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Strategic directions of development of the inner carbon market of sector of agricultural land-use

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The purpose. To justify necessity of reforming organizational-economic ratios between subjects of land-use with the purpose of implementation of low-carbon land-use. **Methods.** On the basis of statistical analysis and graphical method it is proved that the way of land-use in Ukraine is not balanced. By means of methods of systems analysis, synthesis and monographic the justification is proved of necessity of reforming organizational-economic relations between subjects of agricultural activity during land-use. **Results.** Strategic directions of formation of the inner carbon market (ICM) and its productivity for saving agricultural potential are shown. **Conclusions.** It is justified that formation of ICM is a path which may heighten capitalization of agricultural lands, and be the stimulant of further development of animal husbandry and the source of financial receipts.

Key words: *inner carbon market, sector of land-use, land of agricultural assignment, basin of mineral soils, low-carbon development.*

Introduction. The launch of the Low Carbon Development (LCD) in the land use sector is a step towards achieving the goals set out in the Strategy of Low Carbon Development of Ukraine until 2050, the purpose of which is "to determine the strategic directions of the transition of Ukraine's economy to the low carbon growth path on the basis of sustainable development in accordance with national priorities" [1]. To specify the overall goal, a list of tasks is outlined, one of which in the list is indicated "increase of absorption and carbon content due to the application of best practices in agriculture and forestry adapted to climate change". The draft of this document is proposed for implementation of the objectives of the Concept for the implementation of the state policy in the field of climate change for the period up to 2030 and this is in the key to the general objectives of the Concept of the State Target Program for the Development of the Agricultural Sector for the period up to 2020. These documents contribute to the fulfillment by Ukraine of the commitments made to comply with international requirements under the UN Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Paris Agreement. At this moment, the development of ideas for counteracting climate change continues with the introduction of the concept of LCDIn the context of the UNFCCC, the LCD is expressed by the notion of "Low-Emission Development Strategies" (LEDS), an LCD strategy that initiates national long-term low carbon development strategies and ultimately all greenhouse gas (GHG). Particular attention is paid to economic development through the implementation of measures to mitigate climate change and adapt to their consequences.

Analysis of recent publications. The search for solutions to problems of balanced use of agricultural land and the optimal balance of land in the region are the subject of research by scientists from around the world. Among the national school of researchers, the outline of the range of issues is widely considered at different angles. In particular, the directions of the theoretical and methodological basis of organization and applied aspects of ensuring the effectiveness of land use were studied by D. Babmidra [2], I. Bystryakov [3], P. Sabluk [4], George Boody, Vondracek Bruce [5], Scherr, S. J, S. Shames and R. Friedman [6] and others. Aspects of the introduction of the agricultural land market were studied in the works of M. Bohyra [7], D.. Dobriak [8], A. Martin, T. Yevsyukov [9], A. Sokhnich [10], M. Fedorov [11], Roger Claassen [12], Yong Jiang [13] and others. The researches of A.Kytura, [14], M. Bereznitskaya, N.V. Karaeva [15] are devoted to solving the problems of the introduction of the domestic carbon market (DCM).

The purpose of the work is to substantiate the need to reform the organizational and economic relations between entities of plant growing commodity production for introducing low-carbon agricultural land use.

Materials and methods. Based on the results of the GHG inventory data of different countries and international data statistics using statistical analysis methods, it is graphically demonstrated that in Ukraine the use of agricultural land is not based on scientifically based approaches, but in an unbalanced way, and the increase in volumes of crop production is carried out through exhaustion agro-resource potential. By involving methods of system analysis and synthesis, a monograph, the necessity of reforming the organizational and economic ties between the subjects of agro-industrial activity in the process of land use has been substantiated. The central consolidating role of the LCD is highlighted and the stabilizing influence of the financial-economic instrument of the DCM on the economic situation is proved. On the basis of the application of the analytical method, strategic directions of the DCM of land use sector have been proposed, and its stimulating significance for the level of agroecological and food security, as well as for the enhancement of the development of a number of related industries, that contributes to overcoming the ecological and economic crisis of Ukraine.

