UKRAINE 2050 LOW EMISSION DEVELOPMENT STRATEGY

KYIV, November 2017

CONTENTS

LIST OF ABBREVIATIONS

NPP	nuclear power plant
GDP	gross domestic product
RES	renewable energy sources
LULUCF	land use, land use changes and forestry
Catalogue	Catalogue of directions and policies and LEDS measures
IAC	inter- agency commission on implementation of United Nations Framework Convention on Climate Change
IPCC	Intergovernmental Panel on Climate Change
IEA	International energy agency
OR	oil refinery
OECD	Organization for Economic Cooperation and Development
GHG	Greenhouse Gases
VAT	Value Added Tax
PPP	Purchasing Power Parity
UNFCCC	United Nations Framework Convention on Climate Change
LEDS	Low Emissions Development Strategy
CPP	co-generation power plant
DSW	domestic solid wastes
FAO	United Nations Food and Agriculture Organization

SUMMARY

Low emission development strategy (hereafter – LEDS) determines national stakeholders agreed vision on decoupling further economic and social growth of the State and its social development from the growth in greenhouse gases emissions (hereafter – GHG).

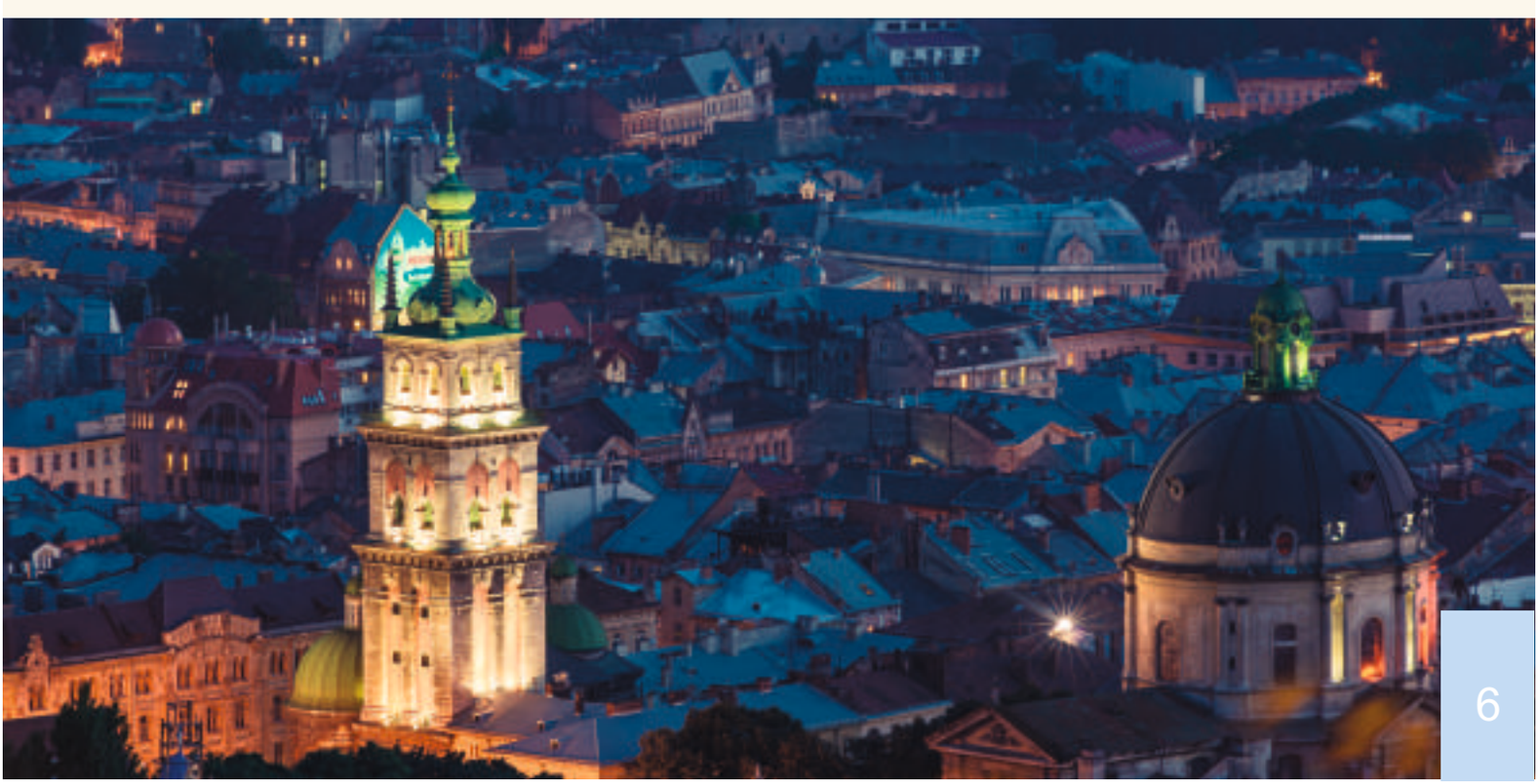
LEDS development has become Ukraine's first experience in synergy approach application, as climate change problem solution requires significant advances in the key sectors of economy and main components to human livelihood.

On the one hand, LEDS is based upon the national priorities for sustainable development and current sectoral strategies, while, on the other, it determines a potential pathway for economic development with due account of the goals for the state policy on emission reduction and GHG absorption.

At the national level, the LEDS is an instrument for public administration and shaping of climate responsible behavior of both businesses and citizens, while at the international level, it supports a global target on stabilization of GHG concentration in accordance to the scenario of global average temperature increase confinement to well below 2°C of pre-industrial level.

Existence of LEDS is the basis for development and implementation of economic instruments used to support Ukraine's transition to low emission development, attraction of innovation technologies and international financial resources.

LEDS is made of six sections.



FIRST SECTION «Strategic vision of low emission future for Ukraine» briefly describes the problems in Ukraine's economic development and approaches to solve them, as well as the LEDS's goal and objectives.

The LEDS goal is to determine strategic directions for Ukraine's economy sustainable development based on national priorities accordant transition to low emission growth trajectory.

Strategy objectives:

Objective I. Transition to energy system which envisions the use of energy sources with low carbon content, development of the sources of clean electricity and heat energy, increase in energy efficiency and energy saving in all sectors of economy and housing and utilities infrastructure facilities, stimulation of the use of alternative to oil motor fuels and transition of cargo and passenger carrying operations to more environmentally clean types of transport.

Objective II. Increase in the volumes of carbon absorption and uptake with the help of best climate change mitigation practices in agriculture and forestry.

