a final assessment report, containing information on the level of achievement of objectives and of the expected impact, will be prepared. Based on this report, the next stage of strategic planning of climate change adaptation has to be decided.

Further, the Republic of Moldova will put in place a four year based NAPs and SAPs. The proposed framework for NAPs and SAPs will allow for monitoring and planning along a 3-tier M&E approach.

First tier, *macro-level monitoring* would allow for tracking the evolution of the national adaptation planning process as a whole.

This would entail the development of a number of process-oriented indicators that would be followed across sectors. Examples of such indicators could include: number of SAPs; overall level of Government funding channelled towards adaptation needs; index of resilience/vulnerability of the Moldovan economy, etc. These indicators would provide an image of the overall dynamism of the adaptation planning process as a whole. As such, they may depend on the aggregation of data from lower-level indicators (e.g., data on adaptation funding by sector). The final indicator on level of resilience would allow for tracking of the impact of the adaptation process as a whole. It would have to be computed from recognized vulnerability indices and legitimate sources of data. The next NAP will be used to develop the 'Index', 'Methodology' and to gather 'Baseline Data'.

Second tier, *meso-level monitoring* would allow for tracking of progress and results at a disaggregated level, either sectoral or geographic (e.g., regional), depending on the choices made during planning phases.

These indicators would depend on the provision of data from regional or sectoral authorities. Such indicators would be the following: the number and type of adaptation measures included in sectoral/regional plans, proportion of sectoral budget dedicated to adaptation measures, number/type of sectoral stakeholders implementing adaptation or resilient measures, degree to which the sector/region's vulnerability has been reduced.

Similarly to the first tier, the final indicator would be an 'Index' for which the 'Methodology' would be determined in the early phases of NAP planning. Also, while these indicators remain somewhat process-oriented, it could be possible to adopt more concrete indicators within each sector (e.g., if water availability was a constraint to resilience, the water sector M&E framework could adopt an indicator on "overall water availability").

Sector-specific indicators would have to be agreed upon during the early phases of NAPs or SAPs planning, and could be renewed, depending on their relevance, at the end of each planning period. However, it would be important to keep a number of indicators similar from one sector to the next, to enable comparisons. The prioritization of adaptation measures will be done by the sectors or stakeholders participating in the development and implementation of NAPs and SAPs.

Each time a SAP or a NAP is proposed, it should contain prioritized measures for that planning period. The process of determining the prioritization and selection of certain adaptation options over others should be transparent, and based on rationalized criteria. Ideally, it would be carried out by a stakeholder group, which can consider different economic, environmental, social, cultural or political spheres and concerns. The M&E system will verify if the planned measures have been implemented accordingly. The Cost Benefit Analysis (CBA), Cost Effectiveness Analysis (CEA), Multi Criteria Decision Analysis (MCDA) and other relevant to case econometric assessment methods and tools will be used.

Third tier, a *micro-level structure of reporting* would also be defined. This would concern indicators related to specific adaptation actions that are adopted within individual sectoral or national plan. For each action or group of actions, a target and an indicator have to be developed (e.g., number of people trained; hectares of forest protected; kilometres of road upgraded; degree of water use (drop-per-crop) efficiency in the wine sector, etc.). Each of these indicators should be attached to the actions contained in the specific sectoral or regional action plan. As such, they would serve as the basis level of results tracking by stakeholders, and would be reported upon annually at least. They could be modified at each round of successive planning, and be aggregated to feed into the

meso- and macro-level reporting frameworks. Responsibility for providing information on these indicators would rest upon those who will also be tasked with the implementation of the adaptation actions.

The milestones for reporting under the national adaptation planning process would be as follows:

- micro-level indicators: annually;
- meso- and macro-level indicators: every two year.

As each NAP will be set for four years, this would mean that results could be tracked and aggregated twice per period, allowing for an informed planning process for the next phases. Naturally, the first planning period would also entail a baseline assessment of key indicators, and some time to develop the methodologies and indices.

At the end of a planning cycle, the data would be aggregated into a "NAP Impact Study", which would synthesize all results achieved during the period and make recommendations for the next period. This study will be submitted for consideration to the Government.

The main responsibility for reporting will be of the sectoral administrations, which would need to undertake annual and biennial reporting for micro- and meso-level indicators. All data would be provided to the coordination mechanism, whose secretariat could synthesize information to develop reports. The Secretariat would also provide sectoral administrations with templates and formats in order to allow for standardized tracking. Also, a database would be created to be administered by the coordination mechanism, being accessible however to all participating administrations, in order to facilitate the flow of information. In addition, micro-level reporting could be undertaken with the participation of local NGOs and associations which would participate in the implementation of targeted adaptation measures. Participation of NGOs at all levels of the M&E framework would allow for increased transparency and for broader ownership and dissemination of results.

As adaptation planning is an iterative process, gradually growing in scope and learning from the monitoring and review of on-going adaptation actions, a description of how adaptation progress will be nationally monitored, reviewed, updated, and reported can be an important element.

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Romania

Country profile

Romania is a constitutional republic based on the separation of three powers: legislative, executive and justice (5th National Communication of Romania to UNFCCC, 2010). The President is elected through popular vote and the Prime Minister, who is appointed by the President, proposes the synthesis of the Government, which receives a vote of confidence by the Parliament.

Romania is situated in the south – eastern part of Central Europe, inside and outside of the Carpathians Arch, on the Danube lower course (5th National Communication of Romania to UNFCCC, 2010).

With an area of 238.391 km^2, Romania has an eastern Black Sea coastline and shares borders with Bulgaria, Hungary, Moldova, Serbia and Ukraine. The exit to the sea enables water way connections with the countries in the Black Sea basin and the rest of the world.

Romania's climate is a transitional temperate-continental with oceanic influences from the West, Mediterranean ones from the South-West and excessive continental ones from the North-West.

The population is 20.121.641 people[44] (2011). The capital city is Bucharest, official language is Romanian, and the currency is the Romanian Leu.

The country joined the European Union on January 1st 2007 and is expected to adopt the euro in 2015[45].

Location map

National climate change policy

Romania signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, ratified it by Law no. 24/1994 on 8 June 1994, and was included in the Annex I as a country with economy in transition. Romania signed the Kyoto Protocol (KP) in 1999 and became the first Annex I Party to ratify it by Law no. 3/2001 on 19 March 2001. The Romanian KP target was 8% reduction in GHG emissions for the first commitment period 2008-2012, compared to a different – with the other Annex B countries - base year (1989)[46].

Romania is one of the six countries (Albania, Bosnia and Herzegovina, Bulgaria, Greece, Romania and the Former Yugoslav Republic of Macedonia) that together with the European Commission (EC) have signed (Secretary of State of the Ministry of Industry and Trade ***Mr. Nicolae Staiculescu***) the "Declaration of Intent for the establishment of a competitive Regional

[44] "Romanian 2011 census (final results)". INSSE. Retrieved 28 August 2012.
[45] "Fifth report on the practical preparations for the future enlargement of the euro area", Commission of the European Communities, 16 July 2007
[46] Ministry of Environment and Forest of Romania, 2010. 5th National Communication of Romania, available at: http://unfccc.int/resource/docs/natc/rou_nc5_resbmit.pdf

Electricity Market in South Eastern Europe" (Thessaloniki, 1999) (Annex I) and also the signatory (Secretary of State of the Ministry of Industry and Trade ***Mr. Eugen Constantin Isbasoiu***) of the "MoU for the establishment of a competitive Regional Electricity Market (REM) in South Eastern Europe" (Athens 2000) (Annex II), which are the origins of the Energy Community in the area.

Since 1 January 2007, Romania is a member of the European Union and its energy policy takes into account the EU requirements. The post - accession development objectives are linked to European approaches. All policies and development strategies have been elaborated and implemented in compliance with the harmonization of the EU policies, plans and programmes in order to sustain the integration process. Reducing GHG emissions is a priority objective of Europe 2020 Strategy, which was adopted by the European Council on 25-26 March 2010. Its objectives are:

- a 20% reduction of GHG emissions at EU level at least compared to 1990 level;
- a 20% increase in the share of Renewable Energy Sources (RES) in total EU energy consumption;
- a 20% reduction in primary energy consumption and increase of energy efficiency.

Romania initiated and completed the process of setting new national targets for all objectives of the strategy, which was validated by the High Level Working Group on 8 June 2010 and resulted in the signing by the Romanian Government of the Memorandum "Approval of values Romania's objectives for the final of Europe 2020". Agreed national objectives related to the implementation of the Energy - Climate Change Package, congruent with the commitments of the European Commission are presented in Table 1[47].

Table 1: Romanian climate change policy objectives in accordance to the EU Energy- Climate Change Package.

2020 Objectives	EU 27 (%)	Objectives for Romania (%)
Reduction of GHG emissions	20	20
Share of energy from RES in gross final consumption	20	24
Increasing energy efficiency	20	19 (estimated at about 10 Mtoe)

According to the National Renewable Energy Action Plan the corresponding sectoral targets for achieving the 24% in Table 1, are: i) 42,62% penetration of electricity produced by RES (RES-e) until 2020; ii) 22,05% RES share to the total consumption for heating and cooling and iii) 10% share of renewable energy in transport.

At the National Sustainable Development Strategy, Romania 2013-2020-2030, that was published in 2008, the country has set an intermediate target of reaching 13,5% reduction in final energy consumption for the time interval 2008-2016 compared to the average consumption levels of the time period 2001-2005, in conformity with the first National Action Plan for Energy Efficiency 2007-2010.

Mitigation

In order to achieve its mitigation targets, Romania has implemented the policy instruments presented in Table 2. These policy instruments concern the sectors of households, industry, services, transport, energy and waste management.

[47] ISPE, 2011. Promitheas 4 Report - Overview of the Mitigation/Adaptation Policy Instruments in Romania, available at: http://www.promitheasnet.kepa.uoa.gr/Promitheas4/images/library/3.2/wp3.2romania.pdf

Table 2: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Households	Thermal insulation	Building isolation requirements (Order 18/2009)
		Subsidy (Order 18/2009)
		Subsidy (Order 69/2010)
	Energy efficient buildings	Performance standards (i)Requirements; ii) Certificates of building energy performance; iii)energy audits (Law 372/2005 – Ordinance 22/2008)
	Solar water systems/air conditioning	Energy efficient appliances (Law 372/2005)
	Hot water, lighting, heating	Energy efficient appliances (Order 69/2010)
Industry	Energy efficient buildings	Performance standards (i)Requirements; ii) Certificates of building energy performance; iii) energy audits (Ordinance 22/2008)
	Best available technologies	Combined standards (performance, technological or design standards) (GEO 40/2010 – Law 205/2010)
	Energy efficiency	Tradable permits (Law 554/2006, GD 60/2008, Law 126/2008)
Service	Energy efficient buildings	Performance standards (i)Requirements; ii) Certificates of building energy performance; energy audits (Law 372/2005 - Ordinance 22/2008)
	Solar water systems/air conditioning	Energy efficient appliances (Law 372/2005)
Transport	-	-
Energy	High efficiency cogeneration	Subsidy (Bonus scheme) (Law 219/2007)
	Promotion of RES	Tradable permits (Green certificates – Economic policy instruments) (Law 220/2008)
	Best available technologies	Combined standards (performance, technological or design standards) (GEO 40/2010 – Law 205/2010)
	Energy efficiency	Tradable permits (Law 554/2006, GD 60/2008, Law 126/2008)
Waste management	Best available technologies	Combined standards (performance, technological or design standards) (GEO 40/2010 – Law 205/2010)

Adaptation

Concerning the adaptation policy, the main instrument is the preliminary assessment of flood risks and the respective prevention measures, if needed.

Table 3: Implemented policy instruments for adaptation until 31st December 2010.

Adaptation		
Water management	Regulations - Planning	Command and control

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Romanian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population are used for all scenarios (Table 4).

Table 4: United Nations projections for the Romanian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,3	-0,26	-0,30	-0,41	-0,46	-0,46	-0,58

Romania has been developing a free market economy since 1990. As a result of the global financial crisis, Romanian GDP fell more than 7% in year 2009, prompting the country to seek 26 billion $ as emergency assistance package from the International Monetary Fund (IMF), the EU, and other international lenders. Drastic austerity measures, as part of Romania's IMF-led agreement, resulted to a 1,3% GDP contraction in year 2010. The economy returned to positive

growth in 2011 due to a strong export performance, but in a deflationary environment caused by bountiful crops and weak domestic demand. In March 2011, Romania and the IMF/EC/World Bank signed a 24-month precautionary stand-by agreement, worth of 4,9 billion $, to promote compliance with fiscal targets, progress on structural reforms, and financial sector stability.

The Eurostat projections for Romania's GDP until 2014 are presented in table 3. These were used instead of those of the IMF as in the other PROMITHEAS-4 countries, because they were characterized as more realistic. IMF has for year 2012 the projection of 4,4% increase, while Eurostat 0,8% which was closer to the recorded values. Additionally, the Eurostat projections are adopted by the Romanian authorities for the preparation of policy documents.

Table 5: Projections for the Romanian GDP (Eurostat[48], 2012).

Year	2011	2012	2013	2014
Annual percent change of GDP (%)	2,2	0,8	2,2	2,7

Business-As-Usual

The policy mixture of the BAU scenario consisted of the Mitigation/Adaptation (M/A) policy instruments implemented before 31 December 2010 (Table 2). The respective for this period Romanian climate change policy has three main components: i) penetration of RES in the national energy mix, ii) support to increase energy efficiency; iii) GHG emission reductions through Joint Implementation (JI), Green Investment Scheme (GIS) and EU-ETS. Concerning the adaptation policy, the main instrument is the preliminary assessment of flood risks and the respective prevention measures, if needed (Table 3).

The combination of mandatory quotas with tradable green certificates is considered as more appropriate for the Romanian case. Under this policy mixture, the investments in RES facilities were very intense and with a rapid growth rate. Structural funds[49] and the green certificate market supported the RES investors. The necessary legal framework for the promotion of energy efficiency was set in force. Romania is active in the development of JI projects but not in GIS ones since no priorities were defined for the latter.

Optimistic scenario

The policy mixture of this scenario was synthesized by:

i) the policy mixture of BAU;

ii) the M/A policy instruments that were set into force after 1 January 2011. The following Laws were set into force as update of previous ones. The New Energy Law 123/2012 regulated the liberalization of the energy market so as to be in line with the European Commission regulations. It had also clauses for the support of electricity production from RES and cogeneration of high efficiency. A new regulation, GEO 88/2011 - Official Journal no. 736/19.10.2011, defined the number of tradable green certificates that the RES producers would receive (different compared to BAU policy mixture). EU Directives for supporting energy efficiency were transposed into national legislation. These set into force regulatory policy instruments (energy labeling and standard product information of the consumption of energy and other resources by energy-related products, energy performance of buildings – certificates).

iii) additional policy instruments which were:

[48]http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tec00115

[49] The financing of projects in the fields of RES from structural funds is carried out within the Sectoral Operational Programme "Increase of Economic Competitiveness" (SOP IEC) - Axis 4 "Increasing energy efficiency and security of supply, in the context of combating climate change (see http://oie.minind.ro/). The scheme is managed by the Ministry of Economy, Commerce and Business. The maximum value of the non-refundable support which can be granted for a project as percentage of the eligible expenses is the following: i) for small enterprises and micro-enterprises: 70%, except for projects located in the Bucharest - Ilfov region where the maximum value is 60%; ii) for medium enterprises: 60%, except for projects located in the Bucharest - Ilfov region where the maximum value is 50%; iii) for large enterprises: 50%, except for projects located in the Bucharest - Ilfov region where the maximum value is 40%.

- Regulatory and dissemination policy instruments for EE covering the transport sector (energy efficiency standards for the rail and road modes, performance standards for vehicles, behaviour change (eco-driving, walking, bike-cycling modes) awareness campaigns and use of biofuels).
- Regulatory policy instruments for adaptation through forest management.

Additional main characteristics of this policy mixture are efforts for achieving the nuclear program, the continuing use of national coal (lignite) but in modernized and new capabilities with high performances, the import of natural gas / hard coal for new power plants with high performance for closure of the energy and power balance.

Pessimistic scenario

The policy mixture of this scenario was synthesized by:

i) the policy mixture of BAU;

ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT policy mixture) and

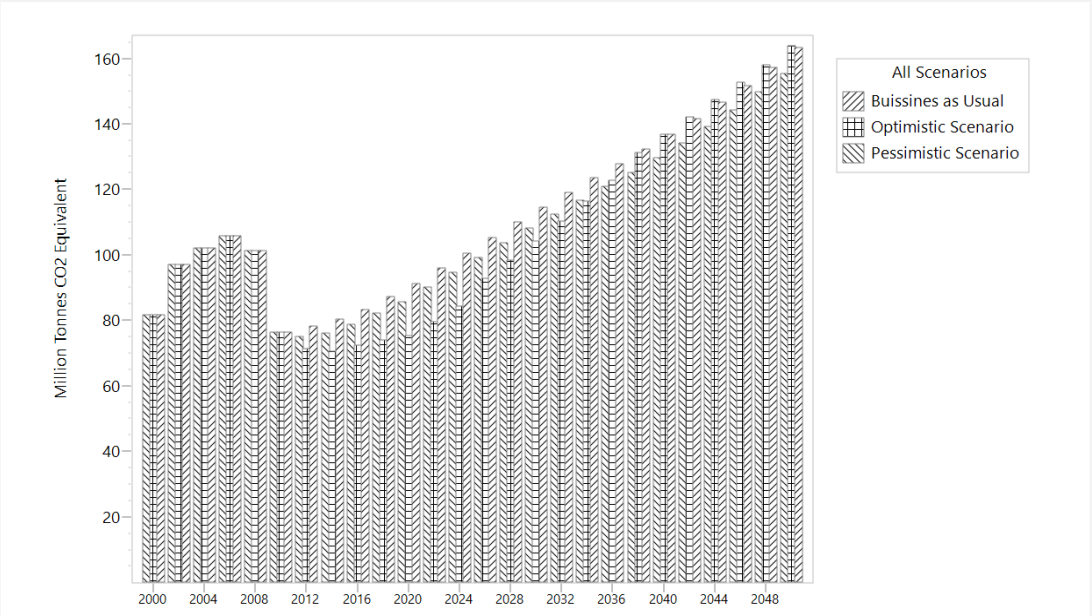
iii) additional policy instruments. This category of policy instruments was restricted (in less sectors (mainly in energy and transport sectors) and with smaller amount for financial support towards EE and RES) compared to the OPT. These were:

- Regulatory policy instruments for EE covering the transport sector (energy efficiency standards for the rail and road modes, performance standards for vehicles, restricted use of biofuels compared to the OPT policy mixture).

Results

CO_2 emissions

According to LEAP, the GHG emissions sector showed that in 2020 the OPT scenario will have lower levels than the PES, while the BAU is expected to have the highest. Regarding the Romanian 2020 targets, the 8% GHG emissions reduction is hardly achieved[50], even with the OPT scenario.

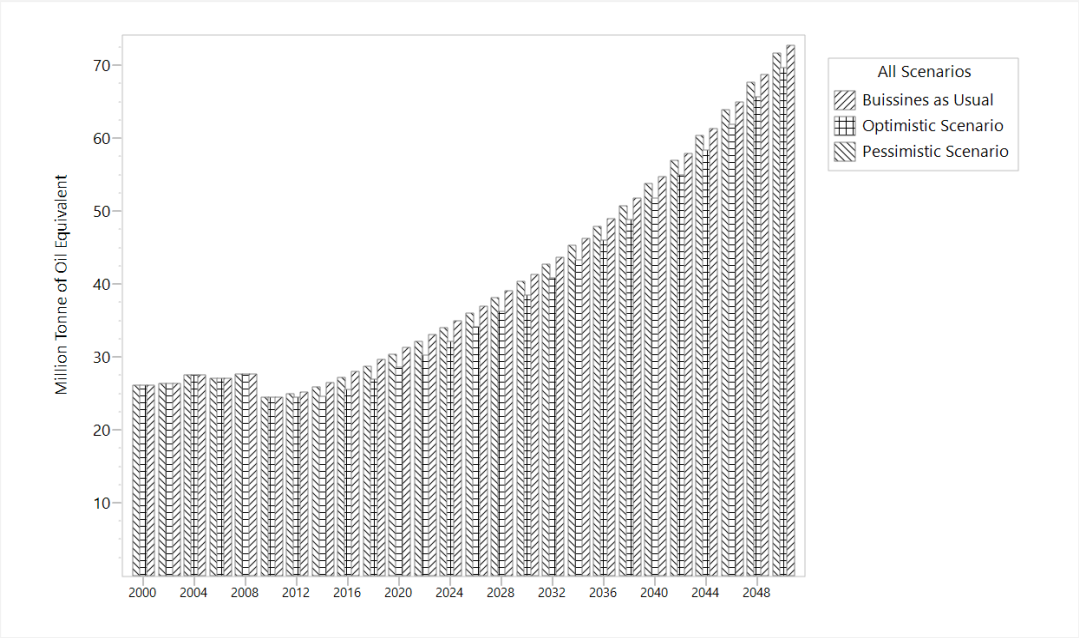


Graph 1: CO_2 emissions for 3 scenarios.

[50] 2000 is considered the base year in this report, since data were not available before this year.

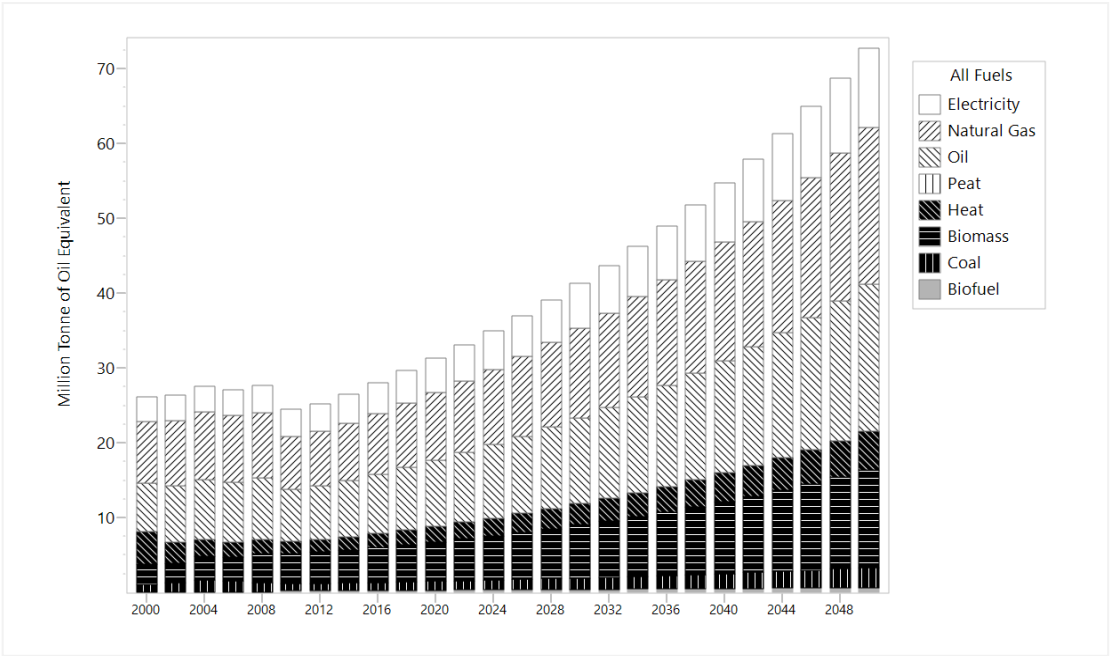
Final energy consumption

Projections until the year 2050 present increasing final energy consumption, which is highest for the BAU scenario followed by that of the PES scenario. The OPT scenario provides lowest final energy consumption.



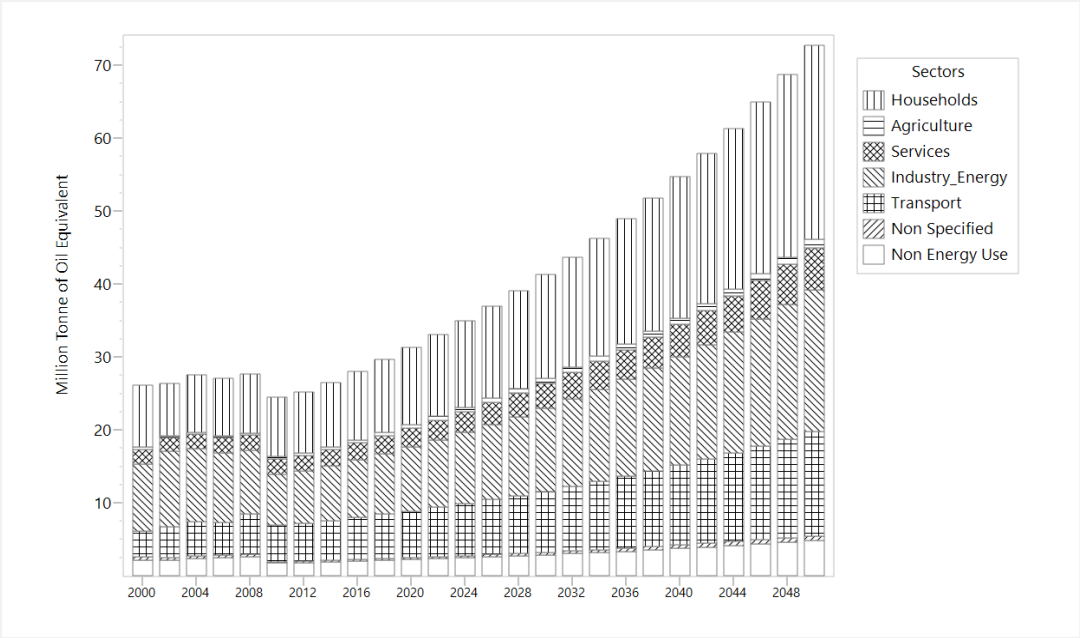
Graph 2: Final Energy Consumption for three (3) scenarios.

Regarding the trends for the final energy consumption per fuel until year 2050, natural gas, oil and biomass appear to have an important increase in their use. Coal and heat biomass have a small increase of their consumption in the coming decades.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

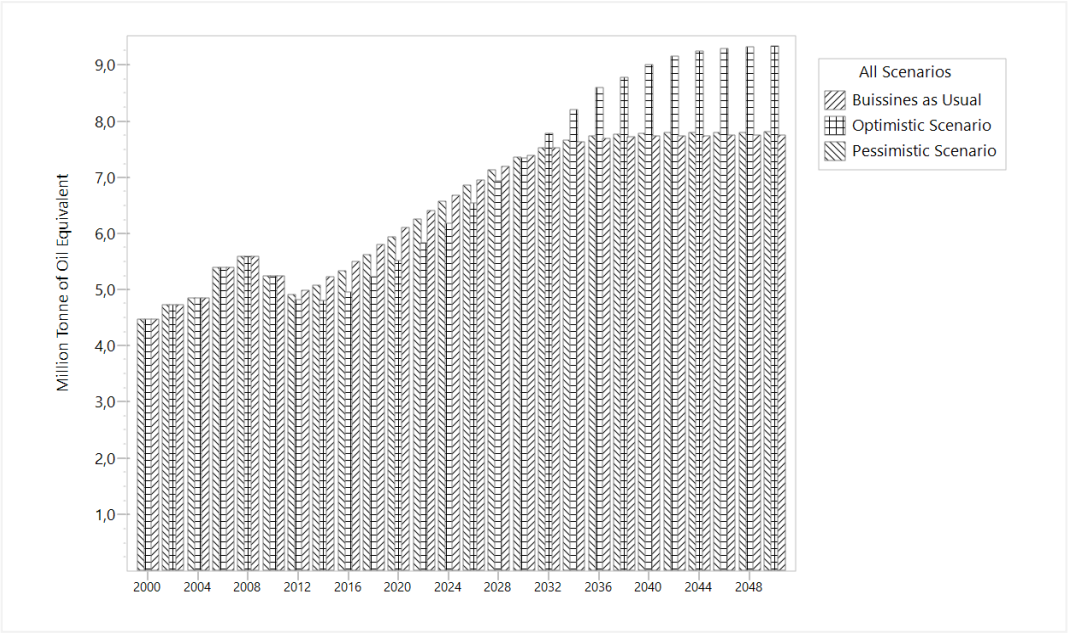
The sectors, in BAU scenario, that appear to have the highest increase in final energy consumption are mainly households, industry and transport, followed by agriculture and services whose final energy consumption is expected to increase, but with smaller rate.



Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

The LEAP results regarding electricity generation for the three (3) scenarios are shown in Graph 5. For the BAU scenario the following were considered: the finalization of the units 3 and 4 of the NPP Cernavoda until year 2020 and the construction of the new capacities forecasted in the National Action Plan for Renewable Energy Sources. For the OPT scenario the complete realization of the investment stipulated in the National Investment Plan was also taken into account. For the PES scenario only the achievement of the National Action Plan for Renewable Energy Sources was taken into account.

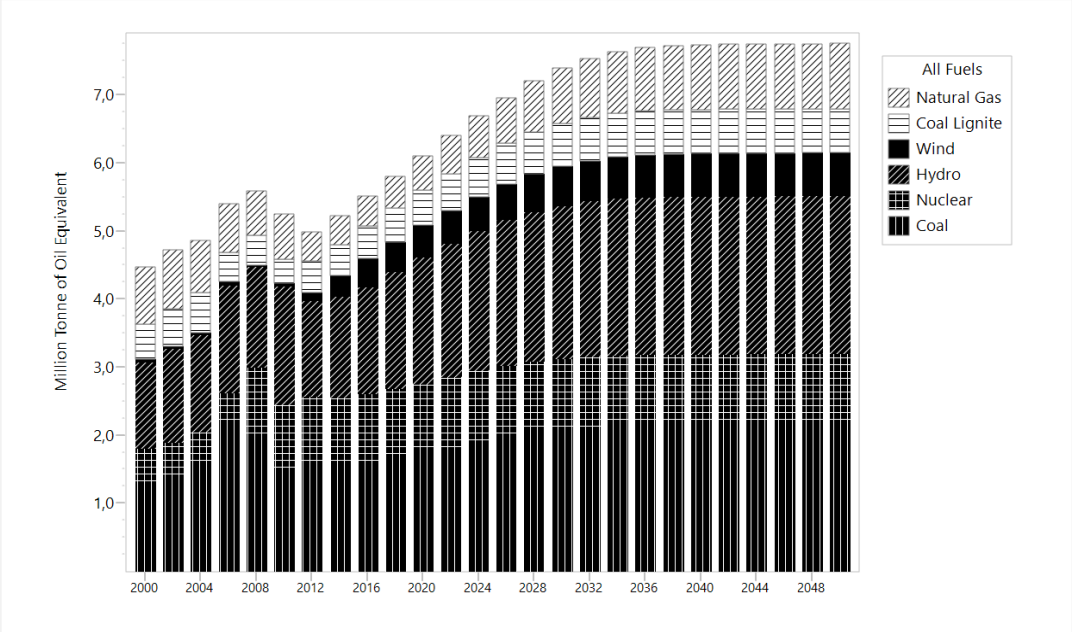


Graph 5: Electricity generation in the three scenarios.

Romania has available various energy resources but there are insufficient quantities to cover the energy demand. The evolution of primary energy production in the period 2000 - 2010, leads to the following conclusions:

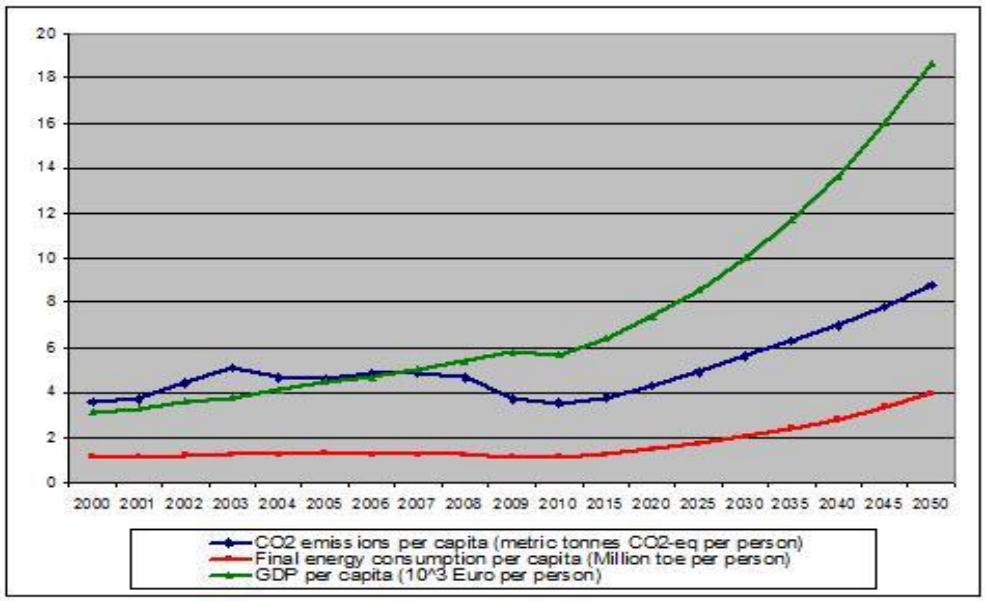
- the production of coal increased due to the production of lignite;
- the fossil fuel production (coal, natural gas, crude oil) keeps majority weight in primary energy production (71,8% in 2010);
- the firewood and agricultural wastes keep an important weight in primary energy production.

In order to cover the energy demand, Romania imported important quantities of primary energy. The imports of energy exceed of about 3 times the exports, Romania being a net importer. During the last years, the electricity produced in hydropower and nuclear plants was increased, while the use of natural gas and coal was slightly decreased.



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

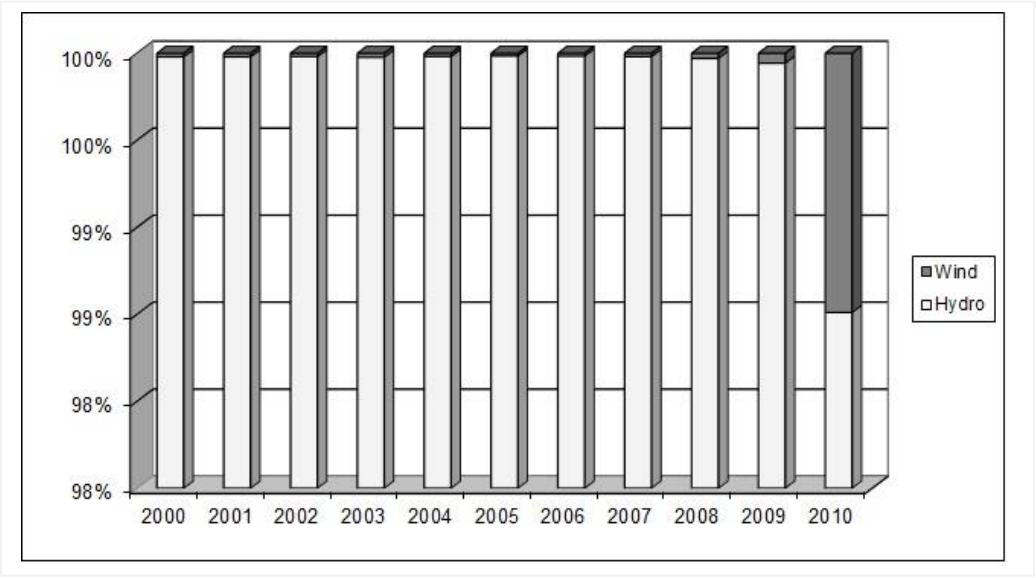


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they are increased; the growth is higher for the GDP per capita.

RES production per technology

The main RES technology for electricity generation is hydro (there are no separate data on installed capacity for small-scale and large-scale hydro plants), followed by a small percentage of wind.



