







“Green” Sector of the Air Transport of Ukraine Sustainable Development

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Abstract. Harmful impact of global air transport on the environment is evaluated in the article. Global environmental problems and directions for their reduction at the national level are identified. It is established that the most harmful influence for the ecosystem is done by the air transport during performance of logistics processes and operations at the airport. World experience of solving the environmental pollution problems in aviation sector on the basis of principles and methods of “green” logistics is studied. It has been found that Ukrainian airlines are not active enough to use environmental solutions in their activities; the main reason of this is the lack of effective mechanisms for implementation and state support of “green” initiatives. Main tools of sustainable environmental development, which should be implemented in the aviation industry of Ukraine, are proposed. It is proposed a mechanism for formation of a “green” airport in Ukraine. It represents a system of principles, methods and tools of logistics management of production and technological processes as well as airport infrastructure, to reduce their negative impact on the ecosystem and achieve a high level of resource efficiency.

Realization of the system of principles of “green” logistics allows to implement gradually technologies for de-carbonization of the airport depending on its spatial development.

Keywords: Environment · “Green” aviation · Sustainable development

1 Actually of the Subject Matter

Currently, at the global level a huge attention is paid to the searching of solution for energy conservation problem, fuel efficiency, as well as control over the level of harmful emissions in the atmosphere by various fields and sectors of the economy.

According to the conclusions, done by the UN experts, at the current temperatures rise, melting of permafrost will be a threat to the planet in 2050. Main reason of the rapid warming in the world is concentration of carbon dioxide CO₂ in the atmosphere, which is increased due to the further expansion of industrial production [1]. 3% of the total CO₂ emissions belong to the air transport, which remains the only means of quick transportation of passengers and cargo over long distances. Rapid development of air transport would inevitably cause enormous damage to the environment, but initiatives, realized by the industry, are designed to stabilize and then reduce greenhouse gas emissions. The COVID-2019 pandemic led to the reduction of business activity, which

allowed to obtain a short-term positive environmental effect. However, according to the ICAO forecast according to the various scenarios of aviation sector development up to 2050, CO₂ emissions are expected to be increase from 890 to 2800 Mt. [2]. Taking into account expected trends of climate changes as well as global requirements regarding environmental safety, the aviation sector is obliged to take active steps in this direction in order to save its role in the global environment and not to lose potential benefits for society, in general.

Ukraine, as a member of the world aviation community, must follow established international recommendations and requirements regarding achievement environmental effect. That’s why, in order to achieve the set global aviation goals there is an urgent need to find and implement resource-efficient “clean” technologies for the Ukrainian aviation sector both at the level of individual aviation enterprises and the industry level, in general.

2 Problem Solution

According to the International Council On Clean Transportation report, it had been established that in 2019 aviation CO₂ emissions amounted to 920 million tons (Mt), and the largest number of emissions, almost 85%, was made by passenger aircraft [3].

In 2019, compared with 2013, the total amount of CO₂ emissions from this segment has been increased by 33% and equals to 785 million tons (Mt). CO₂ emissions from air passenger transportation by narrow-body aircraft comprise 43% of the total world’s volume, by wide-body aircraft - 36%, and regional - 6%. The last 15% are CO₂ emissions from air cargo transportation, 8% of which was performed by passenger aircraft as additional loading, and 7% - by cargo aircraft. In 2020, due to the implementation of quarantine measures because of Covid-19 pandemic and blocking of air transport activity, global volumes of air passenger transportation have been decreased by almost 60%. This has led to a slight reduction of the energy intensity of commercial passenger aircraft and, in the result, increased environmental efficiency of the industry, in general.

Among the world’s major pollutants are United States, China, Great Britain, Japan and Germany. Moreover, 55% of all global aviation CO₂ emissions belong to the markets of US, EU and China [4].

According to the annual global study Energodata, level of the Ukraine’s GDP energy intensity is 2 times more than the average value in the other world countries. For example, level of Poland’s GDP energy intensity is 2.5 times lower than in Ukraine, level of Germany’s GDP energy intensity is 3.3 times lower than Ukrainian one [5].

In 2019 the amount of carbon dioxide emissions in Ukraine has been decreased by 4.03% compared with the previous 2018 and was equal to 121,300 thousand tons. At the same time, the total amount of pollutant emissions in 2019 has been equal to 4108.3 thousand tons (reduction rate - 0.31%). 1648.8 thousand tons of emissions have been generated by mobile devices, which is 2.3% higher than in 2018 [6].