Objective III. Reduction in GHG emissions such as methane gas and nitrogen oxide predominantly associated with fossil fuel production, agriculture and waste.

LEDS focuses on policies and measures which will be gradually implemented up to the mid of the current century CHBP, and envisions their periodical review and adjustment.

SECOND SECTION «Prerequisites to low carbon development» includes information on:

- Conclusions of IPCC - Intergovernmental Panel on Climate Change (hereafter IPCC), which justify the need in GHG reduction in order to maintain such status of climate system which will preclude growing in the risks for health and wellbeing of people and environment.

- Main goals of Paris Agreement, which aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, and the expected outcomes for Ukraine from this Agreement implementation.

- Dynamics in Ukraine's GHG emission for the period 1990 – 2015, including explanations of the specific features in their observed trajectory, as well as the main factors underpinning them. In particular, the GHG emissions in 2015 amounted to 323.36 million tons of CO_2-equivalent, with the exception of sector «land use, changes in land use and forestry » (hereafter - LULUCF), which is by 66.4% lower than in the base 1990 year. If the LULUCF is included, the emissions in 2015 amounted to 308.64 million tons of CO2-equivalent, which is by 66.1% less compared to base year.

- Dynamics in Ukraine's average annual temperature deviations from climate normal over the period from 1961 – 2015, list of climate change impacts and substantial consequences.

- Ukraine's international cooperation and participation in climate change mitigation effort.

THIRD SECTION «Legislative and institutional foundations, » describes legislative framework supporting low emission development, specifically:

- Fundamental legislative acts on sustainable development, Ukraine EU Association, ratification of Paris Agreement, Concept for the State Environmental Policy Implementation.
- Acts issued by the Cabinet of Ministers of Ukraine pertaining to the State policy on climate change.
- Energy Laws and Acts of the Cabinet of Ministers of Ukraine.
- Renewable energy and Energy Saving Laws and Acts of the Cabinet of Ministers of Ukraine.
- Laws and Acts of the Cabinet of Ministers of Ukraine, draft strategies for development of different climate related industries in Ukraine's economy.

Central Executive Body authorized to form and implement the State policy on climate Change is the Ministry for Ecology and Natural Resources of Ukraine. Inter-agency Commission on implementation of the United Nations Framework Convention on Climate Change (hereafter UNFCCC) is an advisory body for coordination of activities on different climate change related aspects.

FOURTH SECTION «Decarbonization of Energy in Ukraine» makes the key section of LEDS as the energy sector's share in total emissions of GHG amounts to 65%, and if taken together with GHG generated by the "Industrial processes sector," the share totals at 82%.

According to 2015 data, carbon intensity of Ukraine's GDP is 1.9 times higher than the global figure, 2.4 times higher than that of the OECD countries and 3.3 higher than that of 28 EU member states. Over 1990-2015 the GDP's carbon intensity was going down, yet, under the current economic policy the pace of such reduction is not sufficient.

According to Baseline (business as usual) scenario, which envisions that the characteristics for most of technologies that households apply in their use and consumption of energy resources and those applied throughout all the stages of goods and services production remain unchanged up to 2050, projections of GHG emissions in «Energy» and «Industrial processes» are the following:

	2012*	2015*	2020	2025	2030	2035	2040	2045	2050
Emissions, million tons *of CO_2-equivalent*	367	265	347	408	455	500	540	570	592
Share of 1990 level, %	44	31	41	48	54	59	64	68	70

** data of the National Cadaster of anthropogenic emissions from sources and absorption of greenhouse gases by absorbers in Ukraine over 1990-2015.*

In order to measure reduction in GHG emissions, identified and factored in were the policies and measures on de-carbonization of Ukraine's energy sector grouped by functional and sector principle. Of which, single out were those aiming at the energy sector de-carbonization.

I. Energy efficiency

Projections of GHG emissions in «Energy» and «Industrial processes» sectors under «Energy efficiency» scenario.

Scenario	Unit	2012*	2015*	2020	2025	2030	2035	2040	2045	2050
Scenario «Energy efficiency»	Million. tons of CO_2 -equivalent	367	265	294	335	344	363	406	429	448
	% of 1990 level	44	31	35	40	41	43	48	51	53

Group of policies and measures in energy efficiency includes the following:

1. Increase of energy efficiency in the buildings;
2. Promotion of private and public financing of measures aiming at increase in energy efficiency;
3. Specific measures aimed at increase in energy efficiency in the use of electricity and heat energy and/or types of fuel in all sectors of Ukraine's economy;
4. Incentives to use energy efficient technologies in agroindustry;
5. Incentives to use energy efficient measures in the industry.

II. Renewable energy

Projections of GHG emissions in «Energy» and «Industrial processes» sectors under «Energy efficiency and renewable energy» scenario.

Scenario	Unit	2012*	2015*	2020	2025	2030	2035	2040	2045	2050
Scenario «Energy efficiency and renewable energy»	Million. tons of CO_2 -equivalent	367	265	282	315	312	291	299	288	278
	% of 1990 level	44	31	33	37	37	34	35	34	33

Group of policies and measures in renewable energy includes the following:

1. Increase in output and consumption of electricity produced from renewable sources;
2. Environmentally sustainable production and extension in the use of biomass (biofuel);
3. Production of biogas and extension in its use for heat energy and electricity production;
4. Development of Ukraine's sectors international integration in the sphere of renewable energy.

III. Modernization and innovation

Projections of GHG emissions in «Energy» and «Industrial processes» sectors under «Energy efficiency, renewable energy, modernization and innovation» scenario.

Scenario	Unit	2012*	2015*	2020	2025	2030	2035	2040	2045	2050
Scenario «Energy efficiency, renewable energy, modernization and innovation»	Million. tons of CO_2 -equivalent	367	265	265	361	244	242	274	284	285
	% of 1990 level	44	31	31	31	29	29	32	34	34

The highest reduction in GHG emissions level will be attained by 2035, after that, the GHG emissions may show insignificant growth. Under this scenario, the share of GHG emissions shall amount to 34% of 1990 level, which is by one percentage point higher compared to the above presented scenario. Under the «Energy efficiency, renewable energy scenario» which does not include modernization and innovations, higher share of renewable energy sources was needed in the structure of energy resources production and consumption in the sphere of traditional generation, in particular.

Group of policies and measures in the sphere of modernization and innovation includes the following:

1. Increase in power plant operations;
2. Nuclear energy development;
3. Modernization and intellectualization of power grids;
4. Modernization of transport sector;
5. Development of highly efficient cogeneration at local and regional level;
6. Support to energy accumulation technologies implementation;
7. Development of hydrogen generation.

