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## ENVIRONMENTAL LIABILITIES ARISING FROM THE TRANSACTIONS WITH ATMOSPHERIC AIR AS AN ACCOUNTING OBJECT

**ABSTRACT.** Due to the restructuring the economy of Ukraine on the way to sustainable development has become necessary to develop tools to evaluate environmentally safe, sustainable development of the country and its regions. The atmospheric air pollution yields great economic losses. That is why the atmospheric air protection for providing sustainable economic development is an issue of primary importance to be covered by framework documents. The organization of environmental activity accounting at the enterprises should be considered as an effective tool of atmospheric air condition improvement with the purpose of providing necessary information to manage and to improve environmental security at the macro-level. In common set of environmental liabilities of the enterprise a separate element were identified environmental liabilities from transactions with the atmospheric air. The classification of environmental liabilities from transactions with the atmospheric air has been proposed for the formation of the necessary information about the environmental activities of the company.

**JEL Classification:** Q01, Q56 **Keywords:** sustainable development, atmospheric air pollution, environmentally-oriented management, accounting for environmental liabilities, environmental liabilities, Ukraine.

### Introduction

The problem of sustainable development, which is observed in modern society is one of the most actual global problems. It has become an important part of the external and internal policy of many countries. At the international level first systematic and methodical description of the principles and criteria for sustainable development has been given in the documents of the Rio-92, especially in the Agenda for the XXI century (2013). In program documents on sustainable development in the global environmental partnerships identified one of the fundamental principles – reducing the information gap and increasing access to information in decision-making and implementation. To provide sustainable functioning of the company must to own greater volume of information about the state of internal and external environment.

Ilyicheva (2010) argues that, the source of quantitative information about the enterprise is accounting. But, integration of environmental accounting in the traditional enterprise accounting system is a difficult problem, but that does not mean that it can not be solved. The experts of the Agency for Environmental Protection (ERA, USA) in 1995, generalizing research in this field, proposed the following classification of integration of environmental activities:

- national accounting: serving the information needs of governments and other external users at the macro level;
- financial accounting: conducted for the whole enterprise and examines it as a single economic complex;
- management accounting: conducted by sectors of the market in places of expenses formation, responsibility centers and only need for generalize for the whole enterprise.

Financial accounting is one of the most important functions of management that identifies and organizes data about economic activity, while ensuring informed decision-making. Organization of environmental accounting at enterprises is an effective tool for improving the state of the environment in order to provide the necessary information for management and to improve environmental safety at the national level.

Protection of atmospheric air for sustainable economic development is one of the priority positions in the program documents. Determined that air pollution contains a threat not only to human health, but also cause great economic losses. One of the objects of accounting are environmental liabilities in transactions with atmospheric air, which can provide information about forming influence on state of atmospheric air of the entity.

In countries with different models of building NAS regulatory framework at the national level is fixed order and method of forming provisions for liabilities related to environmental protection. More than 100 countries use IFRS (IAS), which provide creation of a reserve for future expenses on environmental protection.

Thus, the organization of environmental accounting entity in Ukraine should be based on two aspects of regulation: the national legal framework for environmental management and international documents in the field of environmental protection, on the legal basis of accounting.

Nowadays the Ukrainian enterprises can provide the information on environmental liabilities as a part of environmental costs according to the following regulations: “Rules on filling the forms of state statistics investigation #1 – environmental costs “Environmental protection costs and ecological charges” approved by the Order of the State Statistics Committee of November, 11, 2010 # 452; “List of activities included into environmental measures” approved by resolution of the Cabinet of Ministers of Ukraine from 17.09.1996 # 1147; “Guidelines on formation of product (services) cost in the industry” from 02.02.2001 # 47. These documents contain the information on environmental liabilities to the state in the amount of environmental tax charges, penalty charges and other payments concerning environmental activities of a business entity, and besides, concerning settlements with other entities providing environmental services, such as settlements with laboratories of control over the air pollutants emission. Nowadays the most controversial and disputable question is whether environmental liabilities should be considered a part of environmental costs of an entity. We believe that the amount of environmental tax charge for allowable emissions, contaminants emissions and for waste placing, as well as penalties for excessive emissions depend on the efficiency and effectiveness of an entity’s environmental activity. In its turn, this may be recognized as the incentive for such an activity. That’s why the environmental tax charges shouldn’t be included into the environmental costs.