In the transport sector, the largest amount of harmful emissions into the atmosphere belongs to the motor transport. It should be noted that information on CO₂ emissions by the Ukrainian aviation sector are not published in official statistical sources since

2016. According to the international experts, achieving of a short-term environmental effect in 2020 will not solve the problem of air transport negative impact on the environment and climate changing.

Therefore, implementation of the fiscal and regulatory measures are considered are to be the main priorities, which will ensure operational and technical efficiency, as well as risk management that may arise during creation of “clean” aviation infrastructure, new (energy efficient) aircraft engines, power plants, etc. (see Fig. 1).

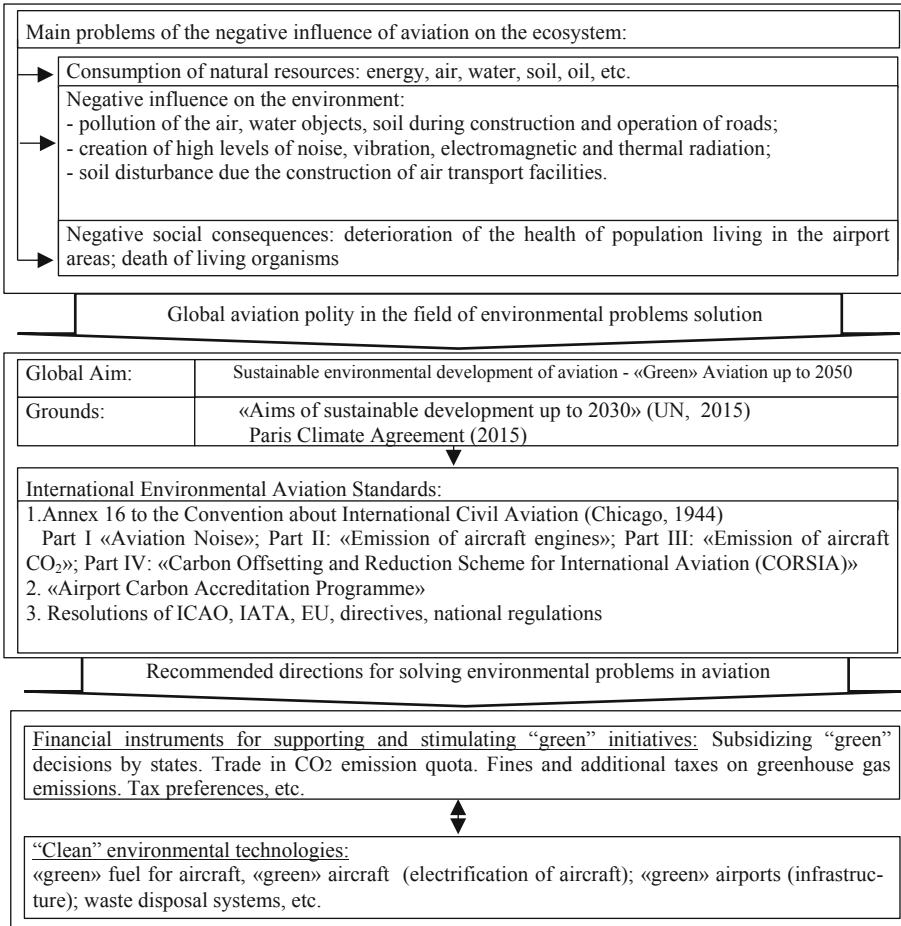


Fig. 1. Global policy for solving environmental problems in aviation.

In order to solve the global problem of reducing the negative impact of the aviation industry on the environment there is a necessity in transformation of its existing state, in accordance with the principles of sustainable development, i.e. its transformation into a sustainable air transport system [7–9].

Taking into account determined global trends in the development of “clean” aviation in the nearest future, Ukrainian aviation sector faces a number of problems and challenges, the solution of which requires appropriate changes both at the legislative level and foresee technological modernization of the air transport system, in general. Moreover, the key factor should be state support and stimulation of energy efficient solutions implementation, which will foresee organization of coordinated work of administrative, financial and legislative structures as well as research institutions.

Ukrainian aviation enterprises are not active enough to develop programs for “green” technological solutions implementation into their activity. First of all, it is observed because of uncertainty of financial mechanisms to stimulate “green” initiatives and lack of own resources for their implementation. In the most countries of the world, the incentives for reduction harmful emissions are an effective system of taxation and penalties for exceeding the established amount of emissions, which allows to invest received budget funds to the resource-efficient projects.