IV. Transformation of market and institutions

Projections of GHG emissions in «Energy» and «Industrial processes» sectors under scenario «Energy efficiency, renewable energy, modernization and innovation, transformation of market and institutions»

Scenario	Unit	2012*	2015*	2020	2025	2030	2035	2040	2045	2050
Scenario «Energy efficiency, renewable energy, modernization and innovation, transformation of market and institutions»	Million. tons of CO_2 -equivalent	367	265	265	259	242	236	264	265	261
	% of 1990 level	44	31	31	31	29	28	31	31	31

Group of policies and measures in the sphere of transformation of market and institutions includes:

1. Introduction of market mechanisms enabling reduction in GHG emissions;
2. Support to research and development and design and engineering works;
3. Promotion of more active engagement of communities into climate related policies and measures;
4. Disclosure of information on GHG emissions and absorption at the enterprise level;
5. Application of energy efficiency criteria in the state procurement process;
6. Training and upgrading the skills of professionals;
7. Enhancement of the program for public awareness of climate change consequences, climate change prevention and adaptation to climate change;
8. Enhancement of requirements to ecodesign and labelling of energy related products;
9. Improvement of the organization of labor relations to stimulate, where possible, the use of remote working arrangements.

Modelling results show that in 2050 the GHG emissions in «Energy» and «Industrial processes» sectors (according to IPCC classification) may be reduced to the level of 31-34% of 1990, or to 260-285 million t of CO2-equivalent, given that a wide set of low carbon policies and measures for low emission development of Ukraine are implemented,, which, in its turn, will lead to positive social and economic outcomes, in particular, additional growth in GDP and real households income.

FIFTH SECTION «Reduction of GHG other than CO2» describes policies and measures in three areas of activities, aimed at reduction of methane and nitrogen emissions, specifically:

I. Reduction in the leaks in the process of extraction, processing, transportation and storage of fossil fuels includes the following policies and measures:

1. Reduction of leaks in gas sector;
2. Reduction in leaks in the process of oil extraction, transportation and processing;
3. Removal, use and recycling of coalmine methane from underground coalmines.

II. Improvement of waste treatment includes the following policies and measures:

1. Reduction in the amounts of waste and prevention of waste generation;
2. Conducting social advertising campaign aimed at reduction of domestic waste generation;
3. Improvement of methods applied to waste treatment, promotion the repeated use and secondary recycling of waste;
4. Improvement of wastewater treatment.

III. Activities in agriculture include the following policies and measures:

1. Improvement of the treatment process of animal origin byproducts;
2. Optimization of agricultural crops fertilization systems.

SIXTH SECTION «Absorption of carbon and reduction in GHG emissions in the land use sector, change in the land use and forestry» describes the sector and its contribution to the balance of GHG emissions and absorption.

List of policies and measures in the LULUCF includes the following:

1. Optimization of land use structure, extension of space covered with forests, wood lines and green planting under enhanced interagency coordination;
2. Betterment of business practices in the sector using the climate smart methods in agriculture and forestry;
3. Development and implementation of national program for forestry development using the best international experience in this field;
4. Fostering replacement of energy intense produce (such items made of metal, concrete, plastic etc.) with produce made of wood, grown under sustained (balanced) yield forest management.

Projections of GHG absorption by Ukrainian forests under different scenarios:

Scenario	Unit	2012*	2015*	2020	2025	2030	2035	2040	2045	2050
«Business as usual» (no change scenario)	Million. tons of CO_2 -equivalent	60	56,4	55,3	52,8	50,3	48,8	47,4	45,9	44,4
	% of 1990 level	95	89	87	83	79	77	75	72	70
«Forward looking» Scenario	Million. tons of CO_2 -equivalent	60,0	57,6	56,4	54,6	52,8	52,2	51,6	51,0	50,4
	% of 1990 level	95	91	89	86	83	82	81	80	79
«Forward looking with optimum forest cover» Scenario	Million. tons of CO_2 -equivalent	60	57,6	57,0	55,6	54,3	54,1	54,1	54,0	53,9
	% of 1990 level	95	91	90	88	86	85	85	85	85

Due to specific features in the age structure of Ukraine's forests, it is expected that moving forward their absorption capacity will gradually decrease because of a declining growth in phytomass attributable to forest stands' natural aging processes.

Yet, if Ukraine's forest cover increase up to 19.4 % and progressive management solutions are implemented, in 2050 the volumes of GHG absorption by the forests will amount to 85% of 1990 level. Given appropriate implementation of other policies and measures in the LULUCF sector, the GHG emissions and absorption balance will reach 1990 level.

Being committed to achieving Paris Agreement goals and being guided by national priorities, Ukraine will ensure doing its best to achieve the indicative GHG emissions target of 31-34% by 2050, compare to 1990 level. This target is ambitious and fair in the context of Ukraine's participation in the global response to the climate change threat.

Long term strategic planning is an iterative process; hence, this document should not be treated as final. Ukraine is planning to review its strategy at least every five years in order to measure its progress, and to increase the level of its ambitions in accordance to national circumstances.

STRATEGIC VISION OF LOW CARBON FUTURE FOR UKRAINE

1

1.1. Problems and challenges of Ukraine's sustainable development

Transition of Ukraine's economy to low carbon trajectory is an important component to Government policy aimed to ensure its sustainable development, specifically, in the context of 2030 Global sustainable development goals.

Following the signing of the Association Agreement between Ukraine as one Party, and European Union, European Atomic Energy Community, and their member states, as the other Party (hereafter - EU Association Agreement) enhancement of competitiveness has been the main challenge for Ukraine's economic development. Main directions to resolve this problem include establishment of more favorable investment climate, stimulation of innovations, modernization of fixed production assets, and creation of high technology jobs, raising the labor and production efficiency, and implementation of structural and institutional reforms.

Innovation-investment development model should become the foundation for extended social restoration, where the increase in the volumes of output produced and increase in its competitiveness are achieved not by means of additional use of resources, but mainly through intensive production factors, active use of new knowledge and materialized outcome of such knowledge. Added to this is the fact that negative trends that are observed in production sphere and include aging of fixed assets, technological equipment, and loss of the most skilled staff etc, make it more difficult for Ukraine's economy to get out of systemic crises. Therefore, resolute transition to innovation development model is the only solution to the crisis.