According to the data of the State Statistics Service of Ukraine (2011) the amount of environmental tax charges for emissions into atmospheric air made up 179.60 mln. USD and

the amount of penalties for violation the environmental legislation made up 14.8 mln. USD. These amounts are quite significant. Insufficient attention to environmental liabilities considerably increases the hazard of inaccurate estimation of enterprises' financial condition, and this influences the objectivity and environmental efficiency of managerial decisions. Thus, in order to provide and intensify the preparing of full and authentic information on environmental liabilities arising from the transactions with atmospheric air the organizational and methodical regulations of accounting have to be worked out for those Ukrainian enterprises striving to establish environmentally-oriented and effective management.

## **1. Literature Review**

### ***1.1. Research of environmental accounting***

Kazenski (1994) argues that, environmental accounting is underway in several dozen countries, where bureaucrats, statisticians, and other proponents both foreign and domestic have initiated activities over the past few decades. Several countries have made continuous investments in building routine data systems, which are integrated into existing statistical systems and economic planning activities. Others have made more limited efforts to calculate a few indicators, or analyze a single sector. Some of the earliest research on environmental accounting was done at RFF by Henry Peskin, working on the design of accounts for the United States.

One of the first countries to build environmental accounts is Norway, which began collecting data on energy sources, fisheries, forests, and minerals in the 1970s to address resource scarcity. Over time, the Norwegians have expanded their accounts to include data on air pollutant emissions. Their accounts feed into a model of the national economy, which policymakers use to assess the energy implications of alternate growth strategies. Inclusion of these data also allows them to anticipate the impacts of different growth patterns on compliance with international conventions on pollutant emissions.

More recently, a number of resource-dependent countries have become interested in measuring depreciation of their natural assets and adjusting their GDPs environmentally. One impetus for their interest was the 1989 study "Wasting Assets: Natural Resources in the National Income Accounts", in which Robert Repetto and his colleagues at the World Resources Institute estimated the depreciation of Indonesia's forests, petroleum reserves, and soil assets. Once adjusted to account for that depreciation, Indonesia's GDP and growth rates both sank significantly below conventional figures. While "Wasting Assets" called many to action, it also operated as a brake, leading many economists and statisticians to warn against a focus on green GDP, because it tells decision makers nothing about the causes or solutions for environmental problems.

Since that time, several developing countries have made long-term commitments to broad-based environmental accounting. Namibia began work on resource accounts in 1994, addressing such questions as whether the government has been able to capture rents from the minerals and fisheries sectors, how to allocate scarce water supplies, and how rangeland degradation affects the value of livestock. The Philippines began work on environmental accounts in 1990. The approach used there is to build all economic inputs and outputs into the accounts, including nonmarketed goods and services of the environment. Thus Filipinos estimate monetary values for such items as gathered fuel wood and the waste disposal services provided by air, water, and land; they then add in direct consumption of such services as recreation and aesthetic appreciation of the natural world.

While their methodology is controversial, these accounts have rovided Philippine government agencies and researchers with a rich array of data for policymaking and analysis.

The United States has not been a leader in the environmental accounting arena. At the start of the Clinton administration, the Bureau of Economic Analysis (BEA) made a foray into environmental accounting in the minerals sector, but this preliminary attempt became embroiled in political controversy and faced opposition from the minerals industry. Congress then asked the National Research Council (NRC) to form a blue ribbon panel to consider what the nation should do in the way of environmental accounting.

Since then, Congressional appropriations to BEA have been accompanied by an explicit prohibition on environmental accounting work. The ban may be lifted, however, once the recommendations of the NRC study are made public.

### ***1.2. Research of environmental liabilities***

Some general books discuss problems of environmental liability in some detail. Many contributions in Heyes (2001) deal with environmental liability from a law and economics perspective. Bergkamp (2001) meanwhile discusses issues of environmental liability as do the contributions in Faure (2003) and Faure and Verheij (2007).

It should be mentioned that many studies have shown that environmental liability does have a deterrent effect in the sense that it influences the behaviour of polluters. For example, Alberini and Frost (2007) found that waste generators do respond to the fact that they can be held liable for the costs of clean-up if the waste disposal site contaminates the environment after closure or abandonment and thus falls under the federal or state superfund legislation. Earlier, Alberini and Austin (2001) also found that the imposition of strict liability in state environmental policies reduced unintended pollution releases.

