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GREENHOUSE GAS EMISSIONS TRADING SYSTEM: EU EXPERIENCE AND PROSPECTS FOR IMPLEMENTATION IN UKRAINE

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Abstract: *The present paper focuses on the European Union emissions trading system and its development. The main regulatory provisions regulating the functioning of the EU emissions trading system, the procedure for selling permits at auctions, the free allocation of permits and the use of funds from sales of permits are analyzed. The process of developing the mechanism of emission trading in Ukraine is described, and existing regulatory and draft documents in this area are analyzed. Recommendations on the introduction of the emissions trading system in Ukraine are proposed.*

Keywords: *emissions trading system, climate change, greenhouse gases, low carbon development*.

1. Introduction

One of the most pressing problems of humanity is global climate change. It is difficult to find ways to address climate change issues at the international level. It is connected with the specific nature of the problem: different climate change impacts on different regions; different levels of economic development; varying institutional capacity and ability of countries to mitigate and adapt to climate change; different levels of current and historical greenhouse gas emissions; close linkage of the climate change problem with the economy; the complexity of solving energy issues at the global level etc.

The EU is considered to be a leader in introducing new mechanisms and instruments to achieve the climate change goals in greenhouse gas emissions reduction. Therefore, the experience of the EU is extremely relevant for the world community, including for Ukraine. Such mechanism is the emissions trading system (ETS) introduced in the EU in 2005. The European Union emissions trading system (EU ETS) is the main instrument for the EU to achieve its greenhouse gas emission reduction targets, internationally declared and reflected in EU legislation.

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The EU ETS contributes to the development of emissions trading in other countries and regions. Therefore, there is a possibility of linking in the future the Ukrainian ETS (after its implementation) with the EU ETS, but this requires harmonization of the rules, transparency and proper control. Therefore, the EU experience is relevant for Ukraine and there are a lot of rules to be learned.

As a result of the analysis of the experience of the EU ETS functioning and the changes that have taken place during its implementation at different phases, recommendations for the implementation of the ETS in Ukraine are proposed. The process of legislation development in Ukraine, which forms the basis for the introduction of the ETS and emission reductions in the future, has begun, but it requires the development and adoption of standards and the appropriate integration of climate change policies in various spheres of the economy.

At the 21st United Nations Climate Change Conference in Paris in 2015, the text of the Paris Agreement [10], which will come into force in 2021, was agreed. In accordance with the Paris Agreement, countries agreed on the need to maintain a global average temperatures rise below 2°C (aiming at 1.5°C), increasing adaptability to the negative impacts of climate change, harmonization of financial flows to address global climate change etc.

In the EU, tackling climate change is a priority in all areas of state policy. The EU has regulations on limiting emissions and meeting relevant goals in the sphere of climate change mitigation and adaptation. One of the policy instruments for preventing climate change and emission reductions is the introduction of the European emissions trading system, which began its functioning in 2005 and covers about 45% of greenhouse gas emissions in the EU. In accordance with the signed Association Agreement between Ukraine, on the one side, and the European Union, the European Atomic Energy Community and their Member States, on the other side [9] in Ukraine, the introduction of the ETS is envisaged.

The purpose of this work is to analyze the experience of the functioning of the European system of emissions trading in the EU, as well as changes that have taken place during its implementation at different phases and to elaborate recommendations for the implementation of the emissions trading system in Ukraine.

2. Material and Method

Theoretical and methodological principles of our research are based on the holistic analysis of environmental and economic policy and the law of Ukraine and the EU regarding the implementation of the emissions trading system. Scientific methods used in this paper include literature review, analysis, synthesis and logical generalization of the conceptual bases, necessity, and preconditions for the functioning of the European emissions trading system, which are important for the implementation of EU experience and good practices. Upon conducting the economic-legal and ecological-economic analysis, we evaluated the possible impact of different norms and rules on the functioning of the emissions trading system in Ukraine. We further conducted a comparative analysis of the most persistent problems regarding the development of clear rules for the functioning, monitoring, and control of the emissions trading system, identifying specific bodies responsible for regulation,

implementation, control, and monitoring of the emissions trading system in Ukraine.

