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ACCOUNTING DEVELOPMENT OF TECHNOGENIC ENERGY RESOURCES

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Abstract. In the context of the development of energy efficiency and of the environmental problems solution related to the municipal waste management, it is urgent to determine the resources increment for economic development of the country and of the individual organization. Therefore, there is the need to reflect information about methane formation in the accounting system of organizations that carry out municipal waste disposal and biogas extraction. Therefore, the authors set forward **the objective** of the research: to develop the account of technogenic gas resources stocks (biogas).

For the purpose of the achievement of aim, the authors apply generally accepted economic research methods. Authors have analyzed the cycle of changing substances: “municipal waste - biogas stocks in the body of the landfill - biogas flows to the economy” and have considered in this paper biogas stocks as the energy potential of separate organization. There is researched the economic essence of the new accounting object “technogenic gaseous resources of municipal waste” as a long-term asset, which is the part of mineral resources (natural assets). Having analysed IAS (IFRS) and Belorussian normative documents of the natural assets account, as well as the points of view of scientists and accounting specialists the authors have proposed the model of the account and reflection in financial statements of technogenic gas resources stocks, allowing to provide with information on the used natural capital for the interested users in two aspects: the cost attraction of technogenic gas resources stocks and economic potential of the used biogas stocks.

Key words: *biogas, mineral resource, municipal waste, natural capital, technogenic energy resource*

JELcode: Q29, Q42, Q53

Introduction

Beginning with the second half of XX century, the globalization of environmental problems, in particular such as climate change and the destruction of environmental elements, and the lack of natural resources, threaten the life and possibilities of the development of subsequent generations at an accelerating pace. Climate change is mainly due to the increase in global emissions of so-called greenhouse gases: carbon dioxide and methane. In the fight against the greenhouse effect, the United Nations Framework Convention on Climate Change (UNFCCC) in 1997 developed the Kyoto Protocol, whose task is to regulate and prevent negative impacts on the environment. In 2015, in Paris, was held the Conference to address climate change caused by anthropogenic emissions of greenhouse gases.

Recognizing the importance of these legal innovations, the countries of the world community are developing packages of legal measures of an international and local nature aimed at regulation and protection of the climate. Solutions to environmental problems do not bypass the issues of rational management of Municipal wastes, which are one of the sources of greenhouse gas emissions at disposal sites. The world course of the effective municipal waste management, the possibility of their re-engaging in the national economy is also caused by the depletion of natural resources. Thus, an urgent environmental problem has led to the emergence of a new industrial sector - the extraction of garbage gas (biogas) at burial sites. Avoiding the total dependence of countries rich in hydrocarbons, a reorientation to alternative energy sources becomes the second actual cause of the biogaseous industry expansion.

In order to develop this industry, increase economic growth and regulate climate change, scientific communities, governments and other interested structures pay special attention to information on air emission quota reserves, which are a direct source of government revenues in the international trade of quotas. No less important is the value of the energy

potential of the country's alternative energy sources, whose reserves are included in the calculation of national wealth and macroeconomic indicators of sustainable development. Presence of technogenic gaseous stocks (biogas) is of commercial interest to potential investors.

Speaking about biogas as about an element of technogenic natural capital, it is necessary to note the urgency of the natural capital registration in the economic growth calculation in the 21st century. In 2012, at the Rio + 20 Conference on Sustainable Development, seventy-five countries and the European Commission supported the Communique on the call of Governments, the United Nations system, international financial institutions and other international organizations to take more active measures to include the natural capital in the macroeconomic indicators calculation throughout the world. (A mass demonstration of support measures to integrate natural capital at a summit in Rio, 2012).

The essential factor for sustainable municipal waste management, for quota (permit) reserves regulation, for the forecasting of the development of the biogas resource base, as well as the reflection of technogenic gaseous resource in national accounts of the statistical system and the use of biogas stocks- is the comprehensive information database in organizations that carry out the municipal waste disposal of and biogas extraction. However, at present time the energy potential of landfill gas (biogas) as an alternative source of energy and, simultaneously, as an element of natural capital is not reflected in the accounting system of organizations of the Republic of Belarus and in international practice. The reserves of emission quotas (permits) to the environment are not considered as accounting objects. There is no correlation in the accounting system between the indicators of municipal waste flows, the biogas stocks formation, its consumption flows and the flows of greenhouse gases into the atmosphere.