Much research has also been devoted to the effects of so-called superfund liability under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Most of these studies (for example, Sigman, 2001) conclude that liability creates various incentives inter alia towards precaution in managing hazardous wastes and to discourage the development of old industrial sites.

Traditional economists would answer that the right incentives can be given by imposing a tax on the polluting activity. Since this idea builds on the earlier work of Pigou (1951), this is usually referred to as a Pigovian tax. By equating the marginal tax rate to the marginal costs caused by the harmful activity, the factory would get incentives to reduce pollution in an optimal way. In his seminal article 'The Problem of Social Cost', Coase showed that if transaction costs are zero, an optimal allocation of resources will always take place irrespective of the content of the governing legal rule (Coase, 1960). Coase stressed the reciprocal nature of harm, meaning in this particular case that the pollution is not just caused by the harmful emissions of the factory but also by the presence of neighbours who are, for example, injured by the smoke emissions.

In various papers Van Egteren and Smith examine the difference between negligence and strict liability in a setting where jurisdictions compete for firms that engage in environmentally risky behaviour. They conclude that (in different settings) strict liability (weakly) dominates the negligence rule (Van Egteren and Smith, 2002; Van Egteren, Smith and McAfee, 2004; and Van Egteren, Smith and Eckert, 2006).

General problems of organization and methods of accounting for environmental liabilities of industry plants have been discussed in different scientific publications for years but certain aspects are still under discussion or call for further research. Particularly these issues concern the development of the organizational and methodical regulations of accounting for environmental liabilities arising from transactions with atmospheric air.

## 2. Statistics of air pollution by stationary sources in Ukraine

The problem of sustainable economic growth and environmental protection is of high priority within the sustainable development strategy. Whatever perfect the modern solutions of environmental problems would be, they are still inappropriate in case we fail to combine them with the global problems solving.

The high level of air pollution is still one of the important problems for Ukraine. Annual concentration of dust, nitric oxide, formaldehyde, sulphur dioxide and other substances in many cities exceeds established norms.

The main air pollutants of country were enterprises which produce electric power, gas and waterprocessing and mining industry enterprises (33% and 21% of emissions respectively). Density of emission from stationary pollution sources over 1 sq. km of the country territory made up 7,2 tons of hazardous agents, according to the maximum permissible concentration of every contaminant in a certain volume of atmospheric air.

According to rating of Framework Convention on Climate Change Ukraine (2013) holds the 19t place among the countries with the highest level of the greenhouse gases emission. Greenhouse gases emission decreased after 1990 (1990 as the base) due to the economic activity decline which is associated with collapse of USSR at that time. However recently greenhouse gas emission has started increasing and now Ukraine is the third of the countries with the high ratio of greenhouse gas emission to GDP in the world. Analyzed the Global Energy Statistic (2011), in 2012 CO<sub>2</sub> intensity to GDP is 0,959 kCO<sub>2</sub> /USD (Kazakhstan – 1.153, Uzbekistan – 1.097).

Statistic accounting for CO<sub>2</sub> emission by Ukrainian plants started after the Kyoto Protocol was ratified in 2004. Dynamics of CO<sub>2</sub> emission for 2004-2011 are shown at the *Figure 1*.

