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**ORGANIZATIONAL AND ECONOMICAL MAINTENANCE OF ECO-ECONOMICAL POTENTIAL OF OIL AND GAS ENTERPRISES' MANAGEMENT**

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*Studying the ecological potential of oil and gas enterprises is very important for increasing the efficiency of their environment-related activity. The paper studies, generalizes and clarifies the essence of the definition "eco-economical potential of oil and gas enterprises". The identification and diagnosis of harmful effects on the environment from oil and gas companies was conducted. Features of the eco-economical potential management of oil and gas enterprises are discovered; especially its principles, methods and functions of eco-economical potential management. Organizational and economical maintenance of eco-economical potential are defined, which includes planned-economic, regulatory and legal, innovation, information, project, and financial supports as well as economic instruments. The effective preventive measures for protection of certain environmental components were offered, which will increase the efficiency of oil and gas companies and observance of sustainable development concept.*

**Keywords:** *ecological potential, eco-economical potential, management, principles, methods, functions, preventive measures, oil and gas production.*

**Introduction.** In recent years, many native and foreign researchers have become increasingly interested in the issues of environmental protection during hydrocarbon deposits exploration. The reason for this is the aggravation of problems during the exploration of these scarce energy resources. The review of the latest researches and publications in energy sector allows us to assert, that under the existing circumstances the need of hydrocarbon energy resources remains high. It

should be noted, that environment-related activity management of oil and gas companies is carried out using the out-of-date command and administration economic system. That is why the transition to the sustainable development concept in oil and gas companies' activity management is extremely urgent nowadays.

**Analysis of recent researches and publications.** A significant number of scientific works is devoted to the issues and improvement of environment-related activity of oil and gas enterprises including: O. Adamenko, J. Adamenko [1], B. Danylyshyn [2], J. Semchuk [3], M. Prykhodko [4], J. Vytvyckyj, N. Gavadzyn [5], G. Stepanjyk [6], L. Melnyk [7], R. Mackiv [8], A. Kernychna [9].

**Previously unsettled problem constituent.** However, the issues of finding the ways of reducing the destructive environmental impacts in oil-gas industry remain relevant. Studying the ecological potential of oil and gas enterprises and its management can facilitate a solution to the problem.

**Main purpose of the article.** The purpose of this article is to generalize and develop management principles of eco-economical potential of oil and gas companies under the ecologization of oil and gas production and to offer effective preventive measures to protect certain environmental components. To achieve this goal it is necessary to complete following tasks:

- clarify the essence of such definitions as ecological and eco-economical potential of oil and gas company;
- identify and analyze the harmful effects from oil and gas enterprises on the environment and offer preventive measures to prevent and overcome the pollution;
- disclose the features of the eco-economical potential of oil and gas enterprises' management, to define its tasks, principles, methods and functions;
- define the organizational and economical maintenance process of eco-economical potential management of oil and gas enterprises.

**Results and discussions.** The general essence of terms «potential», «economical potential», «ecological potential», «eco-economical potential» was studied in works of many scientists.

According to the New Explanatory Dictionary of Ukrainian language the term «potential» means «a reserve, a hidden ability, strength for activities that can appear under certain conditions; a set of all available methods and capabilities of productive power which may be used» [10].

The term «economical potential» that is used to define business activity of economic agents (commercial organizations) means tools, resources, hidden and unutilized reserves, the possibilities and abilities of the entity to ensure the goal of economic growth, social and economic development including the possibility to increase the competitive abilities and development of the management system [11].

Its structural components are the following: natural potential, labor potential, scientific capability, technological capacity and informative potential.

According to the scientists, who studied issues of the environmental protection management, ecological potential is the ability of natural-territorial complex to satisfy all necessary basic livelihood human needs and also natural conditions of employment requirements, recreation and spiritual development.