Among the defined unresolved issues in accounting system **the aim** of this research is the theoretical justification and the accounting development of anthropogenic gaseous resources (biogas) for organizations engaged in waste disposal and biogas extraction.

The object of the research are technogenic gas resources that are derived from municipal waste under the influence of the natural environment. The choice of the research object is due to the topicality of issues of natural resources valuation, reflection them in accounting and financial statements. These issues remain not sufficiently solved, while the indicators of natural resources reserves and their consumption are of practical importance in the context of the transition to sustainable economic development.

In order to achieve the target **the following tasks** shall be carried out:

- to investigate the economic essence of municipal waste in terms of their resource usefulness in economic activities;
- to study the process of formation and the economic essence of biogas stocks (technogenic gaseous resources) from the position of the energy (economic) potential;
- to justify scientifically and recognize biogas stocks as an accounting object;
- to propose a method of biogas stocks evaluation in accounting based on stakeholders preferences;
- to suggest the model of the account and reflecting in financial statements of the biogas stocks allowing to provide information on the used natural capital.

The scientific novelty of the results - is the recognition of technogenic gaseous resources of communal waste (biogas stocks) as an accounting object, as well as the development of accounting methodology for technogenic gaseous resources (biogas stocks). The presented model of natural resources accounting can find its practical application by its implementation in the normative documents of the Republic of Belarus, the CIS countries, the EU.

In the research there are applied the methods of general scientific research in economics: of economic analysis and synthesis, logically – constructive, qualitative methods including the methods of the analysis of normative acts.

Theoretical and methodological basis of a research are: the standard and legislative documents regulating waste management, energy saving, environmental management, environmental protection in Republic of Belarus and

neighboring countries, in the EU; the normative documents regulating accounting in the Republic of Belarus, IFRS; special literature of domestic and foreign scientists; Internet sources.

Research Results and Discussion

Sub-part 1 The Economic Essence and the Recognition of the Technogenic Energy Resource of Municipal Wastes as an Asset in Accounting

The identification and determination of the characteristics of biogas stocks as an accounting object primarily involves the study of the economic essence of municipal waste and the possibility of their use in economic activities.

According to the Law of the Republic of Belarus 2007 “On waste management”, according to the instructions of the Ministry of housing and communal services of the Republic of Belarus “Organization of separate collection (collection), storage and municipal waste transportation”, The Law of the Russian Federation 1998 “On production and consumption wastes”, according to the Model Law of the Interparliamentary Assembly of the CIS member States 1998 “On production and consumption wastes” municipal wastes are forming by the individuals consumption and in the process of life; as well as wastes, which are similar in composition and were generated in the course of entities activities. The municipal waste includes food waste (kitchen waste from households, restaurants, retail stores), waste, received during the cleaning and repair of living quarters, the maintenance of adjoining areas, obsolete household items, etc. The Waste Framework Directive- 2008/98/EC clarifies the concept of “bio-waste”, which is similar to the concept of “municipal waste”. At the same time, bio-waste is waste that undergoes organic decomposition, while municipal waste can include things or substances that are not subject to processing by microorganisms of the natural environment.

Conception of Federal Law 2005 “On secondary material resources”, Kulagina G.A., Pisareva E.N., Berezovsky P.V. in their writings sing out the fundamental characteristic of wastes as secondary resources-the presence of certain consumer properties that can be involved in the economic process. The European Waste Framework Directive 2008/98/ EC and its derived directives on waste management do not define the category “secondary resources”; however, the document notes that the waste usually has a resource value and the “waste management hierarchy” highlights the possibility of their re-use and extraction of energy from them.

Municipal waste has both a material and an energy value. Material or energy value is based on the intentions of further use of the resource, it is depending on the prevailing consumer properties of the waste. The energy potential of waste is used in practice in a variety ways. For example, waste is burned for heat energy receiving. In this context, municipal waste is a direct energy resource. Although, in recent years, for environmental reasons, this practice is not welcome. And it is possible to use organic waste in attracting environmental microorganisms and other natural processes to form the energy resource (biogas in landfill). With this approach, it is a mistake to consider the waste from the standpoint of the energy resource, since they are one of the components in the formation of the energy resource.

The analysis of legislative documents that regulate resource saving and waste management in the Republic of Belarus, the Russian Federation, and Ukraine indicates that “municipal waste” is a “secondary resource”, provided that there are technological opportunities for using these wastes in industrial production to obtain raw materials, products and / or energy (Board of Representatives and the Council of the Republic of Belarus, 2007; State Duma of Russian Federation, 1998; Supreme Council of Ukraine, 1998).