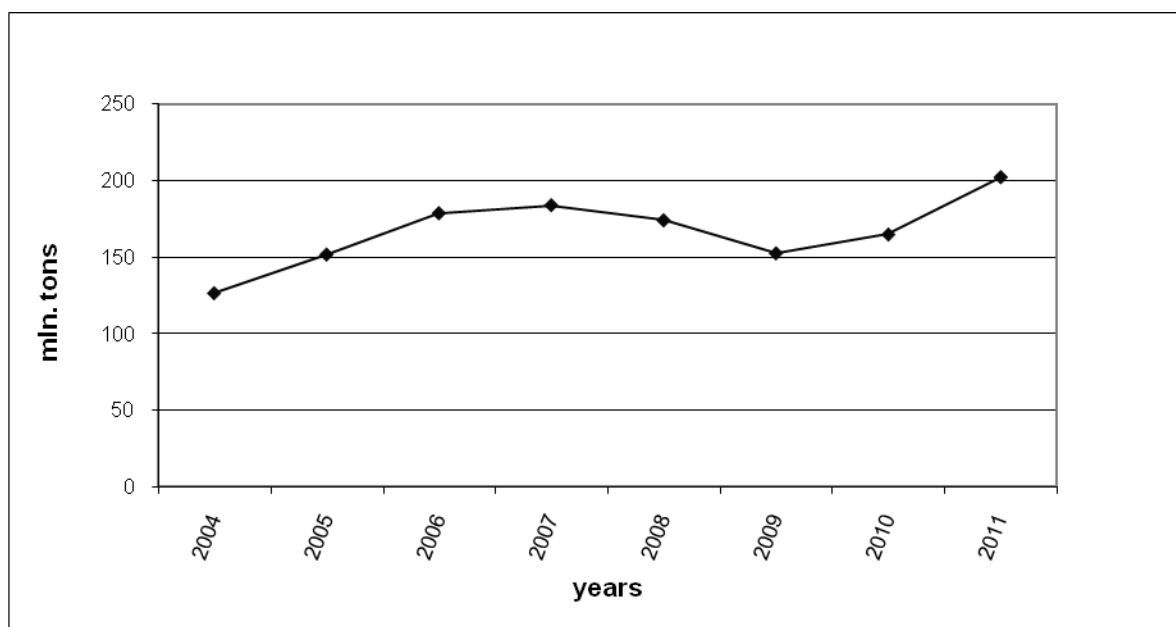


Figure 1. Dynamics of CO<sub>2</sub> emission by stationary sources of pollution in Ukraine in 2004-2011

*Source:* compiled by the official site of the State Statistics Service of Ukraine.

Thus, the quantity of CO<sub>2</sub> on atmospheric air during last three years has increased to 26%. According to the data of the Intergovernmental Commission on Climate Change (2007)

was pointed out that level of CO<sub>2</sub> can be from 650 to 970 particles to million to 2100. It will cause average temperature raise by 6 degrees Celsius in comparison with 1990 and will lead to disastrous effects of a global character.

After studying data of Strategy of environmental policy of Ukraine to 2020 (2007), the cause of increasing air pollution is influenced by the factors as follows:

- default of activities on decreasing the emission volume to normal level by plants-pollutants within the set terms;
- low speed of implementation of modern technologies of emissions purifying;
- ineffective emissions purifying from gas impurities.

Elimination of each of these factors impact depends on the actions of management and, consequently, from his awareness.

Because of the environmental crisis the special attention is to be given to the environmental information. According to the framework of sustainable development within global environmental partnership the main principle is filling up the information gap and extending the access to the information in the decision-making process. Accounting is one of the most important management functions that determines and systemizes data on economic activity, and provides well-grounded management decision-making. That is why accounting for transactions connected with atmospheric air at plants should promote getting the full information for satisfaction the users' needs as such users may be not only investors, owners but society in general.

Having reviewed the Report on sustainable development of corporation "Obolon" (2011), it was found out that the information on atmospheric air is provided in descriptive form with determining the main sources of atmospheric air contaminants and solving problems to reduce emissions. The basis of this information must be put to economic mechanism – documentation, accounting ratios of ecological expenses and liabilities in order to identify the harmful effects on the atmosphere and generate additional income from the investment of funds in the event of ecological character. The bases of accounting information relating to a considered problem are accounting data on transactions with the atmospheric air at enterprises. Expanding the boundaries of traditional accounting systems will allow enterprises to more fully and objectively taken into account the various aspects of its operations and, in particular, the extent of influence on atmospheric air.

Moreover, the introduction of accounting on operations with the atmospheric air at the enterprise will promote environmentally effective mode of its work, reduction negative impacts on air, increase profitability, improve reputation, attracting investment, provide loans, resolve environmental issues in privatization, improvement of sustainable development, etc.