Ecological potential, according to the approach suggested by Golubets M., can be defined as a set of material-energy resources and ecosystem properties, which ensure its highest possible structural and functional parameters (power, biogeochemical, environmental) and useful functions (protective, productive, recreational, resource and aesthetic) that can be used by a human [12].

According to Voloshyna O., ecological potential of an enterprise is a complex of means, capabilities and skills to use them to achieve the objectives and purpose of eco-oriented development [13].

Babina O. [14] interprets this term as a complex of technical, technological, financial, intellectual, consumer resources, mechanisms and instruments for their implementation that are used during the ecologization of company's activity to minimize the harmful effects of its manufacture and products on the environment.

Berling R. [15] says that ecological potential impacts all components of the economic potential of a company. This influence develops through its effect on recovery and operation processes of all resource components owned by an enterprise. Thus, the pollution affects the production capacity of the company because of accelerated deterioration and premature failure of property assets. The impact of the ecological potential on financial potential is investment resources abstraction in environmental activities, and this eliminates the possibility of profitable deposits in other investment projects. Company's staff potential gets lower due to increased labor fluctuations through the unsatisfactory ecological labor or residence conditions, as well as by the quality decrease of the individual potential of employees as a result of increased morbidity caused by pollution at an enterprise.

G. Beliaeva [16] defines eco-economical potential as integrated complex of potential abilities of maintenance and profitability increase of the company's activity along with the reduction of technological environmental impact. Each of the components of company's eco-economic potential is seen as an opportunity to improve overall financial results by reducing enterprise's expenses and increasing other income through recycling and resource saving.

On this basis we offer the following definitions of ecological and eco-economical potential of oil and gas enterprises:

- ecological potential of oil and gas enterprise is a complex of natural, technical, technological, financial, informational and intellectual resources and advanced management techniques, tools, methods and means of their implementation which are used in the process of research, exploration and development of oil and gas fields in order to minimize the destructive environmental impacts;

- eco-economical potential of oil and gas enterprise is a complex of natural, technical, technological, financial, informational and intellectual resources and advanced management techniques, tools, methods and means of their implementation that are used in the process of research, exploration and development of oil and gas fields for economic growth, competitiveness and social-economical development of oil and gas company, along with a reduction of its destructive environmental impacts.

The effect of eco-economical potential implementation has a multivariate aspect for the enterprise and includes not only the direct environmental effect, but also economic, market-based, financial, structural, technical, technological and social effects.

Eco-economical potential of oil and gas company is generated on the basis of the following sources: revenue sources due to economic benefits in various fields of economic activity; reduction of operating expenses; reduction of the environmental penalties amounts; incomes from alternative investments and of additionally obtained and saved financial resources; external effects in other sectors; effects from oil and gas company's rising public image.

As it was mentioned before oil and gas enterprises are the sources of significant integrated and concentrated negative impacts on all environmental components.

These effects are caused by the toxicity of natural hydrocarbons, associated formation fluids and various chemical substances used in manufacturing processes of drilling and oil and gas extraction.

Analysis showed that the main environmental impacts occur: in the process of drilling of exploratory and producing wells; directly during the oil and gas exploitation; during the storage of produced oil and gas in oil-gas gathering station; in the process of oil and gas transportation to the final consumer.

As for the process of oil-well drilling, then the effective use of ecological potential can be realized through:

1) efficiency increase of well construction technological processes, that is, reduction of the negative effects of geomechanical processes (removal and storage of topsoil during the preparation of areas for wells, the creation of bulk and technological fields for drilling rig, technical drilling contamination which is the source of environmental violations balance);

2) decrease of hydrogeological pollution which causes breach of the upper aquifers in the preparatory work related to drilling; contaminants flow and absorption of mud in the aquifers in the wells deepening process; changes in hydrogeological regime and the functioning of aquifers;

3) cuttings are dangerous for the environmental objects. Hazardous waste are collected, accumulated and stored on drilling site territory. They contain significant amount of hazardous substances such as materials and chemicals used for the preparation and processing of drilling muds. Drilling wastewater is the most

significant content of drilling waste. Equally hazardous are wasted drilling mud and drilling cuttings. Drilling waste are collected and stored in ground barn that are liquidated after drilling. Untimely eliminated barns are permanent sources of environmental pollution. It should be noted that drilling wastewater has the ability to be filtered through waterproofing coating of sludge barns while they pollute the soil, surface water and groundwater. Among the opportunities and threats of recycling and disposal of drilling waste production on environmental protection [18] are: landfills, plants for disposal of toxic and other hazardous waste captured during drilling; vehicles for the transportation of waste to the storage and destruction location.