3. Results and Discussions

The functioning of the EU ETS is regulated by the European Parliament and Council Directive (2003/87 / EC) [2] and the Auctioning Regulation No. 1031/2010 [3].

EU ETS is based on the "cap and trade" principle. Subjects that emit greenhouse gases are issued certain amount of quotas for a certain amount of emissions. The cap determines the number of permissions available throughout the trading system. The limit (upper limit) is set on the total amount of allowed greenhouse gas emissions. The upper limit decreases over time. Strengthening rules over time allows enterprises to adapt slowly to emission limits [4].

According to the ETS rules, within the emission limitations, enterprises receive or purchase emission allowances and can sell them to each other. At the end of each year, enterprises must have sufficient permits to cover their emission. Otherwise, fines are imposed on those, who do not meet the requirements. If an enterprise has cut its emissions, it can retain a reserve/surplus permit to cover its future needs or sell it to another company that does not meet permission limits. Trade provides flexibility that guarantees emission reductions where it costs less. The price on carbon emissions contributes to investments in clean, low-carbon technologies.

The greenhouse gas emission permits can be sold at auctions, but there is certain amount of permits allocated for free, including allocation from the Reserves for new entrants.

5% of the total amount of the permits remains in Reserve for the possibility of their free distribution for new entrants [4].

The price on emissions increases the costs associated with activities that pollute. This affects the competitiveness of some industries compared to the same industries in competitive countries, where the ecological requirements for greenhouse gas emission reductions are much lower. To address these challenges, if the industrial sectors, purchasing emission allowances, are at risk of exceeding emission limits and becoming uncompetitive due to higher carbon cost price, are supported by providing additional free emission permits and state aid [4]. Consequently, some of the emission permits are free, and their number decreases over time. The total number of free permissions granted to installations, depends on the carbon intensity of products. The standard of carbon intensity of products is determined on the basis of the level of emissions of 10% of the most efficient installations within the sector of the economy. Thus, installations that are environmentally efficient receive free permissions that they need. Inefficient (carbon-based) installations should take measures and make significant efforts to cover their emissions using received permits, either through emission reductions or by purchasing emission permits. Each year, a certain number of permits are given free of charge to participants in sectors where there is a potential risk if they pay the full cost for emission permits, they will need to transfer their activities to countries with a significantly lower requirements on greenhouse gas emissions reduction targets [4].

Permissions that are not provided for free are realized through auctions. Auctions are an open way of distributing permissions.

Income from EU ETS provides Member States with revenues that can be used for programs to reduce greenhouse gas emissions and the introduction of renewable energy. In accordance with the EU ETS Directive, the participating countries determine how to use proceeds from the permits sale at auctions and inform the European Commission. At least 50% of such revenues should be used to combat climate change in the EU and in third countries according to the EU Directive 2003/87/EC. The EU Directive also defines the types of activities that can be funded.

Normative acts that regulate functioning of EU ETS are periodically revised. The EU ETS reforms relate, in particular, to the following aspects: the scope of the application of the EU ETS in a geographic scale, by sectors, on list of greenhouse gas emissions, is expanding over time; the commitment to limit greenhouse gas emissions is tightening over time.

The implementation of the EU ETS was divided into separate time periods (phases) (Table 1).

Phases of EU ETS Table 1

First phase	Second phase	Third phase	Fourth phase
2005-2007	2008-2012	2013-2020	From 2021

The EU-Ukraine Association Agreement [9] laid the main principles for greening of Ukraine's economy. The implementation of Annex XXXI to the Association Agreement concerning the development and implementation of climate change policy and the other directives listed in the Association Agreement is an important task for Ukraine. One of these directives is the Directive on the establishment of a scheme for greenhouse gas emission trading. By the Regulation of the Cabinet of Ministers of Ukraine No 371-p from April 15, 2015 [6], the plan for the implementation of the ETS Directive was approved. The implementation of the ETS Directive includes: developing a national emission allocation plan; the introduction of a permit system for greenhouse gas emissions and allowances for emissions that will be sold at the national level between plants/industrial complexes in Ukraine; the establishment of a monitoring, reporting, verification and proper implementation system, as well as public consultation procedures.