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

According to the AMS outcomes the OPT policy mixture was evaluated as the most effective one compared to the other two.

The BAU scenario has the largest amount of GHG emissions, followed by the PES scenario.

The policy mixture of the OPT scenario had significantly better performance in political acceptability, since it is the most cost effective for the target groups compared to the other two. It supports better the innovative technologies and methods, compared to the others and offers a fair distribution of the "climate change" burden among the respective sectors. Also, it allows the economic sectors to be more competitive. All policy mixtures performed low in stringency for non-compliance and in flexibility, since they did not include the necessary rules and influencing mechanisms for transgressors.

The performance of the OPT policy mixture under the third criterion was better compared to the other two. The country has established an implementation network that is able to adjust properly its activities under a more strict policy mixture like that of OPT compared to the BAU one. The OPT policy mixture appears to have a more capable implementation network able to provide the necessary information of the respective policy instruments, to handle administrative matters and secure adequate financial means for its implementation.

Given the above, the Mitigation/Adaptation policy mixture which characterizes the OPT scenario is the one that allows the achievement of most goals of the climate change policy of Romania.

Nevertheless, the success of this policy mixture requires the encouragement of business investments in RES and EE projects, the continuation of the demonstated effectiveness of the implementation network and a more stringent frame for non-compliance.

Policy Trends

Romania's climate change policy is in line with the EU's directives and will continue to be evolved, given the new EU framework on climate and energy for 2030 which aims to drive continued progress towards a low-carbon economy and sets new EU-wide binding targets for climate change[51].

The energy efficiency policy instruments tend to focus mainly on thermal insulation and energy performance of residential buildings and on the promotion of high efficiency cogeneration of heat and power (CHP), providing subsidies from state and local budgets as well as grants. Romania introduced Law 159/19.7.2013 (published in Official Gazette No. 283/20 May 2013) about buildings transposing in this manner Directive 2010/31/EU on energy performance of buildings in the Romanian legislation, amending and completing Law No. 372/2005**.** New obligations for building owners came into force (Ministry of European Funds, 2014)**.** The energy performance certificate should be obtained by the relevant owners in view of concluding sale or lease agreements[52].

Although transport is among the most energy-intensive sectors, there are no relative energy efficiency policy instruments.

Promotion of energy efficiency in Romania is expected to be enhanced and applied also in industrial and district-heating supply sectors by 2015, according to "National Energy Efficiency Strategy (GD 163/12.02.2004[53]).

After analyzing different options to promote RES-e, the decision was made on the Mandatory Quota system, combined with the use of Green Certificates (GC). The RES technologies that are promoted the most, by receiving more GCs, are solar power followed by small scale hydro (≤ 10MW), biomass, biogas, geothermal and last, wind. Governmental Decision No. 994/2013 (State Gazette No. 788/16.12.2013[54]) modified Romania's Renewable Energy Law No. 220/2008 by approving the reduction of Green Certificates (GCs) for wind power, PV installations and small hydro power (Eclareon and Eco-Logic, 2014).

Investments in RES facilities are very intense and with a rapid growth rate. Structural funds[55] and the green certificate market support investors in RES facilities. In Romania, the electricity derived from hydro power represented about 7% of the electricity production from hydropower plants of the European Union in 2011, giving the country the 7th place among the countries using this resource along with Sweden, France, Italy, Austria, Germany and Finland (EUROSTAT). Also, companies such as EDP, CEZ AS, EON, Iberdrola SA and ENEL SA have installed wind farms in Romania[56]. Also, Romania has the third highest geothermal potential of European nations, but this type has not been exploited yet. Five sites have a temperature over 100°C (5th National Communication, 2010).

Furthermore, the biodiesel industry in Romania is still at its inception compared with other EU markets, but shows over the last year one of the highest growth rates (Olteanu, 2009).

The country applies the JI mechanism as host country starting from year 2000. Many of the approved projects are developed at local authorities' level. Romania has signed 10 Memoranda of Understanding. To date, out of the 16 investment JI projects of undergoing different stages of development, 6 JI projects aim at promoting RES (Ministry of Economy, Trade and Business

[51] http://ec.europa.eu/clima/news/articles/news_2014012202_en.htm
[52] http://www.lexology.com/library/detail.aspx?g=e9a6cb34-a544-416b-ae63-8eb1515e1e8a
[53] GD 163/12.02.2004 approving the National energy efficiency strategy was published in Official Gazette of Romania, part I, no. 160/24.02.2004. The strategy is an annex to GD 165/2004 and it was subsequently published in the Official Gazette of Romania, part I, no. 160 bis;
[54] http://romaniascout.ro/hg-9942013/
[55] The financing of projects in the fields of RES from structural funds is carried out within the Sectoral Operational Programme "Increase of Economic Competitiveness" (SOP IEC) - Axis 4 "Increasing energy efficiency and security of supply, in the context of combating climate change (see http://oie.minind.ro/). The scheme is managed by the Ministry of Economy, Commerce and Business.
[56] Transelectrica web – site: www.transelectrica.ro

Environment, "National Renewable Energy Action Plan", 2010). The priority areas for JI projects, as identified by the Ministry of Environment and Forests[57] concern mainly energy efficiency, CHP installations, fuel switch, RES and afforestation. The continuation of the JI Mechanism is priority for Romania's post 2012 climate change policy. Also, the country is participating in EU-ETS and introduced GIS in 2010 without specific priorities though. No NAMAs are registered at the UNFCCC or the Ecofys database[58],[59].

For adaptation policy, the only implemented policy instruments concern the assessment and management of flood risks, as a result of the transposition of EU Directives 2007/60/EC and 2000/60/EC into national legislation. Currently, there are no other relevant policies or strategies foreseen. According to the 5th National Communication of Romania to UNFCCC in 2010, the sectors that are expected to be affected by climate change are mainly: energy, agricultural, forests and water resources.

Conclusions

- Energy efficiency measures concern mainly residential buildings and the installation of high efficiency CHP systems.
- RES investments mainly for wind and hydro show rapid growth rate. Electricity generation from hydro and wind increased considerably after 2009. International energy companies run wind farms on Romanian territory.
- During the last years, electricity generation from nuclear power plants was almost doubled.
- Joint Implementation is a promising mechanism for Romania to achieve its climate change targets.
- Adaptation policy instruments are only those that were transposed from EU directives and concern mainly the assessment and management of flood risks.

Intended Nationally Determined Contribution (INDC) of Romania

Romania, being an EU Member State is committed to contribute to the EU climate policy targets (20-20-20) and to transpose EU Directives into national laws. The Romanian INDC is that of the EU which is presented under the chapter for Greece.

[57] GD 846/2010 - Official Journal no. 626/6.09.2010 available at: http://www.legex.ro/Hotararea-846-2010-107070.aspx

[58] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=143

[59] http://www.nama-database.org/index.php/By_region

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Russian Federation

Country profile

Russian Federation (Russia) is a democratic, federal law-governed state, where the state power is exercised by the President, the Federal Assembly and the courts of the Russian Federation.

The executive power is split between the President and the Prime Minister, but the President is the dominant figure. He is elected every six years by the citizens of the federation. The Federal Assembly of Russia has two chambers: the State Duma – the lower house, and the Federation Council – the upper house. The judicial power is vested in courts and administered by the Ministry of Justice.

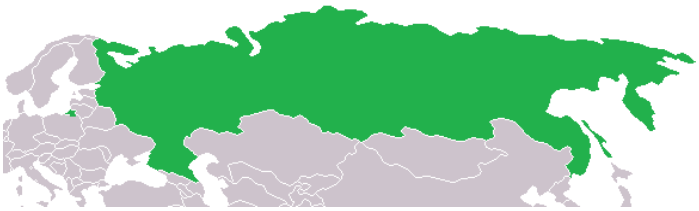
Russian territory covers more than one eighth (1/8) of the Earth's land area and extends across the whole of northern Asia and 40% of Europe. It is rich of a great range of environments and landforms, with great reserves of mineral and energy resources. Russia shares land borders with 16 countries[60] and its total area of the country equals 17.075.400 km^2, lying mostly in the moderate temperate climate zone and in the arctic and subarctic zones. Most part of Russia has continental climate.

Official language is the Russian, the currency is the Russian ruble and the capital is Moscow.

As a federal republic, Russia includes 83 federal subjects; each federal subject belongs to one of the following types:

- 21 republics — nominally autonomous, each has its own constitution and legislature; is represented by the federal government in international affairs; is meant to be home to a specific ethnic minority.
- 46 provinces — most common type of federal subjects with federally appointed governor and locally elected legislature, and commonly named after their administrative centers.
- 9 territories —essentially the same as oblasts. The title "territory" is historic, originally given because they were once considered frontier regions.
- 1 autonomous province—the only autonomous oblast is the Jewish Autonomous Oblast
- 4 autonomous districts — with substantial or predominant ethnic minority
- 2 federal cities — major cities that function as separate regions.

Location Map



[60] Norway, Finland, Estonia, Latvia, Lithuania, Poland, Belarus, Ukraine, Georgia, Azerbaijan, Kazakhstan, China (S), Mongolia, China (SE), North Korea, Abkhazia and South Ossetia

National climate change policy

Russia signed on 13 June 1992[61] and ratified on 28 December 1994 the United Nations Framework Convention on Climate Change (UNFCCC) as Annex I country (Interagency Commission of the Russian Federation on Climate Change Problems, 1995).

The Federal Law 128-FZ "On ratification of the Kyoto Protocol to the UNFCCC"[62] was adopted by the State Duma of Russia on 22 October 2004 was approved by the Council of the Federation on 27 October 2004 and signed on 4 November 2004. The Protocol entered into force on 16 February 2005, 90 days after the formal transfer of the instrument of ratification by Russia to the UNFCCC Secretariat on 18 November 2004. Under the Kyoto protocol the Russian Federation has a 0% reduction in GHG emissions[63]. It has refused to participate in the second commitment period of the Kyoto Protocol.[64]

Under the Copenhagen Accord, the country announced its target to reduce the total GHG emissions by 2020 within a range of 15% and 25% compared to the 1990 level of emissions (UNFCCC, 2012). This amount of reduction depends on: (a) the appropriate accounting of the potential of national forestry sector in the context of its contribution to meeting the obligations of anthropogenic emission reductions; and (b) the undertaking by all major emitters legally binding obligations to reduce anthropogenic GHG emissions (UNFCCC, 2012).

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instruments**
Buildings	Energy management	Performance standards (energy efficiency standards, energy audits, energy service contracts) (Law No. 261-FZ/23-11-2009; Government Order No. 1830-p/1-12-2009; Decree No. 636/18-8-2010)
	Energy efficient appliances	Energy labelling for appliances (Law No. 261-FZ/23-11-2009)
	Energy management	Dissemination policy instruments - Behaviour change (Information and education plan) (Law No. 261-FZ/23-11-2009)
	Energy management	Financial policy instruments – Subsidy (Tax credits) (Law No. 261-FZ/23-11-2009)
Industry	GHG emission reduction	Tradable permits (JI) (Government Orders No. 215-p/20-2-2006; No. 278-p/1.3.2006; No. 444/20-12-2007; No. 884-r/27-7-2009; Resolutions No. 422/30-11-2007; No. 424/30-11-2007; No. 843/28-10-2009)
Transport	Emission standards	Technological standards (Euro 3-4-5, standards) (Law No. 41-FZ, 25-4-2002)
Energy	GHG emission reduction	Tradable permits (JI) (Orders of the Government of the Russian Federation No. 215-p/20-2-2006; No. 278-p/1.3.2006; No. 444/20-12-2007; No. 884-r/27-7-2009; Resolutions No. 422/30-11-2007; No. 424/30-11-2007; No. 843/28-10-2009)
	Promotion of RES technologies	Financial policy instrument - Subsidy (Premium scheme) (Federal Law No. 250-FZ/4-11-2007; Order No. 1166-r/18-8-2009)
	Promotion of RES technologies	Regulatory standards (Certificate) (Federal Law No. 250-FZ/4-11-2007; Decree of the Government of the Russian Federation No. 426/3-6-2008; Order No. 187/17-11-2008)
	GHG emission reduction	Technological or design standards (Resolution No. 410/1-7-2005)

[61] http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php
[62] http://www.rg.ru/2004/11/09/kiotskiy-doc.html
[63] http://unfccc.int/kyoto_protocol/items/3145.php
[64] http://www.fni.no/doc%26pdf/FNI-Climate-Policy-Perspectives-10.pdf

Mitigation

In order to achieve its mitigation targets, Russia has implemented the following policy instruments. As shown in Table 1, buildings, industry, transport and energy are the four sectors supported by the Russian government.

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010. The Water Code[65] (Law of Russian Federation No. 74-FZ, issued on 3 June 2006) does not refer to mitigation of or adaptation to climate change.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

Population in Russia is expected to decrease for the time period 2011-2050 (UN, 2011). The average annual rates of change are presented in Table 2 and were used for all three scenarios.

The country had an impressive economic growth performance for almost a decade, which was ended by sharp contraction in 2009 with the GDP falling by 8%. After year 2008, the Russian budget was in surplus for the first time by 0,4-0,8%[66] of GDP for year 2011 and remained in surplus for the first half of 2012. Russia improved its position in the global ranking of economies - measured in current U.S. dollars - from the 18th to the 8th position for the time interval 2000 - 2008, and remained in this position since then. The Russian economy has entered a "post-crisis" period of moderate GDP growth (IMF, 2012a; IMF, 2012b; FAO, 2012; World Bank Group, 2013).

Table 2: United Nations projections for the Russian population (UN, 2011).

Average annual rate of change (%)							
2005-2010	2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,12	-0,10	-0,17	-0,28	-0,40	-0,38	-0,38	-0,44

Exports increased in year 2010. Higher agricultural output partially increased exports during the second half of 2011. Imports continued to grow substantially due to the strengthening of domestic demand in 2011. The EU is Russia's most important market since 44,8% of Russia's imports come from Europe and 56% of Russian exports go to Europe (EC, 2012; Dettke D., 2011). The International Monetary Fund provides projections for the Russian GDP until 2017 (IMF, 2012c)[67] which are presented in Table 3.

Table 3: Projections for the Russian GDP.

Year	2011	2012	2013	2017
Annual percent change of GDP (%)	4,3	4,0	3,9	3,8

Business As Usual scenario

The policy mixture of the BAU scenario includes Mitigation/Adaptation (M/A) policy instruments implemented before 31 December 2010 (Table 1). The respective Russian climate change policy focused mainly on Energy Efficiency and less on Renewable Energy Sources. There were obstacles in supporting energy savings (mainly lack of incentives, change of behaviour). This policy mixture is characterized by the slow development of the framework for Joint Implementation (JI). No practical steps were taken to establish a Green Investment Scheme (GIS) in Russia.

There were no policy instruments concerning climate change adaptation issues.

[65] http://dinrac.nowpap.org/documents/law/Russia/Water_Code_Russia.pdf
[66] According to World Bank the consolidated budget surplus amounted to 1,6% of GDP in 2011, compared to a deficit of 3,5% of GDP in 2010 (World Bank, 2012).
[67] http://www.imf.org/external/pubs/ft/weo/2012/01/pdf/tables.pdf

Optimistic scenario

The enhanced M/A policy mixture of the OPT scenario includes:

i) the policy mixture of BAU;

ii) policy instruments set into force after 1 January 2011. These were: a new supportive policy instrument for RES, the capacity-based scheme; an amendment of the Decree for JI and GIS; energy performance labels; energy performance standards for lighting in the public sector and energy audits (IFC/GEF, 2012; Boute A., 2012; Shishlov I., 2011; Millhone P. J., 2010).

iii) additional policy instruments. These were:

- financial incentives and targeted information dissemination campaigns (IFC, 2011; McKinsey&Company, 2009) to encourage energy saving and tax exemptions for vehicles of new technology, along with a small amount of subsidy,
- federal program to improve the quality of road infrastructure (RuGBC News, 2012),
- dissemination measures for eco-driving and transport mode change from road to rail and regulatory measures to support the use of energy efficient vehicles and fuel switch from oil to biofuels (McKinsey&Company, 2009),
- adaptation measures focusing on agriculture (subsidies/tax exemptions, information campaigns) and on water and forest management.

Pessimistic scenario

The PES policy mixture was synthesized by: i) the policy mixture of BAU; ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT) and iii) additional policy instruments which were considered in less sectors and with smaller amount for financial support towards EE and RES compared to those of the OPT.

These additional policy instruments were:

- financial incentives (including taxes) to support energy efficiency,
- dissemination and regulatory measures for the transport sector concerning the use of rail instead of road and the use of energy efficient vehicles and fuel switch,
- adaptation measures on agriculture (subsidies/tax exemptions) and forest management.

Results

The policy mixtures of the three scenarios, as outcomes of the Long range Energy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per category.

It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanding of the required adaptation measures, in order to implement the selected policy mixtures.

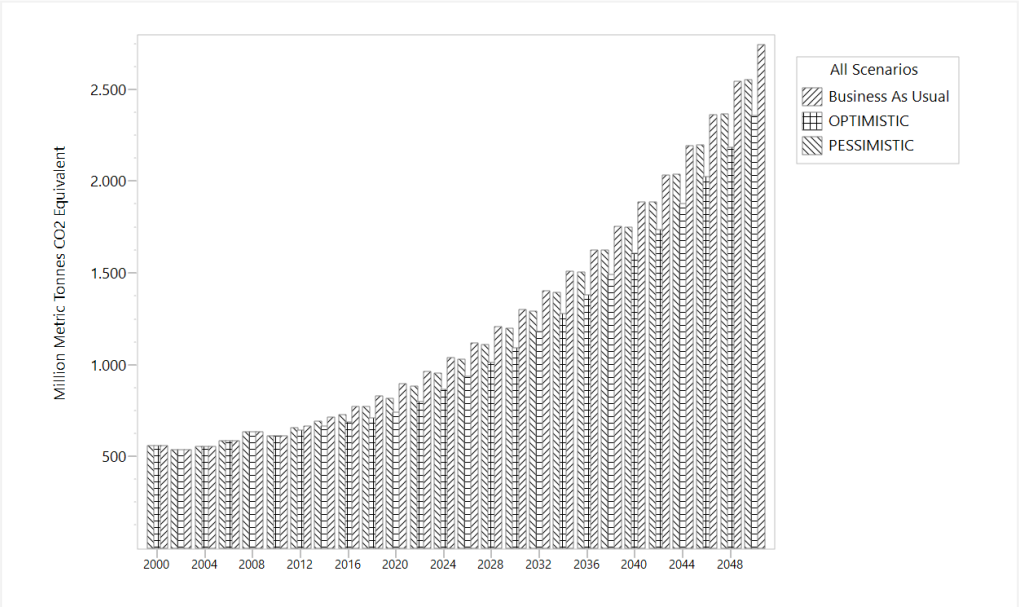
CO_2 emissions

According to the outcomes of the LEAP model for the BAU scenario, in 2020 the GHG[68] emissions are expected to increase compared to those of year 2005[69] by 131,6%; for the OPT

[68] For biofuels the amount of air pollutant was not available in LEAP for all branches.

[69] GHG emission sources which are taken into consideration in this study do not include the "Oil transformation" sector due to missing data. Due to this lack of data there is difference between the official historical data for GHG emissions and those calculated by the LEAP model.

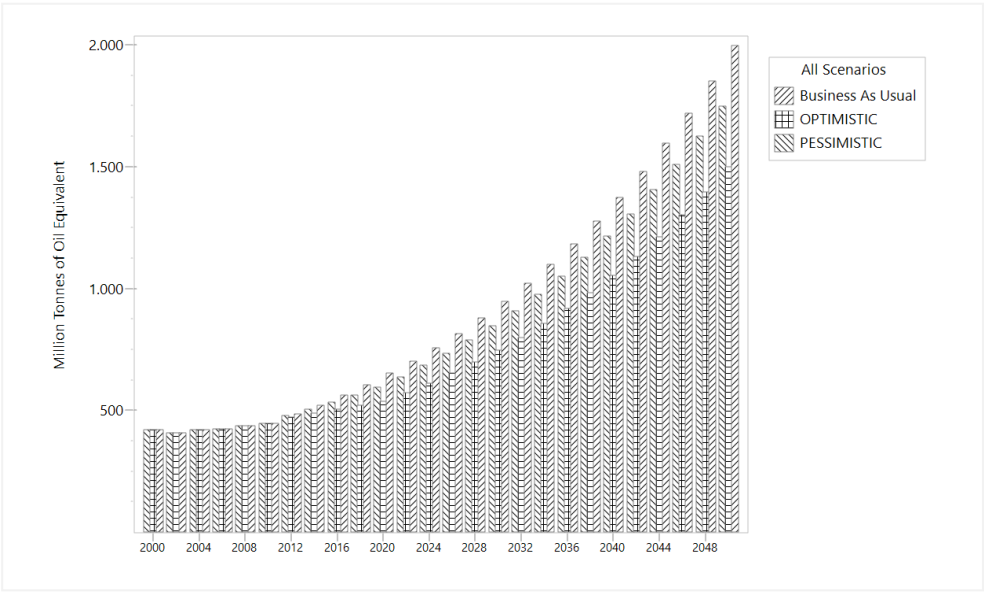
scenario, GHG emissions in Russia will probably increase by 120,9% in 2020 compared to those of year 2005 and for PES the increase will be by 126,8% compared again to those of year 2005.



Graph 1: Russia - CO_2 emissions for 3 scenarios.

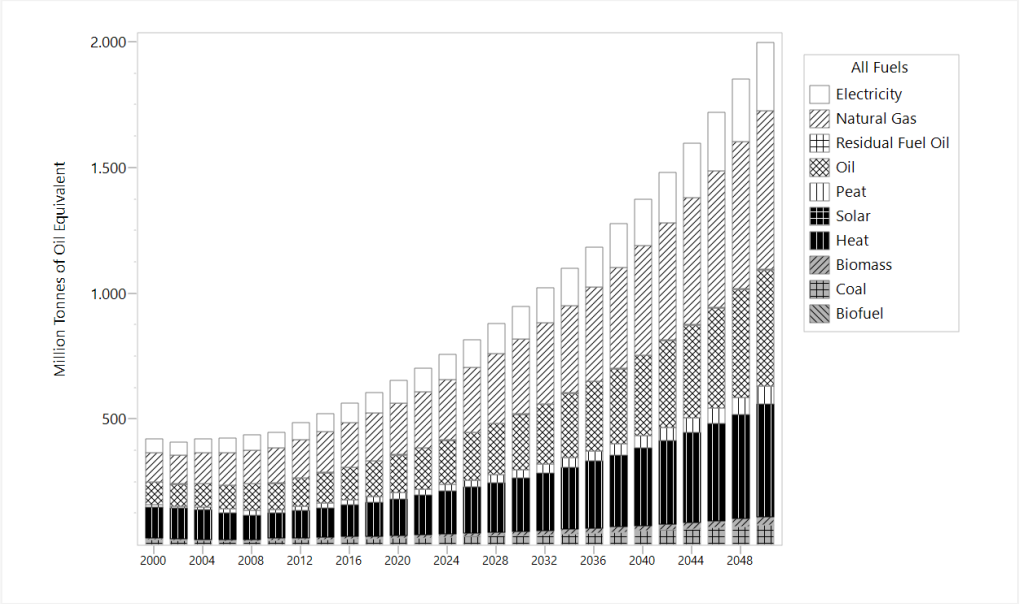
Final energy consumption

Russia is the third largest energy consumer in the world (UNECE, 2010). The future projections until the year 2050 present increasing final energy consumption, reaching the highest by applying the BAU scenario. As expected, the OPT scenario shows the lowest final energy consumption.



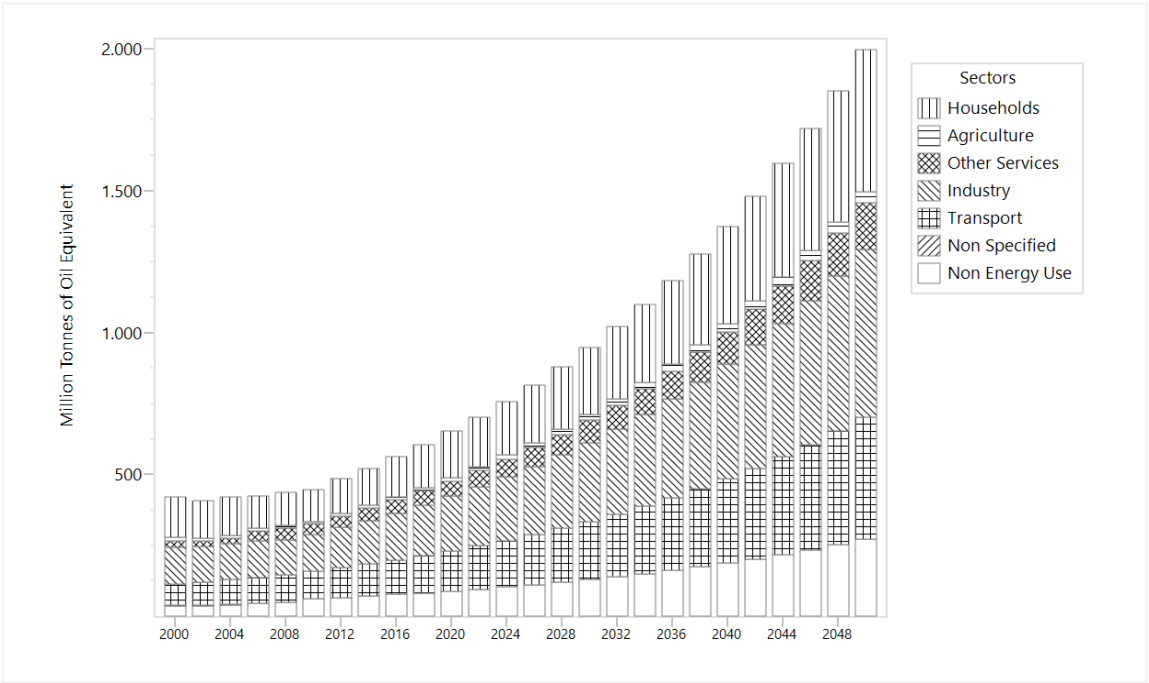
Graph 2: Final Energy Consumption for three (3) scenarios.

Analyzing the BAU scenario, natural gas, the use of oil and biomass appear to increase up to 2050. Regarding the trends on the fuel use until 2050, the use of natural gas, oil and electricity show important growth, while the use of peat and biomass show only a slight increase in the coming decades.



Graph 3: Final Energy Consumption per fuel in BAU scenario.

The final energy consumption, in BAU scenario is increased the most in the residential, the industrial and the transport sectors, due to the population and GDP growth.



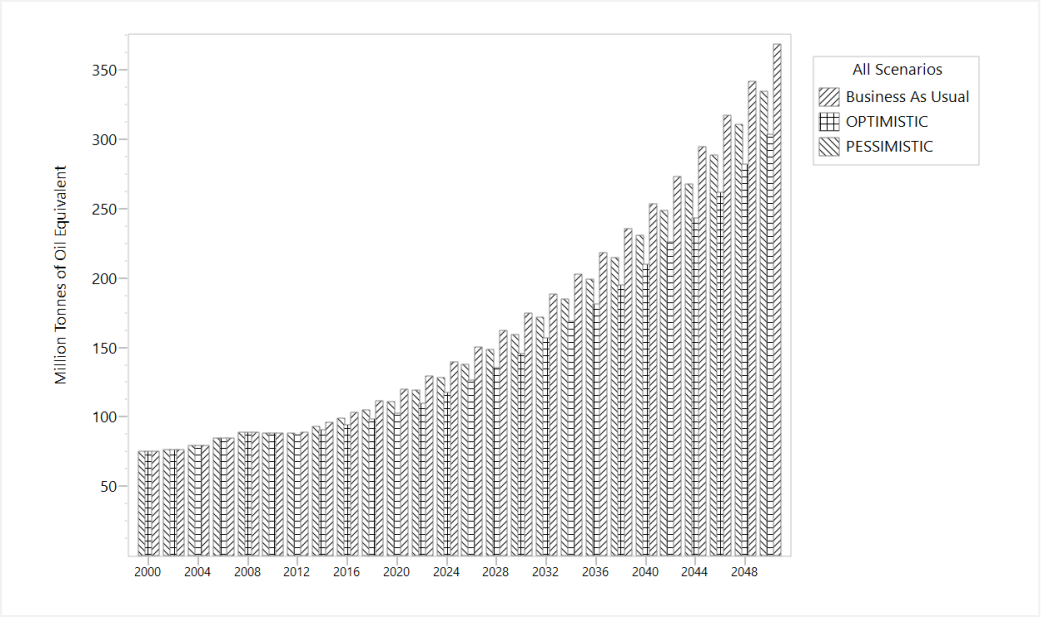
Graph 4: Final Energy Consumption per Sector in BAU scenario.

Electricity generation

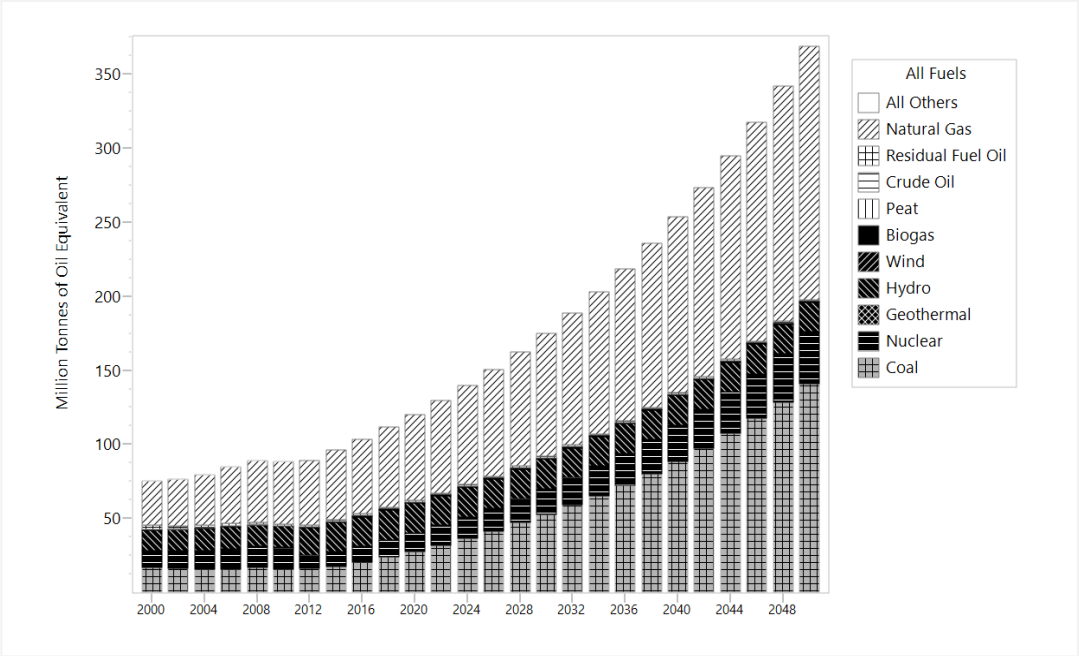
The total generation capacity of the electric system was of 217 GW in 2010 (230GW in 2012) with more than 440 thermal plants (approximately 77 of which are coal-fired), hydro power plants and 29[70] nuclear reactors (EIA, 2012; Chernenko N., 2012; UNECE, 2010). One particular characteristic of this power capacity is that the part located in the far-eastern area of the country is

[70] For 2012 EIA refers to 32 reactors in 10 nuclear power plants (EIA, 2012). Nine of these plants are located west of the Ural Mountains and the tenth is the Bilibino plant (EIA, 2012).

not connected to the integrated Russian power grid, but operates in an autonomous grid system, the United Grid of the East (UNECE, 2010).



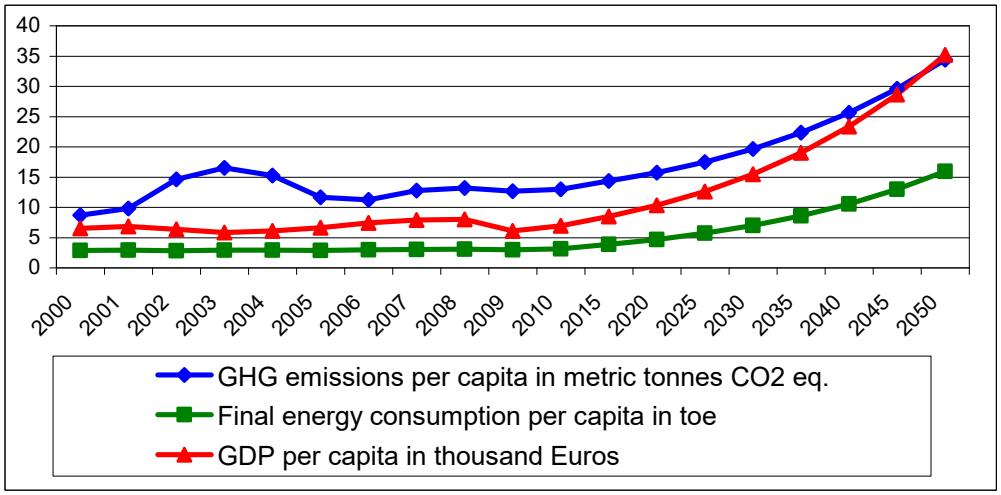
Graph 5: Electricity generation in the three scenarios.



Graph 6: Electricity generation per fuel in BAU scenario.

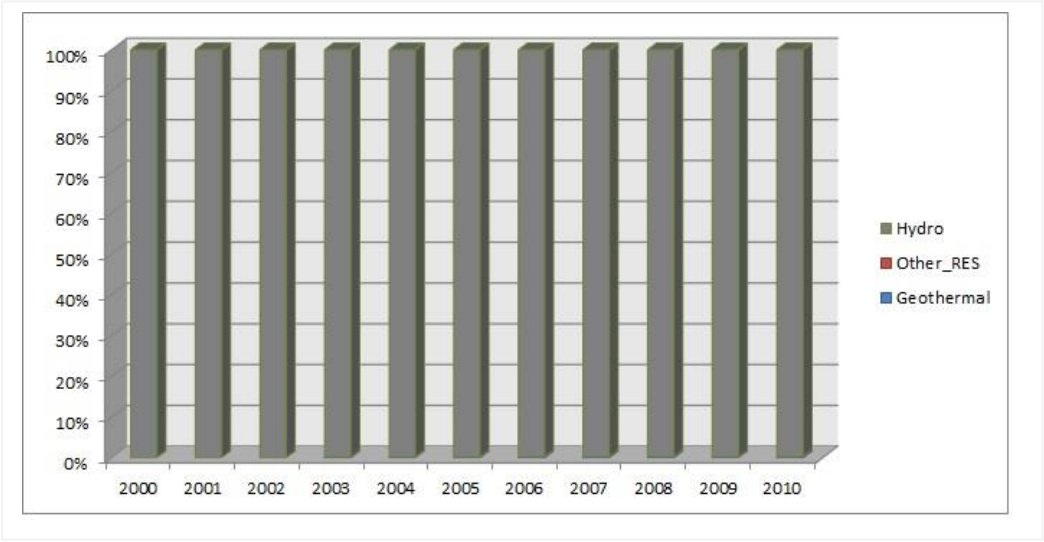
Key resources in the national electricity system are CHP (Cogeneration of Heat and Power) plants, representing approximately one third of total generating capacity (IEA, 2012). They also contribute as essential district heating service, affecting their participation in wholesale electricity during winter months (IEA, 2012).

National indicators



Graph 7: Trends of national indicators (BAU scenario).

RES production per technology



Graph 8: Technology shares in RES electricity generation (2000-2010).