Equally important component of the environment, which is polluted in the process of oil and gas production, is the atmosphere. Air protection can be carried out by more efficient use of such ecological potential planned elements, which are: organization of sanitary protection zone; the formation of autonomous technology systems; territorial zoning at all stages of oil and gas companies' activity; localization of the emissions; oil and gas companies' location on platforms that provides minimal environmental pollution; location's selection that will guarantee not exceeding the maximum permissible concentrations of harmful substances [19].

Technological measures include: the reduction of air pollution through the use of progressive technologies; replacement of hazardous substances used in the production for less harmful or harmless; the transition to a continuous production process with the pollution restriction.

The special measures, focused on improving air quality, include specific combinations of technological, planned and social activities for each stage of oil and gas production, which are aimed at air quality improvement.

The major environmental issues on natural water pollution from oil and gas production are [4]: withdrawal of water from surface and underground bodies of water which reduces the self-repairing ability of rivers and causes the depletion of water resources potential; natural water pollution from reversible water of production facilities; deterioration of water quality; insufficient funding and implementation of water-protective measures; the lack of the permanent monitoring network in the water consumption scheme.

Reduction of hydrosphere pollution is possible by effective use of ecological potential of oil and gas companies, such as: wide implementation of water consumption scheme with limited freshwater abstraction in the areas of oil and gas extraction; the use of effective methods of preparation of oil, gas and formation water; the usage of effective tools for oil and petroleum products removal from the surface of reservoirs. Also the rational water usage and improvement of exhaust water quality indicators by raising their purification are effective measures for reduction of pollutants discharge at the existing oil and gas companies.

Soil pollution from oil and gas production occurs during:

- flowing of wells during drilling;
- formation of the surface polluted area by drilling wastes;
- flowing of operated wells.

Among the ecological problems of soils are: reduction of humus soil layer power and nutrient content; change in the level and salinity of groundwater; soil instability to the anthropogenic pollution; unfavorable natural and anthropogenic processes.

Oil and gas companies have to use their environmental potential effectively through soil-protecting measures to prevent economic and environmental damage related to the pollution of soils. These soil-protection measures are [20]: reduction of size and number of industrial sites and access roads; prevention of drilling mud emission during drilling; sludge separation from drilling wastewater and its transportation to the specially allotted place; reuse of drilling and industrial wastewater and its purification improvement, use of wastewater for water flooding; purification of surplus wastewater to the sanitary prescribed level; soil purification of waste pollution.

Overall, ecological potential in the soil protection can be implemented by [18]: using anti-erosion hydrotechnical constructions; applying mudflow and landslide protection structures; constructing shore protection structures; terracing steep slopes; exploiting facilities for cleaning oil, fuel oil, garbage and other wastes from soil; using modern machinery and equipment for excavation during the construction of earth containment and diversion berms, dumps, loading of soils.

Contamination of subsoil while developing oil and gas deposits can be eliminated by controlling the circuits' promotion of oil and gas potential, formation pressure and hydrodynamic connections between the layers.

As it was already noted, the elimination of destructive environmental impacts is possible by improving the eco-economic potential management of oil and gas companies.

Eco-economical potential management is an activity that involves ecologization of business processes in the enterprise for its effective management when it comes to the rational use of resources and environmental protection.