National standard of the Russian Federation “Resource-saving. Secondary Material Resources”, Model Law “On Production and Consumption Waste” adopted by the Decision of Inter-Parliament Assembly of the member-states of the Commonwealth of Independent States, as well as Katunin S.V., Polyvko V.A. recognize wastes as secondary resource, provided that it is economically feasible to use them in production.

Thus, the second characteristic feature of “secondary resources” is the technologically realizable possibility of using waste. At the same time, wastes involvement in the national economy should be commercially expedient and justified.

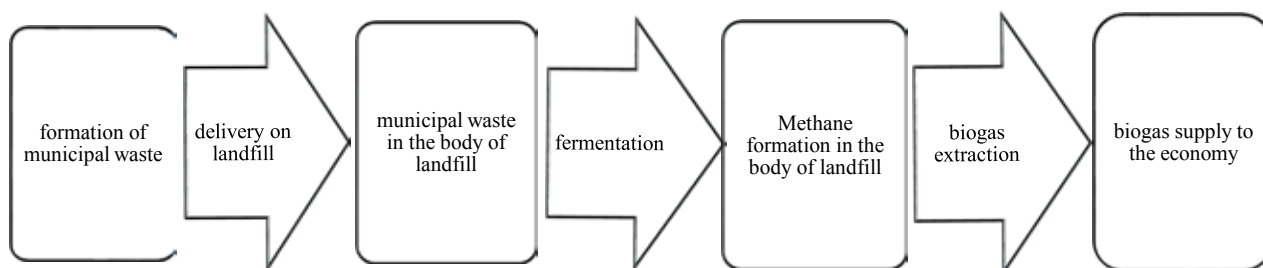
In the presence of consumer utility, technological opportunities and economic expediency of using municipal waste, the secondary resources market is emerging as a combination of economic relations in transferring benefits from one person to another. So, municipal wastes become an economic category and are treated as sale objects. Organizations, whose main purpose is the production of biogas in special device (bioreactor), buy from the procurers the sorted organic municipal waste as raw material. As an economic category organic wastes, which are involved in the production of biogas, treated as secondary resources (raw materials) and, accordingly, can be considered as objects of accounting. However, the sorting of household waste to date has some difficulties, and therefore, the main goal pursued by society is their safe removal by organizations that are engaged in waste disposal. So, the bulk of organic waste mixed with inorganic ones enter the landfill, where all solid wastes lose their resource value.

According to the legislation of a number of CIS countries and the European Waste Framework Directive 2008/98 / EC in the field of wastes management, wastes that must be buried do not represent an opportunity for further processing. Accordingly, buried wastes in specially adapted objects, lose their economic value and are not considered as secondary resources.

In the context of a wasteless economy, all municipal wastes have a resource value. However, in itself the category “secondary resources” as an economic category exists within the technological capabilities of the state and the commercial profitability of garbage use. Investigating the activities of organizations that deal with the waste burial, we came to the conclusion that municipal waste, which are directed to burial do not represent economic value at the period of collection unsorted garbage . Such waste is treated primarily as an object, which it is necessary to get rid of in environmentally safe conditions in controlled landfills. So, the analysis of the economic essence of human waste has shown that their recognition as secondary resources is very conditional.

Next, consider the expected impact of the environment on waste in the landfill body. Fermentation microorganisms break down complex organic compounds (waste) into simpler ones. These less complex organic substances are a source of nutrition for another group of bacteria - methane-forming bacteria, which convert organic acids into methane-biogas (garbage gas).Methane has an energy potential, so gas generation in the body of a landfill can to fill up national raw material base in production, subject to the availability of technological capability and economic profitability of biogas extraction to the surface of the landfill. So, a new economic category is emerging, which affects the level of national security and is one of the conditions for sustainable development.

Below is a schematic representation of the chain of biogas formation in the landfill body.



Source: author’s construction based on the studied special literature

Fig. 1. The chain of biogas formation in the landfill body

Thus, municipal wastes in the presented cycle have material utility in the body of the landfill, as they are a product of consumption for a microbiome. Without falling under the definition of the economic category “secondary resources”, municipal wastes do not cease to be one of the biogas formation sources. Since municipal wastes by themselves are a

direct threat to the environment (including potential emission of greenhouse gases into the atmosphere), at the stage of collection and accumulation in the body of the landfill, they are subject to mandatory assessment in physical units of measurement.