### **3. Environmental liabilities as an accounting object**

According to the Report by the UNCTAD secretariat (1995), had reviewed the requirements for environmental information to be provided in the reports of companies. Character of the information contained in the reports of companies foreign countries (accounting 21 countries were investigated) on accounting of environmental activities varied. An insignificant number of countries, namely 19% (France, USA, Switzerland, the Netherlands) provides a financial information in reports. All other countries provide information mainly descriptive. In each country is conducted necessarily or considered for further implementation of cost accounting for environmental activities. Also takes place reflection in the reporting of accounting of environmental liabilities in 33% of reports (USA, Switzerland, Italy, Germany, Finland, Canada, Brazil), accounting for income from environmental activity – in 19% of reports (Italy, France, Finland), accounting for investments in environmental activities – in 19% (Switzerland, Japan, Germany, Brazil). Only

in accounting reporting of Italy are clearly defined accounts belonging to the Balance Sheet reporting and reflected in Notes to the accounts.

Ilyicheva (2010) attaches great attention to the formation of new objects of accounting. To ensure compliance with the Kyoto Protocol identifies such objects as: environmental liabilities on greenhouse gas emissions, the environmental costs of reducing greenhouse gas emissions, gases emissions quota, certificates of emission reduction, an environmental fund. Scientific researches and practical experience of foreign countries indicate that it is the liability and expenses in transactions with atmospheric air, becomes so important that the insufficient attention to it significantly increases the risk of erroneous assessment of the financial situation of enterprises, which is formed in the accounting and reporting. It reflected on objectivity and effectiveness of acceptance of administrative decisions which form environmental capacity of entities that can significantly change the level of risk investment attractiveness, competitiveness and in general image of the company.

After analyzing publications about formation activity environmental accounting objects, Zamula (2010), Kireitseva (2012) proposed a certain amount of objects in transactions with atmospheric air, which should be reflected in accounting. These include: environmental costs, environmental liabilities, environmental profit in transactions with atmospheric air and quotas for greenhouse gases.

The concept of “environmental liabilities” is referred to as real liabilities before the state in the amount of environmental tax charges, penalties and other forms of payments for performing the environmental activity, and in the amount of payments for environmental services to other entities as contingent liabilities for negative impact on the environment.

Thus, real liabilities are liabilities that occur on the basis of an agreement or legislation relations the amount of which can be evaluated precisely, and which can be included into the accounting reports. Contingent liabilities can be liabilities that may arise in future in the form of ecological measures, paying penalties for harming the health of population and employees, etc. because of negative impact on the environment caused today (in case it is detected).

#### **4. Conditions of forming accounting for environmental liabilities arising from transactions with atmospheric air**

##### ***4.1. The classification of environmental liabilities arising from transactions with atmospheric air***

The important condition of designing accounting for transactions with atmospheric air is to work out their classification. Thus, we recommend to classify environmental liabilities according to their origin, if it is the source of their forming: conditional and real ones (*Fig. 2*). In its turn real liabilities are divided depending on their purpose into liabilities directed to atmospheric air protection and the ones intended to prevent the climate change. Such distribution is necessary to separate liabilities in the accounting system of the enterprise related to the prevention of climate change. As part Kyoto Protocol Ukraine allowed to together with developed countries implement projects joint implementation (PJI) that from reduction of greenhouse gases. By investing in these projects certain amounts of funds, “side-donor” want to receive report with a detailed estimate of expenditures as to their targeted use from each of industrial enterprise which accepts participate in the project.