In Russia, for the time-period 2000-2010, the main RES technology for electricity generation was hydro (there are not separate data on installed capacity for small-scale and large-scale hydro plants). The total share of solar, wind and geothermal capacities was hardly 0,3% of the total RES capacity.

Evaluation

According to the AMS results, the OPT policy mixture was evaluated as the most effective one compared to the other two.

The BAU policy mixture had the largest amount of GHG emissions, followed very closely by the PES scenario. The policy mixture of the OPT scenario had the best performance in political acceptability since it is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two. It offered a fair distribution of the "climate change" burden among the respective sectors and allowed the economic sectors to be more competitive. It offered more flexibility for the target groups in complying with their obligations under the specific policy mixture. The performance of the BAU and PES policy mixtures under the third criterion was equal. The country has established an implementation network that is not

able to adjust properly its activities under a more strict policy mixture like that of OPT compared to the BAU. Additionally, Russia can not manage to allocate the necessary funds for the implementation of its supportive policy instruments for RES and Energy Efficiency under all mixtures.

Policy Trends

The climate change policy in Russia is influenced strongly by the aim to reinforce and maintain the dominant position of the Russian energy resources and products in the world energy market (UNDP, 2009).

Russia is placed among the top 25 energy-intensive countries, since its energy intensity of GDP is 250% higher than the world average and 250-350% higher than in advanced countries (GPEE-2020, 2010[71]).

Energy Efficiency measures tend to be a priority starting from 2007. In this context, energy efficiency standards for new buildings along with financial incentives, obligatory labelling of energy efficiency classes of energy-consuming goods produced in Russia and energy efficiency on heat supply were set. Most of the laws stated the framework conditions such as the background, requirements and action plan for creating energy audit system and the requirements for an energy service contract conducted by state or municipality.

In 2011, energy efficiency in buildings is reinforced through stricter policy with: i) installation of energy meters, first in industrial and commercial building and then in every dwelling, ii) energy audits for energy companies and large energy consumers with penalties for non-compliance included, and iii) energy labeling for appliances (including office equipment and computers) and ban of incandescent light bulbs first in state and municipal buildings and then throughout the country.

Although transport is one of the three most energy-intensive sectors, no energy efficiency policy instruments are implemented.

RES was supported through a premium scheme (later transformed to capacity-based scheme) and a short-term certification, without a clear preference on the type of RES. Despite the legal basis introduced by the Federal Electricity Law to support RES, the ‘‘premium’’ scheme was not practically applied until December 2011 after the document “*Decree on the Procedure for the Determination of the Premium Added to the Equilibrium Price of the Wholesale Market*”.

On 28 May 2013, a capacity-based support scheme i.e. a mechanism to support the use of RES for power generation through the wholesale market for generation capacity, was established (Decree No. 449 “On a Mechanism for the Support of Renewable Energy Sources on the Wholesale Electric Power and Capacity Market” (White & Case, 2013)). Power generators receive certain capacity payments in return for maintaining their facilities in readiness to generate. With this Decree the Wholesale Market Rules were amended so as to integrate agreements for the Supply of RES Capacity into the wholesale market architecture, while rules were established for the selection of RES projects, capacity supply by variable renewable energy installations and capacity pricing (IFC, 2013).

Also, through Decree No. 861-r “On Amendments to Guidelines for State Policies in Increasing the Effectiveness of Use of RES for the Period until 2020”, targets were established for the installment of new RES capacities (wind, solar and hydro power) (White & Case, 2013).

Russia promotes nuclear energy. The national target for nuclear production is higher than that of RES aiming to double it by 2020 and reach 25% of energy production (Henry A. L. and Sundstrom McIntosh L., 2012; EBRD, 2009).

According to the Climate Doctrine, JI projects are a priority for the federation and an area of potential green investments. Apart from the GHG emission reduction potential, Russia holds a

[71] http://rosenergo.gov.ru/upload/GP%20do%202020.doc

considerable number of free allowances, a total Assigned Amount Units (AAU) amount of 16,6 billion tons of CO_2eq, with a commitment period reserve of 10,6 billion tons. It is indicative that in July 2010, 39 proposals were received and the first 15 were approved, valued at approximately 3,5 billion $ and offering a potential of 30 million Emissions Reduction Units[72] (ERUs) (Henry A. L. and Sundstrom McIntosh L., 2012).

Russia's favor to promote energy efficiency measures is also evident through JI. The type of the registered JI projects is mainly energy efficiency in industrial and energy supply sectors.

Concerning JI registered RES projects, there is a strong trend for biomass power plants. There is a great potential for wide-scale and effective use of biomass resources since Russia has approximately 22% of the world's forests located on its territory (EBRD, 2009; European Parliament, 2008). The forest industry is an important Russian economic sector, a large potential supplier and consumer of biomass (wood waste) products. These products are only being minimally exploited. So far, no NAMAs are registered at the UNFCCC or the Ecofys database[73],[74].

As far as adaptation climate change policy is concerned, still neither policy instruments are implemented nor is a strategy designed, despite the fact that climate change will affect the forests, agriculture and water resources, which are very important sectors for Russia. Notably, the agricultural sector accounts for 8% of GDP, and employs 11% of the labour force (EBRD, 2009).

Conclusions

- There is a remarkable effort toward the improvement of energy efficiency, especially in buildings and secondly in industrial and energy supply sectors.
- In the transport sector, no policy instruments for decreasing the GHG emissions, either through improving the energy efficiency or fuel switching, are in place.
- The limited policy instruments together with their late practical application and the tendency to promote nuclear energy over RES fail to boost RES utilization.
- Joint Implementation is a promising support mechanism for green investments, such as the installation of biomass plants, energy efficiency projects in industrial and energy supply sectors and afforestation.
- Russia lacks of policy instruments for adaptation to climate change, posing water resources and consequently agriculture in danger.

[72] the equivalent of one tonne of carbon dioxide reduced
[73] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=144
[74] http://www.nama-database.org/index.php/By_region

Intended Nationally Determined Contribution (INDC) of the Russian Federation

Unofficial translation

The Russian Federation, recalling the statements of the Russian Federation at the UN Climate Summit in September 2014 and at the 20th Conference of the Parties to the UNFCCC in Lima in December 2014, as well as the Decision 1CP/.20 of the Conference *Lima Call for Climate Action*, i.e. para 13, which contains the invitation to all Parties to communicate their intended nationally determined contributions well in advance of the twenty-first session of the Conference of the Parties (by the first quarter of 2015 by those Parties ready to do so), **presents its intended nationally determined contribution (INDC) and clarifying information.**

However, the final decision of the Russian Federation on the INDC in the framework of the new climate agreement will be taken pursuant to the outcome of the negotiating process underway throughout the year of 2015 and the INDCs announced by major emitters of greenhouse gases.

INDC	**Limiting anthropogenic greenhouse gases in Russia to 70-75% of 1990 levels by the year 2030 might be a long-term indicator, subject to the maximum possible account of absorbing capacity of forests.**
Base year	1990
Time frames / periods for implementation	1 January 2020 — 31 December 2030
Scope and coverage	Economy-wide, in particular, as determined by decisions of the UNFCCC Conference of the Parties on reporting: • energy; • industrial processes and products use; • agriculture; • land use, land-use change and forestry; • waste. The INDC indicator is to be achieved with no use of international market mechanisms.
GHGs	The INDC includes information on the following GHGs: • Carbon dioxide (CO2); • Methane (CH4);

	• Nitrous oxide (N2O); • Hydrofluorocarbons (HFCs); • Perfluorocarbons (PFCs); • Sulfur hexafluoride (SF6); • Nitrous trifluoride (NF3).
Planning processes and forecasts	The Russian Federation currently has in force legally-binding instruments aimed at providing for limitation of the GHG emissions to at most 75% of 1990 levels by the year 2020 (Decree of the President of the Russian Federation of 30 September 2013 and Act of the Government of the Russian Federation of 2 April 2014 No. 504-p). These acts provide, inter alia, for organization of GHG emissions forecasting at the economy-wide scale and for each individual sector. The Russian Federation will further elaborate and adopt legislative and regulatory acts providing for achievement of the stated INDC target by 2030 based on the provisions of the Climate Doctrine and the Energy Strategy of the Russian Federation.
Methodological approaches used, in particular, for measurement and verification of anthropogenic GHG emissions and, in appropriate cases, their absorption	Methodological approaches are based on using the following methodologies: • IPCC 2006 Guidelines; • IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol; • IPCC 2013 Wetlands Supplement. The Russian Federation will use global warming potential values as contained in Decision 24/CP.19 of the UNFCCC Conference of the Parties.
Consideration of fairness and ambition based on national conditions	GDP of the Russian Federation in 2012 amounted to 172.9% of the 2000 level while the GHG emissions (without land use, land-use change and forestry) had reached only 111.8% of the 2000 level. Thus, as the GDP was growing significantly at that time period, the increase in GHG emissions was minimal. The economic growth and GHG emissions can be definitively decoupled upon achievement of the earlier announced indicator, i.e. limitation of

	the GHG emissions to at most 75% of 1990 levels by the year 2020, and the INDC announced for 2030. There will be GHG emissions reduction per GDP unit. At the same time, if contribution of the Russian forests is fully taken into account, limiting GHG emissions to 70-75% of 1990 levels by the year 2030 does not create any obstacles for social and economic development and corresponds to general objectives of the land-use and sustainable forest management policies, raising the level of energy efficiency, reducing energy intensity of the economy and increasing share of renewables in the Russian energy balance. Russian boreal forests have global significance for mitigating climate change, protecting water resources, preventing soil erosion and conserving biodiversity on the planet. Russia accounts for 70% of boreal forests and 25% of the world's forest resources. Rational use, protection, maintenance and forest reproduction, i.e. forest management, is one of the most important elements of the Russian policy to reduce GHG emissions.
How the INDC contributes to achieving the ultimate objective of the Convention (Article 2)	Reducing GHG emissions by 25-30% from 1990 levels by 2030 will allow the Russian Federation to step on the path of low-carbon development compatible with the long-term objective of the increase in global temperature below 2 degrees Celsius. This objective can be achieved with efforts of all Parties of the future climate agreement.

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Serbia

Country profile

The Republic of Serbia is a parliamentary republic and the Government is divided into legislative, executive and judiciary branches.

The President of the Republic is the head of the state and elected for a five-year term with a maximum of two terms. In addition to being the commander in chief of the armed forces, the president has the procedural duty of appointing the prime minister with the consent of the parliament.

Serbia is located at the crossroads of Central and Southeast Europe, covering the southern part of the Pannonian Plain and the central Balkans. It covers a total of 88.361 km² (including Kosovo). As a landlocked country in relative proximity to the Mediterranean, Serbia borders Hungary to the north; Romania and Bulgaria to the east; FYROM to the south; and Croatia, Bosnia, and Montenegro to the west; it also borders Albania through the disputed territory of Kosovo.

Serbia is an official candidate for membership in the European Union, currently under the EU accession talks procedure; is an acceding country to the World Trade Organization (WTO) and a militarily neutral state.

Population in Serbia in 2011 was 7.186.862 - excluding Kosovo. The official language is the Serbian, and the currency is the Serbian Dinar. The capital of Serbia, Belgrade, is among Europe's oldest cities and one of the largest in Southeast Europe.

Location Map

National climate change policy

Serbia signed the United Nations Framework Convention on Climate Change in June 2001. The country ratified the Kyoto Protocol and signed it in January 2008. The signing of the Protocol does not oblige Serbia to reduce its GHG emissions.

Serbia, as part of the Federal Republic of Yugoslavia, following an invitation of the Vice President of European Commission (EC) has signed (Minister of Economy and Internal Trade **Mr. Momcilio Vucetic**) the "Declaration for the Accession of the Federal Republic of Yugoslavia into the Regional Electricity Market in South Eastern Europe" (Beograd, May 23rd 2001) (Annex III). Serbia signed the Treaty that establishes the Energy Community of Southeast Europe and EU in 2006 and has accepted the obligation to implement the Energy Community acquis. Under this framework, the country will apply directives related to the use of Renewable Energy Sources (RES) and the promotion of energy efficiency.

On 18 October 2012 the Decision of the Ministerial Council of the Energy Community adopted the RES target for year 2020 at 27% of gross final energy consumption (the target is linked with the implementation of Directive 2009/28/EC). This percentage is expected to be

achieved in 2020 with the share of RES in the electricity sector amounting 37%, in the heating and cooling sector 30% and in the transport sector 10% (this 10% is the share of biofuels consumption in this sector) (Republic of Serbia, 2013; Energy Community, 2012).

Mitigation

Serbia has implemented a limited number of policy instruments which concern only the industrial and energy sectors (Table 1).

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings		
Industry	Best available technologies	Combined type of standards (IPCC)(OJ 135/2004)
Transport	-	-
Energy	Promotion of RES technologies	Economic instrument - Subsidy (Feed-in-tariffs)(Energy Law OJ RS 84/2004 – Decree OJ 99/2009)
		Regulatory instrument – (Energy Law OJ RS 84/2004- Decree OJ RS 72/2009)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Serbian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Serbian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,10	-0,18	-0,23	-0,30	-0,40	-0,48	-0,54

The Serbian GDP is affected by the economic situation of the EU and of its neighboring countries. Major risks remain, due to exposure to the eurozone, while inflation remains above levels in regional peers (EBRD, 2012). During the period 2005-2010, two thirds of total inward investment to Serbia originated from the EU and European Free Trade Association (EFTA) countries, with the largest Foreign Direct Investment (FDI) inflows coming from Austria, Greece and Norway (EC, 2011a). Continued support by the International Monetary Fund (IMF) provides an important buffer for Serbia too, but the latest review was postponed until mid-year of 2012, after the elections (EBRD, 2012).

During the last two decades, the structure of the national economy has undergone significant changes. Services contributed more than 60% of GDP during 2010, while agriculture and energy sector approximately 10% each and industry 23%. The main component of industry is manufacturing with a share of 15% of GDP in 2009 (EC, 2011a; 2011b). Manufacturing in Serbia is well diversified with numerous sub-sectors. Although metal, electronic and textile industries dominated previously, during the last decade production became diversified especially into the food and beverages sector which is the biggest single sub-sector with a share of 4,6% of GDP in 2009, with chemicals, rubber and plastics second at 2,7% of GDP and 15% of total exports (EC, 2011a).

The IMF provides GDP estimates for the country up to year 2017 (Table 3).

Table 3: Projections for the GDP of the Republic of Serbia (IMF, 2011; 2012).

Year	2011	2012	2013	2017
Annual percent change of GDP (%)	1,8	0,5	3,0	3,5

Business-As-Usual scenario

The policy mixture of the BAU scenario consisted of the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31 December 2010 (Table 1) and has two main components: i) penetration of RES in the gross final energy consumption, ii) support to increase energy efficiency in industry through best available technologies. Concerning the adaptation policy, there are no implemented adaptation policy instruments.

In the legislature of the Republic of Serbia, there is no law oriented specifically to the promotion of RES. Directive 2001/77/EC was partially transposed into the existing legislature. Investments in RES facilities are small and mainly of domestic origin (Tesic M. et al., 2011). Apart from tax exemptions, only the feed-in-tariffs for RES are quoted as an incentive for investors (SIEPA, 2011).

The necessary law framework for the promotion of energy efficiency in Serbia does not exist for this period. There are no Energy Efficiency (EE) measures apart from those supported by the Energy Law. No Clean Development Mechanism (CDM) projects are registered to provide credits before 31 December 2010.

Optimistic scenario

The policy mixture of this scenario was synthesized by:

i. the policy mixture of BAU;

ii. the M/A policy instruments that were set into force after 1 January 2011. The following laws were issued: i) Updated Energy Law (Official Gazette of the Republic of Serbia 57/2011 - issued on 1.8.2011). Transposing Directive 2009/28/EC[75] on RES is performed with the updated Energy Law. Green certificates are also implemented with this law. ii) Law on Construction and Spatial planning (Official Gazette of the Republic of Serbia 72/2009, 81/2009 - correction, 64/2010 – decision of the Constitutional court, final 24/2011) which refers to energy efficiency in buildings as an implementation of the respective Directive and it defines the conditions for the installation of solar systems for the heating of sanitary water, areas or drying of agricultural products

iii. additional policy instruments. For this category of policy instruments, future EU climate change policy instruments were taken into consideration and were adjusted according to the needs and priorities of the examined country. This was justified by the following events. On 22 December 2009, Serbia presented its application for membership of the European Union (EC, 2011b). On 3 March 2012 the European Council decided to grant Serbia the status of an official candidate country to the EU[76]. Serbia is assumed to be accessing EU in 2015 (SUDES, 2012). These additional policy instruments were:

   - Financial policy instruments for RES (improved Feed in Tariffs (FITs) compared to those of the previous policy mixture, tax reliefs, and subsidies).
   - Regulatory, financial and dissemination policy instruments for EE for the building and industrial sectors (energy labelling, eco-design of products, energy performance standards for buildings, behaviour change using awareness campaigns, subsidies).

[75] Serbia has been obliged by Decision on the Implementation of Directive 2009/28/EC and amending Article 20 of the Energy Community Treaty to bring into force the laws, regulations and administrative provisions necessary for complying Directive 2009/28/EC on Renewable Energy Sources by 1st January 2014.
[76] http://ec.europa.eu/enlargement/press_corner/whatsnew/serbia_en.htm

- Regulatory, financial and dissemination policy instruments for EE in the transport sector (fuel quality standards, use of biofuels, tax exemptions, soft loans behaviour change through eco-driving, walking, fuel economy).
- Regulatory and dissemination policy instruments for adaptation in water and forest management.

Pessimistic scenario

The policy mixture of this scenario was synthesized by:

i) the policy mixture of BAU;

ii) the M/A policy instruments set into force after 1 January 2011 (described in OPT policy mixture) and

iii) additional policy instruments, which were:

- Financial policy instruments for RES (improved FITs compared to those of the BAU policy mixture, but lower compared to those of OPT, tax reliefs, subsidies).
- Regulatory policy instruments for EE (building code, Energy Service Companies).
- Regulatory, financial and dissemination policy instruments for EE in the transport sector (performance standards, use of biofuels).
- Regulatory policy instruments for adaptation in water management.

Results

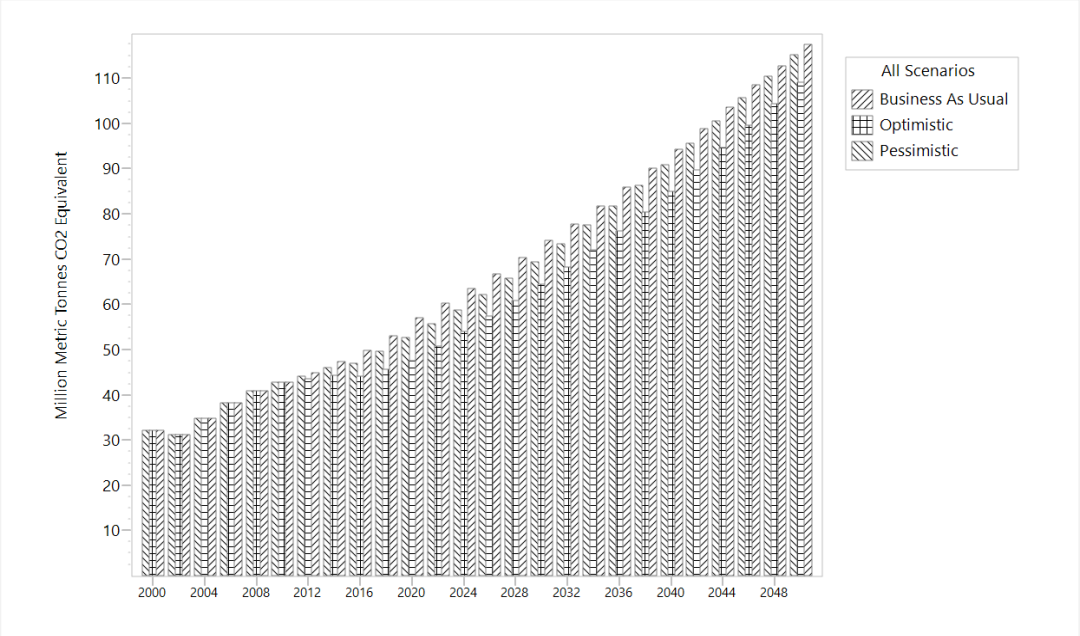
The policy mixtures of the three scenarios, as outcomes of the Long range Enregy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per category.

It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanidng of the required adaptation measures, in order to implement the selected policy mixtures.

CO_2 emissions

According to the outcomes of LEAP for the BAU scenario in 2020, the GHG[77] emissions are expected to increase compared to those of year 2000 by 78%. For the OPT scenario, GHG emissions in Serbia will increase by approximately 49% in 2020 compared to those of year 2000 and for the PES scenario, GHG emissions will increase by approximately 64% in 2020 compared to those of year 2000.

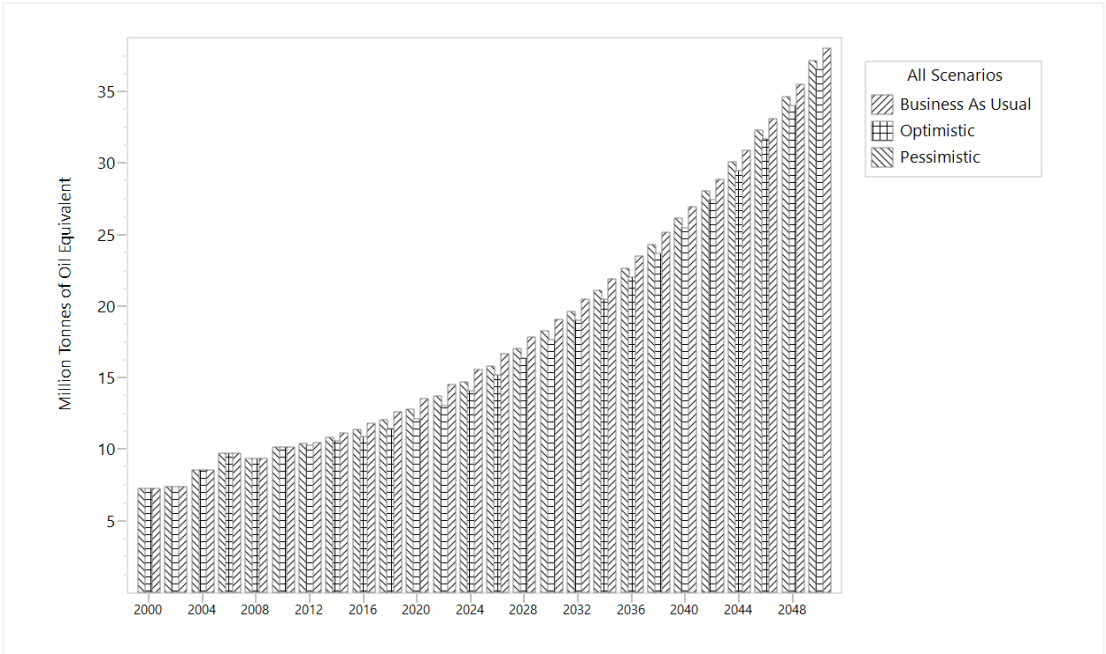
[77] For biofuels the amount of air pollutant was not available in LEAP for all branches.



Graph 1: CO_2 emissions for three (3) scenarios.

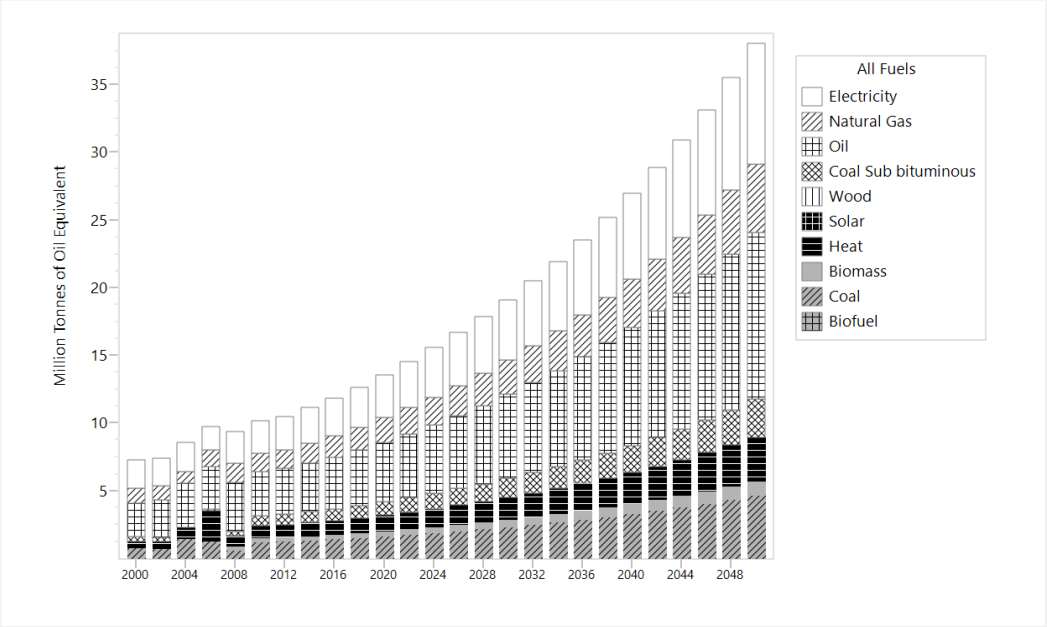
Final energy consumption

The projections until the year 2050 present a steady increase of the final energy consumption, which is highest for the BAU scenario followed by the PES scenario. The OPT scenario will have the lowest final energy consumption compared to the other two scenarios.



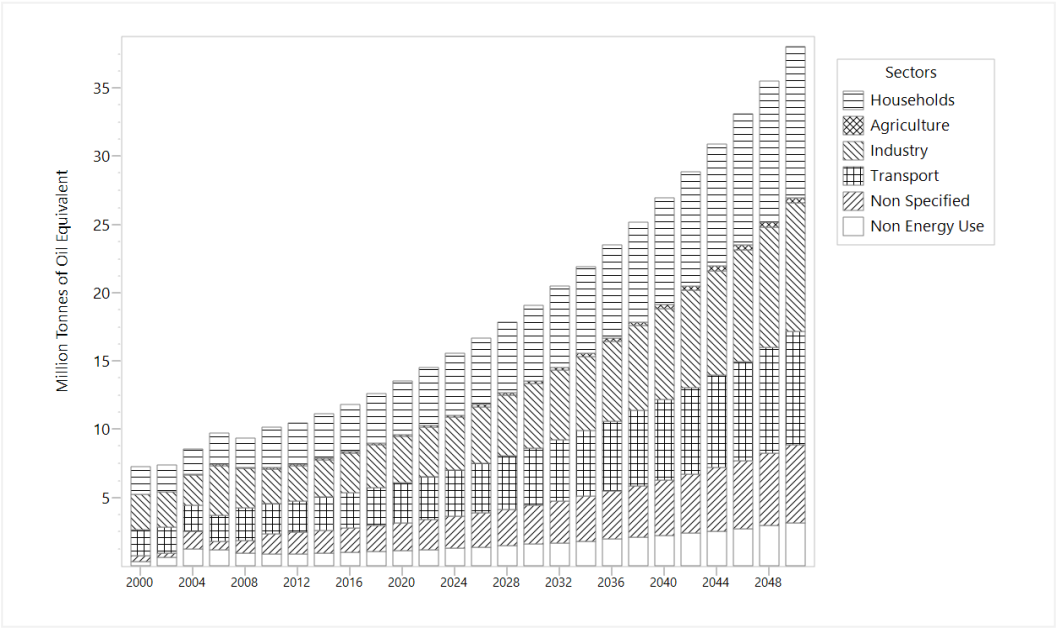
Graph 2: Final Energy Consumption for three (3) scenarios.

Regarding the trends on fuel use until year 2050, oil and electricity are expected to have the higher consumption followed by natural gas and coal. Coal sub bituminous, biomass and heat will present a smaller rate of increase.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

Under the BAU scenario, the sectors with the higher increase in final energy consumption are households, industry and transport. Non energy and non-specified sectors will have also increased final energy consumption, but with lower rate, while agriculture will present the lowest final energy consumption, which is expected to remain steady for the coming decades.



Graph 4: Final Energy Consumption per Sector for BAU scenario.

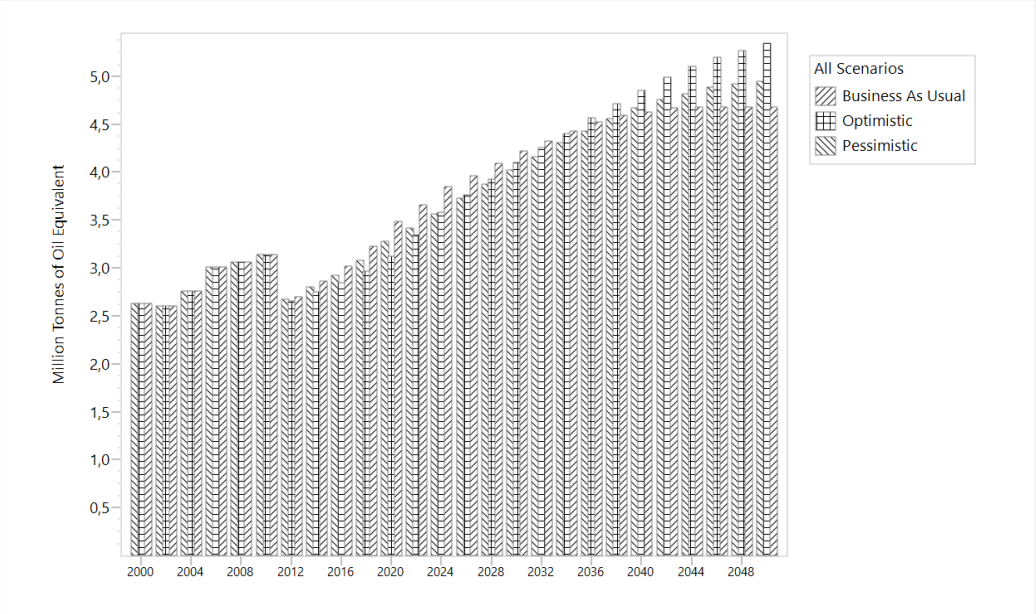
Electricity generation

The LEAP results for electricity generation of the three (3) scenarios are shown in Graph 5.

For the BAU scenario, according to Strategic and Development Projects of the Electric Power Industry of Serbia, new coal fired thermal power plants and new hydro power plants will be built in the next 15 years for covering the growing future demand, but also for replacing old lignite fired thermal plants (EPI, 2011a).

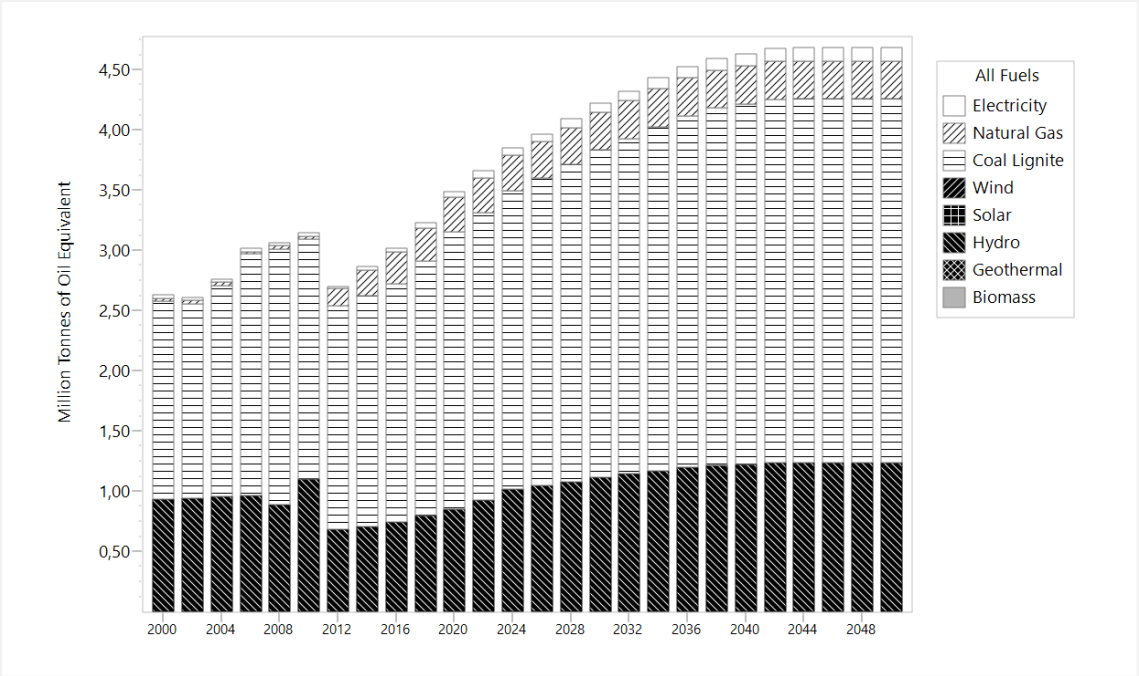
Under the OPT scenario, the usage of RES for electricity generation is intensively promoted. Apart from new hydro power plants, additional capacities for RES utilization (compared to BAU) are planed to be built and specifically: wind 1000MW, biomass 300MW and solar 1000MW, by 2050.

The policy mixture of the PES scenario promotes the use of RES in primary energy consumption. Electricity generation sector development will be based on introduction of new thermal facilities that use lignite and hydro power plants (EPI, 2011a). However, electricity generation from RES is also assumed. The planed to be built capacities until 2050 are: wind 700MW, biomass 200MW and solar 500MW. Planed hydro and biomass capacities are smaller compared to those of the OPT scenario, due to growth of average annual temperature and decrease of annual precipitation.



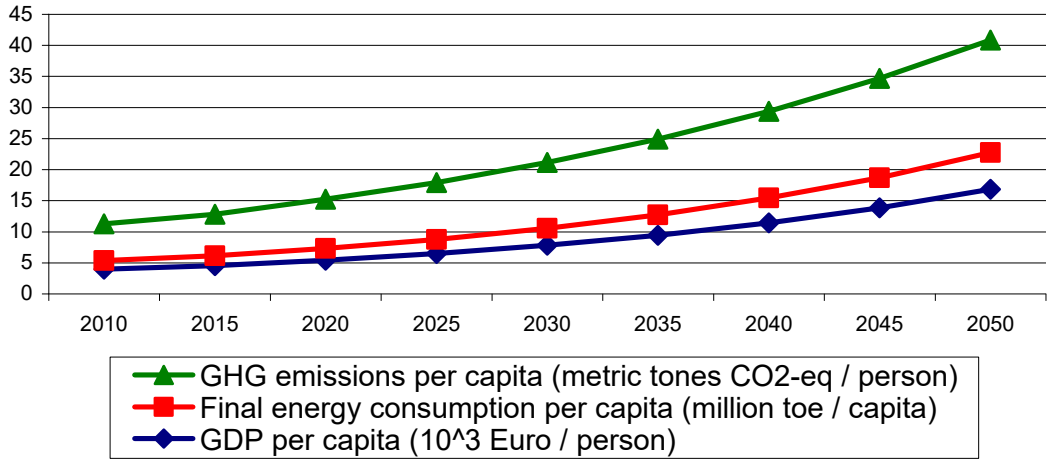
Graph 5: Electricity generation in the three scenarios.

Electricity generation is carried out by Public Company Electric Power Industry of Serbia. In 2010, the total electricity generation was 35,855 GWh mainly from lignite fired thermal power plants, natural gas fired cogeneration plants and hydro power plants (EPI, 2011a, 2011b). Lignite and hydro plants serve the base load, while pump storage system and the CHP plants serve peak load.