The methane presence in the biogas shows the natural origin of the resource. The essential difference between this deposit and natural ones is the absence of gas-tight insulation, as a consequence of which, without the rapid extraction of gas at the same time as its generation, the resulting biogas will simply be emitted into the atmosphere, contaminating it (Sirius Group, 2017). Confirmation of the fact that biogas is a part of mineral substances is indicated by an almost identical chemical composition with natural gas.

It should be noted that the quantitative evaluation of biogas in the body of the landfill is being expressed by its stocks, the value of which is being established by specialists on the basis of data on the volume and composition of wastes, temperature in the body of the landfill, climatic conditions and other parameters.

In the economic literature and special internet sources biogas is often seen as a “secondary energy resources” or “renewable energy resources”. We analyzed these categories in order to assign additional characteristics to the energy resource as an accounting object.

National Standard of the Republic of Belarus “Energy saving. Basic Terms and Definitions” (1770-2009), the Law of the Russian Federation “On Energy Saving and on Improving Energy Efficiency”, the Law of Ukraine “About Energy Conservation”, the Law of the Republic of Moldova “On Energy Efficiency”, secondary energy resources are interpreted from the standpoint of the energy potential of various energy carriers. Pospelova T.G., Sukhotsky A.B., Kirvel I.I. and others use a similar approach in their scientific works.

National standard of the Russian Federation “Resource-saving. Secondary material resources”, gives the following explanation to secondary energy resources: “Production and consumption wastes, reused, with the allocation of thermal and / or electrical energy”(National Standard “Resource-saving. Secondary material resources. Terms and definitions”, 2012). This context is understood by us as the existence of energy potential of the wastes, the burning of which leads to the release of thermal energy or electricity. The same standard of the Russian Federation states that secondary energy resources include alternative fuels. Interpretations to the concept of “alternative resources” in the document are not presented.

The Law of the Russian Federation “On Energy Saving and on Improving Energy Efficiency”, as well as such authors as Lysienko V.G., Shchelokov Y.M., Ladygichev M.G. consider secondary energy resources not only from the position of *the energy potential of energy carriers*, but also reveal its essence from the standpoint of the gases *energy* leaving the installation; *steam or the physical heat* of the waste gases of the main production. A similar approach is used in the Law of the Republic of Belarus “On Energy Saving”, where secondary energy resources are considered as the energy of production waste (losses) obtained in technological units and plants, technological processes.

There is found a position in a separate literature, where secondary energy resources are interpreted as the result of the conversion/processing of primary energy sources: for example, diesel derived from crude oil refining.

Thus, there is a different interpretation and legislative explanation of the semantic meaning of the concept of “secondary energy resources”. Of course, methane formation in the landfill has an energy potential. However, talking about this energy as a “secondary” is not correct enough if we consider it as an economic object in the energy life cycle: “energy resource-biogas (product) –energy”. Considering methane formations at burial sites as the latest stage in the substance conversion chain: “organic substances (primary resource) -products -organic wastes-methane (secondary resource) –energy”, the use of the term “secondary” is entirely permissible. This context is understood that primary resources are formed and accumulate in natural conditions, but secondary resources undergo transformation and are already formed in technogenic conditions of economic activity

The application of this term also does not bear any semantics if it is interpreted from the standpoint of the possibility of using the energy resource again.

In the West European normative and legislative terminology, in the special literature, within the scope of the possibility of obtaining an energy resource from organic waste (municipal waste), is used the category “renewable energy resources”. It is a special type of resources. In a general understanding in international practice, renewable energy resources replace traditional (non-renewable) energy resources, they are capable of recovery in a short time in the scale of human life and are inexhaustible. R.W. Gorodov, V.E. Gubin, A.S. Matveyev note that renewable energy sources constantly exist or periodically arise energy flows (Gorodov, R.V., 2009).

The International Energy Agency, the 2009/28 / EC Framework Directive “On the promotion of the use of energy from renewable sources” describe a list of types of energy sources, such as sun, wind, tidal energy, including landfill gas, biogas. By the Law of the Republic of Belarus “On Renewable Energy Sources” biogas is also included in the list of such sources. In our opinion, the inclusion of biogas (garbage gas) in the composition of renewable sources is unambiguous.