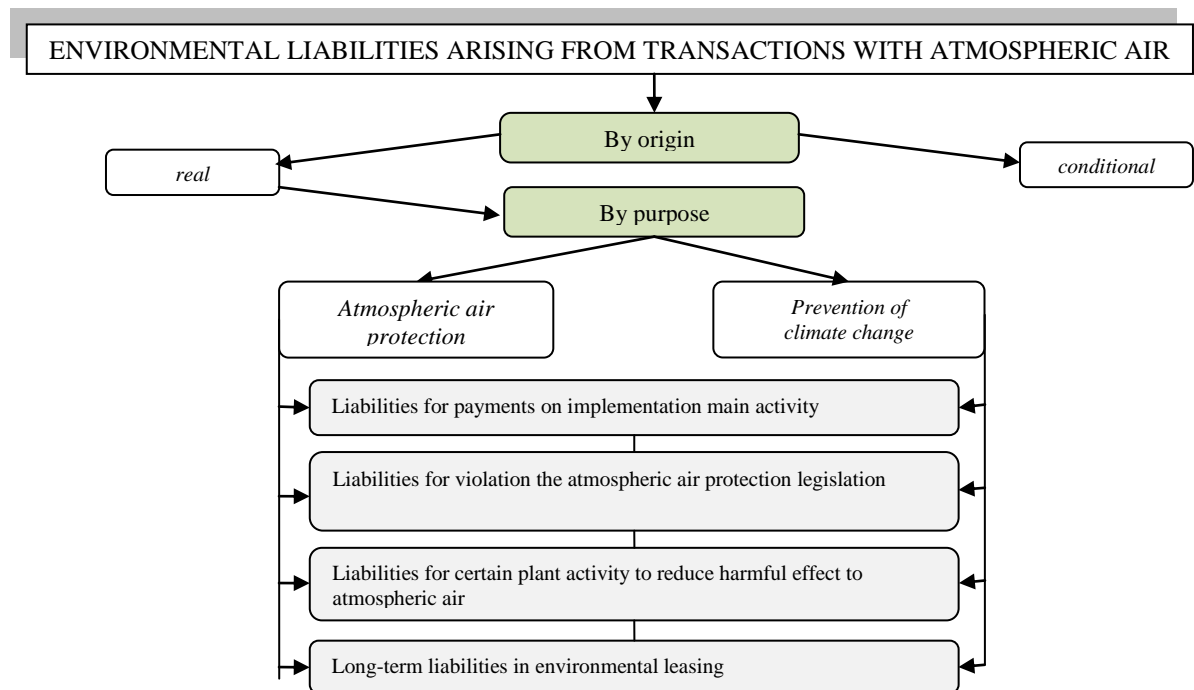


Figure 2. The classification of environmental liabilities which arise from transactions with atmospheric air

Source: compiled by the authors.

*Conditional* environmental liabilities arising from the transactions with atmospheric air appear when an entity has to provide environmental actions in future as a result of atmospheric air pollution made today. Zamula (2010) argues that, conditional environmental liabilities are difficult to count, as their reflection in the accounting system is complicated. In theory and in practice in organizing and accounting of conditional environmental liabilities from transactions with atmospheric air may arise the following main problems:

- impossibility to determine the real level of damage from ingress of contamination into the atmospheric air for environment and health of people living near the plant. The harmful influence of a certain contaminant can reveal in years, depending on the accumulative capacity of contaminants;
- impossibility to detect the real level of pollution of area and certain measures to its elimination, because it's difficult to determine and disclose the source of pollution of contaminant emission;
- the problem in determining the amount of costs for correcting hazardous environmental situation caused by difficulties in detecting real atmospheric air pollution;
- impossibility to divide costs for corrective activities among plants-pollutants;
- the absence of appropriate legislative regulations.

*Real* environmental liabilities arising from the transactions with atmospheric air appear on the basis of real payments. Thus, real liabilities in transactions with atmospheric air that can be included in accounting are:

- liabilities for payments on implementation main activity as environmental tax charges depending on the volume and types of ingress of contamination from stationary pollution sources (plant, workshop, assembly etc.);
- liabilities for violation of legislation of atmospheric air protection that lead to penalties and claim costs for atmospheric air pollution;



- liabilities for certain plant activity to reduce harmful effect to atmospheric air (payments to entities that provide environmental services; payments to laboratories that exercise control over emissions of contaminants into the atmospheric air);

- long-term liabilities in environmental leasing (plant investments in environmental safe and alternative technologies).

Liabilities concerning state environmental tax make up a great percentage of environmental liabilities arising from transactions with atmospheric air. Environmental tax that replaced the pollution charges was introduced in Ukraine on the 1<sup>st</sup> of January 2011. According to the Clause 249.3 of the Tax Code of Ukraine (2012), the amount of environmental tax levied for air emissions of pollutants from stationary sources of pollution are calculated by taxpayers on their own quarterly without applying the cumulative principle based on actual emissions, and tax rates (regardless of whether payer obtained a permit for the emission of air pollutants from stationary pollution sources) using the formula:

$$T = \sum_{i=1}^n Mi \times Hni,$$

where  $T$  – environmental tax;  $Mi$  – actual emission of  $i$  – contaminant agent in tons (t);  $Hni$  – tax rate in the current year for 1 ton of  $i$ -contaminant in USD.