Eco-economical potential management of oil and gas enterprises should be directed to dealing with following tasks:

- implementation of enterprise resource planning system based on sustainable development with relevant organizational and economic maintenance;
- reduction of negative impact on all components of the environment during oil and gas extraction;
- implementation of preventive measures to ensure the protection of air, natural surface and groundwater, soils and subsoil.

Process of eco-economical potential management of oil and gas company should be based on the following principles:

- priority of environmental safety requirements;
- ecologization of oil and gas production and widespread introduction of new environmental technologies;
- evidence-based coordination of environmental, economic and social standards of oil and gas companies;
- compensation of damage caused by environmental protection legislation violation;
- rational use of natural resources;
- combination of incentives and responsibilities in the environmental protection field.

Implementation of eco-economical potential management of oil and gas company is carried out through the use of appropriate management mechanism.

This mechanism includes classical methods of eco-economical potential management, namely administrative, economic, social and psychological methods.

Administrative management techniques include restrictions and direct control of the ecosystem exploitation process. They are intended to limit the activities of manufacturers concerning the production of eco-dangerous goods and negative impact on the environment and to replace them in favor of eco-friendly or environmentally acceptable production [17]. Their identifying feature is compulsory nature and lack of incentives during decision-making in the perspective to achieve the objectives of environmental protection. The application of administrative methods of eco-economical potential management of oil and gas enterprises is characterized by low efficiency, but at the moment they are prevalent.

Economic methods of eco-economical potential management are more effective than administrative, in terms of the motivational theory, but they are characterized by slow action and certain inertia. Their application is possible through the use of various economic tools and levers (prices, payments, tax incentives, penalties). The state can apply various economic instruments and incentives for those enterprises which comply with the environmental legislation requirements [18].

Social-psychological management methods implement the capabilities of environmental potential management through social responsibility of oil and gas enterprises [8]. An important element of these methods is the improvement of social and psychological condition of employees and the local population due to the reduction of environmental pollution and occupational diseases, proper arrangement of the territory, where the oil and gas enterprises are situated, and the construction of modern infrastructure.

Methods of eco-economical potential management cannot be considered separately from management functions. The eco-economical potential management

functions of oil and gas enterprises should be based on the classical functions of business management theory: planning, organization, motivation and control.

The planning of oil and gas companies' ecological potential enables to reveal the environmental problems, determine the nature of their occurrence and preliminary evaluate alternative options for these problems solution. Environmental activities planning for the next year is made during the year as part of the oil and gas companies' current plans development. In subsequent years it is made within the environmental protection program of a district and region. In the long term it is made in the frame of the environmental protection state policy.

The organizational function of environmental potential management is carried out by implementing preventive measures within the company's plans and it is applied on the self-financing principles. It should be noted that proper organization of environmental activities will attract financial resources from respective budget funds. The organization of the environmental-related activity should be based on licensing, certification, standardization, environmental audit and environmental insurance and it also should be based on the use of advanced management technologies.

The motivation of the ecological potential management efficiency increase of oil and gas enterprises should be carried out within the tax policy, by cutting tax payments or providing benefits, subsidies in the case of environmental pollution reduction.

Control over the use of ecological potential of enterprises should be carried out and it is carried out by internal divisions of the enterprise (for example, the department of labor and the environment) in order to conserve resources and reduce environmental charges and penalties.

An important element of the ecological potential of oil and gas enterprises' management is its organizational and economical maintenance, which includes planned-economic, regulatory and legal, innovation, information, project, and financial supports as well as economic instruments.

The organizational and economic maintenance is closely related to regulatory and legal support since the organization of environmental activity mustn't conflict with regional, national and international policy in the field of environmental defense and should rely on a number of regulatory and legal state and international documents in the ecological sphere.