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

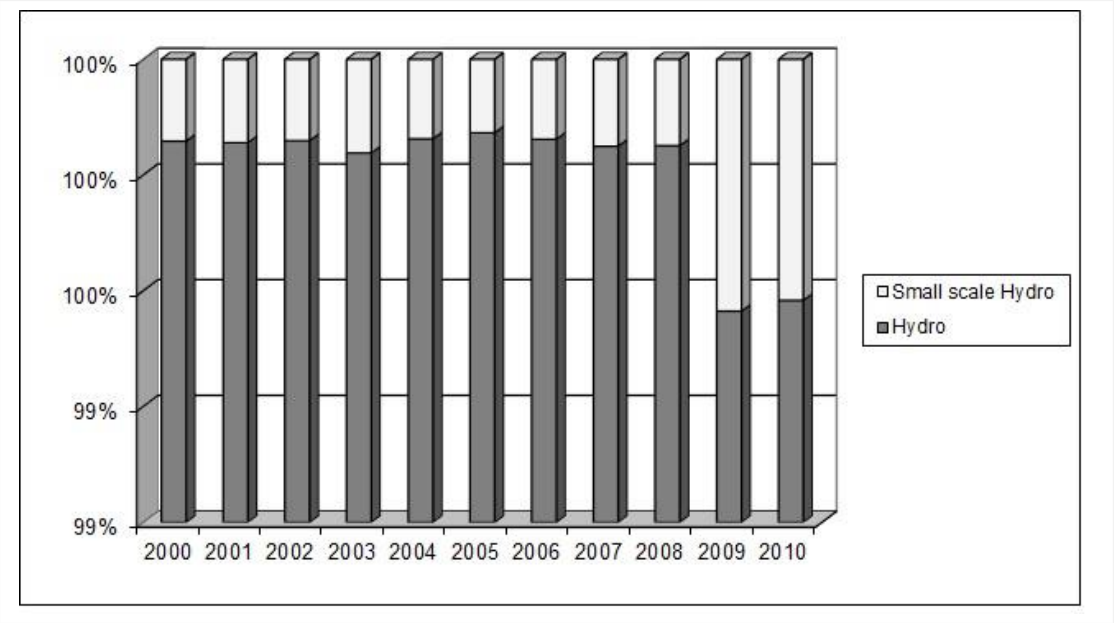


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they are increased. The growth is higher for the CO_2 emissions per capita.

RES production per technology

In Serbia, the main RES technology for electricity generation is hydro. The small scale hydropower plants produce 0,4% of all electricity that is generated in hydro plants.



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

According to the AMS outcomes the OPT policy mixture was evaluated as the most effective one compared to the other two.

The policy mixture of the BAU scenario has the largest amount of GHG emissions, followed by that of the PES scenario.

The policy mixture of the OPT scenario has the best performance in political acceptability since it is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two policy. It offers a fair distribution of the "climate change" burden among the respective sectors and allows the economic sectors to be more competitive. It offers more flexibility for the target groups in complying with their obligations under the specific policy mixture.

The performance of the BAU policy mixture under the third criterion is better compared to the other two, while that of OPT is the worse. The national implementation network is not performing sufficiently for the implementation of the BAU policy mixture, and is not able to adjust properly its activities under a stricter policy mixture like that of OPT. Another significant disadvantage for this policy mixture is the inadequate insurance of the necessary financial resources so as to be effective.

Given the above and the fact that none of the three scenarios achieves the two main goals of the Serbian climate change policy, the most promising Mitigation/Adaptation policy mixture is the one which characterizes the OPT scenario.

Nevertheless, its success requires the appropriate implementation network, the necessary financial means and a more stringent frame for non-compliance.

Policy Trends

Serbia's climate change policy will be adjusted to that of the EU's, since it is a candidate country to join EU.

The electricity generation sector is the main source of GHG emissions. The majority of mitigation efforts are focused on this sector because approximately 70% of electric power is generated from domestically-sourced lignite (EPI, 2011a, 2011b; Government of the Republic of Serbia, 2011).

The Energy Law in 2004 was the first law to support the development of RES and introduced the category of "privileged producers" of electrical/thermal energy which use New Renewable Energy Sources (NRES) or waste for energy production. In 2009, the FIT scheme was introduced, covering a great range of RES technologies. The technologies with the higher tariffs are photovoltaics (PV), small-scale biomass, biogas and CHP, small-scale hydro and wind. Through the updated Energy Law (2011) which is partly in line with the RES Directive 2009/28/EC (EC, 2011a), green certificates were also implemented.

Despite the introduction of the FITs, RES have not been promoted. There are rare examples of individual solar thermal building systems and small solar PV roof maintained units (Djurdjevic D., 2011). Utilization of RES is currently limited to hydropower plants and non-commercial use of biomass and geothermal energy (Golusin M. et al., 2010).

Regarding heating and cooling, Serbia is considered to have significant biomass potentials. The majority of households use biomass or wood pellets for heating purposes (EBRD, 2009). Also, Serbia promotes the installation of solar systems for the heating of sanitary water, areas or drying of agricultural products (Pavlovic T. et al., 2011). Most solar installations are used for water heating in residential and commercial settings (EBRD, 2009).

In the transport sector, for the year 2009, only 0,21 ktoe were derived from biofuel (this quantity was not recorded in the national statistics) which is an insignificant amount compared to the total energy demand for transport (Republic of Serbia, 2013).

The major energy consumers are the residential, tertiary and industrial sectors (Energy Community, 2010; Republic of Serbia, 2007). Although there is the national target of 9% reduction in final energy consumption in 2018 (compared to that of year 2008), the policy instruments for the promotion of EE in Serbia are inadequate and concern only the buildings and the electricity generation through the inclusion of CHP plants in the FIT scheme (Pavlovic T. et al., 2011).

Serbia as a Non-Annex I Party is eligible for CDM projects (UNFCCC, 2009). The CDM projects that are characterized as potentially viable and of significant priority for Serbia concern the energy production, the agricultural sector and the waste management - construction of new biomass power plants, CHP plants (using agricultural and forestry residues) and biomass-fired boilers to replace fossil-fuel based thermal power and landfill gas collection and flaring (Ministry of Environment and Spatial Planning, 2010; Stankovic J., 2007). These types of projects can be viable in mid- and long-term and only with the support of the energy sector. Another proposed CDM project is the replacement of traditional agricultural crops for food production with energy crops (biodiesel) (Stefanovic M., Sikirica B., 2010). Currently, the registered CDM projects concern the construction of wind farms and biogas power plants and landfill gas collection.

Thirteen (13) NAMAs[78] are under development concerning three sectors (energy supply, buildings and transport). The NAMAs concern energy efficiency and Renewable Energy Sources (Ministry of Energy, Development and Environmental Protection – Japan International Cooperation Agency, 2012)[79].

The energy sector is particularly sensitive to climate change due to impacts on: i) the availability of cooling water for power generation; ii) the potential for hydropower, wind and solar power; iii) the productivity of crops for bio-energy; iv) the energy use for heating and cooling in households (Pilli-Sihvola P. et al., 2010; Isaac M., van Vuuren D.P., 2009).

The agricultural sector, which is a very important primary sector and has a considerable potential as an engine for economic growth, is also vulnerable to climate change (EC, 2011a, Government of the Republic of Serbia, 2011).

Despite the above, no adaptation measures are implemented.

[78] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=154
[79] http://www.nama-database.org/index.php/Serbia

Conclusions

- The policy instruments for the promotion of energy efficiency are greatly inadequate; concern only the building sector and the promotion of cogeneration of heat and power, through its inclusion in the FIT scheme.
- Apart from tax exemptions, only the FITs are quoted as an incentive for RES investors. Despite their introduction, RES have not been promoted. The fuel mix in electricity generation is still based on lignite and large scale hydro. Investments in RES facilities are small and mainly of domestic origin.
- CDM projects are of significant priority. Currently, the registered CDM projects concern the construction of wind farms, the installation of biogas power plants and landfill gas collection.
- There is no adaptation policy or strategy in the country.

Intended Nationally Determined Contribution (INDC) of the Republic of Serbia

Intended Nationally Determined Contribution of the Republic of Serbia

Although non-Annex 1 Party to the Convention, the Republic of Serbia express its willingness to contribute to global GHG emissions reduction in accordance with its capabilities, national circumstances and development goals. Those contributions are even greater taking into account extreme, already observed and projected climate change and its impacts on sectors and systems.

According to the national analyses, the period 1960-2012 is characterized by an average trend of mean annual temperature of 0.3°C per decade. Depending on the scenario, a rise in temperature will ranging between 3.2 and 4 °C by the end of the century and precipitation deficit of up to 20%. These will be followed by the intensification of extremes, particularly in regard to temperatures.

The most vulnerable sectors are agriculture, hydrology, forestry, as well as human health and biodiversity. From the mid-20th century, the river discharges in Serbia generally records a negative trend. Average annual long-term trend in river discharges, excluding large rivers, is negative and about -3% per decade, with variable spatial distribution. This reduction is expected in the future, particularly after 2050, ranging from a few to over 20%. These changes will cause, among other things, problems related to water availability, water quality and the intensity and frequency of floods and droughts.

Droughts, insect invasions and the occurrence of forest fires have significantly influenced forest ecosystems in R. Serbia. In the long run, climate change may cause a transformation of entire forest ecosystems, changing the distribution and composition of Serbian forests. By the end of the 21st century, about 90% of today's beech forests will be outside the bioclimatic niches they inhabited in the 20th century and around 50% will be found in the zone where mass mortality is likely to occur.

Climate change will affect the spatial variation in agroclimatic conditions, the conditions for plant breeding and the selection of suitable varieties. Warming will also affect the phenology of plants, leading to faster development. Certain scenarios for the period 2071-2100 indicate the expected corn yield reduction from -52 to -22% for the whole territory of the Republic Serbia, for conditions without irrigation. The impact on other crop and vegetable varieties can also be expected.

As regards biodiversity and natural ecosystems, changes in climate may lead to changes in the phenological cycles; morphological changes, physiology and behavior of species; loss of existing habitats and emergence of new species; changes in the number and distribution of species; increased number of pests and diseases; genetic changes and extinction of species unable to adapt.

Impacts of climate change on health are becoming more pronounced in recent years. During the heat wave in July 2007, increased mortality was recorded in Belgrade. Climate change will certainly lead to changes in the distribution and increase in frequency of vector-borne infectious diseases (malaria, dengue fever, West Nile virus, etc.), as well as the spread of infectious diseases through water.

Since 2000 the Republic of Serbia has faced several significant extreme climate and weather episodes that have caused significant material and financial losses as well as losses of human lives. The two most prominent events are the drought in 2012 and the floods in 2014. The

drought in 2012 was particularly strong, and contributed to a decrease in yields of some crops by 50%. Estimates show that the droughts in 2000, 2003, 2007 and 2012 caused over 3.5 billion Euros worth of damage and the floods in 2014 over 1.5 billion Euros. Estimates show that the material damage incurred by forest fires in the period 2000-2009 is worth more than 300 million Euros.

Taking into account the impacts of climate change and the need to reduce the risk thereof, and recognizing the importance of its contribution to global GHG emission reduction, the Republic of Serbia has identified GHG emissions pledges at the national level.

Type	Overall emission reductions compared to GHG base-year emissions
Scope	GHGs which are not controlled by the Montreal Protocol: • CO_2 • CH_4 • N_2O • HFCs • PFCs • SF_6
Base year	1990
Period	1 January 2021 – 31 December 2030
Level of GHG emission reduction	GHG emission reduction by 9,8% until 2030 compared to base-year (1990) emissions
Percentage of GHG emissions covered	100%
Planning process	Climate change strategy with an action plan, that should be finalized in 2017, will further define the precise activities, methods and implementation deadlines
Fair and ambitious	In 2010, the Republic of Serbia, as a developing country, associated with the Copenhagen Accord and in the letter of support expressed readiness for voluntary GHG emission limitation until 2020 by 18% compared to emissions in 1990. The Republic of Serbia, as an EU candidate country, harmonizes national with the EU legislation, contributing on that way additionally to national emissions reduction.
Key assumptions	
Calculation method	Global warming potential on a 100 time scale in accordance with the IPCC's 4th Assessment Report
Methodologies for assessing GHG emissions	IPCC Guidelines 2006 and IPCC 2013 KP Supplement
Scope	
Sectors/Source categories	In accordance with IPCC Guidelines 2006 and IPCC 2013 KP Supplement
Needs for adaptation measures	

Sector vulnerability and impacts of climate change	The greatest impacts of climate change have been observed and reflected in agriculture, hydrology, forestry, human health and biodiversity sectors.

Loss and damage associated with extreme events in the period 2000-1015
The total damage caused by extreme climate and weather conditions, since 2000, exceeds 5 billion euros, and more than 70% of the losses are associated with drought and high temperatures. Another major cause of significant losses was floods. Currently there is no analysis of the damage resulting from long-term slow changes in the climate system that has been observed in the past decades. The total estimated investment in implementation of projects that can be considered as adaptation measures in the period 2000-2015 amounts to approximately $ 68 million. There are no estimates for long-term investments in the area of adaptation to climate change in the Republic of Serbia.

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Turkey

Country profile

Turkey, formally known as the Republic of Turkey, is a democratic, secular, unitary, constitutional republic with an ancient cultural heritage, founded in 1923.

It is bordered by eight countries: Bulgaria to the northwest; Greece to the west; Georgia to the northeast; Armenia, Iran and the Azerbaijani exclave of Nakhchivan to the east; Iraq and Syria to the southeast. The Mediterranean Sea is the south border, the Aegean Sea is the west and the Black Sea is the north border of Turkey. In total, it covers an area of 783.562 km^2, of which 755.688 km^2 are in Southwest Asia and 23.764 km^2 in Europe.

Turkey's population is 73.950.000, (2011). The Capital city is Ancara, the official language is Turkish and the national currency is the Turkish Lira.

Location map

National climate change policy

Turkey became a party to the United Nations Framework Convention on Climate Change (UNFCCC) on 24 May 2004, ten years after the Convention was set into force. This delay was caused by the fact that initially Turkey was included as a developed and OECD country in both Annexes[80] of the UNFCCC. Decision 26/CP.7 of Conference of the Parties-7 (COP7) that was held in Marrakech in 2001 deleted Turkey from Annex II. The country remained as an Annex-I Party of the UNFCCC in a different position from that of the other Annex I countries of the Convention[81].

This decision entered into force on 28 June 2002[82] and was repeated in Decision 1/CP.16, of COP16 held in Cancun in 2010[83]. More recently, Decision 2/CP.17 of COP17 in Durban on 2011[84], expresses the agreement of the Parties to continue with the discussion on modalities for the provision of support for mitigation, adaptation, technology development and transfer, capacity-building and finance to those Annex I Parties to the UNFCCC, like Turkey, that are recognized being in a different situation compared to the others.

Turkey ratified Kyoto Protocol on 5 February 2009[85], 4 years after it came into force (16 February 2005). Therefore, the country was not included in Annex B of the Protocol and did not

[80] Annex I includes West-European countries, East-European and former Soviet Countries which have adapted market-economy and OECD countries, while Annex II includes only OECD countries.
[81] http://iklim.cob.gov.tr/iklim/AnaSayfa/BMIDCS.aspx?sflang=en
[82] http://www.mfa.gov.tr/united-nations-framework-convention-on-climate-change-_unfccc_-and-the-kyotoprotocol.en.mfa
[83] http://unfccc.int/files/na/application/pdf/07a01-1.pdf
[84] http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf
[85] Law No. 5836 on the Ëndorsement of Turkey;s Ratification of Kyoto Protocol to the UNFCCC, Official Gazette no. 27144, date Februray 17, 2009 and adoption by the Council of Ministers of the Cabinet Decree (No. 2009/14979) on 13 May 2009 (http://iklim.cob.gov.tr/iklim/AnaSayfa/BMIDCS.aspx?sflang=en)

have a quantified emission limit or reduction commitments for the first commitment period (2008-2012).

Mitigation

In order to achieve its mitigation targets, Turkey has implemented until 31 December 2010 the policy instruments shown in the following table. The four sectors getting support by the government are buildings (including households and services), industry, transport and energy.

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

		Mitigation
Sector	**Technological options**	**Policy instrument**
Buildings (Households and Services)	Energy and thermal insulation	Building isolation requirements (Law 5627/2007, Regulation 27075/2008)
	Energy management	Performance standards (energy certificates, energy consumption) (Law 5627/2007, Regulation 27075/2008)
	Energy efficiency	Eco-design requirements (Regulation 27722/2010)
Industry	Energy management	Performance standards (energy certificates, energy consumption) (Law 5627/2007, Regulation 27075/2008)
Transport	Energy efficiency	Performance standards (transport management) (Regulation 26901/2008)
	Energy efficiency of vehicles	Behavior change (Awareness, eco-driving, fuel economy) (Regulation 26901/2008)
	Energy management	Performance standards (principles and procedures) (Law 5627/2007)
Energy	Promotion of RES technologies	Regulation standards (Certification of RES, principles and procedures) (Law 5346/2005, Law 5627/2007)
	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Law 5346/2005)
	Energy efficiency	Eco-design requirements (Regulation 27722/2010)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Turkish population is expected to increase for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Turkish population (UN, 2011).

Average annual rate of change (%)							
2005-2010	2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
1,31	1,14	0,95	0,78	0,48	0,21	0,21	-0,04

GDP is characterized as a key driver of energy demand (World Energy Outlook 2010, IEA[86]). For the developed scenarios, the GDP growth rate remains constant after 2017 until year 2050 based on projections of Table 3 below.

Table 3: Projections for the Turkish GDP (IMF, 2011).

Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Annual change of GDP (in %, constant prices)	8,503	2.969	3,528	4,002	4,259	4,414	4,447

[86] http://www.worldenergyoutlook.org/

Business-As-Usual scenario

The policy mixture of the BAU scenario consists of the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31 December 2010 (Table 1). This policy mixture focused mainly on the energy sector, which is the major source of GHG emissions. It had two objectives: i) the penetration of RES in electricity generation and ii) the promotion of energy efficiency for thermal power plants and lighting. For the first objective there were: i) administrative barriers related with authorization, licensing and construction of projects and ii) financial obstacles such as lack of funds and low tariffs compared to EU countries. The Voluntary Carbon Market that the country established as an alternative for not being able to participate in the Clean Development Mechanism proved to be supportive for RES (MoEF, 2010a; 2011)

Concerning the adaptation to climate change, no policy instruments were implemented.

Optimistic scenario

The policy mixture of this scenario was synthesized by:

i. the policy mixture of BAU;

ii. the M/A policy instruments set into force after 1 January 2011. Law No. 6094, the amended version of Law No. 5346, was set into force establishing the "Renewable Energy Support Mechanism" which is applied to plants commissioned between 2005 and 2015, and enables these plants to benefit from feed-in tariffs for ten years (Sirin M.S. and Ege A., 2012). The same Law allowed the construction of renewable energy plants in protected regions (such as national and natural parks, natural monuments, protected regions, etc.). A new regulation on "Increasing Energy Efficiency in the Use of Energy Resources and Energy" that supported energy efficiency projects in industry was also introduced.

iii. additional policy instruments. For this category, the EU climate change policy instruments were taken into consideration and were adjusted according to the needs and priorities of the examined country. For Turkey this was also justified by two facts: i) The country is an observer to the Energy Community and it formally expressed interest in full membership[87], and ii) it is a candidate country for EU membership following the Helsinki European Council of December 1999. Accession negotiations started in October 2005 with the analytical examination of the EU legislation. On 18 February 2008 the Council adopted a revised Accession Partnership with Turkey[88]. The additional policy instruments were:

   - Economic instruments for RES: Feed-In-Tariff (FIT) system with higher tariffs, tax-reliefs and subsidy programs.
   - Regulatory instruments for EE: building code, energy efficiency standards.
   - Regulatory and dissemination instruments for the transport sector: eco-driving, subsidies for the purchase of new technology cars, change of transport modes (preference of rail over road, walking, bike-cycling modes) and promotion of biofuels.
   - Regulatory framework for the CDM.
   - Dissemination instruments such as awareness campaigns for climate change.
   - Economic and regulatory instruments for adaptation of the agricultural sector: subsidies and tax exemptions for irrigation equipment and changing plantations; regulation for arable land and water use.

[87]Contracting Parties of the Energy Community have committed to comply with the EU energy policy. This commitment concerns also climate change instruments that support EE and RES.
http://www.energy-community.org/portal/page/portal/ENC_HOME/ENERGY_COMMUNITY/Stakeholders/Observers

[88] http://ec.europa.eu/enlargement/candidate-countries/turkey/relation/index_en.htm

Pessimistic scenario

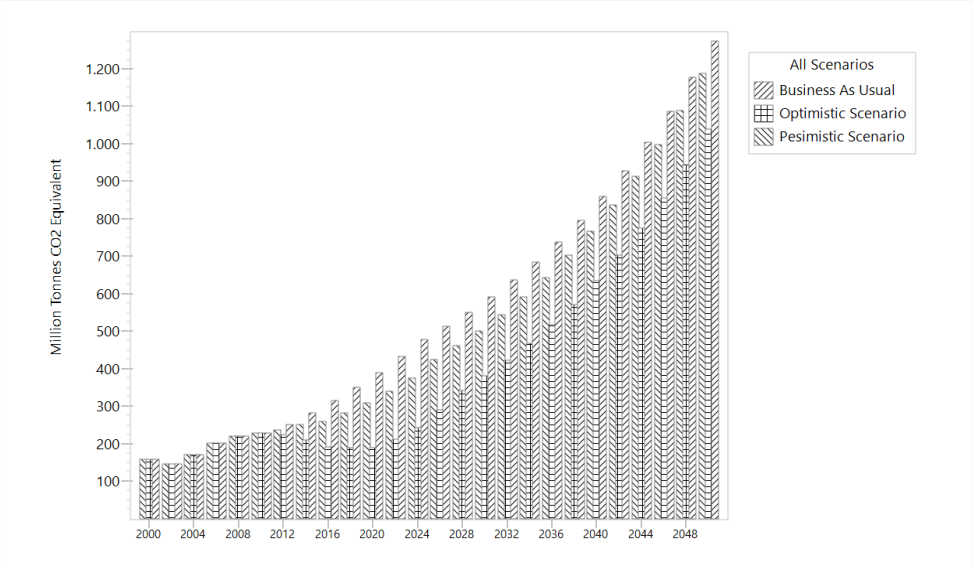
The policy mixture of this scenario was synthesized by: i) the policy mixture of BAU; ii) the M/A policy instruments set into force after 1 January 2011 (described in OPT) and iii) additional policy instruments for less sectors and with smaller amount for financial support towards EE and RES (compared to those of the OPT). The additional policy instruments that were taken into account were:

- Economic instruments for RES: Feed-In-Tariff (FIT) system with higher tariffs, tax-reliefs and subsidy programs, but for more promising RES types such as hydro and wind.
- Regulatory instruments for EE in the household sector: building code, energy efficiency standards.
- Regulatory and dissemination instruments for the transport sector: promotion of new technology cars, change of transport modes, and promotion of biofuels (less compared to OPT).
- Regulatory framework for the CDM.
- Economic and regulatory instruments for adaptation of the agricultural sector: subsidies and tax exemptions for irrigation equipment and changing plantations, but with lower amounts compared to OPT; regulation for arable land and water use.

Results

CO_2 emissions

According to the outcomes of the LEAP model for the BAU scenario, GHG emissions in Turkey will increase by 269% in 2020 and by 1104% in 2050 compared to the year 1990[89]. Compared to the year 2010, the emissions will increase by 70,13% and by 455% respectively. According to the OPT scenario, GHG emissions in Turkey will increase by 78,62% in 2020 and by 882,8% in 2050 compared to the year 1990, while compared to the year 2010, there will be a decrease of 17,66% and an increase of 353,05% respectively. Finally, on the PES scenario, GHG emissions in Turkey will increase by 191,4% in 2020 and by 1023% in 2050 compared to the year 1990 while compared to the year 2010, they will increase by 34,35% and by 417,7% respectively.

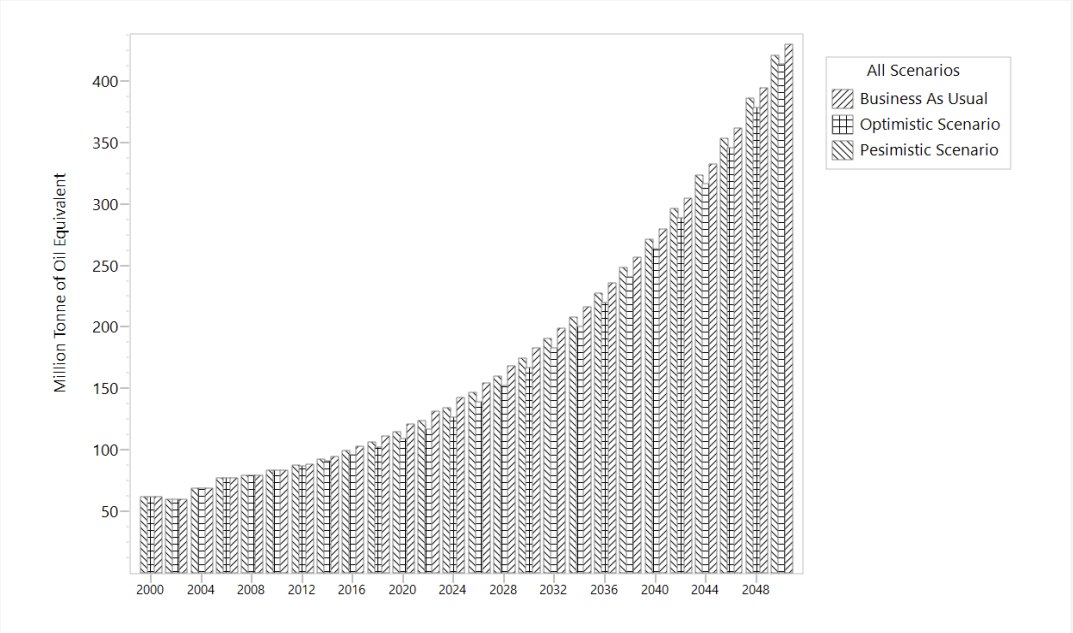


Graph 1: CO_2 emissions for three (3) scenarios.

[89] The GHG emission sources which are taken into consideration in this study are mostly those related to the implemented mitigation policy measures due to missing data.

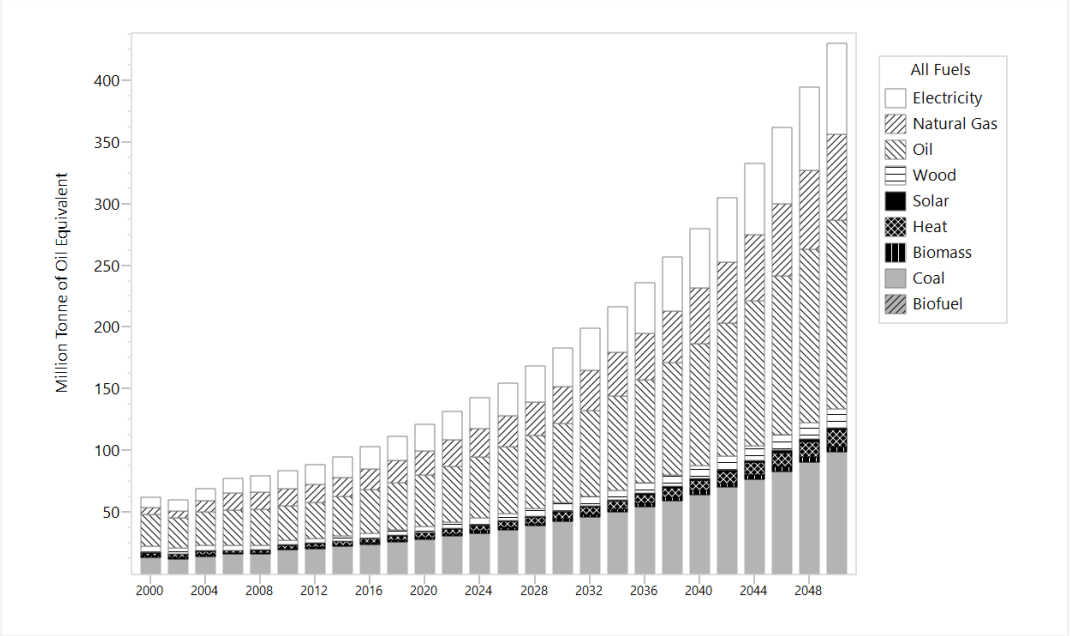
Final energy consumption

The future projections until the year 2050 for Turkey show a rapid increase in the final energy consumption, reaching the highest levels of consumption in BAU scenario and the lowest levels in Optimistic scenario.



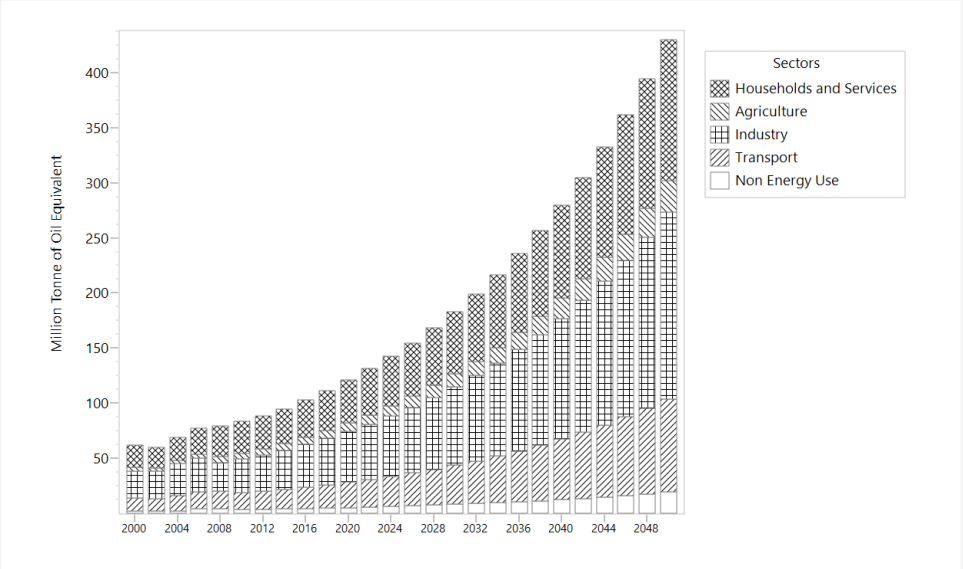
Graph 2: Final Energy Consumption for three (3) scenarios.

As shown in the following graph, coal and oil are the dominant fuels in the final energy consumption, in BAU scenario, followed by natural gas and electricity. Solar and biofuel hold a minimal share in the mix.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

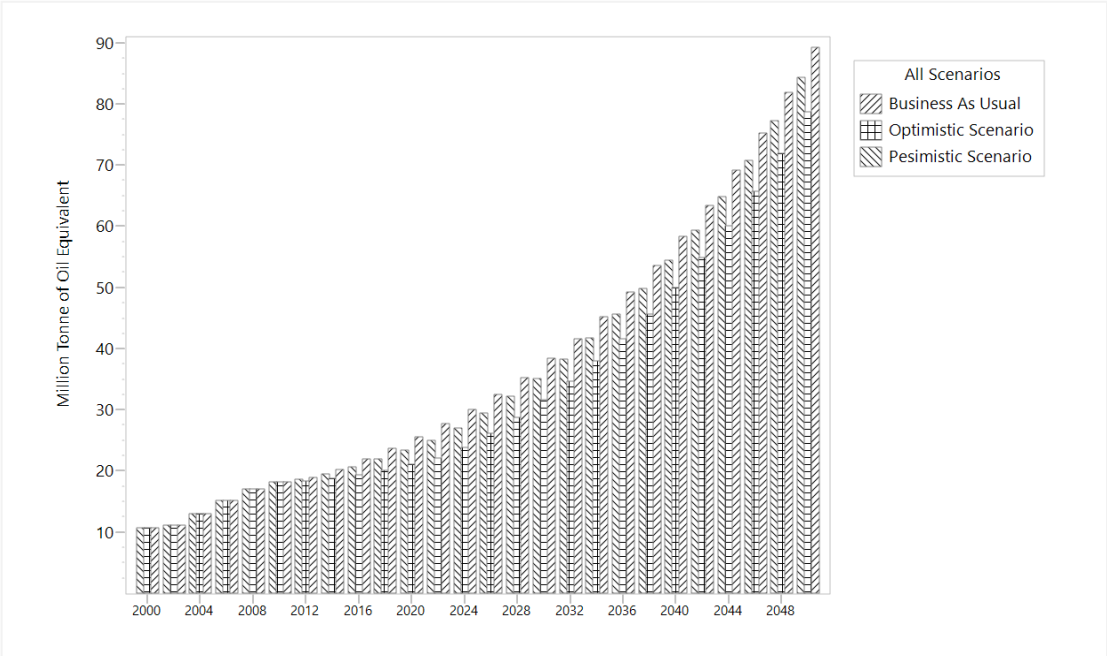
The final energy consumption appears to increase mostly in the residential and industrial sectors, in BAU scenario, followed by transport and agriculture.



Graph 4: Final Energy Consumption per Sector for BAU scenario.

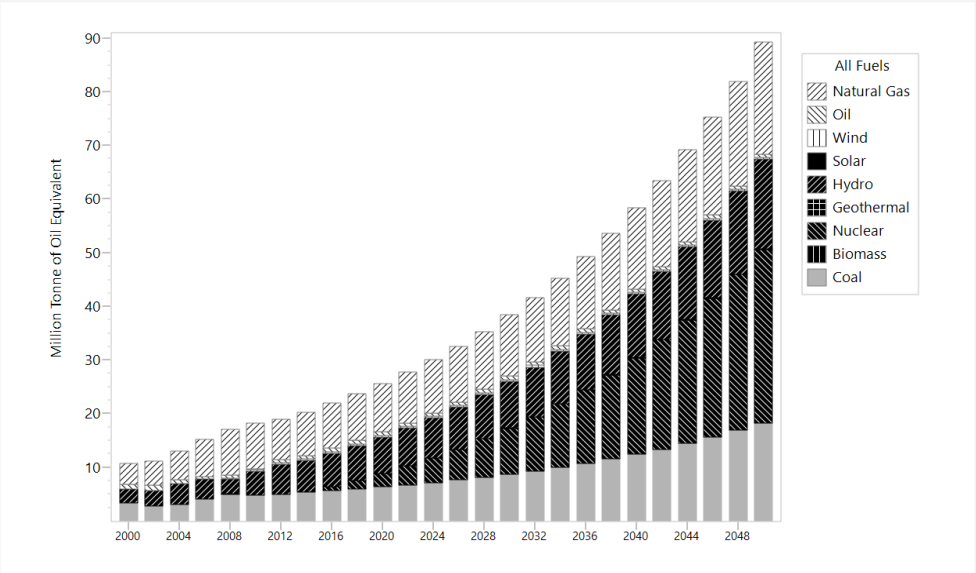
Electricity generation

The LEAP results of electricity generation for three (3) scenarios are shown in Graph 5.