At this stage, Ukraine has introduced a carbon tax, the rate of which (10 UAH/t CO₂ - 0.36 USD/t CO₂) is the lowest one in comparison with the other countries. For example in Poland, having the economy, which is the most close to the Ukrainian one, the carbon tax rate is 1 US dollar/t CO₂.

According to the international experience, a carbon tax can be a powerful tool to reduce harmful emissions if the rate is high. At the same time, in case of considerable increase of the carbon tax rate, there is a risk that, for the first, companies will provide inaccurate data to reduce tax costs, and for the second, this value will be included into the products prime cost and will cause increasing of its final cost. The low tax rate does not create incentives for any technological changes, but leads to the appearance of a fair concept, called “polluter pays”.

It should be added that in the most countries of the world the carbon tax mechanism is narrower than in Ukraine. Also, the world practice provides exemption from carbon taxation if there are risks of CO₂ leakage or the industry is vulnerable to high emission costs. As a rule, this category includes agriculture and forestry, as well as transport (by types).

That’s why, in order to achieve the expected effect from the aviation sector, it is necessary to solve a wide range of existing problems, starting from the state regulation of the tasks and possible scenarios of their development. At the same time, the key functions here should be performed by the State Aviation Service of Ukraine. It should determine requirements, develop methods and implement necessary tools for gradual decarbonization of domestic aviation enterprises on the basis of regulatory and supervisory policy.

Main tools of sustainable environmental development to be implemented in the aviation industry of Ukraine should include: creation of an effective environmental management system; formation of a flexible “environmental” pricing policy; creation of an effective public procurement policy; reforming of the “environmental” taxation system; development and usage of effective mechanisms of state investment into the infrastructure, correspondent to the principles of sustainable development; implementation of state support mechanisms for the researches, connected with the development of “green” technologies; development and implementation of the strategies for “green” air transport development as a composite part of a strategy for the sustainable “green” society formation.

It is obviously, that the greatest damage to the ecosystem is caused by the air transport during implementation of logistics processes and operations at the airport. Therefore, reduction of harmful substances emissions during airport activities should be carried out in the technical, operational and logistics areas [10]. The environmental effect in technical area can be achieved due to the improvement of aircraft engine design, usage of alternative types of fuel (energy). Operational activities will include staff training and usage of information and communication technologies. Main activities directed to the reduction of the negative environmental impact in the logistics sector include: optimization of the distribution network, carrying out procurement and production activities taking into account CO₂ emissions, usage of intermodal and multimodal technologies, “green” designing of warehouses, packaging management, waste management, etc. It means that environmental problems in aviation sector should be solved on the basis of principles and methods of “green” logistics. Implementation of the “green” logistics principles allows to balance economic, social and cultural as well as environmental efficiency of the logistics system (supply chain) [11].

As it was mentioned before, airport logistics processes have a high level of energy consumption. That’s why, development and implementation of the measures for access to the “green” energy is an extremely important step in airports decarbonization, and it also gives possibility to replace fossil fuels in production by alternative energy sources. Airports can get “clean” energy by two ways: buy or generate it. In this case, the second option is more expensive one from a technical point of view, but it is the most attractive one from the side of business sustainability.

In order to achieve maximum socio-economic and environmental effects, Ukrainian airports should be developed not only from the standpoint of the aviation industry needs, but also should take into account the features and capabilities of the urban system to which they belong and have a significant impact. Thus, according to the world experience, if the airport is located within the city, then due to the territorial constraints, logistics and commercial infrastructure will be mainly concentrated on its territory. In case of airport location outside the city, business infrastructure will be developed around it, which allows you to create special economic zones and develop the airport on the bases of aerocities or aerotropolises models.

This approach will provide an opportunity to resolve systematically environmental problems and challenges for ensuring sustainable functioning of both the air transport system and other economics sectors of individual regions and country in general.

Thus, taking into account the information, described above, the authors propose a mechanism for the formation of a “green” airport as one of the necessary step to achieve sustainable development of the aviation sector of Ukraine. It consists of the system of principles, methods and tools for management of production and technological processes and airport’s infrastructure objects in order to reduce their negative impact on the ecosystem and achieve high level of resource efficiency (see Fig. 2).

According to the proposed mechanism, the airport’s greenhouse gas emissions management subsystem should monitor and control the following processes: 1) direct emissions from the sources owned or controlled by the airport; 2) emissions from purchased electricity and 3) all other indirect emissions from other sources that are not controlled by the airport, but related to its activities.