Ukraine needs high pace of GDP growth to overcome poverty and impoverishment of citizens, yet, it should be underscored, that a new development model should be – «green» restoration, «green» growth, «green» development, which is based on the inflow of investments into renewable sources of energy, environmentally safe production, and «green» technologies.

1.2. Goals and objectives of Ukraine's low emission development strategy.

The LEDS goal is to determine strategic directions for Ukraine's economy sustainable development based on the national priorities accordant transition to low emission growth trajectory.

Strategic vision of low carbon future is reflected in the LEDS objectives:

Objective I. Transition to energy system which envisions the use of energy sources with low carbon content, development of the sources of clean electricity and heat energy, increase in energy efficiency and energy saving in all sectors of economy and at housing and utilities infrastructure facilities, stimulation the use of alternative to oil motor fuels and transition of cargo and passenger carrying operations to more environmentally clean types of transport.

De-carbonization of energy system shall bring about structural changes in the economy, primarily through reduced demand for fossil fuels, which will bolster investment opportunities for machine and equipment building, and facilitate expansion of markets for new technology and incentives to further innovations.

Objective II. Increase in the volumes of carbon absorption and uptake with the help of best climate change mitigation practices in agriculture and forestry.

Policy of climate change prevention and mitigation in the sectors of land use and forestry requires strengthening of institutional and improvement of regulatory framework, specifically, with respect to retention and enhancement of climate protection function of forests and soils. Application of climate smart methods in agriculture and forestry will result in the increased volumes of carbon absorption and uptake.

Objective III. Reduction in GHG emissions such as methane gas and nitrogen oxide predominantly associated with fossil fuel production, agriculture and waste.

In addition to reduction in GHG emissions, development and implementation of innovation technologies and production management methods in the above mentioned spheres, will contribute to improvement in human health and reduce the level of environmental degradation.

In the process of Ukraine 2050 LEDS development the best global practices were taken into account, and the policies and measures were widely discussed by sectoral work groups, which included decision makers, representatives of academic and expert communities and public.

LEDS is focused on the policies and measures which will be gradually implemented up to the mid of the current century, and envisions their periodic review and adjustment.

PRECONDITIONS OF TRANSITION TOWARDS LOW CARBON DEVELOPMENT

2

2.1. Climate change combatting advantages

According to IPCC Fifth Assessment Report, research on detection and establishment of the causes behind climate change have demonstrated that anthropogenic influence on global climate system is the main reason of its undeniable warming, which has been observed since 1950. Human influence has also resulted in substantial increase of regional temperatures at the continent and subcontinent levels. It is expected that the change in temperature distribution towards warmer regimes will also result in higher repeatability and intensity of extremely high temperature periods.

It is highly likely that from 2000 to 2100 increase in average global temperature of the air will amount from two до 5 °C, and raising of sea level - from 0.6 to 1.2 meters with a possibility for significantly higher growth. Climate change can make long-term economic growth impossible and will increase the risks for human livelihood security at global level. As its consequences, the climate change will include more frequent waves of heat, drought and other extreme weather phenomena, change in precipitation regime and exhaustion of ecosystems, which will substantially increase the risks to health and wellbeing of people and environment.

Paris Agreement, in enhancing the implementation of the UNFCCC, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

- «Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
- Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; and;
- Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development».

In Ukraine, achievement of optimum interrelationship (synergy) of Paris Agreement goals with Ukraine's national priorities will make it possible to:

- Enhance the role of energy efficiency and general technological modernization of economy on the basis sustainable development;
- Implement the renewable energy sources on broader and more sound basis;
  Ensure interlink ages of the State policy in the climate change sphere with the strategies, policies, plans and programs in other spheres of economic and social development of the State;
- Implement new economic instruments to ensure optimum way for Ukraine to make its national determined contribution into Paris Agreement;
  Establish grounds to attract climate investments into Ukraine's economy;
  Strengthen Ukraine's role in international climate change combatting efforts.

2.2. Greenhouse gas emissions

In Ukraine GHG emission in 2015 amounted to 323.36 million tons of CO2-equivalent, the exception is the sector of LULUCF, with its emissions by 66.4% lower than in the base 1990 year, and by 12.3% less than in 2014. Inclusive of LULUCF sector, emissions in 2015 totaled at 308.64 million tons of CO2-equivalent, which is by 66.1% less compared to base year, and by 13.2% less compared to 2014.

Such a reduction is mainly attributed to decrease in the use of energy resources due to decline in GDP, decrease in Ukraine's population number and lowering of social standards of life (figure 2.1).