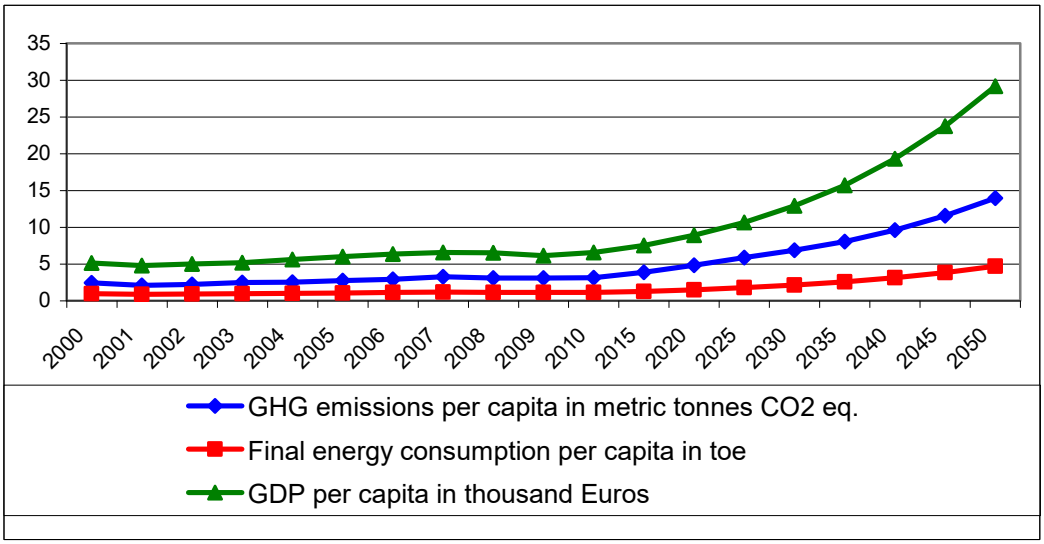
Graph 5: Electricity generation in the three (3) scenarios.

Electricity generation in Turkey is performed by EUAŞ and private sector and is based on natural gas, coal and hydro power plants.



Graph 6: Electricity generation per fuel in BAU scenario.

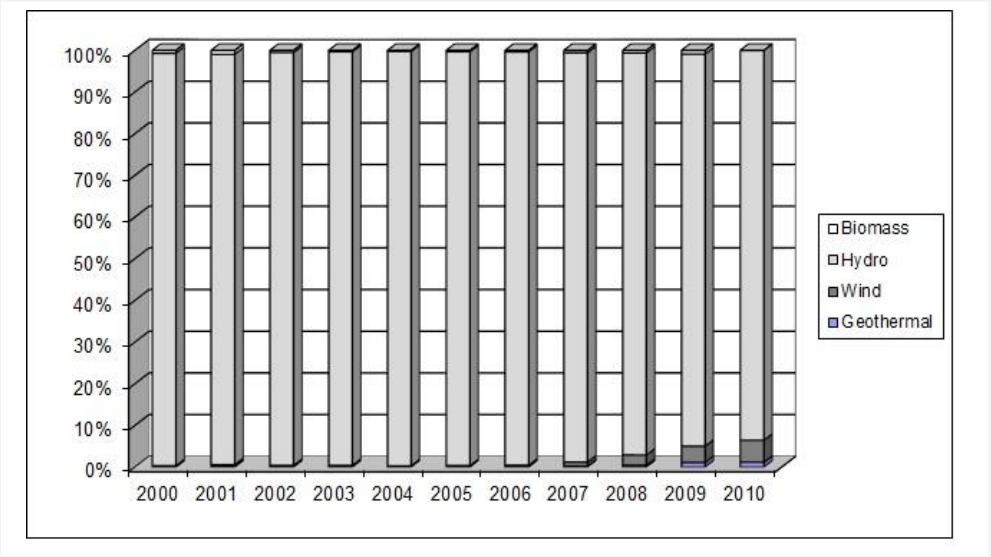
National indicators



Graph 7: Trends of national indicators (BAU scenario).

Turkey as an emerging economy is expected to increase its final energy consumption, resulting to increased GHG emissions.

RES production in BAU scenario



Graph 8: Technology shares in RES electricity generation in BAU scenario.

In Turkey, the main RES technology for electricity generation is hydro (there are not separate data on installed capacity for small-scale and large-scale hydro plants), followed by wind, geothermal and biomass.

Evaluation

According to the AMS results the OPT policy mixture was evaluated as the most effective one compared to the other two.

According to the evaluation of multi-criteria method AMS, the BAU policy mixture was characterized by the highest final energy consumption and the worst environmental performance, compared to the other two, which results from the limited number of mitigation and adaptation policy instruments. PES was characterized by moderate environmental performance while OPT had the lowest amount of GHG emissions and the lowest energy consumption.

The policy mixture of the OPT scenario was the most cost effective with fair distribution of the "climate change" burden among the respective sectors. It was also more flexible by offering more incentives and options (subsidies, feed in tariffs) to target groups that the other two. The success of the OPT policy mixture, as a stricter national climate change policy mixture requires increased capacity of the current implementation network and a more stringent frame for non-compliance which will foresee penalties, fees or sanctions. Turkey is an emerging economy with a high rate of economic and population growth, resulting in high levels of GHG emissions. Additional measures will be necessary so as to maintain or reduce the emissions for the period beyond 2020 and to establish carbon trading in the context of sustainable financing mechanisms related to energy efficiency and renewable energy sources.

Policy Trends

Turkey's climate change policy is based on the promotion of RES and energy efficiency. Particularly, the current mitigation efforts aim at the penetration of RES in electricity generation and the energy efficiency of buildings, transport, thermal power plants and energy-efficient lighting.

The energy efficiency policy instruments focus mainly on the buildings, the transport sector and the energy generation sector and according to the "Energy Efficiency Strategy 2012-2023"

and the "National Climate Change Action Plan 2011-2023", Turkey will keep focusing on these sectors including the electricity distribution sector.

Concerning new buildings, energy and insulation standards were set and Energy Identity Certificates were introduced. In the transport sector, awareness campaigns towards fuel economy, eco-driving and promotion of public transport and traffic management are implemented. Transport mode switch is also among the measures that will result in energy savings.

Among measures to increase energy efficiency rapidly and effectively, priority is given to the replacement of incandescent bulbs used for lighting purposes with compact fluorescent lamps which are up to 5 times more energy-efficient. The aforementioned action is accompanied by awareness-raising activities[90]. However, there are no direct tax incentives to encourage end-use energy efficiency, nor is there any other kind of direct financial incentives, so as to boost energy efficiency (Kotcioglu İ., 2011).

Constant rehabilitations are also performed on the existing power plants. The efficiency of thermal power plants increased significantly, from 34% in 1998 to 43% in 2009[91].

Although the industrial sector is the second major source of GHG emissions, no other actual energy efficiency policy instruments were implemented, than voluntary measures. The "Regulation on Increasing Energy Efficiency in the Use of Energy Resources and Energy" put in place authorizations and certifications for universities, engineering organizations and energy consultancy companies to support energy efficiency projects in industry through voluntary agreements.

As mentioned above, the sector that shows the maximum percentage of GHG emissions is electricity generation, followed by industry. The country is making efforts toward the enhancement of RES utilization with the introduction of three (3) mechanisms: feed-in tariff (starting from 2007), certification of RES and grid-accession priorities (Sirin S.M. and Ege A., 2012).

In 2011, an improved incentive mechanism was introduced with higher feed in tariffs for geothermal, biomass and solar power plants followed by the tariffs for hydro and wind plants. Although multiple tariffs are envisaged by the amended RES Law, the tariffs are still low compared to EU countries (Sirin S.M. and Ege A., 2012). In order to encourage even more the renewable energy investment opportunities, the Law allows for the construction of renewable energy plants in protected regions (such as national and natural parks, natural monuments, etc.).

Also, on 2 November 2013 the Electricity Market License Regulation entered into force in line with the Law No. 6446 about the Electricity Market which was consistent with the EU Electricity Directive[92]. According to this regulation the electricity generation plants in the Turkish market require electricity generation license to be obtained from the Energy Market Regulatory Authority (Gedik & Eraksoy, 2013). According to this Law electricity generation plants based on RES are more favorable, for example paying lower licensing fees (Gozen M., 2014).

Renewable energy supply in Turkey is dominated from 2007 by hydro, wind, geothermal and biomass and increased considerably after RES Law in 2005. The country has great potential in geothermal and hydro power, since it is ranking seventh in the world for its geothermal resources, while it has over 1% of the world's hydropower potential (EBRD, 2009). The aforementioned RES technologies will continue to account for the RES-e generation, along with solar. Licensing process has been carried out regarding 600 MW solar power. Also, unlicensed production for 500 kW sub-systems will be performed. By this way, electricity production from photovoltaic systems across the country will be started (Ministry of Science, Industry and Technology, 2013).

Turkey decided to include nuclear power in its energy mix to meet the increasing demand for electricity and in parallel, the country tries to decrease the use of natural gas. The country has a

[90] http://www.enerji.gov.tr/index.php?dil=en&sf=webpages&b=enerjiverimliligi_EN&bn=217&hn=&id=40719
[91] http://www05.abb.com/global/scot/scot316.nsf/veritydisplay/bcfe8957cb2c8b2ac12578640051cf04/$file/turkey.pdf
[92] http://www.turkishweekly.net/news/158083/eu-s-2013-progress-report-assessed-turkey-s-energy-sector.html

project to build a nuclear power plant at Akkuyu with the Russian Federation and is developing another project at Sinop with Japan. The share of nuclear power in Turkish electricity generation is aimed to reach at least 10% by 2023[93].

Turkey does not participate in the flexibility mechanisms (CDM, JI and ETS). A Voluntary Carbon Market is established with 109 projects (mainly concerning hydro, wind and then waste, biogas, and geothermal) registered before 31 December 2010 (MoEF, 2010b; MoEF 2011).

No registered NAMAs at the UNFCCC or the Ecofys database[94],[95]. Additionally, Turkey has no access rights as a NAMA Approver for recoding its NAMAs in the registry (Statement by Turkey, 2014). Currently, Turkey is not willing to ratify the Kyoto Protocol amendment since its specific interest is regarding concrete ways for international support to be provided to it for the targets of the second committment period (Daniela Carrington, 2013).

Turkey's National Climate Change Adaptation Strategy and Action Plan (Draft) (MoEU, 2011) quotes that "impacts of the climate change pose danger on the national sectors which depend on natural resources and especially water". These sectors are industry, forestry, energy, tourism and especially agriculture since has 75% water utilization throughout the country and is the most vulnerable to climate change. Despite this acknowledgement, no adaptation measures are implemented.

Conclusions

- The existing Energy Efficiency policy mixture focuses mainly on buildings and transport sector and then on electricity generation. It does not include financial incentives.
- Although efforts are made to increase RES utilization in electricity generation with an ambitious target (30% in 2023), the financial incentives are low compared to EU countries. The RES technologies, that are promoted the most, are solar, wind, geothermal and hydro.
- Nuclear power is expecting to gain market share in electricity generation in the near future. There are also plans to reduce natural gas share.
- Turkey does not participate in Kyoto mechanisms, losing the opportunity for GHG emission reduction and further foreign investment.
- No adaptation policy instruments are in place so far, putting vulnerable and essential sectors like agriculture and energy in danger.

[93] http://www.iaea.org/newscenter/news/2013/turkeynpd.html
[94] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=179
[95] http://www.nama-database.org/index.php/By_region

Intended Nationally Determined Contribution (INDC) of the Republic of Turkey

REPUBLIC OF TURKEY

INTENDED NATIONALLY DETERMINED CONTRIBUTION

In accordance with decisions 1/CP.19 and 1/CP.20, the Republic of Turkey hereby presents its Intended Nationally Determined Contribution (INDC) towards achieving the ultimate objective of the United Nations Framework Convention on Climate Change which is set out in its Article 2 and clarifying information.

National Circumstances

Turkey achieved 230 per cent increase in GDP between 1990 and 2012. Its population has increased more than 30 per cent since 1990. Turkey's energy demand increases by 6-7 percent every year.

Turkey is an upper-middle income developing country according to the World Bank classification. Turkey remains eligible to official development assistance (ODA).

Turkey is listed in Annex I to the UNFCCC. However, Decision 1/CP.16 recognized the special circumstances of Turkey and placed Turkey in a different situation than the other Parties included in Annex I.

Turkey aims to contribute to the collective efforts to combat climate change in line with its national circumstances and capabilities.

With this perspective, National Strategy on Climate Change and National Climate Change Action Plan were adopted in 2010 and 2011 respectively.

National Climate Change Action Plan consists of emission control and adaptation policies and measures which are being implemented in all relevant sectors.

The greenhouse gas inventory of the year 2012 revealed that the total emissions in 2012 expressed in CO_2 equivalent were 440 million tons in Turkey. The energy sector had the largest share with 70.2 percent. Industrial processes with 14.3 percent, waste sector with 8.2 percent and agriculture with 7.3 percent followed the energy sector. Turkey's per capita greenhouse gas (GHG) emission for the same year was 5.9 ton CO_2 equivalent, which is much lower than the EU and OECD average.

Information on INDC

INDC	**Up to 21 percent reduction in GHG emissions from the Business as Usual (BAU) level by 2030.**
Period for Implementation or Contribution	2021-2030
Scope and Coverage	Economy-wide. Energy, industrial processes and products use, agriculture, land use land-use change and forestry, and waste sectors.
GHGs	All greenhouse gases included in the national inventory: • Carbon dioxide (CO2); • Methane (CH4); • Nitrous oxide (N2O); • Hydrofluorocarbons (HFCs); • Perfluorocarbons (PFCs); • Sulfur hexafluoride (SF6); • Nitrous trifluoride (NF3).
Methodological approaches	Methodological approaches are based on using the IPCC 2006 Guidelines and IPCC 2013 KP Supplement. Global warming potential on a 100 year timescale in accordance with the IPCC's 4th Assessment Report.
Use of International Market Mechanisms	Turkey aims to use carbon credits from international market mechanisms to achieve its 2030 mitigation target in a cost effective manner and in accordance with the relevant rules and standards.
Consideration of fairness and ambition based on national conditions	Turkey has to continue its sustainable development process. Rapid industrialization and urbanization have been taking place in Turkey over the last 30 years. Turkey is responsible for only 0.7 percent of the global emissions since the industrial revolution. Energy imports have a significant share in Turkey's account deficit. Turkey has to use its limited energy resources. Turkey experiences financial and technological constraints in combating climate change. This INDC provides additional policies, plans and measures in many sectors.
How the INDC contributes to achieving the ultimate objective of the Convention (Article 2)	Up to 21 percent reduction in GHG emissions from the BAU level by 2030 will enable Turkey to step on low-carbon development pathways compatible with the long-term objective of limiting the increase in global temperature below 2°C.

Planning Process	**Turkey may revise this INDC in accordance with changing circumstances.** Turkey supports its INDC through a national climate change policy which includes; - 10th National Development Plan - National Strategy on Climate Change - National Climate Change Action Plan - National Strategy on Industry - Strategy on Energy Efficiency - National Strategy and Action Plan on Recycling - National Legislation on Monitoring, Reporting and Verification of GHG emissions - National Smart Transportation Systems Strategy Document (2014-2023) and its Action Plan (2014-2016) Turkey's INDC was prepared in a participatory approach through multiple stakeholder meetings and by analytical studies conducted for 1 year. Times-MACRO model is used for energy related modeling and other national models and studies are used for non-energy sectors.
Financial Needs	Recalling the decisions 26/CP.7, 1/CP.16, 2/CP.17, 1/CP.18 and 21/CP.20, in view of successfully implementing this INDC, Turkey will use domestic sources and receive international financial, technological, technical and capacity building support, including finance from the Green Climate Fund.

Plans and policies to be implemented for this INDC

Energy

- Increasing capacity of production of electricity from solar power to 10 GW until 2030
- Increasing capacity of production of electricity from wind power to 16 GW until 2030
- Tapping the full hydroelectric potential
- Commissioning of a nuclear power plant until 2030
- Reducing electricity transmission and distribution losses to 15 percent at 2030
- Rehabilitation of public electricity generation power plants
- Establishment of micro-generation, co-generation systems and production on site at electricity production

Industry

- Reducing emission intensity with the implementation of National Strategy and Action Plan on Energy Efficiency
- Increasing energy efficiency in industrial installations and providing financial support to energy efficiency projects
- Making studies to increase use of waste as an alternative fuel at the appropriate sectors

Transport

- Ensuring balanced utilization of transport modes in freight and passenger transport by reducing the share of road transport and increasing the share of maritime and rail transport
- Enhancing combined transport
- Implementing sustainable transport approaches in urban areas
- Promoting alternative fuels and clean vehicles
- Reducing fuel consumption and emissions of road transport with National Intelligent Transport Systems Strategy Document (2014-2023) and its Action Plan (2014-2016)
- Realizing high speed railway projects
- Increasing urban railway systems
- Achieving fuel savings by tunnel projects
- Scraping of old vehicles from traffic
- Implementing green port and green airport projects to ensure energy efficiency
- Implementing special consumption tax exemptions for maritime transport

Buildings and Urban Transformation

- Constructing new residential buildings and service buildings as energy efficient in accordance with the Energy Performance of Buildings Regulations
- Creating Energy Performance Certificates for new and existing buildings so as to control energy consumption and greenhouse gas emissions and to reduce energy consumption per square meter
- Reducing the consumption of primary energy sources of new and existing buildings by means of design, technological equipment, building materials, development of channels that promote the use of renewable energy sources (loans, tax reduction, etc.)
- Dissemination of Green Building, passive energy, zero-energy house design in order to minimize the energy demand and to ensure local production of energy

Agriculture

- Fuel savings by land consolidation in agricultural areas
- Rehabilitation of grazing lands
- Controlling the use of fertilizers and implementing modern agricultural practices
- Supporting the minimum tillage methods

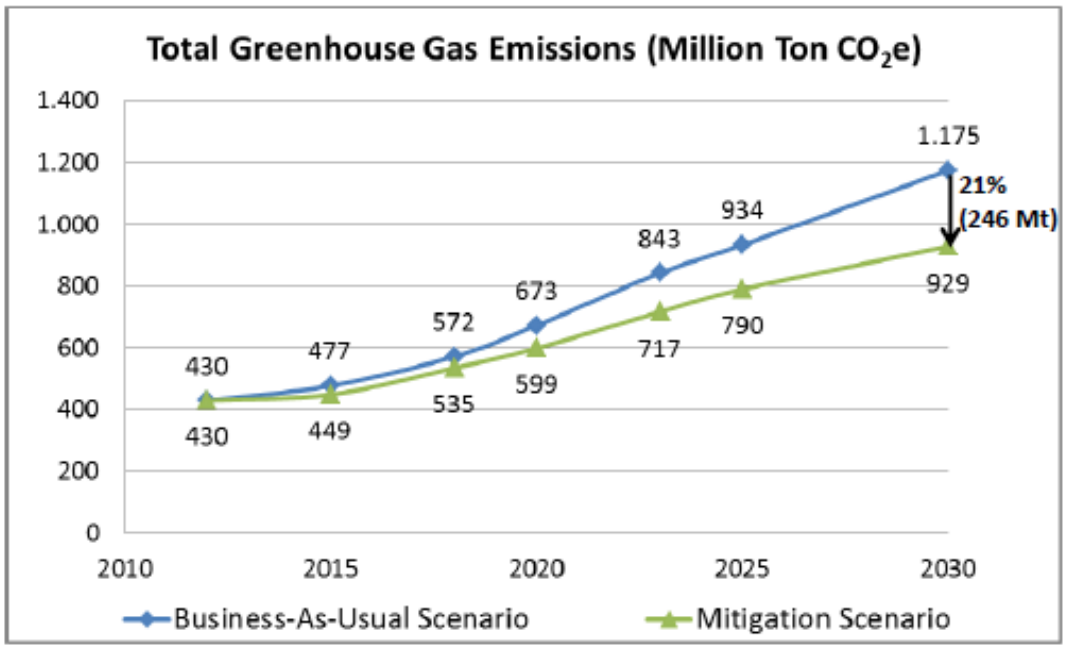
Waste

- Sending solid wastes to managed landfill sites
- Reuse, recycle and use of other processes to recover secondary raw materials, to utilize as energy source or to remove wastes
- Recovering energy from waste by using processes such as material recycling of wastes, bio-drying, bio-methanization, composting, advanced thermal processes or incineration
- Recovery of methane gas from landfill gas from managed and unmanaged landfill sites
- Utilization of industrial wastes as an alternative raw material or alternative fuel in other industrial sectors, through industrial symbiosis approach
- Conducting relevant studies to utilize wastes generated from breeding farms and poultry farms
- Rehabilitation of unmanaged waste sites and ensuring wastes to be deposited at managed landfill sites.

Forestry

- Increasing sink areas and preventing land degradation
- Implementing Action Plan on Forestry Rehabilitation and National Afforestation Campaign

The emission reductions to be achieved by these policies and plans compared to the business-as-usual scenario are presented in the figure below.



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Ukraine

Country profile

Ukraine is a republic with a presidential-parliamentary system of government with separate legislative, executive, and judicial branches. The prime minister is appointed by the president with the consent of more than one-half of the parliament.

Located in Eastern Europe, it shares borders with the Russian Federation to the East and Northeast, Belarus to the Northwest, Poland, Slovakia and Hungary to the West, Romania and Moldova to the Southwest, and the Black Sea and Sea of Azov to the South and Southeast, respectively, with an area of 603.628 km^2.

Throughout its history, Ukraine has been one of the powerhouses of world agriculture due to its fertile conditions and one of ten most attractive agricultural land acquisition regions.

The population is 46 million people (2012). The capital city is Kiev and the currency is the Ukrainian Hryvnia.

Location map

National climate change policy

The Ukrainian Parliament ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 29 October 1996. According to UN regulations, the country became party to it on 11 September 1997 (Ministry of Environmental Protection of Ukraine, 2007).

The Ukrainian Parliament ratified also the Kyoto Protocol on 4 February 2004 (Ministry of Environmental Protection of Ukraine, 2007; Ministry of Environmental Protection of Ukraine, 2006). According to the Ukrainian Kyoto Protocol obligation, the country should not exceed its 1990 level[96] of Greenhouse Gas (GHG) emissions (Assigned Amount of Units (AAU)) which corresponds to a 0% reduction target[97] (Ministry of Environmental Protection of Ukraine, 2006).

According to the "Report on demonstrable progress under the Kyoto Protocol" prepared by the Ministry of Environmental Protection of Ukraine in 2006, the emission forecasts for 2012 indicated that the level of emissions of year 1990 was not going to be exceeded. The latter in conjunction with the fact that the Ukrainian emissions declined due to the deep economic recession of the 90s justified the decision of the country at that time not to undertake any specific measures to fulfill its commitments to the Kyoto Protocol (Ministry of Environmental Protection of Ukraine, 2006).

Mitigation

Ukraine has implemented mitigation policy instruments that concern the sectors of buildings, industry, transport, energy, agriculture and forests (Table 1).

[96] In 1990 GHG emissions (with account of CO_2 removal in LULUCF) were 891,5MtCO_2eq (Ministry of Environmental Protection of Ukraine, 2006)
[97] http://unfccc.int/kyoto_protocol/items/3145.php

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings	Energy efficiency	Regulatory standards (Declaratory) (Law No. 74/94-VI/1.7.1994, Law No. 2663/2.6.2005)
Industry	Energy efficiency/RES	Tradable permits (JI) (Law No. 206/22.02.2006, Resolutions No. 221/22.2.2008, No. 392/17.4.2008, No. 642/16.7.2008, No. 1369-p/30.10.2008, No. 1034/16.09.2009)
	Energy efficiency	Regulatory standards (Law No. 74/94-VI/1.7.1994, Law No. 2663/2.6.2005)
Transport	Promotion of Biofuels	Regulatory standards (Fuel switch) (Law 1391-VI/21.5.2009)
Energy	Promotion of RES technologies	Regulatory standards (Presidential Decree No. 159/2.3.1996, Dece of Cabinet of Ministers No. 37/3.2.1997, Law 575/16.10.1997, Law No. 1391-XIV/14.01.2000, Law 1775/01.06.2000, Law 1682/20.4.2000, Law 555-IV/20.2.2003, Law 2509-IV/5.4.2005, Law No. 601- VI/25.9.2008)
	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Law No. 1812-111/8.6.2000, Law No. 601-VI/25.9.2008)
	Energy efficiency in heat branch mainy	Regulatory standards (Declaratory) (Law No. 74/94-VI/1.7.1994, Law No. 2663/2.6.2005)
	Energy efficiency/RES	Tradable permits (JI) (Law No. 206/22.02.2006, Resolutions No. 221/22.2.2008, No. 392/17.4.2008, No. 642/16.7.2008, No. 1369-p/30.10.2008, No. 1034/16.09.2009)
Agriculture	Mitigtion of GHG emissions	Tradable permits (JI) (Law No. 206/22.02.2006, Resolutions No. 221/22.2.2008, No. 392/17.4.2008, No. 642/16.7.2008, No. 1369-p/30.10.2008, No. 1034/16.09.2009)
Forests	Mitigtion of GHG emissions	Tradable permits (JI) (Law No. 206/22.02.2006, Resolutions No. 221/22.2.2008, No. 392/17.4.2008, No. 642/16.7.2008, No. 1369-p/30.10.2008, No. 1034/16.09.2009)

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Ukrainian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 2).

Table 2: United Nations projections for the Ukrainian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,55	-0,54	-0,58	-0,64	-0,55	-0,55	-0,56

The country experienced a crisis during the transition at the beginning of the 1990s, which was followed by a period of steady growth during the time period 2000-2006, with an annual average real GDP growth more than 7% (Martyniuk Andriy, Ogarenko Yulia, 2012). More specifically, the real GDP growth for the years 2006 and 2007 was 7,3% and 7,9%, respectively (3rd, 4th and 5th NC of Ukraine to UNFCCC, 2009). Ukraine entered a sharp economic downturn in late 2008 (CEC, 2009). GDP declined by 15,1% in 2009 (UKRSIBBANK, 2011). Foreign investments concerned mainly manufacturing, mining (gold, minerals and coal) and the financial sector (European Commission and CASE – Center for Social and Economic Research, 2008). The recovery in Ukraine's economy was slowed during 2012 compared to the previous year (Swedbank, October 2012).

The International Monetary Fund (IMF) provides projections for the Ukrainian GDP until year 2017 (Table 3) (IMF, 2012)[98].

[98] http://www.imf.org/external/pubs/ft/weo/2012/01/pdf/tables.pdf

Table 3: Projections for the Ukrainian GDP (IMF, 2012).

Year	2011	2012	2013	2017
Annual percent change of GDP (%)	5,2	3,0	3,5	3,5

Business-As-Usual scenario

The policy mixture of the BAU scenario consisted of the Mitigation/Adaptation (M/A) policy instruments implemented before 31 December 2010 (Table 1). The respective for this period Ukrainian climate change policy has four main components: i) penetration of Renewable Energy Sources (RES) in the gross final energy consumption; ii) support to increase energy efficiency; iii) reduction of GHG emissions through Joint Implementation (JI) projects and iv) selling of AAUs through the Green Investment Scheme (GIS). Concerning the adaptation policy, there were no implemented policy instruments.

The "green tariff"[99] provided real support for RES and was characterized as good incentive for attracting foreign investors' interest despite the financial downturn (Black & Veatch, 2011; Updated Energy Strategy, 2012[100]). However, there were uncertainties regarding the procedure for applying it to concrete RES power plants. Gaps were identified in the existing legislation for bioenergy (BAP, 2009).

The GIS was introduced in 2008 and during 2009–2010, Ukraine received approximately 450 million euros from the sale of 47 million AAU to Japan and Spain at a price of 9,5–10 euros per unit (Martyniuk Andriy, Ogarenko Yulia, 2012).

Ukraine is considered as the leader in implementing JI Projects (Martyniuk Andriy, Ogarenko Yulia, 2012). The practical efficiency of the national legislative framework for JI projects until year 2006 was considered as adequate (Ministry of Environmental Protection of Ukraine, 2006). The resolutions that were introduced improved the situation. Until 13 October 2011, the Ukrainian GHG emission reductions from JI projects were equivalent to 40% of the total Emission Reduction Units (ERUs) in the world (Martyniuk Andriy, Ogarenko Yulia, 2012).

Regarding Energy Efficiency (EE), only approximately 30% of the planned actions of the Comprehensive State Energy Saving Programme for the period up to 2010 were implemented mainly because of low energy tariffs (Martyniuk Andriy, Ogarenko Yulia, 2012).

Optimistic scenario

The policy mixture of this scenario was synthesized by:

i) the policy mixture of BAU;

ii) the M/A policy instruments that were set into force after 1 January 2011. Law No. 5485-VI (issued on 20.11.2012) introduced the guarantee of origin for the produced electricity and set a fixed percentage for electricity produced by RES. Law No. 5021 (issued on 1.1.2013) introduced fees for connection to the power grid for power plants except for those using RES. A number of Resolutions were set into force for energy efficiency. Law No. 4970-VI (issued on 19.06.2012) referred to production and use of motor fuels containing biocomponents. Finally, Resolution No. 348 (issued on 03.23.2011) defined the procedure for using funds received from the sale of AAUs.

iii) additional policy instruments. Their introduction in this policy mixture was necessary so as to balance the aim of reducing GHG emissions with the national decision to increase the share of coal and reduce that of natural gas. For this category of policy instruments, future EU climate change policy instruments were also taken

[99] Special tariff for purchase of electricity produced at power plants using alternative energy sources (except for blast-furnace and coke gas, and using hydro energy – produced by small hydro power plants).
[100] http://mpe.kmu.gov.ua/fuel/control/uk/doccatalog/list?currDir=50358

into consideration and were adjusted according to the needs and priorities of the examined country. This was reasonable since the Ukrainian climate policy is expected to follow the EU climate policy due to the following facts: i) the country was obligated to comply its environmental legislation with the EU standards when it signed the EU Partnership and Cooperation Agreement in 1994 (Ministry of Environmental Protection of Ukraine, 2007); ii) The EU-Ukraine energy cooperation falls under the European Neighborhood Policy for which an EU-Ukraine Association Agenda replaced the previous European Neighborhood Policy Action Plan[101] (Market Observatory for Energy, 2010; SEC(2009) 515). Two priorities for action include energy and climate change[102]. In March 2008, in the context of the MoU on Energy, EU and Ukraine signed a roadmap on EE, RES and climate change (SEC(2009) 515); iii) Ukraine is participating in the Black Sea Synergy Initiative[103] iv) is an Energy Community member. The additional policy instruments were:

- Financial policy instruments for RES (subsidies, tax exemptions with longer time interval and higher amounts).
- Regulatory, financial and dissemination policy instruments for EE for the building sector (heat metering and consumption based billing, energy performance standards for buildings, energy audit and certification of buildings ("passport" for energy efficiency of buildings), subsidies, behaviour change using awareness campaigns).
- Regulatory, financial and dissemination policy instruments for promoting biofuels and EE in the transport sector (use of biofuels, subsidies, behaviour change through eco-driving, fuel economy).
- Regulatory and dissemination policy instruments for adaptation in water management (regulations for water supply, awareness campaigns for water efficiency).
- Financial and dissemination policy instruments for adaptation in the agricultural sector (subsidies, pollution fees, water charges, awareness campaigns).

Pessimistic scenario

The policy mixture of this scenario was synthesized by:

i) the policy mixture of BAU;

ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT policy mixture);

iii) additional policy instruments which were restricted compared to those of the OPT since Ukrainian national priorities are linked with energy policy objectives and not with those of climate change policy. The country intends to invest in nuclear power and to increase the share of coal over that of natural gas. The additional policy instruments were only:

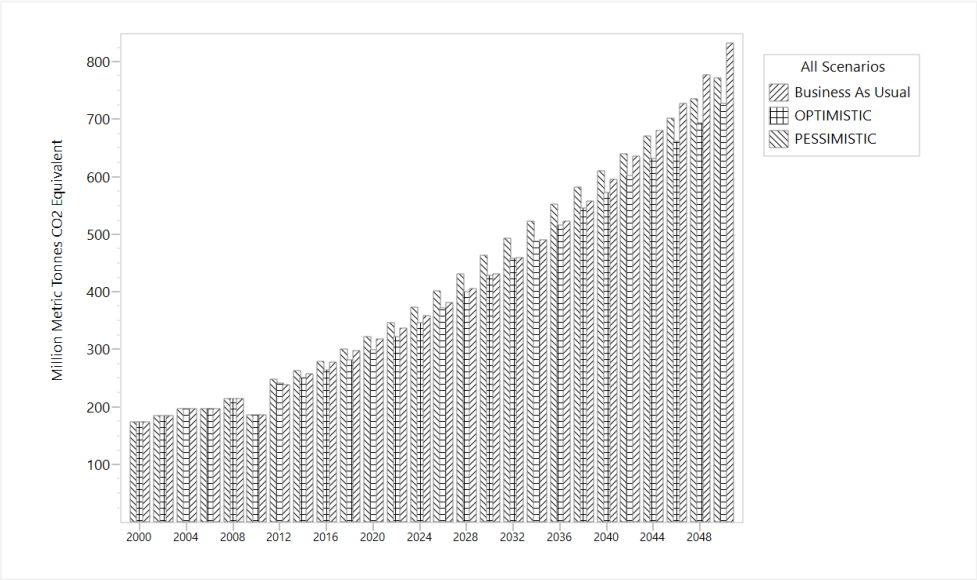
- Dissemination policy instruments for promoting biofuels and EE in the transport sector (less use of biofuels compared to OPT, behaviour change through eco-driving, fuel economy).

[101] http://eeas.europa.eu/ukraine/index_en.htm
[102] http://eeas.europa.eu/ukraine/index_en.htm
[103] http://eeas.europa.eu/blacksea/index_en.htm

Results

CO_2 emissions

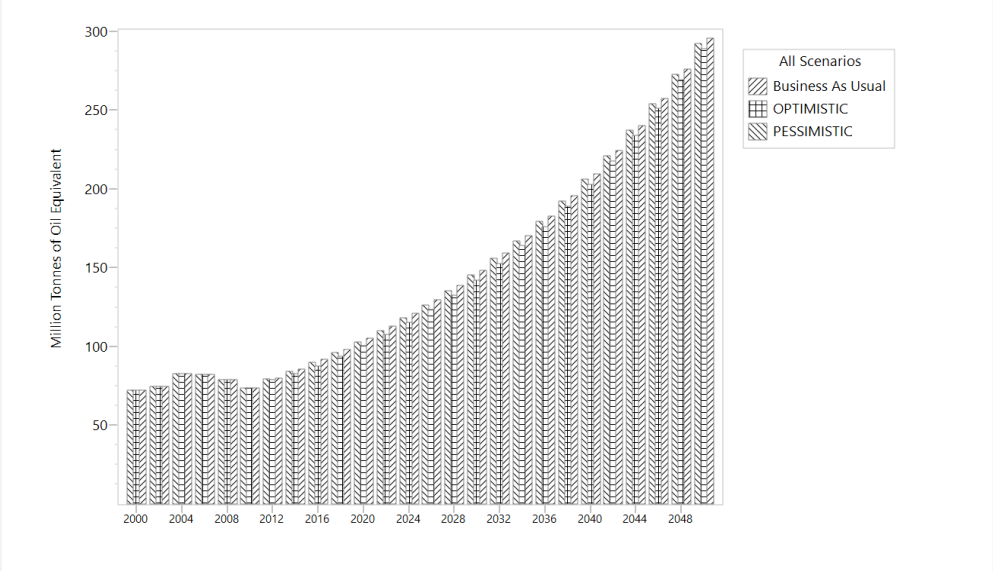
According to the outcomes of the LEAP for the BAU scenario in 2020 the GHG[104] emissions will increase compared to those of year 2005[105] by almost 65%; for the OPT scenario, GHG emissions are expected to increase by 51% in 2020 compared to those of year 2005 while for the PES scenario, GHG emissions will increase by 65% compared to those of year 2005.



Graph 1: CO_2 emissions for three (3) scenarios.

Final energy consumption

Projections up to year 2050 present increasing final energy consumption, under the BAU scenario. The OPT scenario is expected to lead to the lowest final energy consumption, compared to the other two scenarios.