If the formation of biogas in marshes is a natural renewable process, while the formation of biogas reserves at the burial sites directly depends on the volume of organic wastes input, their composition and the creation of optimal conditions for biogas (garbage gas) generation by humans. The energy resources generated in the body of the landfill during the wastes fermentation are a dependent variable.

Therefore, the term renewable energy sources (RES) is applied to those energy sources whose reserves are being replenished in a natural way and unlimited. We are inclined to the fact that methane formation is technogenic gas formation, the stocks of which directly depend on the volumes of organic wastes entering the landfill and their composition.

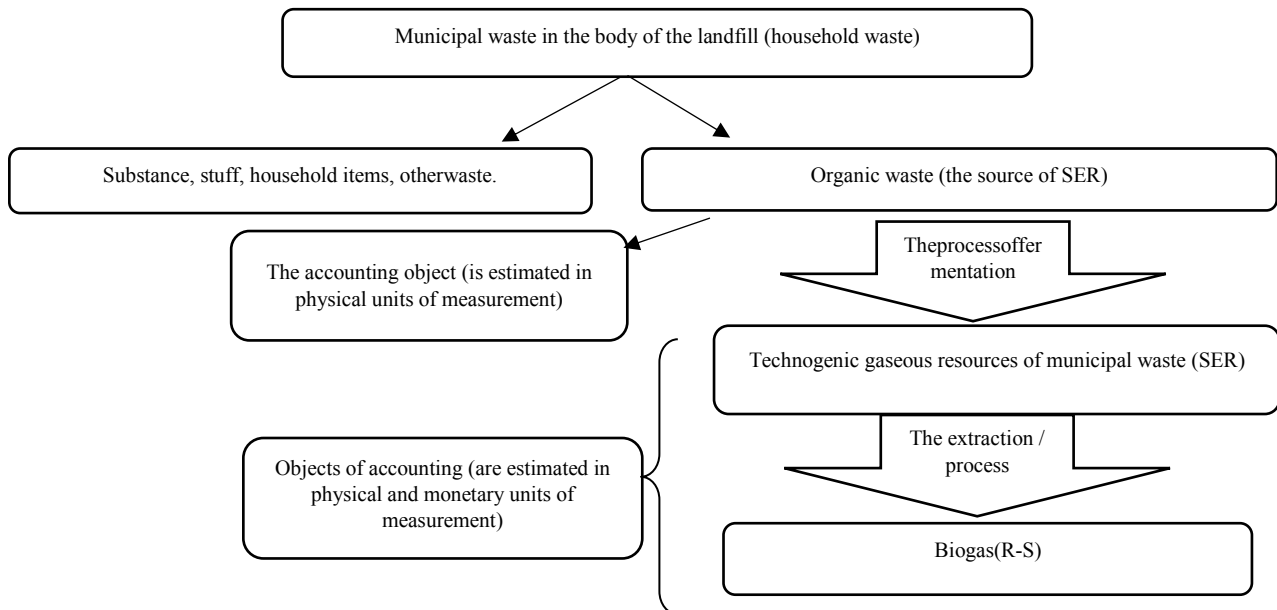
In the specialized literature, the concepts of “the alternative energy resource” and “renewable energy resource” are often equated. By their composition, alternative energy resources are identical to renewable ones. The same energy of the sun, wind, waste and so on. The key characteristic feature of this category of “alternative energy resources” is “which replace traditional energy sources”. This concept originated on awareness of the need for humankind to solve environmental problems and the need to resort to non-traditional sources of energy. Thus, as part of our study, alternative technogenic gaseous resources are the energy-economic potential (methane reserves) generated by the decomposition of municipal waste in the body of the landfill (in special enzymes), under the influence of microorganisms, and the extraction of biogas onto the surface of the earth and its further use implies ecological and economic feasibility. Considering “technogenic gaseous (energy) resources of municipal wastes” as an asset, we believe that the recognition of this object as long-term stocks will be correct. The explanation for this is the non-simultaneous (unstable) emission of biogas in the body of the landfill for several years.

So, in accounting, the stocks of technogenic gaseous resources of municipal wastes are long-term assets that are a part of the mineral resources (established by the results of laboratory tests and expert evaluations).