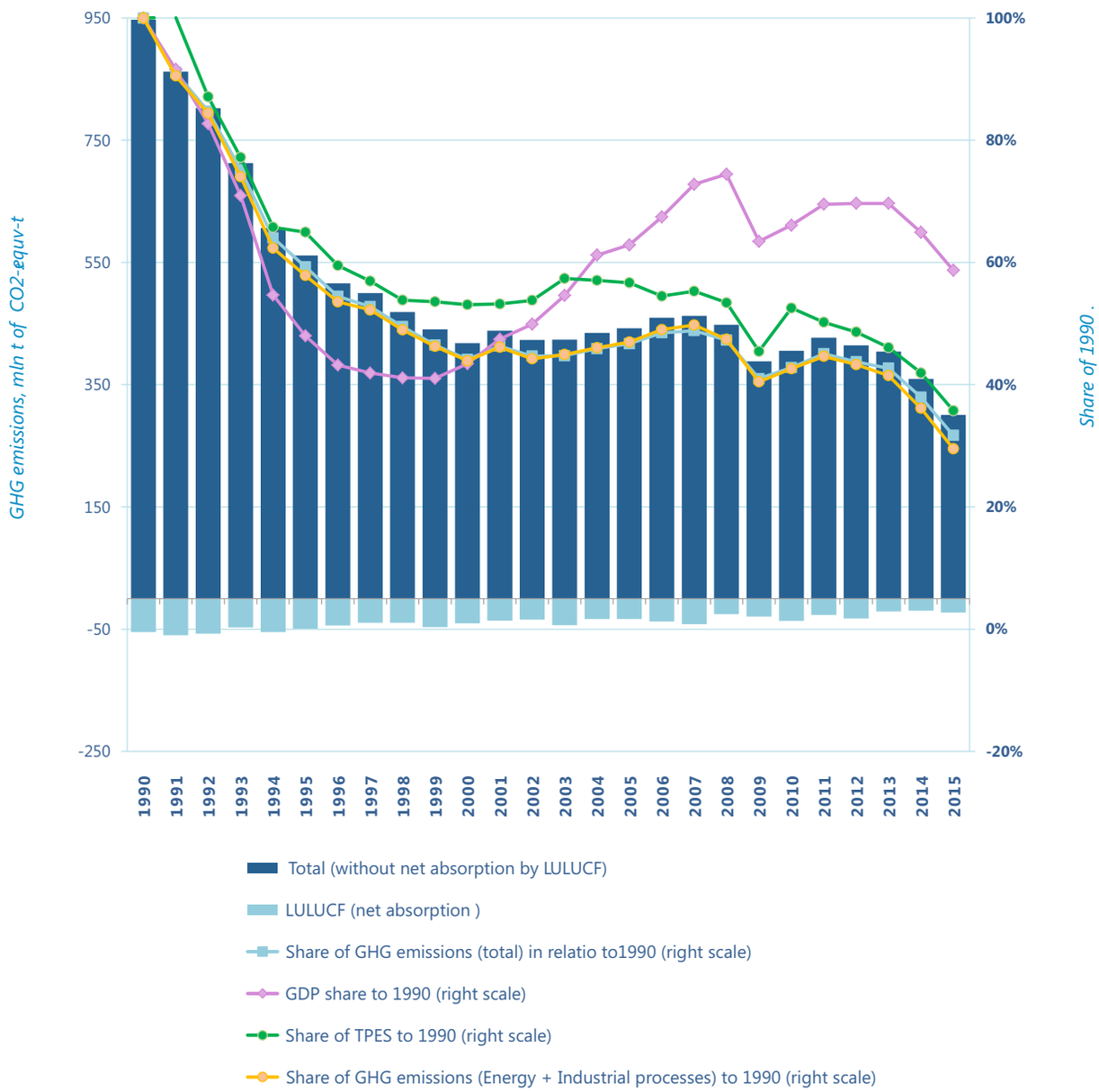


Figure 2.1. ***Ukraine's economic, energy and climate performance over 1990-2015.***

General trend of GHG emissions may be broken down into the following periods:

1 Sharp drop in GHG emissions over 1990-1999, which is attributed to collapse of the Soviet Union and adjustment of Ukraine's economy to new environment. In addition to that, a significant decline in GDP was also taking place;

2 Stabilization and restoration of economic growth over 1999-2008. This period is characterized by a relatively stable economic development and GDP growth. The trend of GHG emissions dynamics does not capture GDP growth, because taking place over this period are structural shifts in economy which increased the role of trade, services and finances in comparison to industrial output growth rate;

3 Decline and gradual restoration of GHG emissions over the 2008-2012. This period reflects severe effect of global financial and economic crises. Particularly affected were export oriented industries such as – iron and steel industry, chemical industry, machine building, and also industries related to them – such as electric grid industry and mining industry;

2013-2015 – Ukrainian production sector, which generates 21-23% of GDP, demonstrated negative dynamics. Almost all industries reduced their volumes of output. Pharmaceutical was the only industry which demonstrated positive growth dynamics in its output;

5 Starting with 2016, owing to a number of structural reforms, Ukrainian economy has started its gradual growth.

Given below are the factors producing adverse effects on the structure and dynamics in Ukraine's economy development:

- Temporary annexation of the AR of Crimea and the city of Sevastopol' by the Russian Federation ;

- Military actions of Russian Federation in some areas of Donets'k and Luhans'k oblasts, which result in reduction of output in the region, worsening of conditions for attraction of external financing and increase in the State Budget expenditures to fund the needs of defense sector and national security and rehabilitation of the ruined infrastructure.

According to findings of experts from the National Institute of Strategic Studies, secondary effects from internal political and economic shakeups, annexation of Crimea, the city of Sevastopol' and some areas in Donets'k and Luhans'k regions permeated most sectors of Ukraine's economy. In consequence, to that, current GDP misbalances are growing, volumes of industrial output, construction works, foreign trade and the amount of attracted and disbursed capital investments are decreasing.

CO2 is the heaviest GHG, its share over 1990-2015 amounted to 65-75%. The share of methane stays in the range of 21-33%, and that of N2O – 6-8% (figure 2.2 and figure 2.3).