Gorobets' (2011) argues that, in order to implement the commitments of the Kyoto Protocol, the list of pollutants in the Tax Code increased by carbon dioxide (CO<sub>2</sub>), the tax rate for which is the first phase of 0,03USD/t, which help to increase cash inflows to the country budget of nearly 7,5 mln. USD and encourage businesses to reduce greenhouse gas emissions. Moreover in case of measures to reduce emissions of pollutants within time limit imposed coefficient to tax rates 1.2, in the event of further non-compliance will grow annually by 20%.

Tools of the tax system include tax incentives for companies that perform business activities related to the implementation of low-waste, resource-efficient and energy-saving alternative technologies, investing in the development of “green production” that specify accounting for environmental liabilities arising from the transactions with atmospheric air.

*Liabilities for violation the atmospheric air protection legislation* that lead to penalties and claim costs for atmospheric air pollution have considerable part in the payment system which is 11%.

In addition to penalties for submitting after the deadline or error submitting of tax bill, the company may have liabilities to pay damages for excessive emission of pollutants into the atmosphere (2008), as well as the effects of pollution to the workers or the people who can go to the law.

*Liabilities for certain plant activity to reduce harmful effect to atmospheric air.* As a result of business activity it is necessary to exercise controls over reducing or neutralizing the harmful influence of plant on atmospheric air. Often a plant lacks resources to implement such measures on it's own, that's why many entities and laboratories come to the services market where firms provide appropriate services and research. Relevant liability arises from the necessity payments to other agencies that provide environmental services as well as payments to contractors and suppliers for services to reduce emissions.

*Long-term liabilities in environmental leasing.* Accounting for leasing is proceeded according to National Accounting Standard (Provision) “Leasing” (2000) where paragraph 4 determines the finance leasing as leasing that specifies that all risks and benefits connected with the right of using and owning of assets go to the leaseholder.

For business entities the object of environmental leasing in the part of transactions with atmospheric air can be low-waste and alternative technologies; waste equipment and facilities that help to reduce or neutralize the ingress of contaminants and greenhouse gases

into the atmospheric air. Economic efficiency of leasing comparing to purchasing the equipment using owned resources or using borrowed resources is revealing by such main factors as follows: preferential tax treatment (getting tax benefit, financial support from the State and local funds for the environment, local budgets, and foreign countries aids); speed-up depreciation of equipment purchased through leasing; including leasing payments into cost. As a result of the use advantages of ecological leasing may be provided with financial feasibility of some projects. For example, special international and national funds are established to invest into projects connected with reducing the greenhouse gases emission. Total volume of liabilities of interested parties to invest projects within these funds is estimated up to 760 mln. USD (Methods of calculation...). But no appropriate legislative regulations, absence of appropriate accounting information for investors (domestic as well as foreign ones), and poor domestic loan capital market suppress the development of environmental leasing in Ukraine.

## Conclusions

One of the important tasks on the way to international cooperation for providing sustainable development of country's economy is working out the organization and methods of accounting for environmental liabilities. In order to provide generating necessary information on environmental activity of a business entity to satisfy needs of users who are not only investors but owners, etc. and the society in whole. Insufficient attention to environmental liabilities considerably increases the risk of mistaken estimation of financial condition that reflects objectivity and ecological efficiency of management decision-making. In the course of investigations we have established that environmental liabilities of an enterprise are the separate object of accounting the part of which is environmental liabilities in transactions with atmospheric air.

Thus, "environmental liabilities" are liabilities that can appear in relation to the country and conditionals liabilities for the negative impact on the environment that may have a material effect on the financial condition of the enterprise. To classify the environmental liabilities arising from the transactions with atmospheric air is offered into conditional and real ones by their origin. As contingent environmental liabilities are difficult to calculate, it is not possible to find them in the accounting system. Real environmental liabilities arising from the transactions with atmospheric air are as follow: liabilities for making business as a payment of environmental tax in dependence of volume and types of ingress of contamination from stationary sources of pollution, liabilities for violation the atmospheric air protection legislation that lead to penalties and claim costs for atmospheric air pollution, liabilities for certain activities on reducing the harmful impact on the atmospheric air, the long-term liabilities in environmental leasing.

To form authentic accounting data on the size, direction and type of real environmental liabilities from transactions with the atmospheric air proposed to distribute such liabilities on purpose: the protection of air and prevention of climate change. Based on the data may consist annual and interim reports.

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