Ukraine has been working on the development of legislation on the implementation of ETS for a long time, but this process is rather protracted, unsystematic and complicated in Ukrainian realities, so the necessary legislative acts have not yet been adopted, although some acts have been developed in this area. At the same time, there has been a recent revival in the area of the development of the relevant legislation.

In December 2016, the Government of Ukraine approved the Concept of State Policy on Climate Change for the period up to 2030 [8]. The main areas of the implementation of the concept are: climate change mitigation through reduction of anthropogenic emissions and increasing the absorption of greenhouse gases, ensuring a gradual transition to a

low carbon development of the state through the establishment and implementation of an internal trading system for greenhouse gas emission quotas in accordance with the provisions of Directive 2003/87 / EU; determination of the specially authorized body ETS; creation and maintenance of the system of monitoring, reporting and verification of greenhouse gas emissions, etc. The Ministry of Environment and Natural Resources of Ukraine should ensure the development and maintenance of the ETS.

A prerequisite for the implementation of ETS is the development of procedures and requirements for monitoring, reporting and verification of greenhouse gas emissions. In January 2018, the Ministry of Environment and Natural Resources of Ukraine presented the Concept of the National Legislative Package on Monitoring, Reporting and Verification of Greenhouse Gas Emissions in Ukraine [11]. Among the principles of this national legislative package, is the approximation of EU legislation. The concept identified gaps in the regulation of monitoring reporting and verification of greenhouse gas emissions in Ukraine, among them: the lack of a single obligatory methodology for calculating greenhouse gas emissions, the absence of an authorized body, the lack of verification procedures etc.

Actual issue is the total allowable amount of greenhouse gas emissions planned by Ukraine, and the total number of emission permits to be issued in Ukraine, and then distributed among the sectors of the economy and provided to specific installations. After all, if there is no shortage of permits, then there is likelihood that the amount of the emissions permits will be higher than factual emissions, which will not encourage emission reductions. Thus, in developing the legislative framework for the implementation of the emissions trading system in Ukraine, it should aim at limiting, stopping growth and further reducing greenhouse gas emissions.

According to the GHG emissions reduction targets, declared by Ukraine in 2015, Ukraine plans not to exceed 60% of GHG emissions by the year 2030 from the level of emissions in the base year (1990) [7]. It should be noted that real emissions of greenhouse gases in Ukraine in 2015 according to the inventory of anthropogenic GHG emissions (1990-2015) is 69% below the level of 1990 [5]. It means that Ukraine remains an opportunity to increase the level of greenhouse gas emissions, compared to present level.

Ukraine's GHG emissions reduction target, which indicate the possibility of actual emissions growth, is not in line with the goals of development and implementation of the ETS, since there will be an excess of emission permits that will result in inappropriate pricing due to the lack of demand for permits. Besides that the “polluters pay” is not realized under such conditions.

When distributing emission permits among enterprises, the following economic indicators should be evaluated and taken into account: current and projected emissions of greenhouse gases; technical potential and specific costs of emission reductions in various industries; influence of distribution of emissions permits on the competitiveness of certain industries and enterprises; energy intensity of Ukrainian export and forecasts for the stability of future demand for exported products [1].

The following economic factors influence on the establishment of the permissible volume (quota) of greenhouse gas emissions for enterprises: energy intensity; carbon intensity, the cost of reducing greenhouse gas emissions; income of the enterprise. The high amount of emissions per unit production requires the development of measures to reduce emissions. Thus, when issuing emission permits, the need for economic and legal incentives for emission reductions on such an installation should be taken into account. In order to ensure economic and legal incentives for emission reductions, companies that reduce emissions and their level of energy and carbon intensity, should receive more emission permits to enable them to sell the part of emission permits, that they have not used, to installations, that do not have sufficient number of permits, to cover all emission quotas, due to high energy and carbon intensity and high cost of emission reductions.

The implementation of the emissions trading system should ensure emission reductions, greening of the economy, and achievement of economic benefits from implementing climate protective measures (climate change mitigation and adaptation, greenhouse gas reduction).