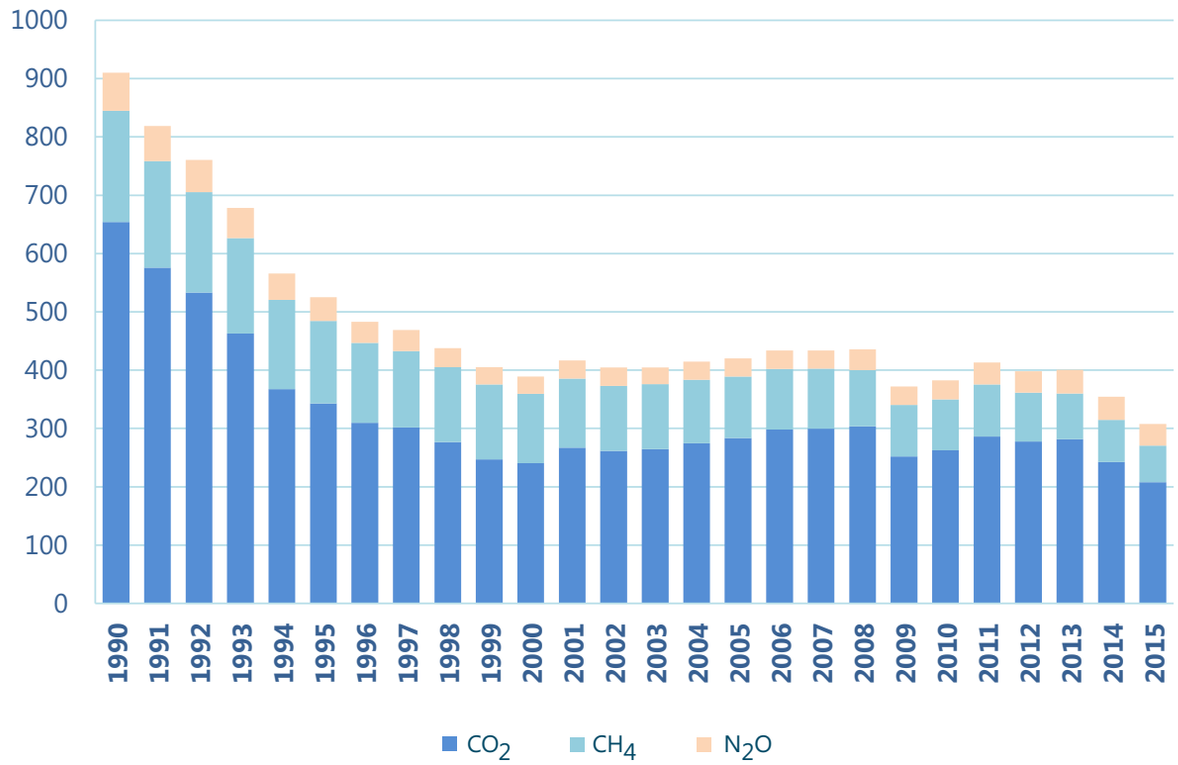


Figure 2.2 ***GHG emissions over 1990-2015, million tons***

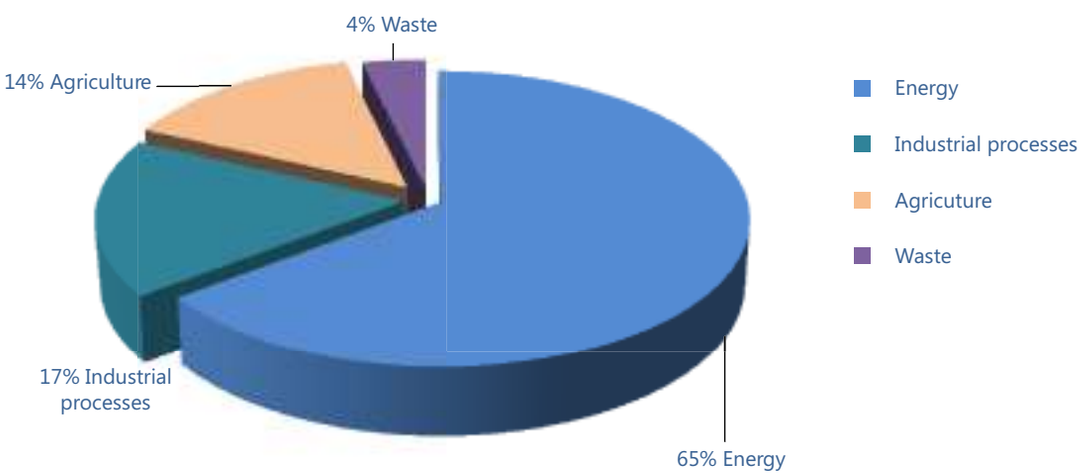


Figure 2.3 ***Structure of GHG emissions by sector in 2015 (without LULUCF)***

2.3. Vulnerability to climate change

Over the course of recent decades climate conditions throughout Ukraine's territory have been changing substantially, bringing about increase in the risks to human health and livelihoods, natural ecosystems and economy sectors.

Since the beginning of XXI, century intense increase in surface air temperature is observed in Ukraine (figure 2.1).

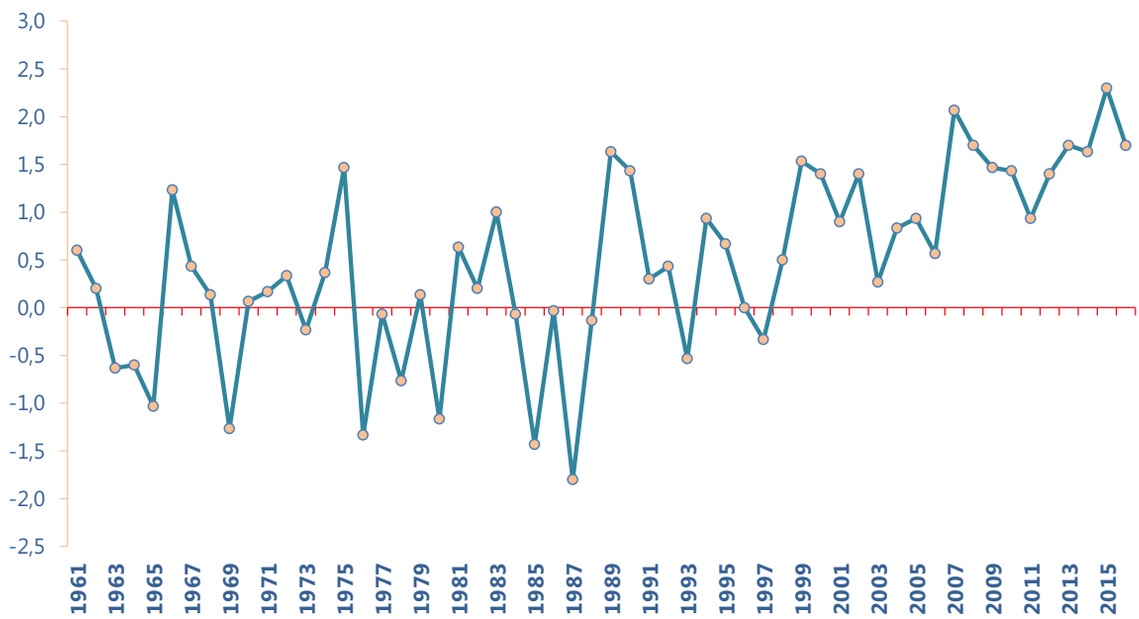


Figure 2.4 ***Anomalies of annual average air temperature in Ukraine in relation to climate norm (base period 1961-1990)***

Norm (1961-1990) +7.8°C Average 1991-2016 +8.8 °C Average 2007-2016 +9.4 °C

Warming brings about:

- Sudden changes in weather;

- Increased frequency and intensity of dangerous and natural hydro meteorological events during the warm season of the year (showers, thunders, rain squall, hail, long periods of heat - heat waves), and in cold season (heavy snowfalls, glazed frost, complex slush buildup);

- Increased frequency and intensity of droughts, and territories covered by them;

- Reduction in river flows in the South and South East of Ukraine, increase in the intensity of river floods in the Western part of Ukraine (Subcarpathia and Transcarpathia), in particular, the Dniester basin, change in the intra-river structure of river flows in Ukraine;

- Raise in the level of Black and Azov seas, which strengthens the processes of erosion, and stream bank erosion, which results in flooding, saturation and soil salting in the coastal area.

Substantial consequences of climate change include increased risks in relation to:

- Human health, stemming from practically all manifestations of climate change;

- Significant reduction in yields of major agricultural crops in consequence of dry weather phenomena and emergence of unseen earlier pests and pathogenic diseases of agricultural crops, and also due to other extreme weather phenomena;

- Exacerbation of problems with water supply in southern and south east regions which suffer from drought in summer, and where the residents are least provided with drinking water of appropriate quality;

- Intensified degradation of lands and desertification due to high paced climate change;

- Decrease in productivity, viability and resilience of forests under significant water stress, which increases the likelihood of fires and outburst of mass epidemics of pests; Accelerated degradation of ecosystems;

- Accidents and unstable operation of electricity grids and district heating systems, other infrastructure facilities.