The innovation support of the ecological potential has to focus on the solving of environmental problems in the control system. Any innovation introduced by gas enterprises within management decisions in environmental activity should not only be effective, which means to assist in profiting additionally or prevent economic losses, but also moral and ethical, that is to meet civilizational priorities. Thus, the innovation management of the ecologization of oil and gas enterprises should include morality, high level of culture, and its priority should be the preventing of



environmental pollution. The support of innovation activity of oil and gas enterprises, transferring of the up-to-date technologies and innovations, introduction of innovation scientific and technical development, support of ecological studies, and organization of international ecological scientific and technical cooperation should be considered as an integral component of the innovation support. The assessment of the results and benefits of preventive measures implementation related to the production modernization and the determination of possibilities of emergency situations should be conducted as part of the innovation support.

The information support of the eco-economical potential is of great importance. Here, attention should be given to the promotion of information spreading, advertising support of environmental activity, creation of new information channels and networks, through which the information exchange will be carried out. The representation of environmental activity of oil and gas enterprises should be done within statistical information systems and public computer networks. An important prerequisite is the availability and reliability of the information.

There is no doubt that the reforming of the environmental potential management processes should start with the development of projects on preventing and combating the harmful effects at the level of oil and gas enterprises. Their implementation will help to reduce the anthropogenic load on the environment, improve its quality and increase its assimilation potential. The environmental projects of oil and gas enterprises are developed within the programs of the environmental policy of the local authorities and are a part of the state policy of environmental protection.

The project support of the environmental potential is determined by technical and technological possibilities of its implementation. The analysis of technologies to be used in environmental activity should be conducted on a competitive basis. The project support, when choosing environmental technologies of oil and gas enterprises, must meet up-to-date requirements of scientific and technical progress and stimulate the increase of ecocapacity, as well as the growth of economic efficiency among the existing alternative projects.

It is important to ensure the proper financial support of the environmental potential, which is mainly provided by the State Fund for Environmental Protection, a constituent part of the State Budget of Ukraine. This Fund is created to accumulate assets and resources from the goal-oriented financing of environmental and resource-saving activities related to environmental protection. It is financed through the fees paid for environmental pollution and other charges specified by the legislation of Ukraine [2]. The centralization of assets and resources in the funds of various levels does not stimulate the implementation of environmental protection measures at the level of enterprises including oil and gas ones. Assets and resources of local and state extra-budgetary funds for environmental protection should be used only for goal-oriented financing of environmental and resource-saving activities as well as

activities aimed at reducing the negative environmental impact on human health. The redistribution of assets and resources of funds for environmental protection should be based on the priority of efficient usage of environmental potential.

The economic instruments – taxes, exemptions, subsidies and penalties, – play an important and significant role in the organizational and economical support of environmental potential. The regulation of rational use of natural resources in Ukraine is based on the concept of pay environmental management, which covers the system of economic instruments aimed at accumulating material resources for the implementation of environmental programs and at encouraging enterprises to increase the ecological compatibility of applied technologies.

Nowadays the main tax instrument is the rent paid by oil and gas enterprises, but the mechanism for its collection does not adequately consider the complicated natural and geological conditions as well as environmental conditions in exploitation of oil and gas fields.

Taxes and fines paid for pollution by oil and gas enterprises are the traditional payments, the main purpose of which is, basically, to compensate the damage caused to ecosystems. Such mechanism results in the loss of purpose of these payments. It is important not only to state the fact of compensation for the caused damage, but also determine the reasons for such damage.

Fines for excessive and irrational use of natural resources are set at the state level in order to strengthen the responsibility of enterprises-consumers of natural resources for the violation of the norms and rules for use of natural resources. Although the rate of the existing fines is significant, it is not sufficient because does not provide the conditions under which the violation is unprofitable for consumers.

Exemptions incite polluters to reduce harmful impacts on environment to a level below the permitted one. This allows selling the difference between the actual and the permitted emissions to other polluters, so-called concept of "emissions trading" (trading of right to pollute).

Ecological subsidies for oil and gas enterprises can be considered as a tool for increasing the environmental investments. They focus on the development of the enterprise and at the same time promote the conservation of natural systems, stimulate the development of specific programs for higher safety level, make it possible to obtain subsidies for the repair of equipment and facilities in order to reduce their negative impact on the environment.