Research results. Implementation of LEDS involves technological modernization not only of the industrial complex, as a separate component of the economic system, but also focuses on the upgrading of a higher level - all components of production stages and consumption. The determinants of the effectiveness of the implementation of LEDS are the indicators of economic efficiency of the functioning of economic systems, as well as indicators of the quality state of the environment. These include indicators of GHG emissions as evidence of anthropogenic environmental impact. Activities on agricultural land cultivation also leads to emissions of one of the main GHG - carbon, provided unbalanced land use, fig. 1

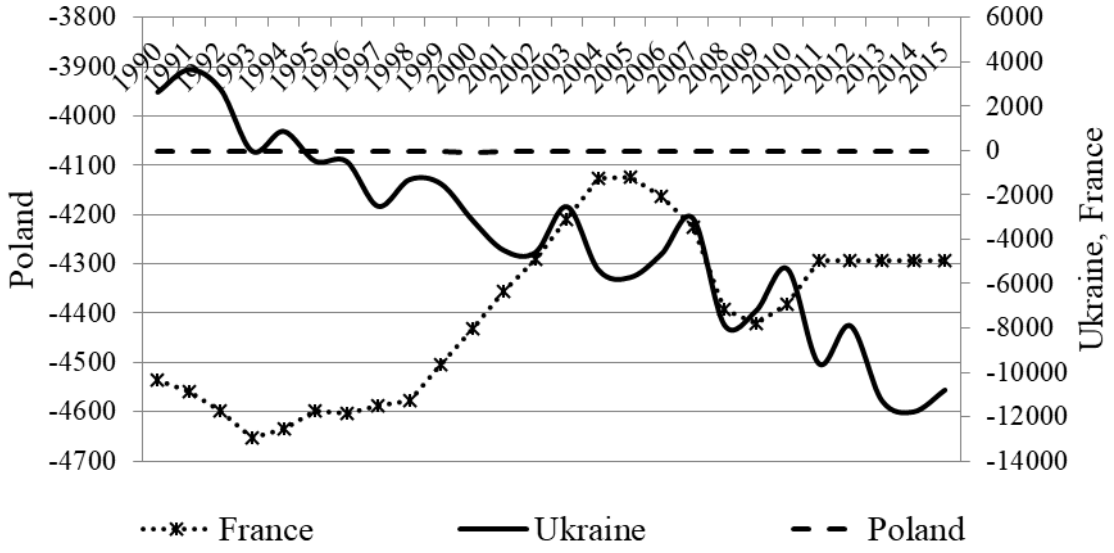


Fig. 1. Dynamics of carbon stocks changes in the pool of mineral soils, 1000 t C

Source: elaborated by author by using data of national unventory reports, 2017 submission [http://unfccc.int/national_reports/annex_i_ghg_inventories/national_invento ries_submissions/items/10116.php]

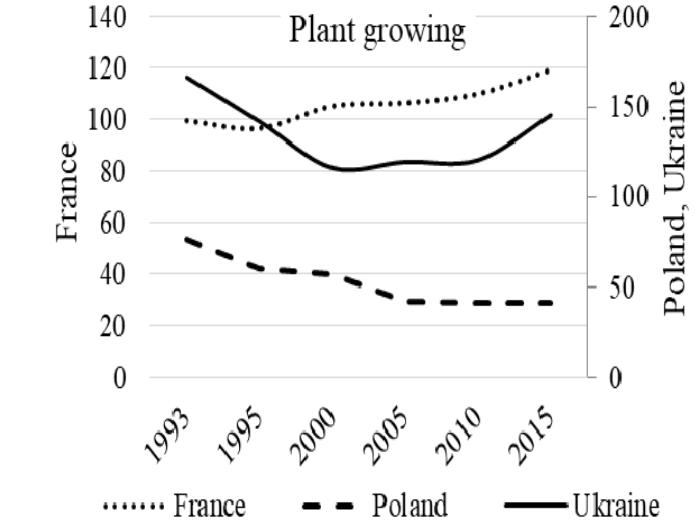
Listed in Fig. 1 information demonstrates the dynamics of carbon stock changes in the mineral reservoir on agricultural lands, as indicated in the national reports of the countries included in the list of Annex I of the UNFCCC, submission 2017. So, if a stable agricultural policy on agricultural land is being implemented in Poland, the results of that are being realized at a relatively stable level of emissions of 4 million tonnes, in France there is an improvement in the state of the land as a result of their cultivation, which has allowed emission reductions to be reduced almost two fold from 10-13 years million tons in the 1990s up to 5 million tons in the last five years.