In addition, to the study of the economic essence of municipal waste, as well as renewable sources of energy, we analyzed the ratio of such categories as “resource” and “raw-substance”. According to the National Standard of the Russian Federation GOST R 54098-2010 “Resource Saving”, the concept of “resources” is primordial in relation to the secondary (specific) concept of “raw-stuff”. From this explanation, the information on the following chain should be recorded in the account: communal wastes-secondary energy resource-secondary energy raw materials.

In our study, we will proceed from the assumption that processed secondary energy resources (SER) are secondary raw-substances (R-S), which are the starting material for the subsequent production of heat or energy production. In this case, by “processing” we mean the extraction of biogas from the body of a landfill, its purification in special installations from unnecessary impurities.

Below we present schematically the formation of accounting objects



Source: author's construction based on the studied special literature

Fig. 2. Formation of accounting objects at the stages of municipal wastes conversion

The technogenic gaseous resource can act as an asset of the organization if it meets the criteria of the asset.

According to the concept of international financial reporting standards, the asset is a resource controlled by the organization as a result of past events, from which future economic benefits are expected to flow into the organization. So in the Republic of Belarus under the law “About accounting and report” assets are considered to be “property, appeared in organization as a result of performed economic operations and that causes receiving economic profit”.

Thus, in the Republic of Belarus there are the following assets peculiarities: right of property for the object, so called right of use, disposition (right of ownership); the presence of economic profit.

According to the current legislation of the Republic of Belarus, a technogenic gaseous resource can not be included in the composition of assets, since the exclusive right to own the components of the natural environment belongs to the state. Consequently, the ownership of the technogenic energy resource (biogas), as a component of mineral resources, belongs to the state.

Reflecting values as balance assets for which there is a right of ownership, is the fundamental objective of static accounting. It's necessary to emphasize that the order of priority of content against form is included into “The main principles of preparation and presentation of financial reports”: if the information should truly represent operations and other events, so it's necessary for this information to be taken into account in accordance with their content and economic essence and not only with legislative form”. The principle of priority of content against form is fixed in Law “About accounting and report” of the republic of Belarus and other countries.

Absence in the balance of this indicator distorts information about the resource and economic potential of the organization. While the economic potential of a business entity reflects the ability to ensure its long-term functioning and the solution of its strategic tasks.

It is necessary to note that biogas as a part of minerals is national wealth of each country, however at this time in the Republic of Belarus, it is not considered the object of economy and it is not joined in calculating of national wealth of the country. National accounts do not record the consumption of biogas as an element of natural capital in the process of economic activity, and, accordingly, the natural capital contribution to the economic component of the state. Therefore,

the system of accounting does not provide necessary informational base for estimation of macroeconomic indicators of stable country development (net inner product, index of adapted net savings, “Green” GDP etc.)

In order to disclose information about the economic facts, that meets the interests of some consumers of financial statements, it is considered permissible to apply the dynamic theory of accounting to accept the technogenic gaseous resource of municipal waste as an asset. Thus, IFRS(IAS) accept the dynamic theory of accounting based on the principle of reflecting all used assets on the balance sheet irrespective of their ownership. The significance of reflecting all natural resources (both owned and not owned by an organization according to the property rights) on the balance sheet is noted in the works of such native and foreign scientists as Vegeera S.G., Metla O.S. Shevlukov A.P., Altuhova Y.V., Shirobokov V.G.

Sub-part 2 Assessment and Accounting of Technogenic Gaseous Resource

Proceeding from the fact that the stocks of methane formation in the body of the landfill (which will be the added value of the organization) are of commercial interest, and the municipal wastes stocks are of ecological interest, the economic evaluation can be assigned only to the energy potential in the body of the landfill. In turn, municipal waste flows, their accumulation are subject to mandatory assessment in physical units for rational management and forecasting of the emission of gaseous resources in the body of the landfill.

As it was already noted, there are no data on the economic value of gas reserves in the accounting of organizations that extract biogas from the landfill body. The lack of such data leads to a decrease in the information content of the reporting and does not allow to assess the resource and economic potential. Accordingly, the investment attractiveness of the organization is missed, the possibility of receiving government subsidies is declining. The organizations reflect only the actual costs of forming and attracting a technogenic gaseous resource into economic activity, which are capitalized as part of fixed assets and intangible assets. This is the cost of acquiring a license for economic activity, the right to use the land and the cost of disposal facility, of equipment that monitor temperature and humidity in the body of the landfill, wells and pumps and other devices. At the same time, according to the legislation of the Republic of Belarus in the accounting of fixed assets and intangible assets and in IAS 16 these costs can subsequently be subject to revaluation at current market prices. As a result, the revaluation distorts the information on the costs of the formation of technogenic gaseous resource and its involvement in economic activity for the analysis of the effectiveness of the invested funds.