In the long-term perspective, adaptation to climate change in Ukraine shall be treated with the same degree of priority as climate change prevention, and will include such aspects of policy planning and improvement as expansion of knowledge base, scientifically justified identification of needs and expenses, implementation of innovation approaches and establishment of conditions favorable for attraction of external investments.

2.4. International cooperation

Combatting the climate change is a global challenge, which requires broad international cooperation, global consensus to which was reflected in the whole number of successively concluded international Agreements including UNFCCC, Kyoto Protocol, and Paris Agreement. Since the tools envisioned in the first two Agreements have not helped to achieve substantial reduction in GHG emissions, 195 countries, including the most powerful economies, have concluded Paris Agreement, which came into effect on November 4, 2016.

According to the objective of holding the increase in the global average temperature to well below 2°C above pre-industrial levels, the Parties to Paris Agreement must balance the sources of GHG emission and absorption in the second half of the current century, or to reach actually net zero global GHG emissions by 2100.

LEDS objectives for Ukraine comply with global objectives of Paris Agreement and joint international actions will have critical importance to their achievement. In parallel to reducing the risks and climate change consequences international cooperation will contribute to significant decrease in de-carbonization expenses, and will provide economic opportunities for both individuals and enterprises.

Brief description of Ukraine's participation history in the climate combatting processes is the following:

- Party to Annex I to UNFCCC since 1997;
- Party to Annex B to Kyoto Protocol since 2004;
- First country in the world in joint projects implementation (250 projects), 47 million assigned amount units were issued under the green investment scheme over 2008-2012 in the framework of Kyoto Protocol;
- Active participant to negotiation process taking place in the framework of UNFCCC;
- Climate related obligations were determined in accordance to EU-Ukraine Association Agreement (2014);
- Party to Paris Agreement (2016).

LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

3

«Sustainable development strategy «Ukraine – 2020» is the main political document declaring comprehensive strategic guidelines of Ukraine's prospective development. The Document was approved by Presidential Decree dated 12 January 2015 № 5/2015. This Strategy envisions reforms in energy sector, agriculture, housing and utilities sector, land reform and implementation of programs for energy independence, increase in energy efficiency, and environmental protection.

Association Agreement with EU, which became the part of National Legislation on September 16, 2014 after its ratification by the Verkhovna Rada of Ukraine, envisioned gradual approximation of Ukraine's legislation to EU Laws and policies in energy efficiency, renewable energy, energy products taxation, waste treatment, and climate change, including implementation of GHG allowances trading scheme in accordance to Directive 2003/87/EU on establishment of greenhouse gas emission allowances trading scheme (ETS) within the Community.

The Verkhovna Rada of Ukraine ratified Paris Agreement on July 14, 2016 (Law of Ukraine № 1469-VIII). Even before this the Cabinet of Ministers of Ukraine by its Instruction dated 16 September 2015 № 980 approved the expected nationally determined contribution to this Agreement. It was declared that in 2030 the GHG emissions might not exceed 60% of 1990 emissions level. Further review of ambitiousness level of this contribution is envisioned to factor in Ukraine's social and economic development indicators. In addition to that, to improve the current climate policy the Cabinet of Ministers of Ukraine in its instruction dated 7 December 2016 № 932-p approved the Concept for Implementation of the State policy on Climate change up to 2030. The Concept determines the tasks in the following areas:

- strengthening the institutional capacity for development and implementation of state policy on climate change;

- prevention of climate change through reduction of anthropogenic emissions and increased greenhouse gas absorption to ensure gradual transition to low-carbon development of the country;

- Adapting to climate change, increasing the resilience and reducing the climate change related risks.

Action plan was developed to implement the Concept for implementation of the State policy on climate change up to 2030.

Tax on carbon dioxide from fixed sources, which was introduced in 2011, is the current fiscal instrument to reduce GHG emissions (Article 243 Section VIII of the Tax Code of Ukraine). Concept for implementation of the State policy on climate change up to 2030 envisions reviewing its rate and administration procedure.

Ukraine's 2035 Energy Strategy: «Security, Energy efficiency, Competitiveness» approved by the Cabinet of Ministers Instruction dated 18 August 2017 № 605-r constitutes a fundamental

element of gradual transition to low carbon development policy. Because of completing the tasks envisioned by Ukraine's 2015 Energy strategy, it is planned to:

- achieve more than twofold reduction in GDP energy intensity ;

- Increase the use of renewable energy sources up to 25% of the total scope of primary energy supply.

Components to current climate change prevention policy include the following effective national plans:

- National Renewable Energy Action plan through 2020, approved by the Cabinet of Ministers Instruction dated 1 October 2014 № 902-p, envisions that by 2020 the share of energy produced from renewables shall amount to 11% of energy consumption mix;

- National 2020 energy efficiency action plan, approved by the Cabinet of Ministers Instruction of 25 November 2015 № 1228, which envisions to reach in 2020 the indicative energy saving target of 9% of the average final domestic energy consumption.

Action plan to implement the EU Parliament and Council Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources, approved by the Cabinet of Ministers instruction of 3 September, 2014 № 791-r, is geared to harmonization of Ukrainian and European legislation on the renewable energy sources (hereafter - RES). It is envisioned that sustainability criteria shall be developed for liquid and gaseous fuel, which is produced from biomass and used by transport vehicles, and for liquid fuel, which is produced from biomass and designated for energy use other than transport vehicles. Technical specifications to production and use of bio fuels and bio liquids are planned to be developed.

According to the Law of Ukraine «On Amending Some Laws of Ukraine on "Green Tariff" Establishment» (of 25 September 2008 № 601), effective in Ukraine is the «green" tariff which is applicable to purchase electricity produced by the facilities using alternative energy sources (except blast furnace gas and coke gas, and in case of hydroenergy - only electricity which was generated by small hydropower plants).