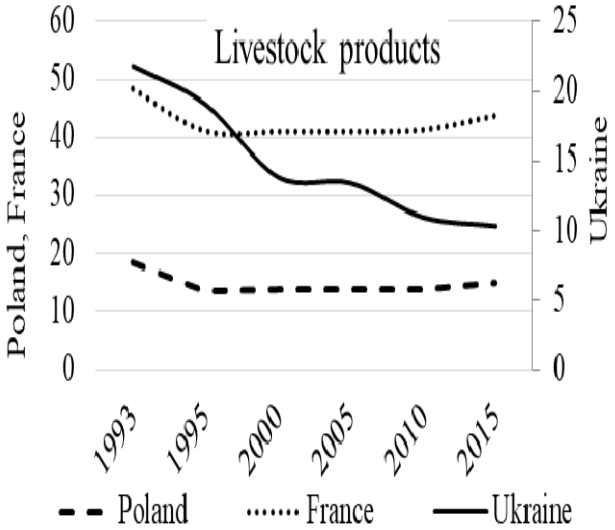
One of the reason of this state can be found through changes in the structure of crops, in particular, relatively stable volumes of perennial plantings in France, which allows producing about 2 million tons of apples. In addition, the volumes of production of commercial products of sunflower seeds from 2.4 to 1.2 million tons were

reduced, relatively stable volumes of meat products production at the level of 3.6-3.7 million tons and milk (25.6-26 million tons), that shows that animal hasbundry has been saved – the main source of manure.

Instead, in Ukraine, the situation is characterized by an increase in sowing of sunflowers, which allowed to increase the production of seeds from 2.1 to 11.2 million tons, and milk production decreased from 19 to 8.6 million tons during the period of independence, while the volume of production of meat products since 2005, the FAO website has not been specified for Ukraine at all. Reducing the number of animals negatively affects at the inpoots of organic fertilizers.

Generalizing trends are shown in Fig. 2 (a) – for the crop husbandry and (b) – for the animal husbandry, million tons. The comparison of these data has some difficultnes due to significant soil-climatic differences between countries, but the general tendency testifies about the disbalanced using of agricultural lands in Ukraine, remains obvious. Also, the structure of land use in the comparison group, which has the highest disproportions in Ukraine among to the categories of land use agricultural land and other their species, matters. About 70 % of the country's territory is agricultural in Ukraine, and most of the state (almost 54 %) is plowed, only 16 % of the territory is covered by forest according to statistic data [16]. More than half of the territory of our country (65.4 %) is used by agricultural commodity producers, 11.9 % - by the householders. But proportion of productive lands in their ownership and use are bigger. In particular, agricultural producers use almost 81 % of productive agricultural land, and the householders - only 16.3 %.





а) б)

Fig. 2. Dynamics of commodity products by agriculture in countries, 10^6 tons

The sources: elaborated by author based on FAO data [http://www.fao.org/faostat/en/#data/GC]

The current situation with agricultural land use poses a threat to the level of agro-ecological and, at the end, to food security. The solution of this problem is considered possible by introducing low-carbon use of agricultural land (LCL), under which the not-negative balance of carbon is achiving in the pool of mineral soils, thus determining the restoration and preservation of the land fertility that is a factor of agroecological safety. The succesful implementation of the LCL requires the formation of an domestic carbon market (DCM) for the agricultural land use sector, which is a financial and economic tool for ensuring the sustainable use of land. The scheme of formation of DCM is shown in Fig. 3. The launching of the DCM needs to improve the development of the regulatory and legislative framework and the institutional framework for the formation and development of inventories of carbon stocks at the regional level. Also it is needed to harmonized of their results with the data of Ukraine's annual submissions to the UNFCCC secretariat, monitoring the state of agricultural land, with a greater emphasis on the aspect of humus stocks, as well as the control and audit system as a process of fixing the results of inventory changes in carbon stocks in the soil pool in the regions, issue of the carbon removal units (RMU) and to the realisation of a system of land protection measures.