To address the issue in determining the type of assessment of a long-term asset as a technogenic gaseous resource, we analyzed the scientific works of J. Richar, Y.V. Sokolov, M.I. Kuter, M.L. Pyatov, N.M. Karzaeva, S.G. Vegeera, O.S. Metla. Scientists are considering approaches to assessing long-term natural resources and are of the opinion that the choice of the type of assessment should be consistent with the goals set for the organization, and the idea of simultaneous application of static and dynamic balance concepts for accounting of long-term natural assets is currently extremely urgent (Vegeera, S.G., Metla O.S., 2015)

The idea of a static balance theory is based in the calculation and reflection of data in financial statements about the organization's ability to pay off its debts. Thus, the valuation of assets at current market prices (fair value) is the principle of the static balance theory. The valuation at fair value provides for the analysis of the property position. Accordingly, the main users of reporting static theory are lenders. The idea of a dynamic theory is based on the reflection in the reporting of the effectiveness of the organization's activities, the calculation of financial results. Valuation of assets at historical cost is the principle of dynamic accounting theory. The owners of the company are interested in such accounting information. The combination of the two accounting theories within a single balance sheet is justified by the desired results- the reflection in accounting and financial reporting of data both on property status and on the effectiveness of the

business entity. Such an idea helps to fix actual costs by attracting natural resources to economic activity (according to the dynamic theory of balance), which provide a basis for analyzing the effectiveness of investments in the formation and attraction of resources. While accounting of natural resources at current market value (according to the static balance theory) will allow assessing the resource potential and investment attractiveness of the organization.

As a result of the study on the possibilities of applying parallel accounting for long-term natural resources, we proposed to account the technogenic gaseous resources as a long-term asset in two assessments: on the one hand, based on actual costs associated with investing in the formation and attraction of alternative technogenic energy resources in economic activity (costs of economic activity right and so on, the costs of acquiring devices to maintain temperature level in the body of the landfill, bioreactors, wells and pumps, etc.), on the other hand - at the fair value (current market value) of the methane stocks.

Reassessment of market value and depreciation of technogenic energy resources (methane reserves) should be carried out according to changes in current market prices, as well as according to changes in the volume of stocks in the body of the landfill, based on laboratory analysis and expert evaluation.

Recognizing technogenic gaseous resources as assets in the system of accounting and financial reporting, information about methane stocks is proposed to be reflected on the subaccount *XX.X "technogenic gaseous (energy) resources"*, opened to synthetic account *XX "Mineral Resources"*

It should be noted, that the system of mineral resources accounting should reflect not only information about biogas stocks, but also include information on its consumption. Consumption should be considered as extraction of biogas from the landfill body, which leads to a reduction in biogas stocks. Therefore, it is proposed to register information about consumption on a separate passive subaccount *XX.X "Consumption of technogenic gaseous resources"* of account *XX "Depletion (consumption) of mineral resources"*.

Speaking of biogas (garbage gas) as an element of technogenic natural capital, we recall the existing need for accounting of natural capital in the 21st century when assessing economic growth. The contribution of natural capital to economic development, the need to take it into account in calculating the indicators of level and quality of life, welfare, national wealth were investigated in works of: R. Konstanza, H. Daley, Brendar Fisher, Kerry Tyurner, Bazylev N.I., Bobylev S. N. and of many other scientists, as well as the study of the contribution of natural capital are paying attention representatives of the collective co-authorship of public and international organizations of the «Big eight» countries, preparing reports on the economics of ecosystems and biodiversity (The Economics of Ecosystems and Biodiversity-TEEB). In order to create an interrelated system of indicators of natural assets and indicators of the traditional system of national accounts, the UN Statistical Commission in 2012 publishes an international standard for environmental and economic accounting (SEEA). The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA) and uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics.

As for the bookkeeping of natural assets, we have analyzed the scientific works of Shevlyukov A.P., Altukhova Y.V., Shirobokov V.G., J. Richar, Vegera S.G., Metla O.S. The recognition of a natural resource by an organization's assets presupposes the existence of a balancing item in the passive side of the balance sheet. Shevlyukov A.P., Altukhova Y.V., Shirobokov V.G. consider "natural capital" as a source of formation of land plots and natural resources of state property.