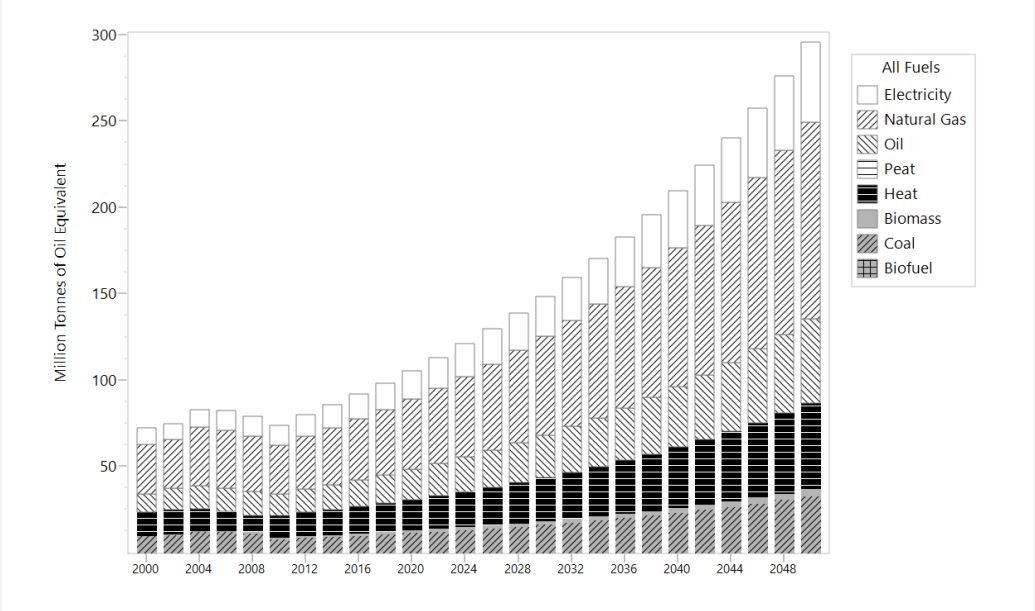


Graph 2: Final Energy Consumption for three (3) scenarios.

[104] For biofuels the amount of air pollutant were not available in LEAP for all branches.

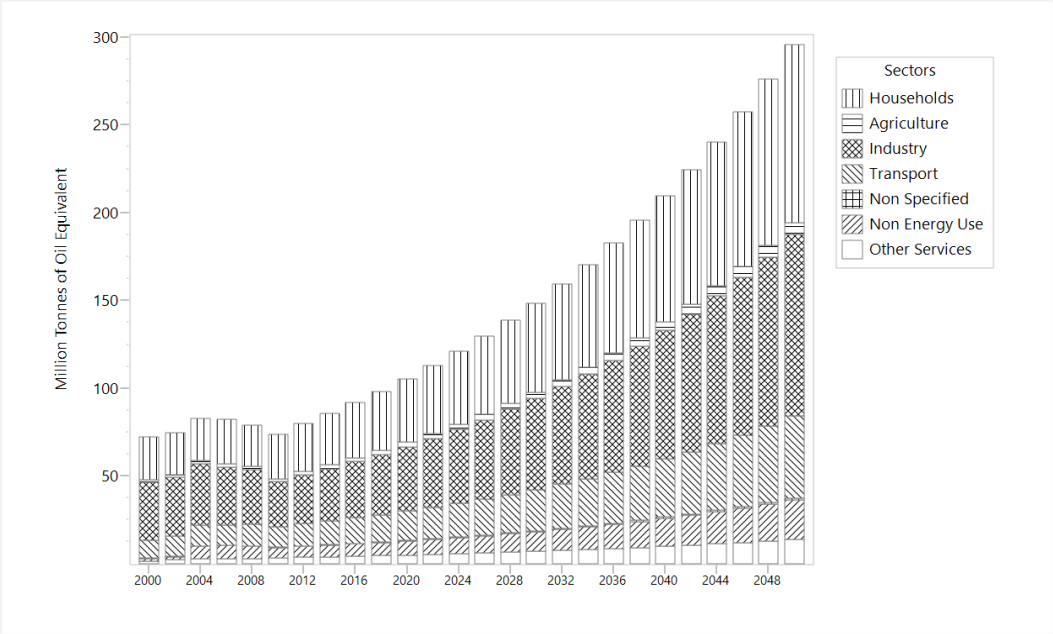
[105] GHG emission sources which are taken into consideration in this study do not include the "Oil transformation" sector due to missing data. Due to this lack of data there is difference between the official historical data for GHG emissions and those calculated by the LEAP model.

For final energy consumption per fuel up to year 2050, the fuels with the higher expected increase are natural gas, oil and coal. The consumption of heat, electricity and biomass increases after year 2015, with small but steady rate.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

Under BAU scenario, the sectors that are expected to present the highest final energy consumption are households and industry, followed by transport and non energy use sectors (Graph 4).



Graph 4: Final Energy Consumption per Sector for BAU scenario.

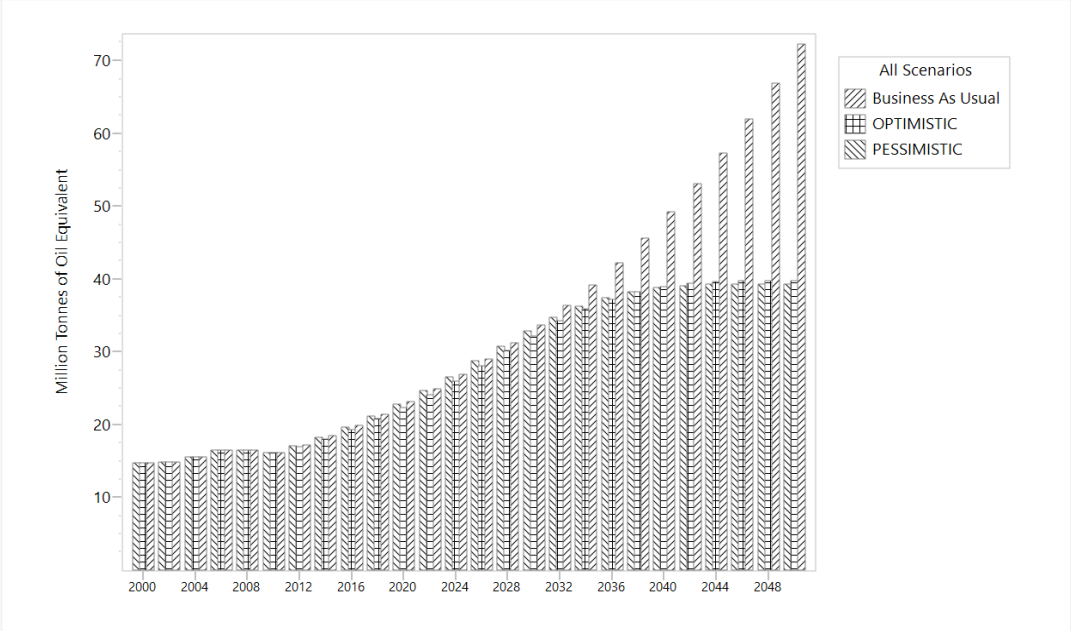
Electricity generation

The LEAP results of electricity generation for the three (3) scenarios are shown in Graph 5.

Ukrainian electricity generation has two major sources: nuclear power (approximately 50% in 2005), and thermal power plants (coal- and gas-fired – around 43%). Hydropower accounts for

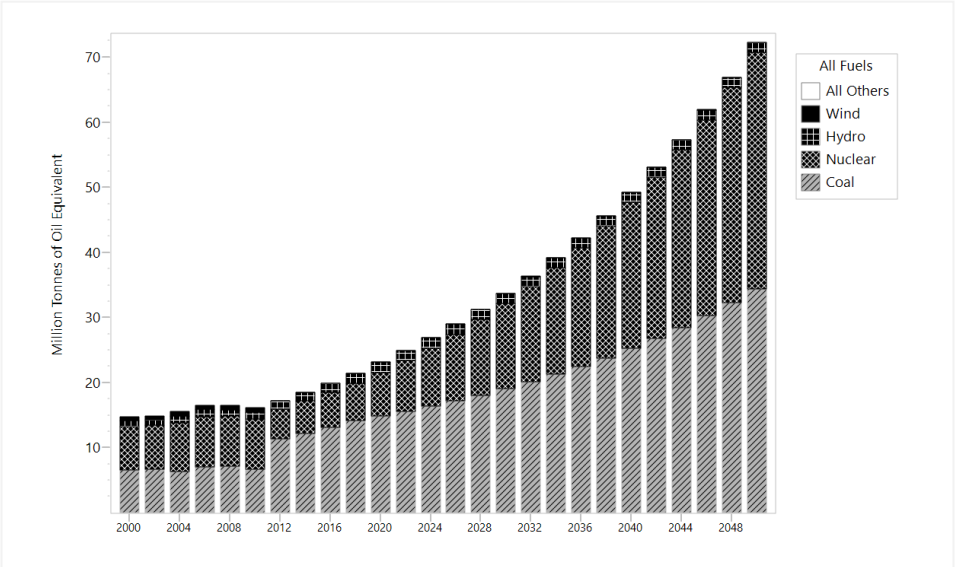
the remaining share (European Commission and CASE – Centre for Social and Economic Research, 2008).

The country intends to increase the share of coal as primary supply for thermal power plants by 150% until year 2030, while simultaneously to reduce the use of gas by 50% (UNECE, 2010). For the OPT scenario the assumption is that the share of biomass, wind, hydro, solar and geothermal energy sources will increase (according to the Updated Energy Strategy by 2030, 2012). For the PES scenario, the share of biomass, wind, hydro, solar and geothermal energy sources will increase, but less than that in OPT and the use of coal will increase compared to the OPT scenario.



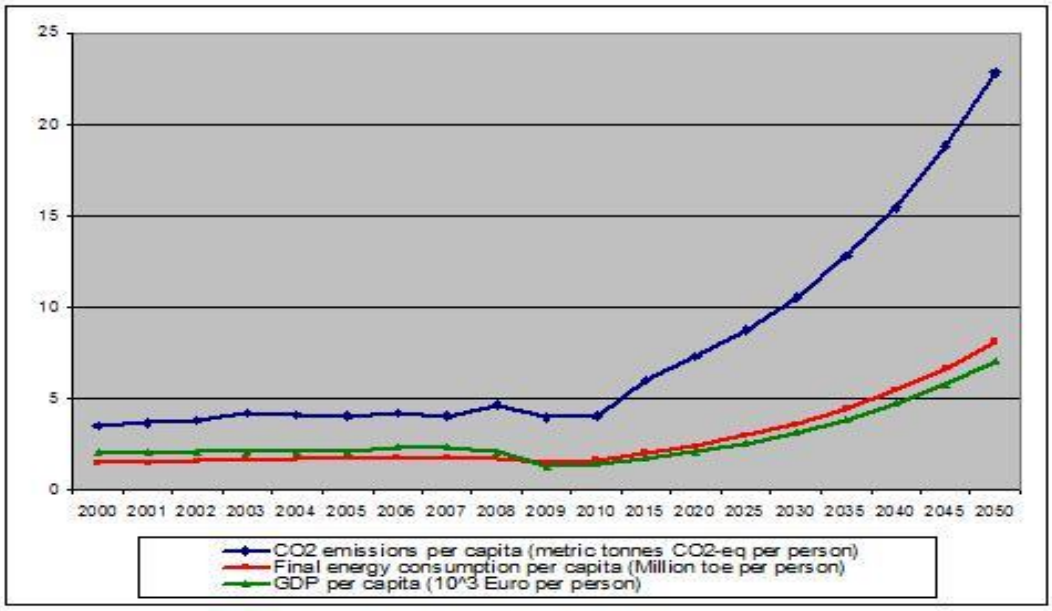
Graph 5: Electricity generation in the three scenarios.

The country exports electricity to Russia and EU countries (European Commission and CASE – Center for Social and Economic Research, 2008). Exports to EU are limited since the Ukrainian power grid is not connected to the EU distribution system (UCTE), but synchronized with that of Russia. In 2015-2020 the expected accession of Ukrainian energy system to the UCTE system will significantly increase the volume of electricity export (3rd, 4th and 5th NC of Ukraine to UNFCCC, 2009).



Graph 6: Electricity generation per fuel in BAU scenario.

National indicators

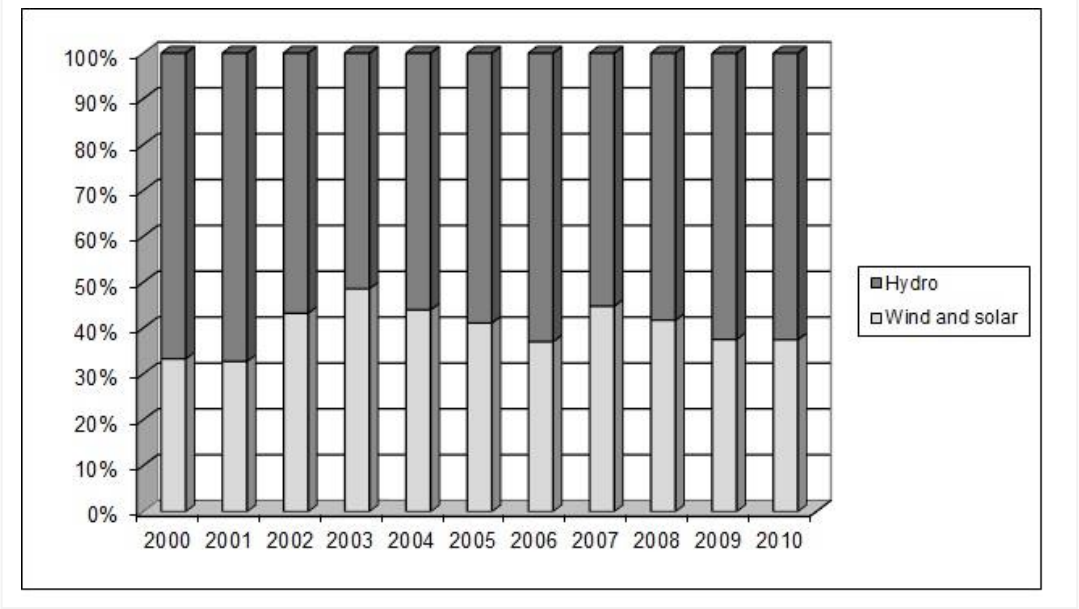


Graph 7: Trends of national indicators (BAU scenario).

The indicators remain almost stable up to year 2020, but afterwards they increase. The growth is higher for the CO_2 emissions per capita.

RES production per technology

For Ukraine, the main RES technologies for electricity generation are hydro (there are no separate data on installed capacity and electricity generation for small-scale and large-scale hydro plants and pump storage units), wind and photovoltaics (there are no separate data on installed capacity and electricity generation for wind and photovoltaics).



Graph 8: Technology shares in RES electricity generation in 2000-2010.

Evaluation

The AMS results showed that the OPT policy mixture was the most effective one compared to the other two.

The PES scenario has the largest amount of GHG emissions, followed very closely by the BAU scenario.

The policy mixture of the OPT scenario has the best performance in political acceptability, since it is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two. It offers a fair distribution of the "climate change" burden among the respective sectors and allows the economic sectors to be more competitive. It offers more flexibility for the target groups in complying with their obligations under the specific policy mixture.

The performance of the three policy mixtures under the third criterion is better for BAU and PES and worse for OPT. The country has established an implementation network that is not able to adjust properly its activities under a more strict policy mixture like that of OPT compared to the BAU one.

It is worth mentioning that the performance of BAU and PES are very close. Even if the PES policy mixture has more climate change policy instruments compared to those of BAU, its performance in delivering GHG emission reductions is the same due to the increased share of coal and the reduced use of natural gas.

Given the above, the mitigation/adaptation policy mixture which characterizes the OPT scenario is the one that allows the achievement of most goals of the climate change policy of Ukraine.

Nevertheless, the success of this policy mixture requires the encouragement of business investments in RES and energy efficiency projects, the continuation of the demonstated effectiveness of the implementation network and a more stringent frame for non-compliance.

Policy Trends

The Ukrainian climate change policy is oriented primarily to the penetration of RES in the gross final energy consumption and secondary to the increase of EE. These key policy objectives along with the reduction of import dependence are reflected in the "*Energy Strategy of Ukraine until 2030*" (Decree of Cabinet of Ministers of Ukraine No. 145-p - Resolution of March 15, 2006) and its updated version of June 7, 2012[106].

The policy instruments supporting RES, starting with the introduction of the "green tariff" on 2008, exceptions of custom duties and value added tax for the imported relevant equipment, the Guarantee of Origin for the produced electricity and a fixed percentage for electricity produced from RES (RES-e), resulted in the improvement of the attractiveness of the country in RES investments, placing it twelfth in the world for year 2012 (Ernst & Young, 2012). Additionally, to these policy instruments, the fact that the production of power from RES has a much lower cost in Ukraine than in other countries supported also RES investments in the country (OECD, 2012). Based on this national framework, forecasts refer to investments of approximately 5 billion USD for RES generation, including solar and wind energy, biomass and biofuel production, in the next five years (Deloitte, 2012).

Ukraine became an Energy Community member on 1 February 2011[107] and only then the country actually undertook actions and implemented policy instruments for EE. Until then the regulatory

[106] http://mpe.kmu.gov.ua/fuel/control/uk/doccatalog/list?currDir=50358

[107] Before becoming a full member, the country had to incorporate specific Directives into its legislation about the electricity and natural gas market in compliance with EU relevant rules, renewable energy sources and biofuels, nuclear safety of power pants in accordance with the IAEA requirements[107] (Energy Community, 2010; European-Ukrainian Energy Agency, 2011).

standards for the building and industrial sectors (Law No. 2663, issued on 2.6.2005) were characterized as declaratory, while – as aforementioned - planned actions of the Comprehensive State Energy Saving Programme up to 2010 were hardly implemented (Martyniuk Andriy, Ogarenko Yulia, 2012). The Resolutions of the Cabinet of Ministers regarding EE issues defined the necessary actions for securing funds, determined priorities and approved the action plan for heat consumption and modernization of heat supply. However, Ukraine remains one of the highest energy intensive countries in the world (World Bank- ESMAP, 2012). The Cabinet of Ministers of Ukraine issued on 7 August 2013 the Resolution No. 702 "On the approval of the technical regulations on energy labeling", based on the Directive 2010/30/EU[108], which established the basic requirements for providing users with information about energy consumption, energy-related products, and supplementary information, thereby allowing users to choose the most energy-efficient products.

Apart from the legislative framework that is dedicated specifically to RES and EE, the Joint Implementation (JI) mechanism and the Green Investment Scheme (GIS) contribute also to the achievement of the respective RES and EE objectives.

The country considers the flexible mechanisms of the Kyoto Protocol as an opportunity to intensify investments for: i) modernization of the economy (Ministry of Environmental Protection of Ukraine, 2006); ii) raising significant funds to finance environment-friendly investments in energy, industry, transport, housing, forestry, agriculture and education (World Bank, 2006). The currently implemented policy mixture reflects these intentions and favors the implementation of JI and GIS projects.

Ukraine has ranked first in the market of JI projects. Until May 2012, there were: i) 305 registered Track 1 projects, 199 of which received 127 million ERUs (The National Ecological Centre of Ukraine, 2012); ii) 39 Track 2 projects with final determination, 27 of which generated almost 17 million ERUs. These projects concern[109] mainly EE (industry, supply side, distribution, service and households), fugitive emissions (fuels, production and consumption of halocarbons and sulphur hexafluoride) and RES (biomass, wind). No NAMAs are registered at the UNFCCC or the Ecofys database[110],[111].

In 2008, the priority areas for GIS investments were energy efficiency, district heating, and forest management (Tuerk A. et al, 2010). In spring of year 2009, 44 million AAUs were sold to the Japan's government and to a Japanese company, while in December of the same year 3 million AAUs were sold to Spain (Tuerk A. et al., 2010). Additional AAUs were under negotiations to be transferred to companies in Switzerland, New Zealand and Japan. Furthermore, the country signed MoUs with Italy and the World Bank and discussed additional sales with the EBRD and the EIB (Tuerk A. et al., 2010). Up to April 27, 2012 National Environmental Investment Agency of Ukraine (NEIA) had reviewed and approved 1668 projects for GIS in 24 regions of the country. These projects are expected to lead to GHG reductions of 385,4 tons CO_2-equivalent/year[112].

The country aims to reduce the use of natural gas and to increase that of coal. The reduction of natural gas consumption was considered necessary since its cost increased by more than two times during year 2006 and imported gas accounted – by that period - for three fourths of the national gas consumption (Institute for Economic Research and Policy Consulting, 2006; Ministry of Environmental Protection of Ukraine, 2006). This intention is reflected in the "Updated Energy Strategy until 2030", which includes also measures for increasing coal extraction by 2030. Production of coal is expected to increase approximately 50% compared to the level in year 2010, satisfying completely the need for coal even at maximum development of the coal electricity generation plants. This increase may create problems with JI and GIS since

[108] http://saee.gov.ua/documents/laws/ENG_Resolutio_702_2013.pdf
[109] http://www.cdmpipeline.org/
[110] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=183
[111] http://www.nama-database.org/index.php/By_region
[112]http://www.neia.gov.ua/nature/control/uk/publish/article?art_id=134929&cat_id=124591

when combusted, coal emits roughly double the carbon dioxide emitted by natural gas for the same amount of energy. On the other hand taking into consideration that in 2012 Ukraine was willing to proceed with a new target of 20% GHG emission reduction compared to 1990[113], the national efforts for promoting RES and EE will probably be intensified in all sectors for the forthcoming years.

There are no adaptation policy instruments although warmer temperatures and changing patterns of precipitation may create water stress for forests, agriculture and the population. There is need for improvement in economic, administrative and technical regulations of water supply (Ministry of Environmental Protection of Ukraine, 2007).

Conclusions

- The current policy mixture promotes effectively investments for RES.
- Joint Implementation projects in combination with the Green Investment Scheme secure for the country the necessary funds for environment-friendly investments in energy, industry, transport, housing, forestry, agriculture and education.
- There are limited in number policy instruments for supporting energy efficiency in the industrial, transport and building sectors.
- Ukraine lacks of policy instruments for adaptation to climate change, particularly for water management.

[113] under the conditions that (UNFCCC, 2012): (a) developed countries have an agreed position on the quantified emission reduction targets of Annex I Parties; (b) Ukraine maintains its status as a country with an economy in transition and the relevant preferences linked with such a status; (c) the existing flexibility mechanisms under the Kyoto Protocol are kept; (d) 1990 remains as the single base year for calculating Parties' commitments; (e) the provisions of Article 3, paragraph 13, of the Kyoto Protocol are used for the calculation of the quantified emission reductions of Annex I Parties under the Kyoto Protocol for the relevant commitment period.

Intended Nationally Determined Contribution (INDC) of Ukraine

Додаток 2: Переклад ОНВВ України

Intended Nationally-Determined Contribution (INDC) of Ukraine to a New Global Climate Agreement

1. Introduction	Over the years of independence since 1991, Ukraine has contributed greatly, with 10.2 billion t to reduction of global greenhouse gas emissions. Greenhouse gas (GHG) emissions in Ukraine amounted to 944.4 Mt CO_2eq in 1990, and 402.7 Mt CO_2eq (excluding LULUCF) in 2012, i.e. 42.6% of the 1990 level. GHG emissions including LULUCF amounted to 874.6 Mt CO_2eq in 1990 and 375.4 Mt CO_2eq in 2012, i.e. 42.9% of the 1990 level. This reduction resulted mainly from a GDP decrease and a decline in the population and social living standards, which are expected to be recovered and improved to reach the EU level. In 2014-2015, the temporary annexation of the Autonomous Republic of Crimea and Sevastopol city by the Russian Federation as well as the anti-terrorist operation in some areas of Donetsk and Lugansk oblasts have radically changed Ukraine's development course. The need has arisen to defend the nation, to build defense fortifications along thousands of kilometers, including those on the border, and to increase the production of weapons, ammunition and other means of defense, which requires upgrowth in output of heavy industry products, metals, cement, etc. Due to the military aggression 20% of the country's economic potential has been destroyed. After restoration of territorial integrity and state sovereignty over the whole territory of Ukraine, the need will arise to reconstruct ruined industrial facilities and infrastructural networks, including railway infrastructure, gas and oil pipelines, water supply systems, sewerage networks, and to repair and build new residential houses and social facilities. All this will cause increase in the production of metals, non-metal construction items, food products, etc. Ukraine will acutely need multi-billion capital

	investments. Ukraine's INDC will be revised after the restoration of its territorial integrity and state sovereignty as well as after the approval of post-2020 socio-economic development strategies with account of investment mobilization.
2. Greenhouse gas emissions level	Ukraine defines ambitious, but at the same time substantiated and fair target with regard to the level of GHG emissions. **It will not exceed 60% of 1990 GHG emissions level in 2030.**
3. Base year	1990
4. Implementation period	1 January 2021 – 31 December 2030
5. Scope and coverage:	
5.1. Greenhouse gases	• carbon dioxide (CO_2); • methane (CH_4); • nitrous oxide (N_2O); • perfluorocarbons (HFCs); • hydrofluorocarbons (PFCs); • sulphur hexafluoride (SF_6); • nitrogen trifluoride (NF_3).
5.2. Economic sectors / source categories	• energy; • industrial processes and product use; • agriculture, land use, land-use change and forestry; • waste.
5.3. Percentage of GHG emissions covered	100 %
5.4. Land use, land-use-change and forestry	An approach to including the land use, land-use and forestry in the climate change mitigation structure will be defined as soon as technical opportunities emerge, but no later than 2020
6. Planning processes:	
National legislation	• Law of Ukraine "On the Ratification of the United Nations Framework Convention on Climate Change" dated 29.10.1996 № 435/96-BP; • Law of Ukraine "On the Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change" dated 04.02.2004 № 1430 - IV; • Law of Ukraine "On the Ratification of the Association Agreement between the European Union and the European Atomic Energy Community and

	their member states, of the one part, and Ukraine, of the other part" dated 16.09.2014 № 1678 – VII; • Law of Ukraine "On the Basic Principles (Strategy) of the State Environmental Policy of Ukraine through 2020" dated 21.12.2010 № 2818-VI; • Decree of the President of Ukraine "On the "Ukraine-2020" Sustainable Development Strategy dated 12.01.2015 № 5/2015; • The Energy Strategy of Ukraine through 2035 (draft); • Decree of the Cabinet of Ministries of Ukraine "On approval of the Concept of the State-wide Target Economic Programme for Development of Industry through 2020" dated 17.07.2013 № 603-p; • Decree of the Cabinet of Ministries of Ukraine "On approval of the Transport Strategy of Ukraine through 2020" dated 20.10.2010 № 2174-p; • Decree of the Cabinet of Ministries of Ukraine "On approval of the Concept of the Development Strategy for the Agricultural Sector through 2020" dated 17.10.2013 № 806-p; • Decree of the Cabinet of Ministries of Ukraine "On approval of the State Target Programme of Energy Efficiency and the Development of Energy Carriers Generation from Renewable Energy Sources and Alternative Fuels for 2010-2015" dated 01.03.2010 № 243; • Decree of the Cabinet of Ministries of Ukraine "On approval of the National Action Plan on Renewable Energy through 2020" dated 01.10.2014 № 902-p.; • The National Action Plan on Energy Efficiency through 2020 (draft).
7. Methodological approaches:	
7.1. Metric	Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)
7.2. Methodological approaches to GHG emissions and removals estimation and accounting	• IPCC 2006 Guidelines as per UNFCCC decision 24/CP.19; • IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol as per UNFCCC decisions 2/CMP.6 and 2/CMP.7;

	• IPCC 2013 Wetlands Supplement.
7.3. International market mechanisms	• Ukraine will participate actively in the development of existing international market mechanisms and implementation of new ones. • The declared GHG emissions level does not account for the participation of Ukraine in international market mechanisms.
8. Substantiation of the INDC fairness and ambition	The economy of Ukraine requires significant structural changes, infrastructural development, technological modernization and recovery after military operations in eastern Ukraine. Consideration of climate protection factor in their planning and implementation provides for addressing new policies. Ambitiousness of stated target envisages making efforts to substantially prevent increase of GHG emissions under conditions of the significant planned structural changes, restoration and development of infrastructure, post-war reconstruction. All these actions will require development and implementation of efficient and effective policies and imposing of limitations of GHG emissions which are beyond current international obligations of Ukraine; as well as require significant financial investments. Pursuant to Annex B to the Doha Amendment to the Kyoto Protocol, Ukraine has allowed greenhouse gas emissions for 2020 equal to 76% of the 1990 level. Presented in section 2 ambitious target on the level of greenhouse gas emissions for 2030 in reference to the base year in amount of 60% is much lower than both the allowed GHG emission level for 2020 and the base 1990 year level.
9. Next steps	1. Adoption of relevant legislative acts for the INDC implementation. 2. Implementation of the Association Agreement between the European Union, the European Atomic Energy Community and their Member States, of the one part, and Ukraine, of the other part, ratified by the Law of Ukraine dated 16.09.2014 № 1678 – VII: • Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive

	96/61/EC; • Regulation 842/2006/EC of the European Parliament and of the Council on certain fluorinated greenhouse gases; • Implementation by Ukraine of the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change, considering all compliance criteria for full implementation of the Kyoto mechanisms; • Development of a long-term action plan for climate change mitigation and adaptation; • Designing and implementation of long-term actions aimed at reducing greenhouse gas emissions. 3. Development and implementation of measures aimed at increasing absorption of greenhouse gases.
10. Adaptation issue	Ukraine will support national adaptation processes in the context of the international commitments in this field. For a medium-term outlook, the adaptation activities will be considered with the same priority as mitigation activates.

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Annex I

Estonia

Country profile

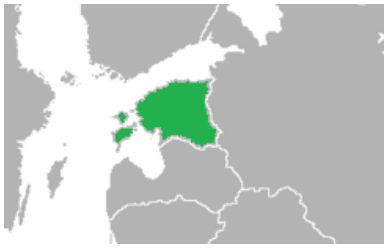
Estonia is a parliamentary democracy with the Riigikogu, the Estonian Parliament, exercising the supreme legislative power, through 101 members, elected for a four year term by proportional representation. The President of the Republic is the head of the state and the Government of the Republic is exerting the executive power. The Prime Minister of Estonia is the head of the government.

Estonia is located in the Baltic region of Northern Europe between 57,30 and 59,49 degrees of latitude and 21,46 and 28,13 degrees of longitude (OWER, 2011). It is bordered to the north by the Gulf of Finland, to the west by the Baltic Sea, to the south by Latvia (343 km) and to the east by Lake Peipsi and the Russian Federation (338,6 km).

The territory of the country covers 45.227 km^2 and has temperate seasonal climate (OWER, 2011). Almost half of the land area is covered by forests (47%), one-third is agricultural land (cropland 28% and pastures 7%), around 2% is under settlements and the rest is covered by mires and bogs.

The population is 1.318.005 (2012) and according to data from Statistics Estonia, it is shrinking (SE, 2012). The currency is Euro and the national and official language is the Estonian.

Location map



National climate change policy

Estonia signed the United Nations Framework Convention on Climate Change (UNFCCC) during the United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992. In 1994 Estonia ratified the UNFCCC and in 2002, the Kyoto Protocol (KP)[114]. Under the KP Estonia was obliged to reduce during the period 2008-1012 the emissions of air polluting greenhouse gases from its territory by 8% compared to the 1990 level (NIR, 2011).

As a first step the National Programme for the Reduction of Greenhouse Gas (GHG) emissions for the time period 2003-2012 was compiled taking into consideration the KP and the European Council Decision 93/389/EC (of 24 June 1993) on the monitoring of GHG emissions in the EU (EÜT L 167, 09/07/1993 p 0031 0033) (CD, 1993). The Programme that was approved on 30 April 2004 by the Estonian Government set, in the long-term, a GHG emissions reduction of 21% by 2010, compared to the 1999 emission level (NIR, 2011). This target implied a reduction of carbon dioxide emissions by 20% and methane emissions by 28%, allowing for an increase of nitrogen dioxide emissions by 9%. For the achievement of these objectives the Programme was oriented towards the Joint Implementation (JI) mechanism and the increase of energy efficiency (LG Action, 2011).

[114] Estonian Act on Ratification of the Kyoto Protocol RT II 2002, 26, 111 and Ambient Air Protection Act RT I 2004, 43, 298

Regarding the second component about the increase of the Estonian energy efficiency the National Energy Efficiency Plan was approved in 2007. It sets respective strategic aims and objectives, and takes into account the task of achieving the indicative energy conservation objective set by Directive 2006/32/EC, i.e. saving of 9% of final energy consumption by 2016 in comparison to the average final energy consumption of the period 2001–2005 (ODYSSEE-MURE, 2009).

Mitigation

In order to achieve its targets, Estonia has implemented mitigation policy instruments for the buildings sector, the industry, the transport and the energy sector (Table 1).

Table 1: Implemented policy instruments for mitigation until 31 December 2010.

Mitigation		
Sector	**Technological options**	**Policy instrument**
Buildings	Energy management	Performance standards (energy audits, energy certification) (Energy Efficient Act – RT I 2003/78-525, Building Act – RT I 2002/47-297, RT I 2002/99-579)
	Energy efficient appliances	Energy labeling for appliances (Energy Efficient Act – RT I 2003/78-525)
Industry	Energy management	Regulatory standards (Ambient Air Protection Act – RT I 2004/43-298, RT I 2010/44-261)
	Energy efficiency	Tradable permits (Ambient Air Protection Act – RT I 2004/43-298, RT I 2010/44-261)
	Best available technologies	Regulatory standards (combined type) (Integrated Pollution Prevention and Control Act – RT I 2001/85-512, RT I 2002/61-375)
Transport	Promotion of Biofuels	Regulatory standards (Liquid Fuel Act – RT I 2003/21-127, RT I 2003/88-591)
	Fuel standards	Fuel quality standards (Integrated Pollution Prevention and Control Act – RT I 2001/85-512, RT I 2002/61-375)
	Energy efficiency	Behavior change (Integrated Pollution Prevention and Control Act – RT I 2001/85-512, RT I 2002/61-375)
Energy	Energy efficient technologies	Regulatory standards (District Heating Act (RT I 2003/25-154, RT I 2007/17-80)
	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Electricity Market Act – RT I 2003/25-153, RT I 2009/39-262)
	Energy efficiency	Tradable permits (Ambient Air Protection Act – RT I 2004/43-298, RT I 2010/44-261)
	Best available technologies	Regulatory standards (combined type) (Integrated Pollution Prevention and Control Act – RT I 2001/85-512, RT I 2002/61-375)
	Technologies and practices for GHG emission reductions	Regulatory standards (Ambient Air Protection Act – RT I 2004/43-298, RT I 2010/44-261)
	Energy efficiency	Economic instruments (Charge) (Environmental charges Act – RT I 2005/67-512, RT I 2006/29-220)
Waste management	Capture and storage of GHG emissions	Regulatory standards (Ambient Air Protection Act – RT I 2004/43-298, RT I 2010/44-261)

Policy instruments for the climate change adaptation of the country concern only two sectors (Table 2).

Table 2: Implemented policy instruments for adaptation until 31 December 2010.

Adaptation		
Water management		Economic instruments (Charge) (Environmental charges Act – RT I 2005/67-512, RT I 2006/29-220)
		Command and control (Emergency Act – RT I 1996/8-165, RT I 2002/57-354 and Water Act – RT I 1996/40-655, RT I 1998/13-241, RT I 2004/28-190)
Forest management		Economic instruments (Charge) (Environmental charges Act – RT I 2005/67-512, RT I 2006/29-220)

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Estonian population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population were used for all scenarios (Table 3).

