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ANALYSIS OF POTENTIAL OF GREENHOUSE GASES EMISSIONS REDUCTION IN UKRAINE

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There was conducted the analysis of measures on greenhouse gases emissions reduction according to various Ukrainian economic development scenarios, assessment of greenhouse gases emissions reduction potential until 2020 and proposed approaches for the development of mitigation to climate change.

Розглянуто заходи зі скорочення викидів парникових газів за різними сценаріями розвитку економіки України. Оцінено потенціал скорочення викидів парникових газів на період до 2020 р. Запропоновано заходи з пом'якшення наслідків зміни клімату.

Рассмотрены мероприятия по сокращению выбросов парниковых газов в разных сценариях развития экономики Украины. Оценен потенциал сокращения выбросов парниковых газов на период до 2020 г. Предложены мероприятия по смягчению последствий изменения климата.

Statement of purpose

The climate of Earth has never been unchanged. The Earth climate changes occur due to various natural processes in all time frames – from decades to million years.

There were recorded a number of glacial periods in the history of the Earth, when the climate was colder in comparison with today's situation and interglacial periods, when the climate was much more warmer. These cycles are caused by natural factors.

From the other side, the climate change occurs more rapidly from the beginning of Industrial Revolution and human-beings make a significant contribution to such changes, where their activities are connected with fuels combustion, deforestation, soil damage, urbanization, etc.

Ukraine was ratified the United Nations Framework Convention on Climate Change and Kyoto Protocol. Thus, it has taken a responsibility not only to protect climate system for present and future generations, but also to fulfill its own individual responsibilities according to the Convention and Protocol [1–4].

Purpose of work

The conduction of the analysis of measures for greenhouse gases emissions reduction according to the different economic development scenarios of Ukraine, the assessment of the potential greenhouse gases emissions reduction until 2020 and mitigation actions of anthropogenic impact on climate change and adaptation to such changes.

Results of research

Since 1997 Ukraine is a Party of the United Nations Framework Convention on Climate Change and since 2004 is a Party of the Kyoto Protocol. These international documents determine the system of actions directed for the stabilization of greenhouse gas (GHG) concentrations in order to prevent dangerous anthropogenic interference with the climate system.

Therefore, the Convention requires that industrially developed countries to demonstrate the leadership in changing long-term tendencies in frame of GHG emissions and calls that rich countries should provide the developing countries with financial and technological resources for the solving a climate change problem and adaptation to its negative impacts.

According to the Kyoto Protocol during 2008-2012 industrially developed countries should reduce their total GHG emissions not less than by 5 % in comparison with the level of 1990.

The higher responsibilities for GHG emissions reduction by 8% were taken by the European Union countries. Ukraine should not exceed its emissions of 1990 level. Ukraine as a Party of these international agreements is responsible for:

– the development of National Inventory Report of GHG emissions and absorption;

– development of climate change mitigation actions;

– development and transfer technologies, methods and processes that lead to the GHG emissions reduction;

– rational usage of GHG absorbers and accumulators;

– adaptation to climate change;

– assistance in the research conduction, information exchange, studying, preparation of specialists and education concerning climate change problem.

There are following sectors of GHG emissions, which are established by the Intergovernmental Panel on Climate change:

– Energy;

– Industrial processes;

– Solvents using and other products;

– Agriculture;

– Land Use, Land Use Change and Forestry;

– Waste.

Annex B of Kyoto Protocol contains 38 developed countries and countries with transition economy, which have quantities' responsibilities for GHG emissions reduction during 2008-2012.

In 2012 the Kyoto Protocol force will be over, that's why the new international strategic document that will reflect quantities' responsibilities for GHG emissions reduction after 2012 is needed. The beginning development of such international document was an adoption of Copenhagen Agreement at 16th Conference of Parties of the United Nations Framework Convention on Climate Change of 6th Meeting of Parties of Kyoto protocol in December 2009 in Copenhagen (Denmark).

The Copenhagen Agreement underlines the necessity of global GHG emissions reduction in order to keep an increasing of global temperature lower than 2˚C.

Annex I Parties should implement individual or collective GHG emissions reduction commitments until 2020. That's why all countries should analyze their potential GHG emissions reduction until 2020 and submit its to the UNFCCC Secretariat for the consideration in the future international documents.