Considering the accounting problem of the sources of land plots on which the organization has no rights of ownership, Vegera S.G. suggests in the passive side of the balance sheet as the source of such asset to consider "the attracted natural capital" and reflect it on the separate account (Vegera S.G, 2011).

Paying attention to the fact that the objects of burial are exploited in the process of landfill functioning and of biogas extraction on lease / temporary use of ecosystem objects, we share the scientific justification of Vegera S.G. in the part

of reflecting in the balance sheet as a source of formation of natural resources not of natural capital as such, but of *attracted natural capital*.

The cost of forming methane stocks in the activities of economic entities is suggested to be capitalized on the accounts “Investments in long-term assets”, “Fixed assets” or “Intangible assets”. So the costs for the formation of technogenic gaseous (energy) resources will include the cost of those facilities that are directly involved in the process of methane generation, namely: the right to use land plots (burial objects), devices for maintaining the optimum temperature level in the body of the landfill, drainage systems and other devices. In the balance sheet, the source of assets at the actual cost of forming and attracting mineral resources will be either own capital or liabilities.

Once again, we should note the need to take into account in physical and qualitative units the flows to the landfill and their accumulation, since the key integration area is the relationship between the indicators of municipal waste, the biogas extraction indicators and the potential emissions of greenhouse gases into the atmospheric air.

Studying the methane formation in the landfill not only from the standpoint of the economic potential of the organization and the state, but also from the point of view of the requirements for reducing greenhouse gas emissions into the atmosphere, it is necessary to note about the trading system of quotas for emissions that exists in the international practice. A similar market mechanism was developed by international climate change programs and the Kyoto Protocol in order to create the most effective methods for reducing emissions by States. The mechanism assumes that countries receive quotas on carbon dioxide emissions, which they can dispose of at their discretion: to use for their own production purposes, to sell, to buy, and to exchange for other assets. Thus, the accumulation of quotas (permits) stocks for greenhouse gas emissions becomes an asset for the organization carries out the bury of waste and the biogas extraction. Such quotas (permits) stocks can be sold with the aim of obtaining additional income.

Thus, the ecological effect of biogas extraction is simultaneously accompanied by an economic effect of the state. However, consideration of the emission quotas stocks as an accounting object requires a deep scientific understanding, taking into account the requirements of modern market mechanisms for climate regulating and of course corresponding additional studies are required.

Conclusions, Proposals, Recommendations

In order to solve environmental problems, ensure sustainable development of nature management and energy efficiency, there is a need to develop accounting of biogas stocks as an energy (economic) potential, the source of accumulation of which are organic municipal wastes.

Based on the highlighted goal and tasks of the research, the following final clauses can be singled out:

1. The study scientifically justified the recognition of a new accounting object of the «technogenic gaseous (energy) recourse of municipal wastes», which is a long-term asset in the form of stocks of mineral substances in the landfill body, and which has economic potential.
2. To keep accounting of the studied object is offered in two aspects:
 - 2.1 accounting at actual costs (historical cost) for the generation of technogenic gaseous (energy) resource of municipal wastes and its attraction to economic activity. We propose to capitalize the costs of forming and attracting technogenic gaseous (energy) resources, which will be included in fixed assets or intangible assets. Through the process of calculating depreciation, these costs will fall into the composition of the costs of the main activity of the organization (extraction of biogas). According to the dynamic theory of balance, the reflection of biogas stocks at actual costs for their formation and involvement in economic activity will provide a basis for analysis of efficiency of investments in technogenic natural resources.

- 2.2 accounting at fair value (current market value) of biogas stocks. According to the static balance theory, biogas stocks accounting at the current market value will allow estimating the resource potential and investment attractiveness of the organization. The process of consumption of technogenic gaseous resources in accounting will reduce the value of technogenic natural resource.
3. In the balance sheet as a source of formation of the investigated long-term asset in the valuation at historical cost is the company's own capital or liabilities. The source of the economic resource (potential) in the market value assessment is the attracted natural capital.

The proposed accounting model will provide an opportunity for further assessing the contribution of natural capital to the development of the business entity and the state as a whole. It will provide the necessary information base for calculating macroeconomic indicators of the country's sustainable development, characterizing human progress taking into account the natural factor.

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