Table 3: United Nations projections for the Estonian population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,07	-0,11	-0,20	-0,33	-0,21	-0,21	-0,24

For the time interval 2000-2007, Estonian economy experienced one of the highest growth rates among emerging market economies and until 2005 had low inflation (5th National Communication, 2010). For Estonia the high growth rate of the GDP is characterized as the main factor of affecting the total energy intensity of the economy (Tallinn University of Technology, 2012). In 2008, GDP in real terms decreased by 3,6%. The decrease in GDP accelerated gradually in the course of the year, influenced by the fast decrease in domestic demand (7,4%). In addition, exports of goods and services decreased due to the decline of external demand.

Due to the expected liberalization of the electricity market, power prices will probably rise significantly for both enterprises and households, which may restrict the growth outlook (Danske, 2012). Estonian economy has a unique position in Europe, since it attracts the interest of Scandinavian investors and is influenced by the Russian economy as well. It was the only EU country to have a budget surplus (1% of GDP) in 2011, which should allow smoothing a negative shock to the economy (EC, 2012; Danske, 2012).

The International Monetary Fund (IMF) provides projections for the Estonian GDP until year 2017 (Table 4).

Table 4: Projections for the Estonian GDP (IMF, 2012; 2011).

Year	2011	2012	2013	2017
Annual percent change of GDP (%)	-	2,0	3,6	4,0

Business-As-Usual scenario

The policy mixture of the BAU scenario consisted of the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31 December 2010 (Table 1). The respective for this period Estonian climate change policy has four main components: i) penetration of Renewable Energy Sources (RES) in the gross final energy consumption, ii) support to increase energy efficiency; iii) GHG emission reductions through JI and EU-ETS and iv) selling of Assigned Amount Units (AAUs) through the Green Investment Scheme (GIS). Concerning the adaptation policy, as mentioned, there are implemented policy instruments oriented towards water and forest management (Table 2).

This policy mixture is adjusted to the EU standards because the country has incorporated since 2004, the respective EU regulations and Directives. Although a spectrum of policy instruments have been introduced, the reduction of the Estonian GHG emissions cannot be attributed to this policy mix. Between 1990 and 2009, GHG emissions from the energy sector decreased by 60,2 % (21,76 Tg CO_2 eq), mainly driven by a decrease in industrial energy use that was caused by the closure of energy-intensive production facilities and structural changes in the Estonian economy after independence in 1991 (UNFCCC, 2011).

The policy instruments linked with the penetration of RES have been successful since the share increased strongly, reaching the set national targets, even those set for year 2020. Actions for the support of energy efficiency are not fully developed since there are no measures directly

targeting the industrial sector. There are plans for stricter energy performance standards after 2013. The actual trading of AAUs started in April 2010 resulting until September 2012, to revenues of approximately 400 million Euros which were allocated for the implementation of Energy Efficiency (EE) and RES investments. By the end of 2010, the Ministry of Economic Affairs and Communications (MoEAC) had allocated approximately 22,4 million euro, under GIS for the construction of new wind farms (Teckenburg E., Rathmann M., Winkel T., 2011).

Optimistic scenario

The policy mixture of this scenario was synthesized by:

i. the policy mixture of BAU;

ii. the M/A policy instruments that were set into force after 1 January 2011. For Estonia there was only an amendment in the Air Protection Act that concerned the emission trading schemes, JI and GIS.

iii. additional policy instruments. For this category of policy instruments, the plans for stricter energy performance standards and measures expressed in the "National Reform Programme "Estonia" 2020" – approved by the government on 26 April 2012 - were also taken into consideration. The OPT was mainly an EE policy mixture since the RES target was almost accomplished in BAU. The additional policy instruments were:

   - Financial policy instruments for RES (reduced amount for premium/Feed-In-Tariffs (FITs) compared to the prices in BAU policy mixture).
   - Regulatory and financial policy instruments for EE covering the energy, the industrial the agricultural and the household sectors (energy efficiency standards, tax exemptions, energy audits, subsidies).
   - Dissemination policy instruments for EE covering the agricultural and transport sector (awareness campaigns for climate change impacts in agriculture, behaviour change (walking, cycling)).
   - Regulatory and financial policy instruments for the transport sector (change of transport modes – rail over road, subsidies and grants for new technology cars particular for electric vehicles, use of biofuels).
   - Regulatory policy instruments for waste management (recycling and reuse).

Pessimistic scenario

The policy mixture of this scenario was synthesized by:

i) the policy mixture of BAU;

ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT policy mixture) and

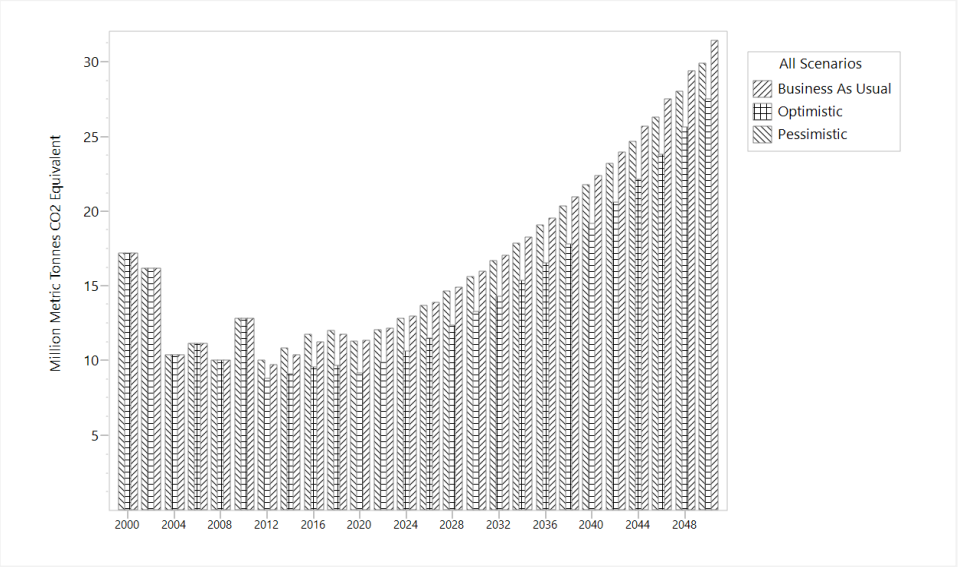
iii) additional policy instruments, which were restricted (in less sectors and with smaller amount for financial support towards EE and RES) compared to the OPT. These were:

   - Financial policy instruments for RES (even more reduced amount for premium/Feed-In-Tariffs (FITs) compared to the prices in the OPT policy mixture and only for the RES types that are not promising).
   - Regulatory and financial policy instruments for EE covering the energy and household sectors (energy efficiency standards, tax exemptions, energy audits, reduced subsidies compared to those in OPT).
   - Regulatory policy instrument for biofuels covering the agricultural and transport sectors (restricted use compared to OPT).

Results

CO_2 emissions

According to the outcomes of LEAP model for the BAU scenario in year 2020, the GHG[115] emissions will increased compared to those of year 2005[116] by almost 90%, but will be reduced by 35% compared to those of year 2000. For the OPT scenario, GHG emissions in Estonia are expected to increase by 54% in 2020 compared to those of year 2005, but will be reduced by 46% compared to those of year 2000. For the PES scenario, GHG emissions will increase by 65% compared to those of year 2005, but will decrease by 34% in 2020 compared to those of year 2000.



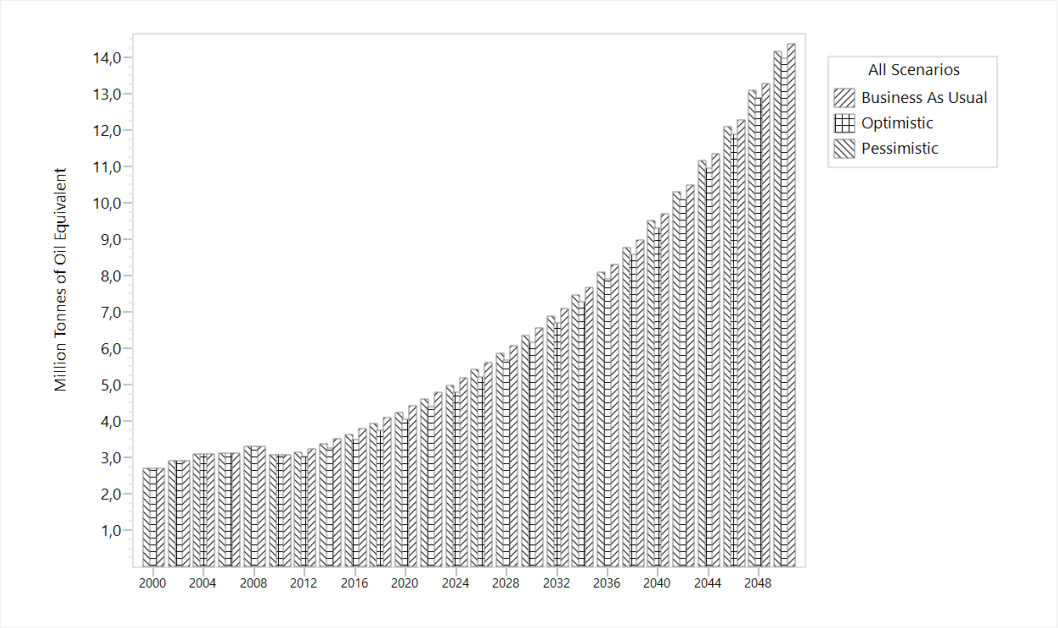
Graph 1: CO_2 emissions for 3 scenarios.

Final energy consumption

Projections up to the year 2050 present a scaled increase in final energy consumption (Graph 2). BAU scenario is expected to have the highest final energy consumption compared to the other two, while the PES provides slightly better results compared to the BAU scenario. OPT scenario will have the lowest final energy consumption among the three scenarios.

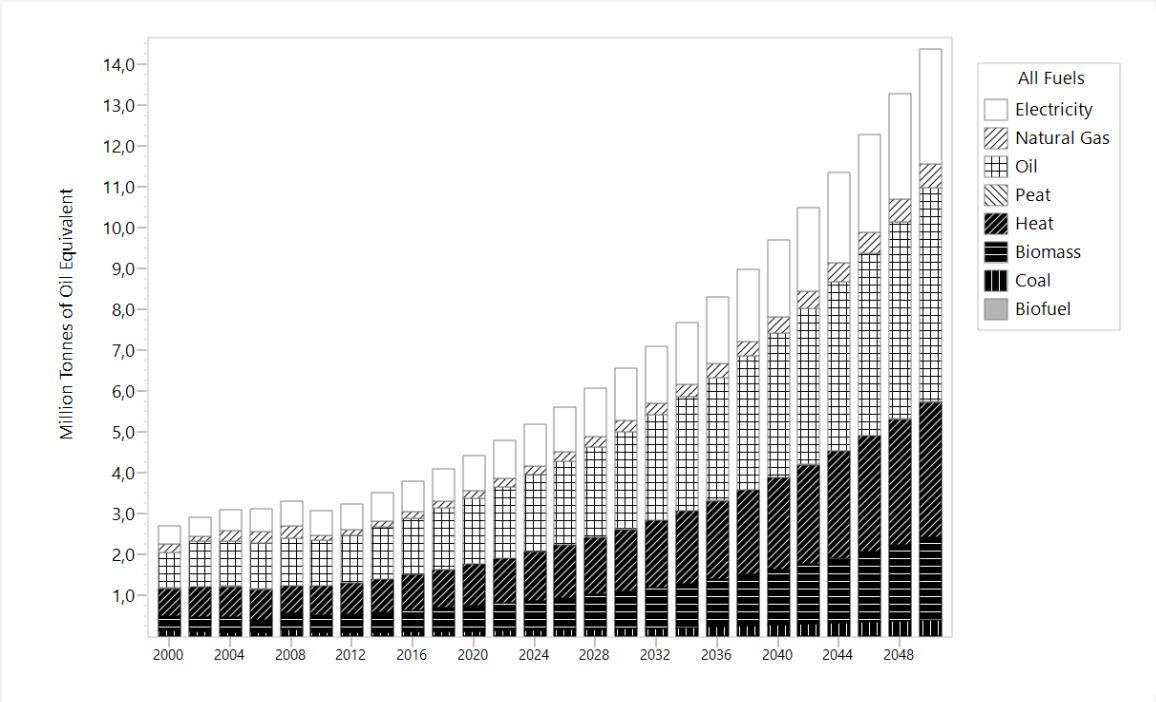
[115] For biofuels the amount of air pollutant were not available in LEAP for all branches.

[116] GHG emission sources which are taken into consideration in this study do not include the "Oil transformation" sector due to missing data. Due to this lack of data there is difference between the official historical data for GHG emissions and those calculated by the LEAP model.



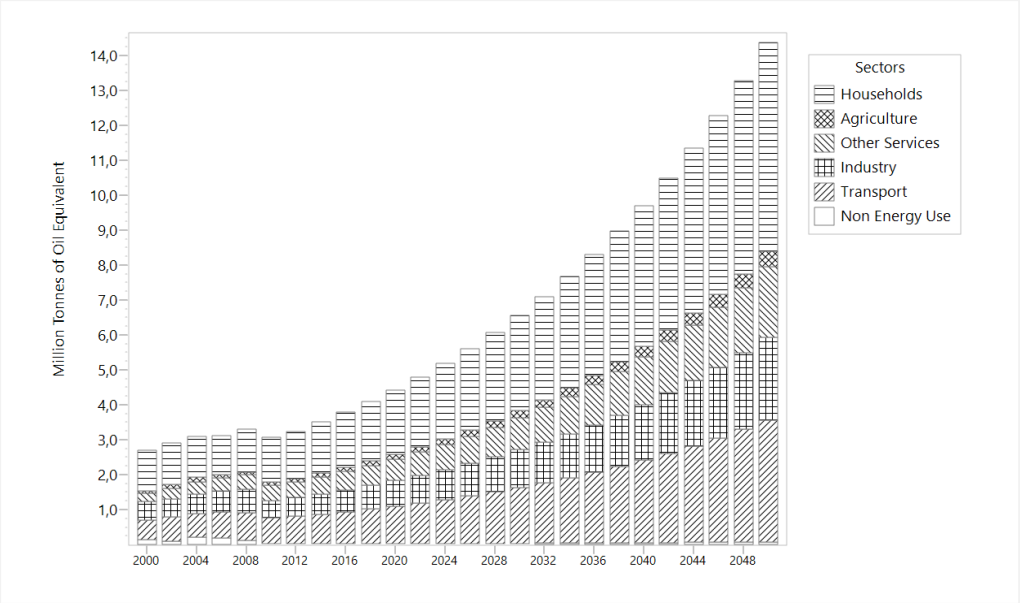
Graph 2: Final Energy Consumption for three (3) scenarios.

For final energy consumption per fuel under the BAU scenario, the fuels with the highest share and highest expected increase of their use are oil, electricity, biomass and heat. The contribution of natural gas, coal and heat is increased but with smaller growth rate (Graph 3).



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

Under BAU scenario, the sectors with the higher expected increase in final energy consumption are mainly the households and the transport sector, followed by industry and other services (Graph 4).



Graph 4: Final Energy Consumption per Sector for BAU scenario.

Electricity generation

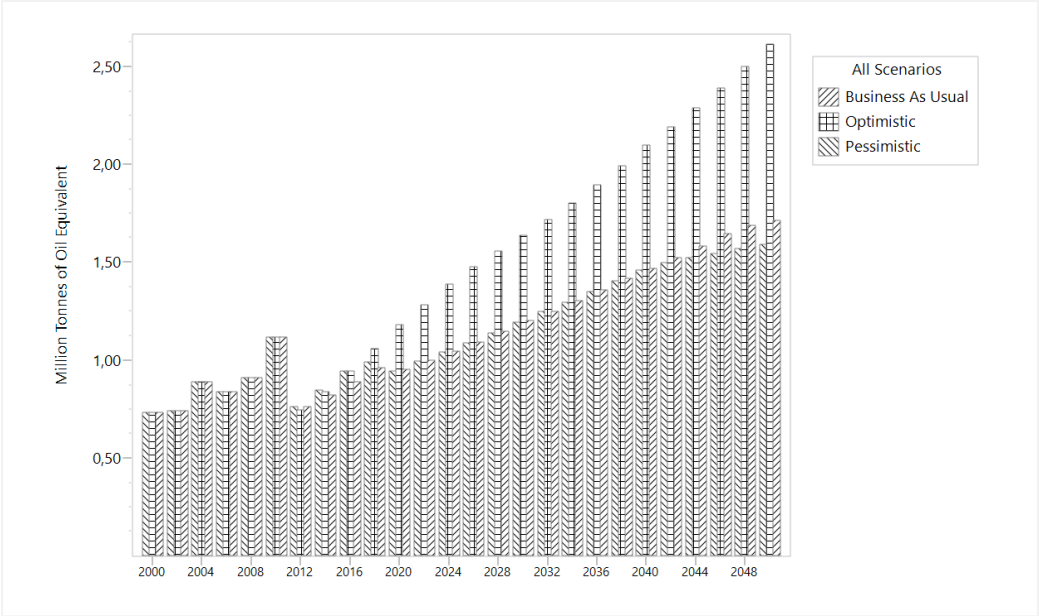
The LEAP results regarding electricity generation for the three (3) scenarios are shown in Graph 5.

The BAU scenario is characterized by the facts that the Circulating fluidized bed combustion (CFBC) oil shale units will be renovated and the production of electricity will be dominated by oil shale. The penetration of wind and biomass in power generation is considered as the existing situation. The rest of oil shale old units will be closed after 2020 and only energy units nr. 8 and 11 of Narva Power Plant will be in operation (EE, 2012).

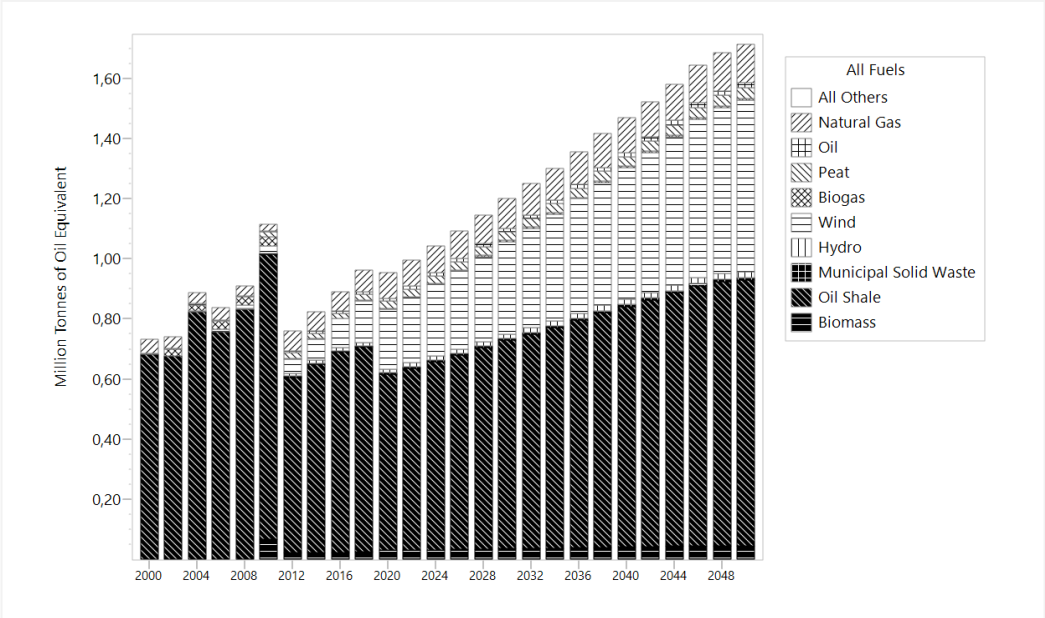
For the OPT scenario the following assumption was added to those used for the BAU scenario: building of additional offshore wind farms with annual electricity production of 4 PJ (wind farms capacity will be up to 900 MW[117]) (EE, 2012).

The PES scenario had the same assumptions with the BAU scenario regarding electricity generation.

[117] There are a number of conducted pre-feasibility studies to install wind energy capacity of approximately 1,000 MW by 2020 (UNFCCC, 2011). Ea Energy Analyses in 2010 developed for Estonia three different scenarios with 900 MW and 1800 MW wind power capacity by 2016 (Ea Energy Analyses, 2010).

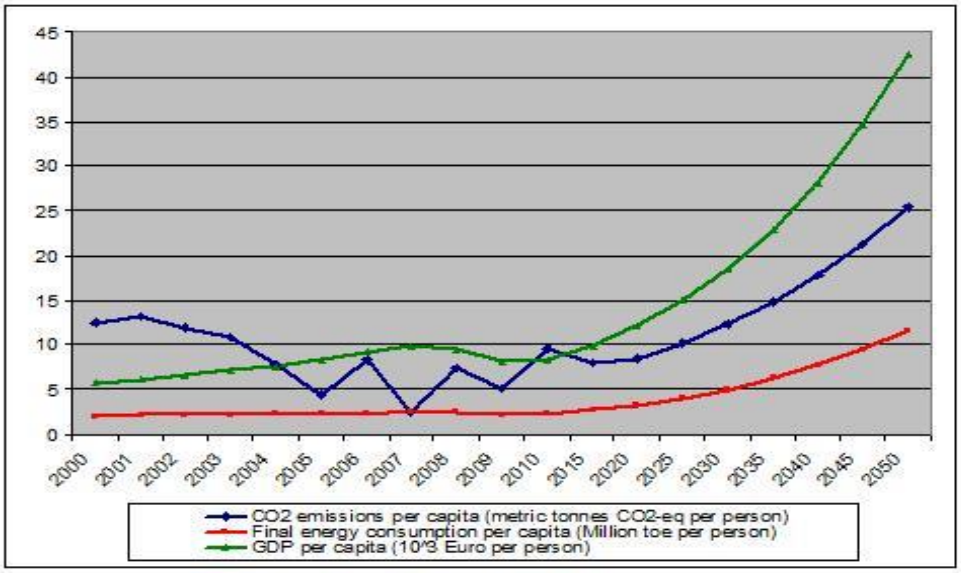


Graph 5: Electricity generation in the three scenarios.



Graph 6: Electricity generation per fuel in BAU scenario.

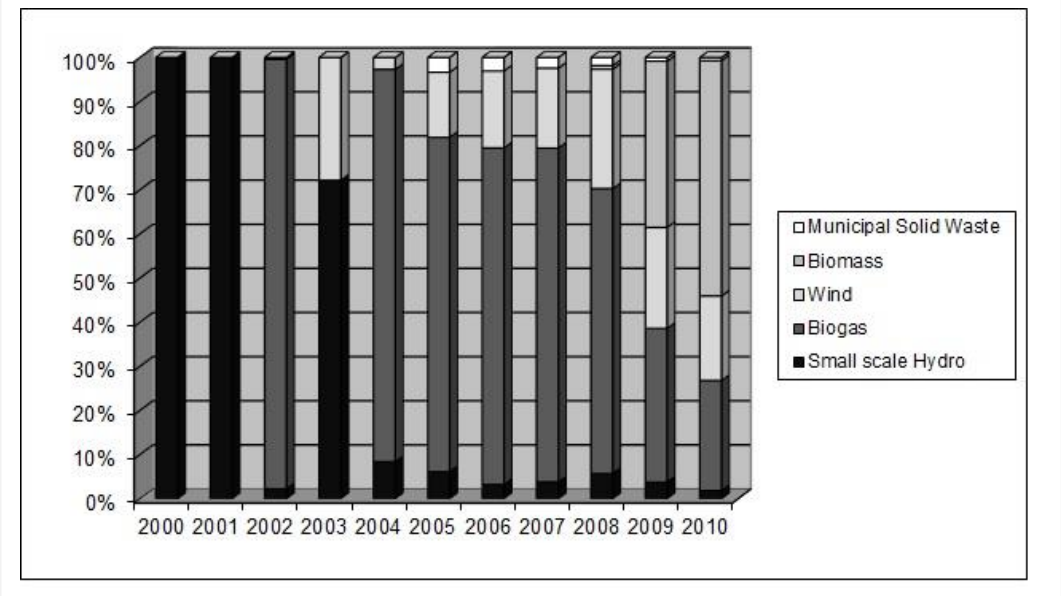
National indicators



Graph 7: Trends of national indicators (BAU scenario).

As aforementioned the high growth rate of the Estonian GDP is characterized as the main factor of affecting the total energy intensity of its economy. This linkage is affecting the growth of these indicators.

RES production per technology



Graph 8: Technology shares in RES electricity generation (2000-2010).

In Estonia, the main RES technologies for electricity generation are biogas, biomass and wind followed by small-scale hydropower.

Evaluation

According to the AMS results, the OPT policy mixture was evaluated as the most effective one compared to the other two.

The BAU scenario has the largest amount of GHG emissions, followed very closely by the PES scenario.

The policy mixture of the OPT scenario has the best performance in political acceptability since it is the most cost effective for the target groups (residential, industrial, energy and transport sectors) compared to the other two. It offers a fair distribution of the "climate change" burden among the respective sectors and allows the economic sectors to be more competitive. It offers more flexibility for the target groups in complying with their obligations under the specific policy mixture.

The performance of the three policy mixtures under the third criterion is equal. The country has established an implementation network that is able to adjust properly its activities under a more strict policy mixture like that of OPT compared to the BAU one. The country has managed to allocate the necessary funds for the implementation of its supportive policy instruments for RES and energy efficiency.

Given the above, the Mitigation/Adaptation policy mixture which characterizes the OPT scenario is the one that allows the achievement of most goals of the climate change policy of Estonia.

Nevertheless, the success of this policy portfolio requires the encouragement of business investments in RES and EE projects, the continuation of the demonstated effectiveness of the implementation network and a more stringent frame for non-compliance.

Policy Trends

The largest share of Estonian CO_2 emissions comes from the energy sector due to the use of domestic fuels (oil shale, wood and peat) (NIR, 2011). Estonia is the only country in the world that uses oil shale[118] as its major primary source of energy[119], because it ensures security of supply and independence of its electricity price from trends in world prices for energy sources. On the other hand, electricity generation from oil shale releases considerable amounts of CO_2 emissions, imposing the need to change Estonian generation portfolio by increasing its energy diversity (EE AR, 2010). This situation dictates the trend of implementing policy instruments linked with the Estonian energy sector and oriented towards EE and RES.

The majority of EE policy instruments focuses on the building sector and includes energy certification of buildings, energy labeling of appliances, energy performance standards and verification of the efficiency of heat and air conditioning systems. Financial incentives for the promotion of EE in buildings include: subsidy of 50% of the cost for energy audit of apartment buildings; grant by the city of Tallinn for energy certificate; loans with low interest for residential buildings; refurbishment of residential buildings by 10% of the cost; tax relief for interest paid for home renovation loans and for reinvested profit in business (UNFCCC, 2011; Laaniste M., 2010). In January 2013 the Estonian government updated minimum energy efficiency requirements for new buildings. These requirements supplemented the existing Building Code and were tighter for public buildings (Eclareon and Eco-Logic, 2013).

Although transport is the second more energy intensive sector, the measures are restricted to those posed through EU Directives, such as labeling of new cars, information and training for eco-driving (since 2002) and obligatory biofuel share in liquid motor fuels and public transport.

There are no measures directly targeting to increased EE in the industrial sector (TTU, EEPM, 2009). There were plans for the adoption of stricter energy performance requirements after 2013, but the existing legal acts did not foresee the application of more stringent requirements yet (Laaniste M., 2010).

[118] Estonian oil shale as a fuel is characterized by high ash (45–47%) and sulphur (1,5–1,7%) content, low net calorific value (8,3–8,7 MJ/kg) and high content of volatile matter in the combustible part (up to 90%) (Roos I., Soosaar S., 2012).
[119] Approximately 85% of electric power is generated from domestic oil-shale based power plants (EE AR, 2010).

EE measures on the supply side are restricted to the zoning of heat supply (municipalities have introduced the zones of district heating), the closure of old oil-shale plants and the simultaneous construction of new ones.

The latest support scheme for promoting RES in Estonia was established by the 2009 amendment to the Electricity Market Act. This amendment introduced a new aid scheme for RES producers which increased strongly the RES share during the coming years (NRP, 2012). The mandatory purchase price for electricity produced from RES (RES-e) rose by 42% and the possibility of using the purchase obligation was no longer restricted to the network losses (EC, 2006). The aid lasts 12 years from the start of production (EBRD, 2009). The Act also foresaw operating support for constructing fossil-fuel-fired CHP plants.

From 2010, the FITs have been kept reducing compared to the feed-in premiums paid before, resulting in lowering the support level for already operating RES plants (EREF, 2012; Schneider T., 2013). Proposals for new reductions in FIT are in place from the beginning of 2013.

Opportunities for investments in RES and EE technologies by foreign investors exist, but they are not so attractive compared to other countries (Ernest & Young, 2012). There are significant untapped RES opportunities − particularly biomethane from the farming sector which the Estonia's Renewable Energy Association, estimated at a potential for 300−400 GWh (Davies S and Holmes I., 2011).

For the promotion of EE and RES through emission trading schemes the country showed preference to GIS. In August 2009 the Government decided to sell excess AAUs through the GIS[120]. GIS projects concern EE and use of renewable energy at small boiler houses and improvement of district heating networks; promotion of public transport; increase in the share of renewable electricity; renovation of public buildings and multi-apartment buildings (Report, 2011). The selling of AAUs under the GIS provided for: i) the construction of new wind farms by the end of 2010 (Teckenburg E., Rathmann M., Winkel T., 2011); and ii) for the development of successful grant schemes for the buildings sector (refurbishment of residential and public buildings) (Egger C. et al., 2012). In August 2010 the Minister of MoEAC issued a regulation providing terms and procedures for the Green Investment Scheme Apartment Building Renovation Grants. Due to the availability of funds, experts see significant progress in financial instruments. (Egger C. et al., 2012). Also, through the GIS new buses were rented to a public transport service provider[121] (Tallinn University of Technology, 2012).

The current Mitigation/Adaptation policy mixture is adjusted to the EU standards. By 2010, the Estonian climate change legislation was harmonized with the relevant EU, except for the legislation on emissions from large combustion plants and from large oil shale fired power plants (Directive 2001/80/EC[122]); it is planned that Estonia will become fully compliant with the EU requirements by 1 January 2016 (UNFCCC, 2011).

Directive 2004/74/EC allowed Estonia to apply a transitional period until 1 January 2010 to introduce the output taxation on electricity. Despite this exemption, Estonia introduced excise duty on electricity on 1 January 2008; the imposed rate of electricity excise is 3,20 €/MWh, while the EU minimum rate is 1,00 €/MWh (non-business use) or even 0,50 €/MWh (business use). The latest increase of excise rates was enforced on 1 July 2009. At present, the CO_2 charge has to be paid by all enterprises producing heat, excluding the ones firing biomass, peat or waste (UNFCCC, 2011).

Estonia introduced pollution charges and resource use charges that will gradually increase in the following years. Environmental charge rates are in place until 2015. Environmental taxes are

[120] http://www.kik.ee/en/energy/renewable-energy.html

[121] In 2010–2011, 21 million € were invested in energy efficient and environment friendly buses (105 buses) for public transport system. The Estonian Road Administration purchased these new buses that were given to the public transport service providers' possession only for the duration of the public service contract. The new buses can use gas (including biogas) as fuel (Tallinn University of Technology, 2012).

[122] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2001:309:0001:0001:EN:PDF

grouped into four categories: pollution, resource, energy and transport taxes. Resource taxes include the mineral resources extraction charge, the water abstraction charge, the fishing charge, the forest stand cutting charge and the hunting charge.

There is no comprehensive strategy for adaptation in place. However, a process for drawing up a National Adaptation Strategy (NAS) has started and is coordinated by the Climate and Radiation Department in the Ministry of the Environment (MoE) (ECAP).

Estonia has introduced three acts concerning the adaptation to climate change. It transposed Directive 2007/60/EC on the assessment and management of flood risks[123] into the national legislation. The management of extreme weather conditions is regulated by the Emergency Act that came into force in July 2009. According to this Act there is a need to draw up emergency risk assessments and crisis management plans in case of storms and floods. The third Act, called "Water Act" regulates the use and protection of water, and relations between landowners and water users.

Conclusions

- The energy efficiency measures in Estonia focus on the building sector. There are no measures directly targeting for increased energy efficiency in the industrial sector.
- Estonian efforts are concentrated in decreasing GHG emissions of the electricity generation sector through the promotion of RES-e and CHP.
- The number of JI registered projects is restricted and concerns mainly wind and biomass plants.
- GIS play an important role for the promotion of energy efficiency in the building sector.
- The adaptation policy instruments concern the management of floods and extreme weather conditions and the use and protection of water.
- A process for a National Adaptation strategy is ongoing.

Intended Nationally Determined Contribution (INDC) of Estonia

Estonia, being an EU Member State is committed to contribute to the EU climate policy targets (20-20-20) and to transpose EU Directives into national laws. The Estonian INDC is that of the EU which is presented under the chapter for Greece.

[123] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:288:0027:0034:en:pdf

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Annex II

Kazakhstan

Country profile

The Republic of Kazakhstan is a unitary state with a presidential form of government. Kazakhstan gained independence on 16 December 1991. The President of the Republic of Kazakhstan is the head of state, its highest official, who determines the main directions of the domestic and foreign policy of the state and represents Kazakhstan within the country and in international relations. The Government implements the executive power of the Republic of Kazakhstan, heads the system of executive bodies and exercises supervision of their activity. Legislative functions are performed by the Parliament of the Republic of Kazakhstan, which consists of two Chambers acting on a permanent basis: the Senate and the Majilis.

By its administrative-territorial structure the country is divided into 14 regions (Akmola, Aktobe, Almaty, Atyrau, East Kazakhstan, Zhambyl, West Kazakhstan, Karagandy, Kostanay, Kyzylorda, Mangystau, Pavlodar, North Kazakhstan, South Kazakhstan) and 2 cities of republican significance (Astana, Almaty).

Kazakhstan is located in the centre of the Eurasian continent. It occupies the ninth (9^{th}) place in the world by its size (2.724.900 km^2). In the North and West the republic has common borders with Russia – 7.591 km (the longest continuous overland border in the world), in the East with China – 1.783 km, in the South with Kyrgyzstan – 1.242 km, with Uzbekistan – 2.351 km and with Turkmenistan - 426 km. Besides that, there are two midland seas in its territory – the Caspian and Aral.

A large part of the country's territory consists of deserts (44%) and semi-deserts (14%). Steppes cover 26% of Kazakhstan's territory and forests 5,5% respectively. Due to the remoteness from oceans the country has an extreme continental climate. The average temperature in January is around −19 °C in the north and −2 °C in the south, the average temperature in July is around +19 °C in the north and +28 °C in the south.

The population of Kazakhstan, as of 1 June 2012, was 16,76 million people. At present representatives of 130 ethnic groups live in the country. According to the national census, the ethnic structure of the Kazakhstan society by 2009 looks as follows: Kazakhs - 63,07%, Russians - 23,70%, Uzbeks - 2,85%, Ukrainians - 2,08%, Uygurs - 1,40%, Tatars - 1,28%, Germans - 1,11%, others - 4,51%.

The capital is the city of Astana. The state language is Kazakh. The Russian language has the status of a language of interethnic communication. The currency is Kazakh Tenge[124].

Location Map of Kazakhstan

National climate change policy

The Republic of Kazakhstan ratified the United Nations Framework Convention on Climate Change (UNFCCC) in May 1995, ratified the Kyoto Protocol (KP) in March 2009. Kazakhstan was included in Annex I for the purposes of the Kyoto Protocol in accordance with Article 1 (7)

[124] http://www.akorda.kz/en/category/respublica_kazahstan

of the Protocol, it was not included in Annex I for the purposes of the UNFCCC[125] up to the end of 2012 and had no formal emission target assigned under Annex B (2nd NC to UNFCCC, 2009). The country expressed voluntary obligations to reduce greenhouse gas (GHG) emissions, in particular by 15% till 2020 and by 25% till 2050 compared to the base year (1990) level[126].