On the basis of forecasting the macroeconomic and industrial development of Ukrainian economy after 2012 there was assessed the technical GHG emissions reduction potential in the main sectors of Ukrainian economy until 2020 in this research work.

There were assigned the three stages of the development of Ukrainian economy for 2010-2020 during the assessment of GHG emissions reduction potential:

2010-2011 – the period of overcoming the financial crisis consequences and implementation the policy directed for economy stabilization;

2012–2013 – the period of economic activity development and supporting the economic development with high levels growth on the basis of generated legal-economical and newly established political platforms; this period is characterized with a forming of fundamental base of long-term economic growth taking into account all cyclic fluctuations on the background of activation of reformative efforts from Government and Parliament;

2014–2020 – the period of fixing the stable rates development with some slowing down of the real GDP dynamic in comparison to previous period.

Perspective assessment of the dynamic of key macro indicators determines intervals of their change about achieving the necessary levels under the condition of innovative-investment model realization of further Ukrainian economy development. Within such context there is proposed a probable-optimistic (active-investment) scenario for 2012-2020. According to this scenario the investment-intensive macroeconomic situation of events development is assessed with the increasing of country's competitive ability. Guidelines of pessimistic (inertial) scenario were determined under the conditions of possible risk situations about price and course dynamic as well as passive-inertial economic policy.

According to the results of analytical calculations the following should be mentioned: economic development of Ukraine will occur very slowly in 2011–2020 maintaining in general positive, but very low rates of GDP growth (at the level less than 3,0–3,5%) on the background of low investment activity with mainly exhausted traditional sources of economic growth and with possible economic crisis and external shocks under the conditions of increasing international competition. So, such development of events will worsen the situation of Ukraine at the global arena and won't let modernize its own economy and compete adequately with other countries. Optimistic scenario should be considered as strategic or the main one.

Realized calculations for pessimistic and probable-optimistic scenarios of economic development of Ukraine (see figure) serve as evidence for temporary (until 2011-2012) GHG emission reduction in comparison with 2006.

This assessment of GHG emissions for determination of basic line in correspondence to formed macroeconomic scenarios of Ukrainian economic development performed accoding to the sectoral approach and GDP dynamic change.

The assessment of technical GHG emissions reduction potential covered the following manufactures: electricity and heat productions, iron-and-steel industry production, coal mining, natural gas transportation.

This potential forms the main part of general GHG emissions reduction potential in Ukraine.

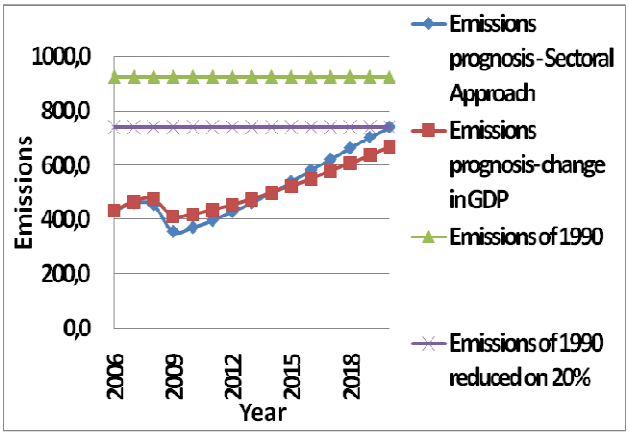
In not-mentioned sectors of economy the main possibilities of GHG emissions reduction are an increasing of energy efficiency and decreasing of natural gas leakage in the gas industry of our country in the process of its distribution and final consumption.

Taking into account some facts, that a part of organic fuel used in not-mentioned sectors of economy is small, in such case the GHG emissions reduction potential is small too in the expense of energy efficiency increase and at the level of 2020 it can be estimated in 2–4 for probable-optimistic scenario and 1,5–3 mln. tons CO_2-eqv. for pessimistic scenario.