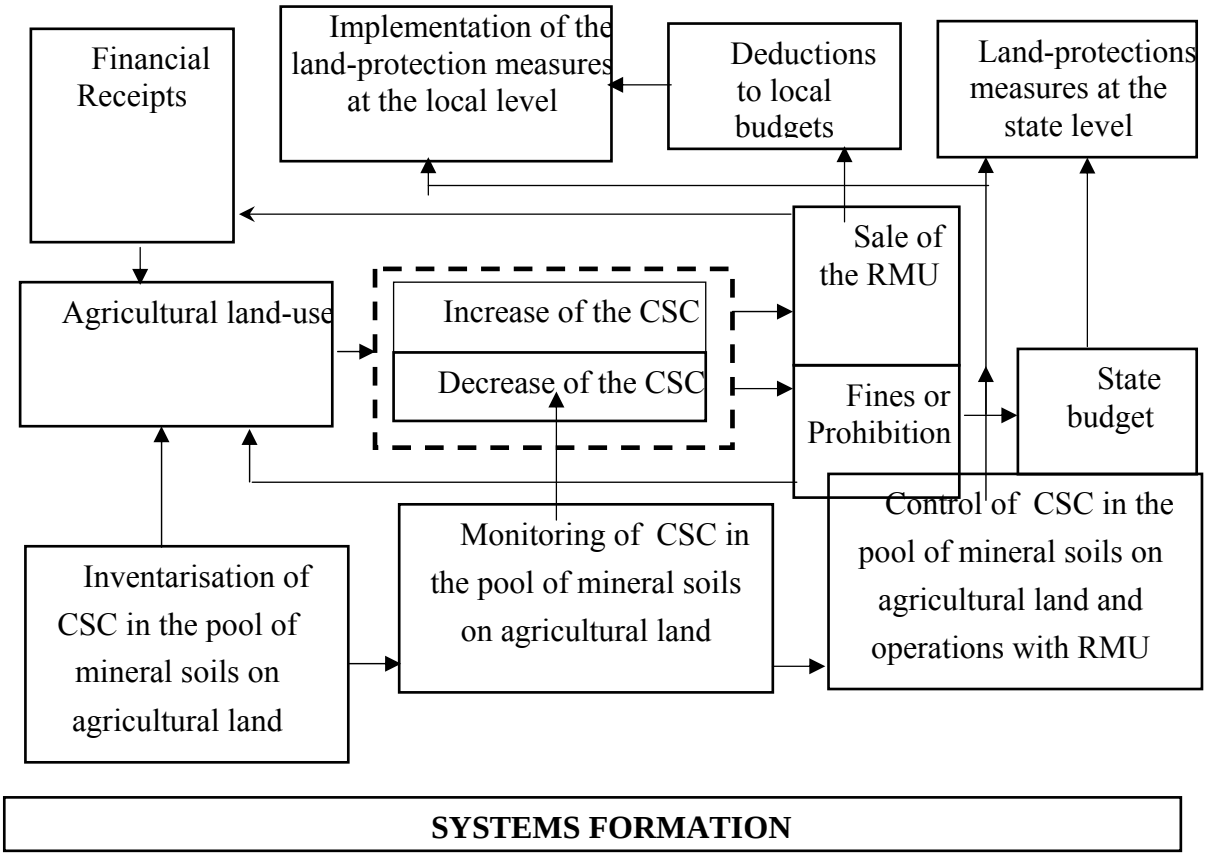


Fig. 3. Strategic directions for the formation and implementation of the domestic carbon market for the sector of agricultural land use

The sources: elaborated by author.