Based on the decision of the COP-18, Doha, Kazakhstan became a Party of Annex B of the Kyoto Protocol[127]. Based on Minister of Environment Protection Mr. Kapparov, Kazakhstan entered Annex B of KP with quantative target to reduce GHG emissions 5% towards base year 1990[128] for period 2013-2020[129], the amendment of the KP-2 is not ratified yet.

Mitigation

In the context of its mitigation efforts, Kazakhstan has implemented the following policy instruments, which are affecting the energy sector. As shown in the table, promotion of RES and Energy management are the two options that the Government has selected to support by implementing the relevant policy instruments.

Table 1: **Implemented policy instruments for mitigation until 31 December 2010.**

Mitigation			
Scen.	**Sector**	**Technological options**	**Policy Instrument**
BAU	buildings	-	-
	Industry	-	-
	Transport	-	-
	Energy	Promotion of RES technologies	Regulatory standards /2010, Law No. /2009
		Energy management	Regulatory standard (law on electricity/2010).

Adaptation

The country had not implemented any policy instruments for climate change adaptation until 31 December 2010.

A view to the future: three scenarios

Demographic and macroeconomic assumptions

The Kazakh population is expected to decrease for the period 2011-2050 (UN, 2011). The average annual rates of change for the population – in analogy with the other countries – are shown in Table 2 – however, these were not used for all scenarios. Different rates were used for each scenario.

[125] Kazakhstan has made a notification under the article 4(2g) of the Convention that they wish to be bound by article 4 (2)(a) and (b) of the Convention despite not being an Annex I country – these articles provide a commitment to adopt policies and measures aimed at reducing anthropogenic GHG emissions and to report these emissions. UNFCCC – Communications in respect of Copenhagen Accord, Appendix I: http://unfccc.int/home/items/5264.php

[126] http://unfccc.int/files/meetings/application/pdf/kazakhstancphaccord_app1.pdf, http://unfccc.int/resource/docs/2010/awg12/eng/inf01.pdf ; the "Sectoral Program Zhasyl Damy for 2010-2014" (GOK Decree № 924, 09/2010, available at: www.zakon.kz/184802-utverzhdena-otraslevaja-pr .

[127] http://www.cop18.qa; http://unfccc.int/meetings/doha_nov_2012/meeting/6815/php/view/decisions.php

[128] GHG emissions in 1990 were 362,7 million tonnes of CO2-eq. without LLUCF and 369,6 mln. tonnes of CO_2-eq. with LULUCF, table P3, page 15,National Report on GHG emissions inventory for 1990-2009 (NIR), available at : http://www.eco.gov.kz, eco.gov.kz/files/o_kadastre.doc

[129] http://www.inform.kz/rus/article/2531332

Table 2: United Nations projections for the Kazakh population (UN, 2011).

Average annual rate of change (%)						
2010-2015	2015-2020	2020-2025	2030-2035	2040-2045	2045-2050	2050-2055
-0,10	-0,18	-0,23	-0,30	-0,40	-0,48	-0,54

The International Monetary Fund (IMF) provides GDP estimates for the country up to 2014 (Table 3).

Table 3: Projection for GDP of Kazakhstan (IMF, 2011).

Year	2011	2012	2013	2014
Annual percent change of GDP (%)	5,9	5,6	6,5	6,4

Business-As-Usual scenario

The policy mixture of the BAU scenario consists of the Mitigation/Adaptation (M/A) policy instruments that were implemented before 31 December 2010 (Table 1). The respective for this period Kazakh climate change policy has the following components: i) penetration of RES, ii) support to increase energy efficiency.

Concerning the adaptation policy, there are no implemented adaptation policy instruments.

Optimistic scenario

The enhanced M/A policy mixture of the OPT scenario includes:

i) the policy mixture of BAU;

ii) policy instruments for energy efficiency set into force after 1 January 2011.

There were no additional policy instruments.

Pessimistic scenario

The PES policy mixture was synthesized by: i) the policy mixture of BAU; ii) the M/A policy instruments that were set into force after 1 January 2011 (described in OPT).

There were no additional policy instruments.

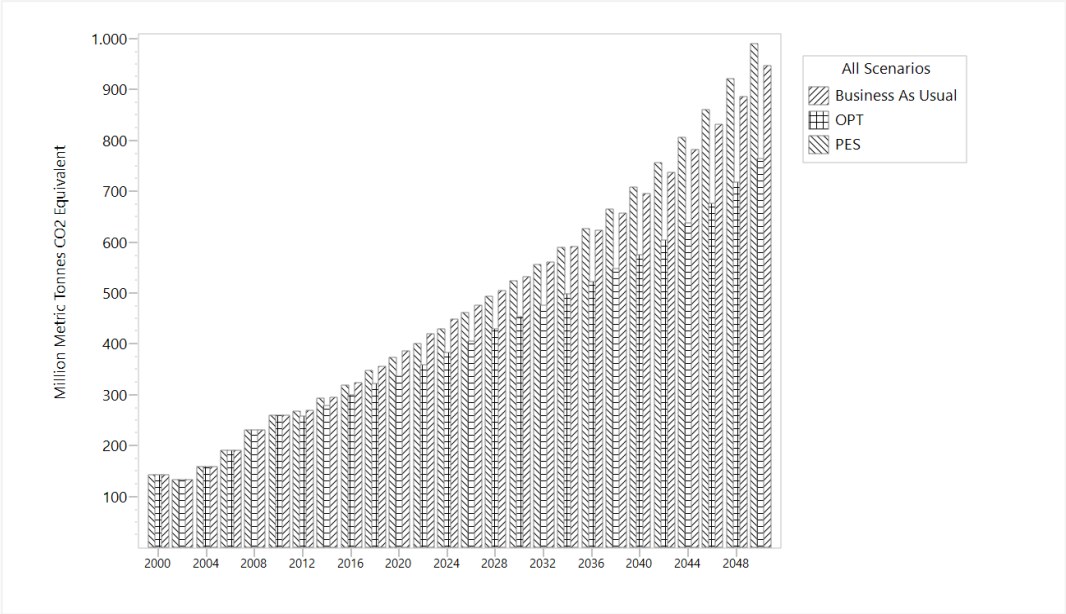
Results

The policy mixtures the characterize the three scenarios, as outcomes of the Long range Enregy Alternatives Planning System (LEAP), provide the following results, regarding the CO_2 emissions, the Final Energy Consumption, the Electricity Generation, the National Indicators and the RES production per technology.

It is clear that the monitoring of the assumptions evolution, applied in each scenario, allows a fuller understanding of the required adaptation measures, in order to implement the selected policy mixtures.

CO_2 emissions

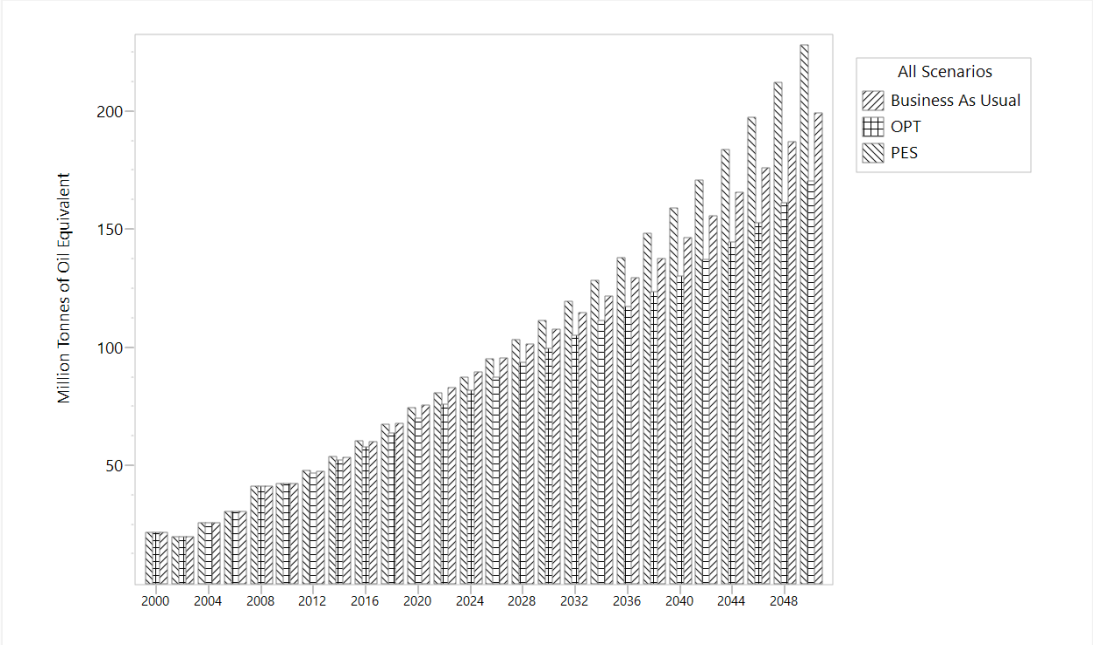
According to the outcomes of the modeling tool LEAP for the BAU scenario, in 2020 the GHG emissions are 386,1 $MtCO_2eq$. and the total primary energy consumption is 75,56 million toe. The OPT scenario demonstrates that the GHG emissions in 2020 are 335,8$MtCO_2eq$, which is less by 50,3 $MtCO_2eq$ compared to those of the BAU scenario. Finally the PES scenario shows that GHG emissions in 2020 are 372,4 $MtCO_2eq$ (more than OPT, less by 13,7 $MtCO_2eq$ compared to BAU scenario).



Graph 1: CO_2 emissions for 3 scenarios.

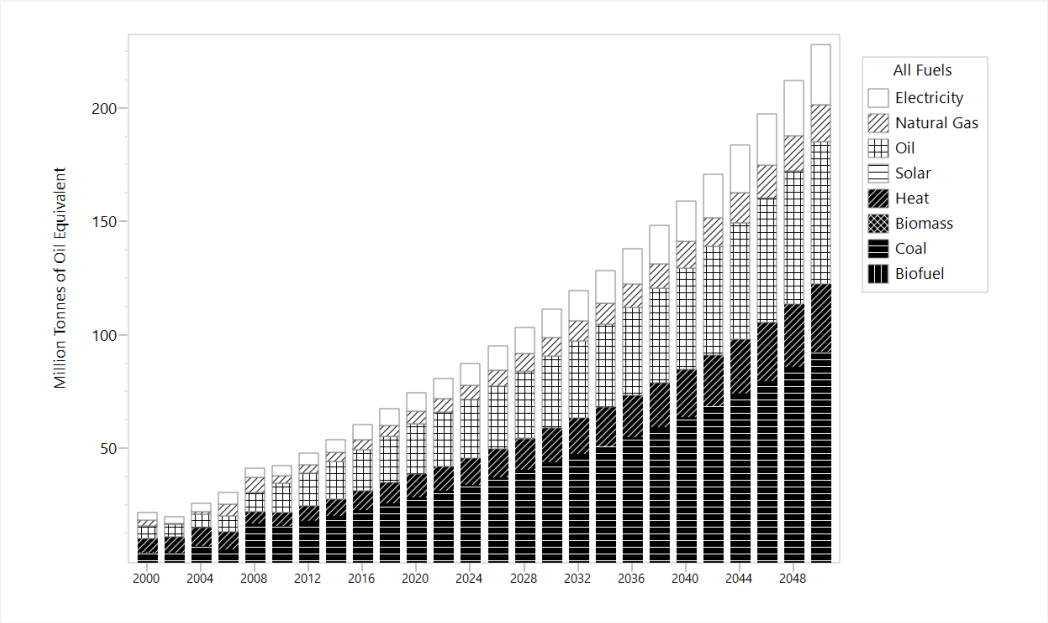
Final energy consumption

The future projections until the year 2050 show increasing final energy consumption, reaching the highest in the PES scenario. In the OPT scenario, the final energy consumption is the lowest by far, compared to those of PES and BAU scenarios.



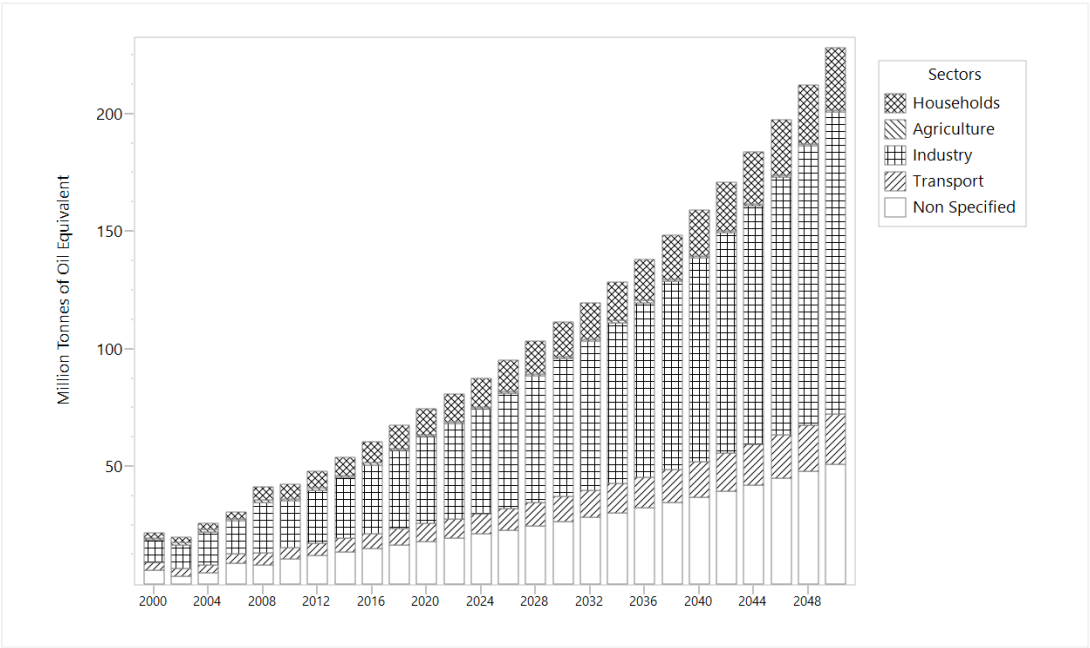
Graph 2: Final Energy Consumption for three (3) scenarios.

Regarding the trends on the fuel use until 2050, oil and coal use appear to have an important increase at their consumption after 2020. RES use (solar, biofuel and biomass) is included in significant smaller amount.



Graph 3: Final Energy Consumption per fuel, for BAU scenario.

The sectors, in BAU scenario, whose energy consumption appear to increase, are mostly industry and non-specified sectors (cumulative energy data). The consumption in Households and Transport is also expected to increase, while the agricultural sector is estimated to hold still the smallest percentage of final energy consumption.



Graph 4: Final Energy Consumption per Sector for BAU scenario.

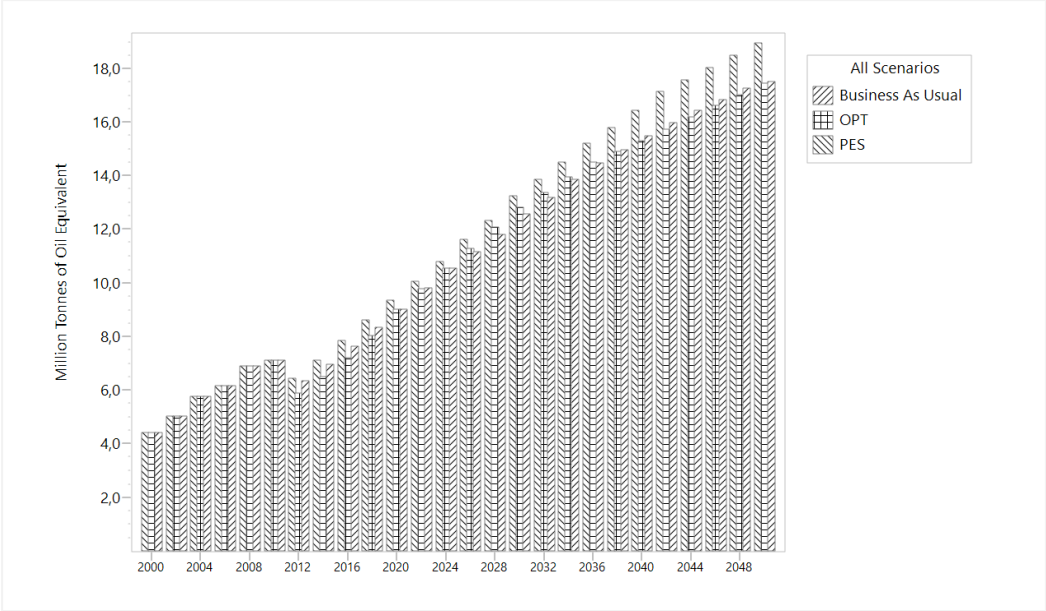
Electricity generation

Many of the existing power plants are aging and need renewal. The total installed capacity of electric power plants in 2010 was 19,4 GW. Coal is the main fuel for electricity generation. The power grid structure, divided into Northern (linked to Russia) and Southern (linked to Kyrgyzstan and Uzbekistan) however, is such that in some southern regions power is imported, while in some northern ones it is exported. In order to face this problem and improve Kazakhstan's energy

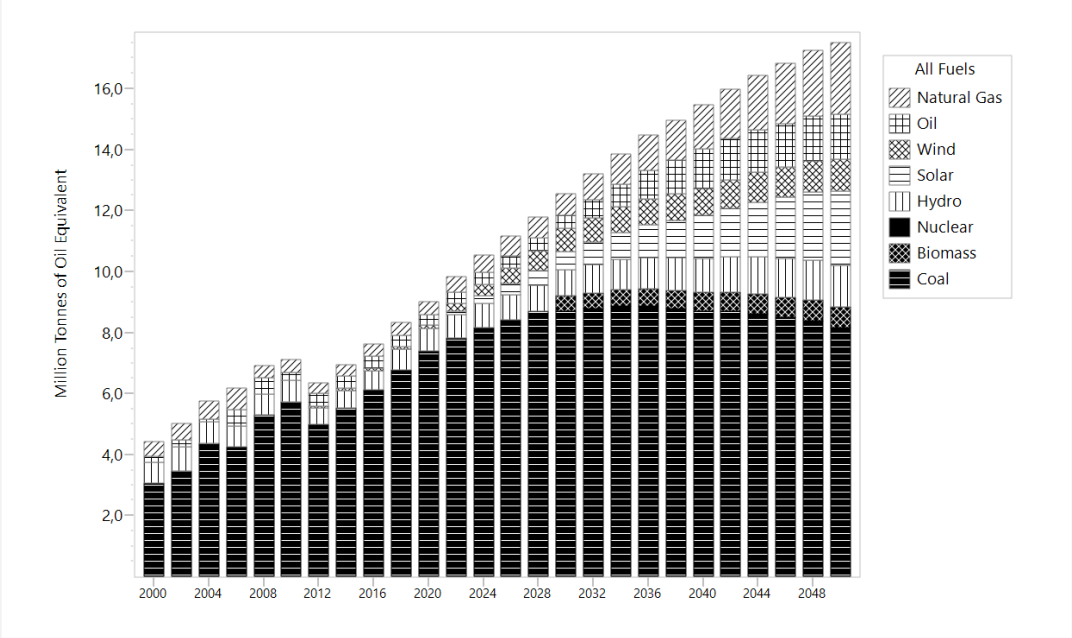
security, an electricity transmission project to link the two grids has been started by World Bank.[130]

The electricity market is regulated by the Agency of the Republic of Kazakhstan on Regulation of Natural Monopolies (ANMR). Generation tariffs are capped by government; transmission tariffs are set by the regulator. Retail tariffs are differentiated by volume and by the time of day, and are regulated as well. A little more than 85% of electricity generation capacity has been privatized, and most regional distribution companies are mostly private; the transmission network, on the other hand, is 100% state-owned.[131]

The LEAP results of electricity generation for the three (3) scenarios are shown in Graph 5.



Graph 5: Electricity generation in the three scenarios.



Graph 6: Electricity generation per fuel in BAU scenario.

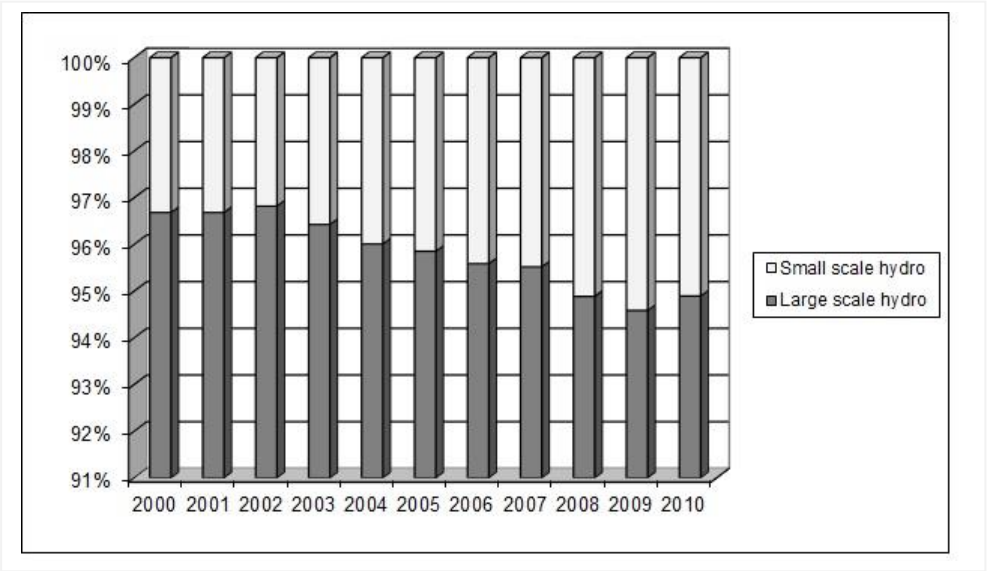
[130] Black & Veatch report for EBRD: http://ebrdrenewables.com/sites/renew/countries/Kazakhstan/profile.aspx
[131] REEEP: http://www.reeep.org/index.php?id=9353&text=policy&special=viewitem&cid=51

Evaluation

No evaluation outcomes.

RES production per technology

In Kazakhstan, the main RES technology for electricity generation is large scale hydro, followed by small-scale hydro, which accounts for 3-5% of the total electricity generation from RES.



Graph 7: Technology shares in RES electricity generation in 2000-2010.

Policy Trends

Kazakhstan, communicated to the UNFCCC secretariat on 18 September 2009, an amendment to the Kyoto Protocol regarding the inclusion of the country in Annex B of the Kyoto Protocol, with a quantified greenhouse gas emission limitation or a reduction commitment under Article 3 of the Kyoto Protocol of 100% of the 1992 level in the commitment period 2008 to 2012 and a footnote indicating that the country is undergoing the process of transition to a market economy.

Kazakhstan has been supporting its proposal of amending Annex B of Kyoto Protocol by: i) committing to a 6% reduction of its GHG emissions compared to that of year 1990 (15% reduction by 2020 and 25% reduction by year 2050) (Statement of the Head of Delegation of the Republic of Kazakhstan at the High Level Segment of UNFCCC COP17/KP CC7, 2011; FCCC/TP/2012/2); ii) adopting legislation for the establishment of a domestic carbon cap and trade scheme which in the future will be part of the international carbon market; iii) preparing and submitting the third national communication of Kazakhstan, which will be also its first national communication under the Kyoto Protocol, not earlier than by the end of 2012 (FCCC/SBSTA/2012/INF.9); iv) undertaking, apart from the establishment of a national cap and trade system, actions for the development of renewable energy resources, energy efficiency and saving programmes and projects, and incentives for the introduction of innovative technologies.

Renewable energy sources were underdeveloped in Kazakhstan due to the abundance of energy resources (GEF, 2011). Now they are promoted by the need to (GEF, 2011; EBRD, 2009): i) reduce GHG emissions; ii) replace electricity imports, especially in the southern region; iii) extend the access to electricity for the remote and nomadic populations of the country; iv) protect the Kazakh delicate ecosystem by reducing the use of coal in the electricity generation system (presently at 85%); v) strengthen local power supply and vi) reduce line losses and improve stability and reliability by installing dispersed and end-of-line generation stations that use RE resources. Kazakhstan possesses significant resources of renewable energy in the form of hydro energy, solar energy and wind energy (UNDP, 2006).

The country adopted a RES target under Law "On Support to Use of RES"[132] (No. 165-IV, issued on 04.07.2009[133], with last amendments and additions made on 10.7.2012[134]). The target is that 5% of Kazakhstan's energy balance must be from RES by year 2024 (EBRD, 2009). The same law established a full regulatory framework for RES, and introduced feed-in tariffs and renewable energy certificates to encourage RES investments (EBRD, 2009). It was supported by four Government Decrees[135]. Due to obstacles (lengthy administrative procedures; uncertainty due to the not fixed Feed in Tariff Rate and to not referring clearly of who will pay the RES cost) during its implementation a new law was prepared (Smith H., 2012). In July 2013, the RES Law and other legislative acts were amended (White & Case, 2013) introducing a system of fixed tariffs for the purchase of electric power from the suppliers by the Financial Settlement Center[136]. These tariffs will be approved by the Government for a period of 15 years separately for each RES type and will be subject to annual indexation for inflation through a procedure determined by the Government. So far, no indexation procedure has been approved (White & Case, 2013). Amendments will become effective on 12 January 2014 (White & Case, 2013).

Law on energy savings and energy efficiency enhancement (issued on 13.1.2012) refers to the sector of buildings and construction[137] by setting obligatory use of energy efficient construction materials and equipment for new buildings; mandatory energy metering and heat regulation equipment; information on projected energy consumption performance – building energy labeling; and mandatory examination on compliance to the above requirements during project designing and acceptance. Particularly for equipment and home appliances, it introduced energy labeling, requirements of energy metering for appliances and limitation on the use of indecent bulbs.

Kazakhstan is the first country in Asia to implement an economy-wide Emission Trading Scheme (ETS), since South Korea's economy-wide ETS is scheduled to begin in 2015. The Ecological Code of Kazakhstan (issued in 2007)[138] set out the basic rules for emission trading and provided for the possibility of emission trading on international level. The ETS scheme was enacted on 3.12.2011 through an amendment of the Ecological Code. Afterwards, this amendment was supported by 17 Government Decrees and 14 Ministerial Orders regarding the regulation of the Kazakh ETS (Kerimray A. et al., 2013).

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[132] The law was a result of a Renewable Energy & Energy Efficiency Partnership (REEEP) program funded by the United Nations Development Program.

[133] http://cis-legislation.com/ document.fwx?rgn=28433

[134] http://kazreff-ser.com/SER/KazREFF_Scoping_Meeting_PPT_Astana_ENG.pdf

[135] i) No. 529 (5.10.2009) "On approval of Rules for monitoring the use of RES"; ii) No. 2190 (25.12.2009) "On approval of Rules, terms of coordination and approval of feasibility studies and construction projects for renewable energy facilities; iii) No. 70 (16.1.2012) "Rules of purchasing electricity from qualified energy-producing organizations"; iv) No.119 (19.1.2012) "Rules for determining the nearest point of connection to the electrical or thermal networks and connecting objects on the use of RES".

[136]Previously regional electric grid companies - to whose electric grids RES-E using facilities were directly connected - were required to purchase the full amount of electricity directly from the qualified power generating organizations using RES. Starting from 12 January 2014 power will be purchased from such Suppliers through a special Financial Settlement Center (White & Case, 2013).

[137] http://www.unescap.org/esd/Energy-Security-and-Water-Resources/energy/efficiency/2012/Urumqi_3_Sepember/presentations/Agenda2_Umirbekov.pdf

[138]http://ecokadastr.kz/Publications/%D0%AD%D0%BA%D0%BE%D1%81%D0%B8%D1%81%D1%82%D0%B5%D0%BC%D0%BD%D1%8B%D0%B9%20%D0%BF%D0%BE%D0%B4%D1%85%D0%BE%D0%B4%20%D0%BE%D0%BF%D1%80%D0%B5%D0%B4%D0%B5%D0%BB%D0%B5%D0%BD%D0%B8%D1%8F%20%D0%B4%D0%BE%D0%BF%D1%83%D1%81%D1%82%D0%B8%D0%BC%D0%BE%D0%B3%D0%BE%20%D1%83%D1%80%D0%BE%D0%B2%D0%BD%D1%8F%20%D0%B8%D1%81%D0%BF%D0%BE%D0%BB%D1%8C%D0%B7%D0%BE%D0%B2%D0%B0%D0%BD%D0%B8%D1%8F%20%D0%B2%D0%BE%D0%B4%D0%BD%D0%BE-%D0%B7%D0%B5%D0%BC%D0%B5%D0%BB%D1%8C%D0%BD%D1%8B%D1%85%20%D1%80%D0%B5%D1%81%D1%83%D1%80%D1%81%D0%BE%D0%B2%20(%D0%B0%D0%BD%D0%B3%D0%BB).pdf

The National ETS[139] is introduced as a cap & trade scheme, covering oil, coal and gas sectors, power sector, chemical industry, mining and metallurgy. Agriculture and transport is under debate (EDF – IETA, 2013). Phase I was initiated in 2013, as pilot phase, and covers companies and not installations as in EU-ETS. In Phase II (2014-2020) companies will be obliged to report data at installation level. For the pilot phase, only CO_2 emissions are covered (Kerimray A. et al., 2013) and there are no penalties for non-compliance with the requirement to surrender allowances. Nevertheless, there are penalties for not submitting the required documents and reports to the Ministry of Environment Protection.

Kazakhstan's participation options in Kyoto Protocol flexibility mechanisms have been indefinite because the country had been considered an Annex 1 country since 2001, thusly excluding it from creating CERs, but it has not been a member of Annex B, so it has been unable to participate in ERU or AAU generation. Until Kazakhstan is accepted into Annex B, its ETS efforts can only impact its domestic market (EDF – IETA, 2013). No registered NAMAs at the UNFCCC or Ecofys database[140],[141].

The country lacks of adaptation climate change policy, although it is already experiencing climate change impacts.

Conclusions

- There are no policy instruments to support energy efficiency in the transport, industrial or agricultural sectors.
- Kazakhstan introduced an economy-wide Emission Trading Scheme (ETS). In 2013, the pilot phase was initiated covering only CO_2 emissions from companies of oil, coal and gas sectors, power sector, chemical industry, mining and metallurgy. 2014 starts the next phase of ETS.
- As an Annex 1 country, it is not eligible for CDM projects. Currently, the country is not yet accepted as Annex B country, so it cannot participate in JI projects either.
- The country lacks of policy instruments for adaptation to climate change.

[139] http://www.thepmr.org/system/files/documents/Kazakhstan_Update_October%202013.pdf
[140] http://www4.unfccc.int/sites/nama/SitePages/Country.aspx?CountryId=89
[141] http://www.nama-database.org/index.php/By_region

Intended Nationally Determined Contribution (INDC) of the Republic of Kazakhstan

Intended Nationally Determined Contribution - Submission of the Republic of Kazakhstan

The Republic of Kazakhstan is fully committed to the UNFCCC negotiation process with a view to adopting a global legally binding agreement applicable to all parties at the Paris Conference in December 2015, with the ultimate aim of ensuring that global temperature rise does not exceed 2°C.

The Republic of Kazakhstan wishes to communicate the following Intended Nationally Determined Contributions (INDC), and intends to achieve an economy-wide **target of 15%-25% reduction in greenhouse gas emissions by 2030 compared to 1990**. In line with the Lima Call for Climate Action, the following quantifiable information is hereby submitted:

Intended Nationally Determined Contribution	
Party	Kazakhstan
Unconditional target	A 15% reduction in GHG emissions by 31 December 2030 compared to the base year
Conditional target	A 25% reduction in GHG emissions by 31 December 2030 compared to the base year, subject to additional international investments, access to low carbon technologies transfer mechanism, green climate funds and flexible mechanism for country with economy in transition.
Type	Economy-wide absolute reduction from base year emissions
Base year	1990
Gases covered	• Carbon Dioxide (CO_2) • Methane (CH_4) • Nitrous Oxide (N_2O) • Hydrofluorocarbons (HFCs) • Perfluorocarbons (PFCs) • Sulphur hexafluoride (SF_6)
Period	1 January 2021 – 31 December 2030
% of emission covered	100%

Net contribution of international market based mechanisms	Kazakhstan supports inclusion of market based mechanisms in the 2015 agreement, and the opportunity to use carbon units recognised by the UNFCCC. Kazakhstan retains the option of using market based mechanisms under the UNFCCC. Kazakhstan will consider adequately discounting international units for compliance to ensure a contribution to net global emission reductions.
Planning process	Kazakhstan's long term objectives is to become one of the 30 most developed countries in the world by 2050. Following a path of low carbon economy growth Kazakhstan adopted the law "On energy saving and energy efficiency", "On Supporting the Use of Renewable Energy Sources" aiming at greater use of renewable energy sources. In order to emphasize its commitment to low carbon growth, Kazakhstan has adopted a Concept on transition to a «Green» Economy. For the implementation of the Concept, an action is developed, under which government programs on waste management, modernisation of housing and communal services, development of sustainable transport, conservation of ecosystems and enhancement of forest cover were adopted. The laws on extended responsibility of entrepreneurs and greening of vehicles are being formulated. The implementation of the «Green» Economy Concept, and adoption of related legislative acts, should lead to modernisation of key infrastructure and production technologies based on energy-efficient technologies, and will make a significant contribution to reducing the emissions of greenhouse gases.

Fair and ambitious targets, taking into account national circumstances	The target set represents a significant progression beyond the pledge of a 7% emission reduction of greenhouse gas emissions by 2020 compared to the 1990 base year. This target is ambitious, as Kazakhstan has undergone a period of consistent growth from 2000 – 2010 during which GDP growth reached 8.3%. GDP growth during this period has always exceeded that of the world average. Under a revised and conservative business as usual scenario which takes into account potentially lower GDP growth rates the target proposed by Kazakhstan amounts to a 22% reduction in GHG emissions by 2030 compared to BAU projected emissions. Under favourable economic conditions and an increase in oil prices, the unconditional target proposed by Kazakhstan would amount to a 34% reduction in GHG emissions by 2030 compared to BAU projected emissions. The ambitiousness and fairness of the statement are concluded by the current emissions of Kazakhstan that reached 80-85% from 1990. At the same time the aim of the government's economic policy of Kazakhstan is faster growth of GDP per capita to reach the current level of development of the countries of the OECD by 2030.

How the INDC contributes to achieving the ultimate objective of the Convention (Article 2)	Recognizing the reality and taking responsibility, Kazakhstan intends to contribute to international efforts to combat climate change. The reduction or stabilization of greenhouse gas emissions in 2030 at 85% of emissions level in 1990 (absolute target) or more ambitious goal of reducing the overall national emissions by 25% (conditional target), is a rather challenging target in economic and financial sense, achievement of which, among other things, should not lead to socio-economic tensions. The objectives set, will contribute to sustainable economic development and enable Kazakhstan to enter the path of low-carbon "green" development, and contribute to the achievement of the long-term global goal – to keep increase in global temperature below 2 degrees Celsius.
Key assumptions	
Global warming potential (GWP) applied	The GWP values adopted by decision 24/CP.19 of the Conference of the Parties to the UNFCCC
Methodologies for estimating emissions	Methodologies for estimating GHG emissions sourced from: • IPCC 2006 Guidelines; • IPCC 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol; • IPCC 2013 Wetlands Supplement.
Sectors covered	All IPCC sectors are covered, namely: Energy, Agriculture, Waste, Land Use, Land-Use Change and Forestry

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National and Kapodistrian University of Athens
Energy Policy and Development Centre (KEPA)

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