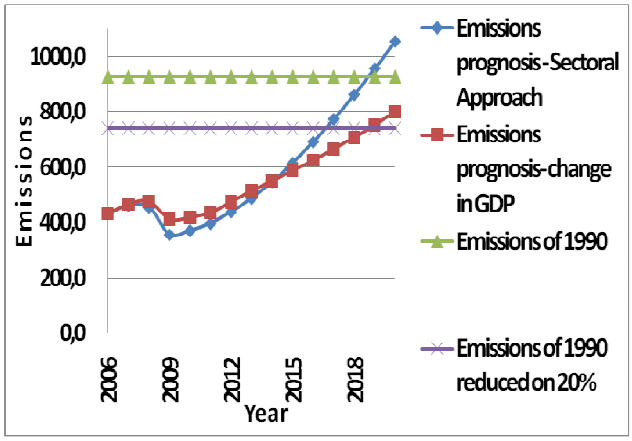
Taking into account the condition of gas industry in Ukraine, the natural gas leakages have a greater capacity. But it's needed special researches for such potential assessment, because there are not available true data in Ukraine today.

That's why the conservative approach was accepted.

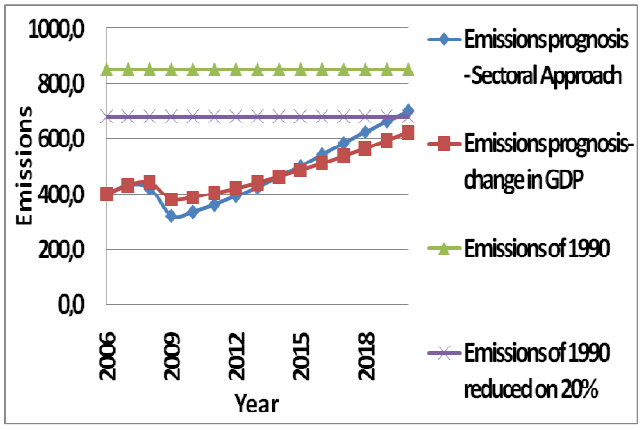
It foresees the leakage reduction for the probable-optimistic scenario by 10–12 and for the pessimistic scenario by 6-8 mln. tons CO_2-eqv.



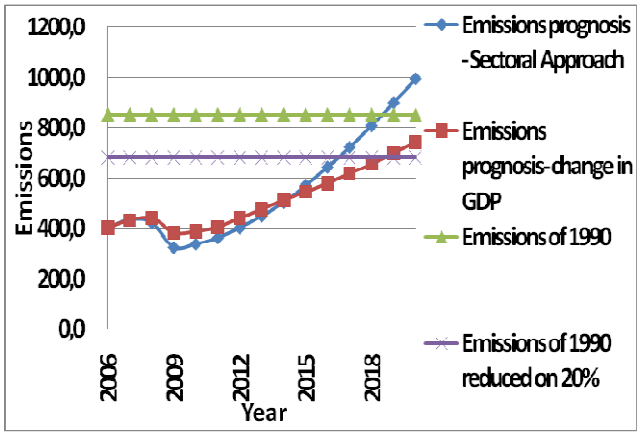
a



b



c



d

The amount of direct GHG emissions with out (*a*, *b*) and with (*c*, *d*) LULUCF according to pessimistic (*a*, *c*) and to optimistic (*b*, *d*) scenario of Ukrainian economy development

Including mentioned there was calculated the possible general technical potential of GHG emissions reduction for 2020 in Ukraine.

For probable-optimistic scenario the GHG emissions reduction level will be nearly 510 mln tons CO_2-eqv., which is approximately 13,5% less than responsibility that Ukraine can take for 2020 i.e. the GHG emissions reduction by 20% in comparison with 1990.

Certainly, Ukraine can't fully use its own potential, that's why there can be some problem to fulfill its GHG emissions reduction commitments more than 25% under probable-optimistic scenario of Ukrainian economic development. Because its achievement needs the realization nearly 60% of technical potential for GHG emissions reduction according this scenario and it requires a big investment, one of which can be emissions trading scheme.

Potentially, using 70% of calculated GHG emissions reduction potential, Ukraine can decrease GHG emissions by 17-20% in 2020 compared with 1990 according to the probable-optimistic scenario and by 32-35% according to the pessimistic scenario.

The National plan of measures for the Kyoto protocol realization to UNFCCC was adopted by the order of the Cabinet of Ministers of Ukraine on 18.08.2005 № 346-p (with the changes and additions) and it provides to develop National and regional plans of measures to climate change mitigation.