The regulation of the implementation of the LCL should be carried out on a legislative basis through the establishment of norms for the application of the volume of necessary payments from land users, the application of incentive exemption for volumes and / or terms of financial payments, collection of payment for lost profit to the owner of the plots where the economic activity is conducted withou the implementation of LCL, application of financial and economic instruments of preferential crediting, insurance, etc. In order to ensure and accelerate the restoration of the agro-resource potential of territories with a lower level of carbon stock in the soil, as well as to optimize financial payments and support the competitiveness of agro-enterprises, the amount of payments for land use should be determined by the scope of implementation of the LCL measures and the quality of these

works. It also needs to take into account the values of land area in the use of agricultural production and the volumes of increase of carbon stock in soil pools.

The using of carbon credits as a trading tool requires the formation of special deposit accounts, on which companies transfer a certain amount of financial resources from sales. Carbon units represent financial documents issued in the equivalent of 1 t C and are credited to the account of the agro-enterprise on the basis of the results of the verification of the carbon stock change in the soil of the agricultural land under the treatment. In such cases, the enterprise should conduct payments, in kind for taxes, which will contribute to budget filling. The funds accumulated by this way should be aimed at implementation of measures to restore the natural resource potential of the regions - the expansion of the forest area on land belonged to the territorial communities, the struggle with the formation of ravines, the building of anti-erosion dams, the restoration of wetlands and meadow-conservation lands, etc. In the case of carbon stock increasing in soil pools, the company increases its unit count, otherwise, they are withdrawn from. It is necessary to legislatively establish the norm, by which the enterprise has the right to produce commodity agricultural products only, provided that there are units on his account. This restriction does not apply to land plots of households, and to adjoining plots (gardens) to the houses. In cases of the carbon stocks reduction in the lands based on the results of the assessment of the impact of their cultivation, compared with the state of the assessment at the beginning of production activity, but with the presence of carbon units on the accounts of the enterprise from previous periods, the agri-enterprice should be subject of penalties that will contribute to filling the state budget. These funds should be directed at the implementation of measures for the restoration of natural resources potential on the lands of the state stock or on land, the responsibility for the results of economic activity which can not be established, but these lands require the implementation of restore measers land or conservation measures. The examples of these cases are, careers or mines , where the mining of minerals was carried out prior to the establishment of the period of Ukraine's independence, but the restore measures on them were not timely implemented. The results of all control steps should be transparent and opened to public access. This a financial instrument will stimulates for agro enterprises to implement measures for the restoration of agro-resource potential of land.

Conclusions.

On the basis on the analysis of the dynamics of carbon stocks chsnges in the soil pools on agricultural land in the comparison with the dynamics of agricultural production from different countries has been shown to be an unbalanced type of land use in Ukraine. The result of these comparisons is used for justification of the necessity of reforming the organizational-economic relations between the subjects of land use is grounded, which is aimed at the implementation of the LCL with the subsequent formation of the DCM.

The launching of the LCL is an approach to ensure balanced use of agricultural land, increase their level of market capitalization and the volume of financial profits of agricultural enterprises become dependent on the quality of soil cover, which arises after their exploitation. In order to acquire the right of the cultivation for different crop types of and to maintain acceptable levels of profitability, it is necessary to adhere to scientifically based norms of agrotechnologies. This will improve situation with the restoration of livestock and will be stimul others economy sectors in Ukraine. The proposed instruments of the LCL and the DCM are the key to the restoration and preservation of agro-resource potential and to ensure an acceptable level of agro-ecological and food security of the state.

The formating of the DCM in the land use sector requires the development of a regulatory and legislative framework and the improvement of the institutional system by the strategic directions: the formation and development of inventory systems for the assessments of carbon stocks in the pool of agricultural land at the regional level, monitoring their condition, control and audit as financial and economic operations with carbon units, directions of the use of financial resources, obtained from these operations and the introduction of a system of land protection measures for all levels.

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