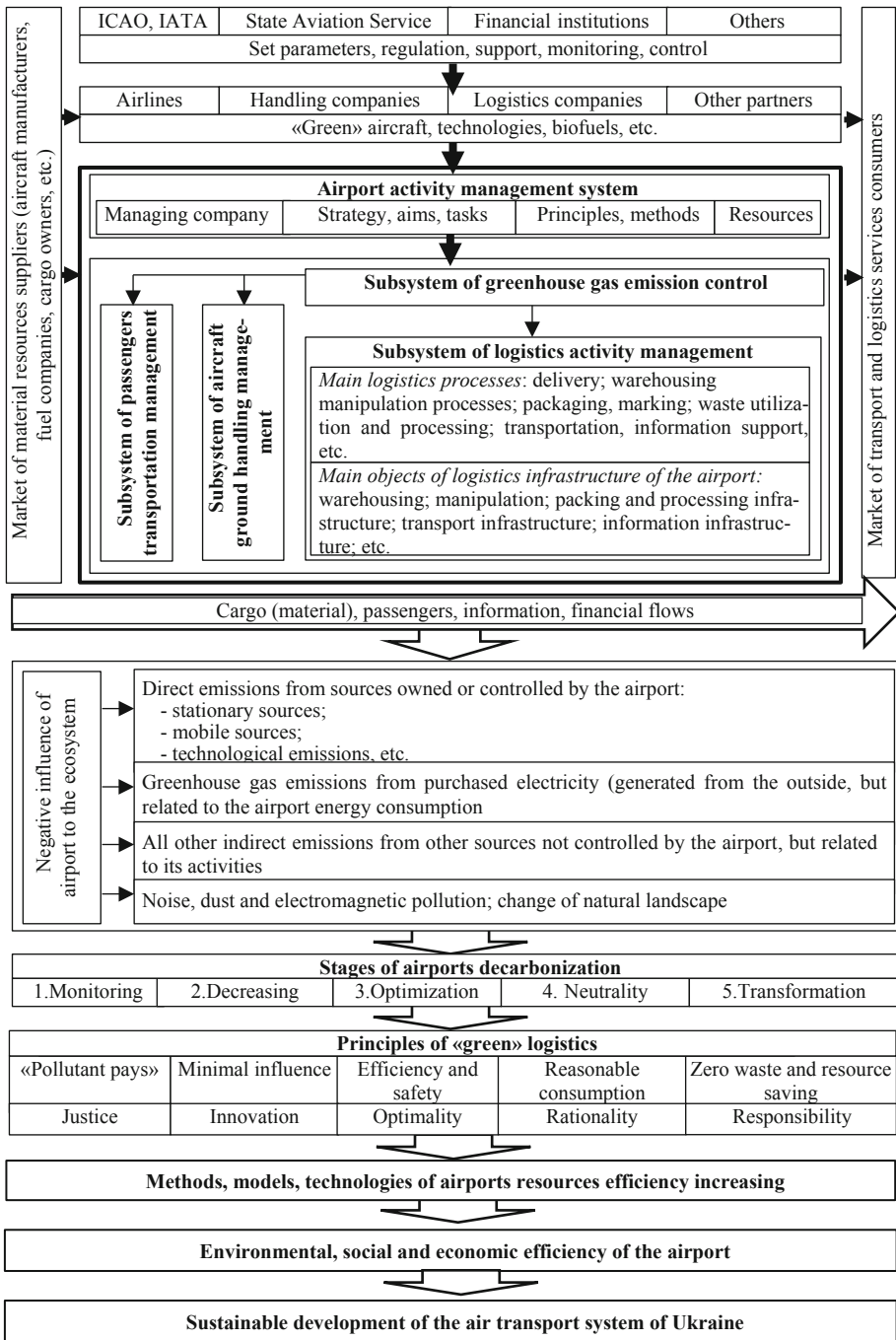


Fig. 2. Mechanism of a “green” airport formation in Ukraine.

Realization of the system of principles of “green” logistics allows to implement gradually technologies for airport de-carbonisation, depending on its spatial and territorial de-velopment as key objects of transport and logistics infra-structure at the national and regional levels [12].

3 Conclusions

In the context of global climate changing and the vector chosen by the international community to creation of a “clean planet”, aviation sector of Ukraine must resolve the task, directed to the achieving of the set universal indexes of greenhouse gas emissions decreasing by 2050. Due to this fact, there is a necessity to improve legislation in order to provide state support, regulation and stimulation of “green” initiatives implementation, as well as realizing structural changes in the aviation industry, in general. Application of the “green” logistics principles allows to implement a systematic approach to solving problems of aviation emissions reduction and developing environment-tally efficient solutions throughout the whole cycle of air transport products creation.

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