It is possible to measure the economic effect from implementing climate protective measures in a long-term timeframe, as the negative effects of climate change are long-lasting and often become noticeable in decades or more. Therefore, we propose to determine the size of the economic effect, as a result of taking measures to prevent and adapt to climate change, using following formula:

$$E_{ef} = (Vnz_1 - Vpz_1) + (Rnz_1 - Rpz_1) + (Vnz_2 - Vpz_1) + (Rnz_2 - Rpz_2) + ... + (Vnz_n - Vpz_n) + (Rnz_n - Rpz_n)$$

where:

E_{ef} is the size of the economic effect of taking measures to prevent and adapt to climate change;

Vnz - expenditures in the scenario, which does not anticipate measures to prevent and adapt to climate change (determined at different periods of time - 1, 2 ... n years);

Vpz - costs in the scenario, which foresees implementation of measures to prevent and adapt to climate change (determined at different periods of time - 1, 2 ... n years);

Rnz - income received within the option, which does not foresee implementation of measures to prevent and adapt to climate change (determined for different periods of time - 1, 2 ... *n* years);

Rpz - income received in the variant, which foresees implementation of measures to prevent and adapt to climate change (determined at different periods of time - 1, 2 ... *n* years).

The main problems in the development of the emissions trading system in Ukraine are: the absence of strategic principles on the basis of ETS operation; the lack of approaches on determining the upper limit of greenhouse gas emissions at the national level, the number of greenhouse gas emission permits to be issued for enterprises; lack of rules for monitoring, reporting and verification of greenhouse gas emissions; uncertainty of the sectors of the economy that should be involved in the ETS etc.

Implementation of the Emissions Trading System in Ukraine should be preceded by the following measures:

- calculation of expected costs for the phased introduction of the GHG emissions trading system in Ukraine;
- calculation and analysis of environmental and economic results from the introduction of ETS in Ukraine for various sectors of the economy;
- establishment of a national target for greenhouse gas emission reductions, which means initial stabilization and further reduction of greenhouse gas emissions, compared to the current emissions level;
- definition of measures and technologies for greenhouse gas emissions reduction in various sectors of the economy of Ukraine;
- calculation of the cost of greenhouse gas emissions reduction in various sectors of the economy of Ukraine;
- introduction of a transparent system for monitoring, reporting and verification of greenhouse gas emissions;
- introduction of effective monitoring mechanisms in the field of ETS implementation;
- identification of the body responsible for the implementation of the emissions trading system, which means preliminary training of specialists in the field.

4. Conclusions

1. Given the long experience of the functioning of the European emissions trading system, it is important to analyze and implement EU practices, after conducting necessary economic and legal analysis and the environmental and economic assessment of the possible impact of various norms and rules implementation in Ukraine.
2. Clear rules for the functioning, monitoring and control after the proper functioning of the emissions trading system should be developed, with the definition of specific bodies responsible for regulation, implementation and monitoring the implementation of the emissions trading system in Ukraine.
3. The emissions trading system should be implemented gradually and divided into different phases of implementation. Over time, the list of industries, enterprises and greenhouse gases – subject to the emissions trading system should be expanded.
4. At the initial stage, the limit on the amount of greenhouse gas emissions should be minimal and over time the limit of allowable emissions should be reduced, and the goal of emission reductions should be increased.
5. Implementation of the emissions trading system should take place with the involvement of all stakeholders (public, business, academics, experts etc.).
6. The guarantee of transparency is a priority for ensuring the effectiveness of the operation of the STS. Public access to the following information should be open: the development of legislation in the field of ETS; emissions and existing emission reduction targets; enterprises participating in the ETS; the distribution and procedure for issuing emission permits and the free allocation of permits between industries and enterprises; sale of emission permits; compliance with emissions permit conditions; actual reductions of greenhouse gas emissions on enterprises and in selected sectors of the economy; finance received by the state from the sale of permits and the use of funds from the sale of emission permits; the procedure for selection of projects financed by the proceeds

from the sale of emission permits; compliance with the norms and rules in the field of ETS functioning by state institutions and enterprises; monitoring, reporting and verification of emissions; control over the implementation of ETS, imposed penalties and existing violations; a register that displays data on the implementation of the EST etc.

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