However, the use of the last two economic instruments in environmental management practices of oil and gas enterprises is limited.

**Conclusions and further researches directions.** Harmful impact on the environment during the activity of oil and gas enterprises is caused by the outdated approaches to management which require the development of scientific recommendations in green production field. The definitions of «ecological potential»

and «eco-economical potential» are developed and features of its management for the oil and gas enterprises are defined. Eco-economical potential of oil and gas enterprises' management must be carried out using appropriate organizational and economical maintenance, which includes planned-economic, regulatory and legal, innovation, information, project, and financial supports as well as economic instruments. Preventive measures, the implementation of which will increase the efficiency of oil and gas enterprises and compliance with the sustainable development concept are offered.

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**ОРГАНІЗАЦІЙНО-ЕКОНОМІЧНЕ ЗАБЕЗПЕЧЕННЯ УПРАВЛІННЯ ЕКОЛОГО-ЕКОНОМІЧНИМ  
ПОТЕНЦІАЛОМ НАФТОГАЗОВИХ ПІДПРИЄМСТВ**

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Для підвищення ефективності природоохоронної діяльності нафтогазових підприємств важливе значення має дослідження їх екологічного потенціалу. Розглянуто, узагальнено та уточнено сутність категорії еколого-економічного потенціалу нафтогазових підприємств. Проведено ідентифікацію та діагностику шкідливих впливів на навколишнє природне середовище нафтогазовидобувних підприємств. Розкрито особливості управління еколого-економічним потенціалом нафтогазових підприємств, а саме: визначено завдання, принципи, розглянуто методи та функції управління еколого-економічним потенціалом. Охарактеризовано організаційно-економічне забезпечення управління еколого-економічним потенціалом, до якого включено: планово-економічне забезпечення, нормативно-правове забезпечення, інноваційне забезпечення, інформаційне забезпечення, проектне забезпечення, фінансове забезпечення та економічні інструменти. Запропоновано превентивні заходи, реалізація яких щодо охорони окремих компонент навколишнього природного середовища сприятиме підвищенню ефективності функціонування нафтогазових підприємств та отримання концепції сталого розвитку.

**Ключові слова:** еколого-економічний потенціал, управління, принципи, методи, функції, превентивні заходи, нафтогазовидобування.

**ОРГАНИЗАЦИОННО-ЭКОНОМИЧЕСКОЕ ОБЕСПЕЧЕНИЕ УПРАВЛЕНИЯ ЭКОЛОГО-  
ЭКОНОМИЧЕСКИМ ПОТЕНЦИАЛОМ НЕФТЕГАЗОВЫХ ПРЕДПРИЯТИЙ**

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Для повышения эффективности природоохоронной деятельности нефтегазовых предприятий важное значение имеет исследование их экологического потенциала. Рассмотрены, обобщены и уточнены сущность категории эколого-экономического потенциала нефтегазовых предприятий. Проведена идентификация и диагностика вредных воздействий на окружающую среду нефтегазодобывающих предприятий. Раскрыты особенности управления эколого-экономическим потенциалом нефтегазовых предприятий, а именно: определены задачи, принципы, рассмотрены методы и функции управления эколого-экономическим потенциалом. Охарактеризованы организационно-экономическое обеспечение управления эколого-экономическим потенциалом, в который включены: планово-экономическое обеспечение, нормативно-правовое обеспечение, инновационное обеспечение, информационное обеспечение, проектное обеспечение, финансовое обеспечение и экономические инструменты. Предложено превентивные меры, реализация которых по охране отдельных компонент окружающей природной среды будет способствовать повышению эффективности функционирования нефтегазовых предприятий и соблюдения концепции устойчивого развития.

**Ключевые слова:** эколого-экономический потенциал, управление, принципы, методы, функции, превентивные меры, нефтегазодобычи.