To legally regulate the energy service related services the Verkhovna Rada of Ukraine passed the Law of Ukraine «On Introduction of New Investment Opportunities, Guarantee to the Rights and Lawful Interests of Business Entities to Ensure Performance of a Full Scale Energy Modernization » (of 9 April 2015 № 327-VIII, including amendments made in accordance to the Laws № 922-VIII of 25.12.2015; № 1980-VIII of 23.03.2017). In addition to that, respective changes were made into the Budget Code of Ukraine with regard to introduction of new investment opportunities, guarantee to the rights and lawful interests of business entities to ensure performance of a full-scale energy modernization, specifically, in the part that relates to definition of energy service contract as a long-term credit liability.

State construction codes SCN B.2.6-31:2016 «Heat insulation of buildings» were approved to ensure rational use of energy resources for the purposes of heating and cooling, and to meet the required sanitary parameters of indoor climate as well as to ensure long life of envelope structures in the course of their use. The said codes include requirements to energy efficiency and thermo technical characteristics of thermal insulation envelope for buildings and structures and their calculation procedure. SCN B.2.6-31:2016 are designated to be applied in doing design for the buildings and structures with heat, conditioning and cooling, in doing Greenfield projects, modernization, thermal insulation and capital repairs.

On June 22, 2017 the Verkhovna Rada passed the Law of Ukraine № 2118-VIII «On Energy Efficiency in the Buildings» which aims to establish conditions enabling reduced energy consumption in the buildings in accordance to Directive 2010/331/EU of the European Parliament and of the Council "On the energy performance of building" as a part to implementation of ratified Treaty Establishing the Energy Community. The Law regulates establishment of minimum requirements to energy efficiency in the buildings, envisions introduction of certification of energy efficiency and survey of engineering systems in the buildings. The Law also intends to regulate professional activity in the sphere of energy efficiency in the buildings.

The Law of Ukraine passed on 8 June 2017 envisioned establishment of Energy efficiency Fund, which is an important instrument to support energy efficiency initiatives. The said Fund complies with requirements of Directive 2012/27/EU of the European Parliament and of the Council as a part to implementation of ratified Treaty Establishing the Energy Community, and is designated to stimulate and support measures aimed at increasing energy efficiency and energy saving mainly in residential sector buildings with due incorporation of respective national plans and for reduction in GHG emissions.

Already passed or modified Laws of Ukraine support measures, instituting low emissions development in different spheres, specifically:

- Law of Ukraine «On Natural Gas Market» (of 9 April 2015 № 329-VIII, with amendments introduced in accordance to the Law № 1541-VIII of 22.09.2016), which defines environmental protection, including energy efficiency, increased share of energy from alternative sources and reduction in GHG emissions as general public interest in the process of natural gas market operations.

- Law of Ukraine «On Electricity Market» (of 13 April 2017 № 2019-VIII), which envisions assignment by the Cabinet of Ministers of Ukraine of special obligations on market participants with regard to environmental protection, energy efficiency, increase in the share of energy produced from alternative energy sources and reduction in GHG emissions.

- Law of Ukraine «On Alternative Energy Sources» (of 20 February 2003 № 555-IV, in the version of 11.06.2017), which determines legal, economic, environmental and organizational basis for the use of alternative energy sources and fosters their more extensive use in the fuel and energy sector.

- Law of Ukraine «On Alternative Types of Fuel» (of 14 January 2000 № 1391-XIV, in the version of 24.11.2016), which envisions incentives to increase the share of alternative types fuels use up to 20% of the total scope of fuel consumption by 2020.

- Law of Ukraine «On coalfield gas (methane)» (of 21 May 2009 № 1392-VI, in the version of 22.09.2016), which determines legal, economic, environmental and organizational principles for activities in the sphere of geological study of coal field gas (methane), its extraction and removal in the course of degassing and further use as material and/or energy resource.

Since the time of Paris Agreement ratification legal framework for the related industries polices is gradually changing, as climate change prevention and adaptation hereto have bearings on practically all sectors of economy and human livelihood. A number of below listed Laws and other regulations, already passed or drafted, envision to incorporate certain climate change related policy provisions into sectoral strategies:

- Law of Ukraine «On Amending the Law of Ukraine «On Drinking Water and Drinking Water Supply» (of 18 May 2017 № 2047-VIII), which provisions aim to improve legal regulation of relations associated with waste water collection and to increase efficiency in the management of drinking water suppliers and water drainage entities.

- Draft of the National 2030 Strategy on Waste Management in Ukraine, which was developed with due regard to the Framework Directive № 2008/98/EU on wastes, Directive № 1999/31/EU on waste burial, Directive № 2006/21/EU on management of extractive industries. The goal of this strategy is to create efficient waste management system based on innovation principles, which in the end should facilitate waste recycling of natural resources and recycling of wastes.

- Draft of Ukraine's National 2030 transport strategy, which aims to comprehensively incorporate global priorities in transport policy, specifically, it envisions to reduce GHG from mobile sources by 60% compared to 1990, increase in the share of electric transport and electro cars vehicles usage, and to increase alternative fuels use share.

- Draft Law of Ukraine «On Amending the Law of Ukraine «On the Main Foundations (strategy) of the State Environmental Policy of Ukraine through 2020», which extends the strategy up to 2030,and envisions, among other things, to broaden the Government tasks with respect to prevention of increase in agricultural lands and territorial expansion of buildup territories and infrastructure; increase in the forest covered space in Ukraine; establishment of conditions facilitating broad implementation of environmentally friendly and organic farming technologies.

- Draft Strategy 2022 for sustainable development and institutional reformation of Ukraine's forestry and hunting sector, which envisions, among other things, integration and intensification of forestry and hunting sector contribution to climate change prevention and facilitation of environmental sustainability of Ukraine.

- Concept for the State heat supply policy implementation, which was approved by the Cabinet of Ministers Resolution of 18 August 2017 № 569-p, and aims to develop and determine the methods facilitating effective implementation of the state policy focused to ensure reliable provision of heat supply services, Ukraine's energy independence and security; reduce adverse effects on environment, improve financial and economic situation of enterprises, to introduce transparent efficient system of payments between consumer and service suppliers, and to establish conditions and incentives geared to attract investment in heat supply sector.

Ministry for Ecology and Natural Resources of Ukraine is the Central executive body authorized to form and implement the State climate change policy.

Operating as Advisory Coordination body is the Interagency Commission on UNFCCC implementation (IAC), which was created by the Cabinet of Ministers of Ukraine in 1999. IAC membership includes officials at the level of Deputy Ministers of key ministries and other executive bodies, plus, subject to, Ukrainian parliament members, representatives of R&D institutions and NGOs.

In addition, Ukraine has established a practice for broad engagement of representatives from academic and expert community, public and business community into the Task forces drafting legislation as well as other strategic climate change related documents.