It should be mentioned that development of such plans and the role of executive authority should rely on implementation of some state instruments for stimulation the changes on enterprises, energy sector, transport, agricultural and communal services, building industry etc. Some examples of such policy are:

– implementation of GHG emissions tax;

– implementation of internal emission trading scheme that limits GHG emissions in the big and medium size enterprises;

– obligations for energy companies to produce some percentage of electricity and heat from the renewable sources of energy;

– obligations for automobile fuel sellers to add some percentage of biofuel;

– the creation of reduced tariff system for renewable sources of energy;

– implementation of state standards for biofuel production and stimulation its usage on the territory of Ukraine;

– implementation the most strict standards of energy saving for new reconstructed buildings;

– implementation the highest tax for the private automobiles with significant GHG emissions (depending of the engine volume and catalyst) and discount for registered energy efficient, hybrid automobiles and vehicles worked on renewable fuel;

– implementation the informational policy for enterprises about any measures of energy saving, the concept of "clean production" and possibilities of flexible Kyoto protocol mechanisms, other programs for the support of energy saving measures in Ukraine.

The first task for executive authority is a development of the national strategy for GHG emissions reduction by Ukrainian economy. This strategy should include the purposes concerning GHG emissions reduction (volume of GHG emissions reduction, the terms of achievement and scheduled actions that will help to achieve this goal).

The Strategy should be adopted by the Cabinet of Ministers of Ukraine and should be an official position of Ukraine.

Actions concerning a formation of the Strategy and GHG emissions reduction plan should be consequent and base on researches about analysis of technical potential of GHG emissions reduction by sectors in Ukraine (energy, transport, industry, communal and agricultural services).

Relative executive authority based on the investigation results and orientated for the National strategy of GHG emissions reduction should develop the Action plan for GHG emissions reduction (develop and implement political instruments directed for the GHG emissions reduction - green taxes, grants, fines).

Executive authority, local administration, scientific research organizations and community should be involved for the preparation of Action plan on GHG emissions reduction.

Action plan should be developed at the local level too.

Government representatives should be responsible for the implementation of such actions.

Time frames should be determined for the implementation of GHG emissions reduction plan.

Conclusion

The analysis of GHG emissions allows to conclude that the main area of activity for climate change mitigation is increasing the efficiency of organic fuel usage that underlines the necessity of development the detailed analysis of production in fuel-energy complex including households expanses on heating and hot water supply and mining-metallurgical complex of Ukraine in the production of building materials.

It should be taken into account the mobile sources of GHG emissions – transport, building and agricultural equipments, which use the most common types of motor fuels: gasoline, diesel and oil-fuel.

It should be take into consideration the economic strategy, which is based on increasing of energy efficiency with corresponding to technologic rebuilding of economy and decreasing of volatile organic compounds leakage during extraction, transportation and distribution of natural gas and coal.

For the purpose of actualization the climate change problem the most urgent task is concentrated for the development of National strategy on GHG emissions reduction by Ukrainian economy.

This strategy should include the purposes concerning GHG emissions reduction (volume of GHG emissions reduction, the terms of achievement and scheduled actions that will help to achieve this goal).

Received scientific results were submitted to the Ministry of Environmental Protection of Ukraine in order to develop Ukrainian position for post-Kyoto period.

References

1. *Моделі* оцінки техніко-економічної ефективності рішень з розвитку структури генеруючих потужностей та їх використання при прогнозуванні її розвитку / І.Я. Гольденберг, Б.А. Костюковський, М.С. Біленко, Н.Л. Костюковська // Проблеми загальної енергетики: наук. зб. – 2001. – № 4. – С. 8–11.

2. *Минприроды* Украины. Третье, Четвертое и Пятое национальные сообщения Украины по вопросам изменения климата. – К., 2009. – 366 с. – Електронний ресурс: http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/4903.php

3. *Доклад* о развитии человека 2007/2008 ПРООН. Борьба с изменениями климата: человеческая солидарность в разделенном мире / пер. с англ. – М.: Весь Мир, 2007. – 400 с.

4. *Survey* on Climate Change Perceptions in Ukraine. – Kyiv: UN GC, 2009. – 56 p.

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