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INTEGRATION OF CIRCULAR ECONOMY AND DIGITAL TECHNOLOGIES IN THE OIL AND GAS SECTOR

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A B S T R A C T

The circular economy is considered as a model of an economic system that is able, on the one hand, to respond to the challenges facing society, and on the other hand, to ensure a sufficiently high efficiency of the activities of economic entities. In practice, the process of transition to a circular economy is rather slow. The article analyzes the integration of the circular economy and digital technologies as drivers for the creation of closed production cycles.

K E Y W O R D S

Circular economy, sustainable development, oil and gas sector, waste, digital transformation, effects of the circular economy.

Introduction

Today, despite the accelerating development of new economic models (green, low-carbon, circular, etc.) based on the principles of sustainable development, the oil and gas sector continues to play a key role in ensuring the modern life of mankind, since the need for hydrocarbons does not disappear.

The oil and gas sector has grown significantly in recent years, so it is especially important for it to make serious adjustments to the way it does business. This sector is one of the largest in the world, with growing revenues and costs needed to provide consumers with energy. Due to the high-risk nature of oil and gas production activities, companies are constantly working to reduce their adverse impact on the environment and the social environment. There are some serious problems on the way to conducting your business:

· high volatility of prices for hydrocarbons;

· Increased pressure on managers from shareholders who focus on value creation rather than output due to low return on investment;

· the complexity of the drilling and production process;

· increasing demand for hydrocarbons in many regions;

· Compliance with health, safety and environmental requirements remains critical – especially in the current environment of volatile prices and cost savings;

· instability of fiscal conditions;

· the level of development of research and development work and innovation;

· Collecting, interpreting, and managing an increasing amount of data.

MAIN PART

The peculiarity of the oil and gas sector is that most of the operating activities are associated with a negative impact on the atmosphere - the release of a huge amount of greenhouse gases (GHG), mainly methane, which can manifest itself during drilling and production, leaks in Christmas trees and pipelines, as well as during an accidental release. which emit a significant amount of greenhouse gases. Therefore, countries that produce carbon-intensive products need to introduce the principles of the so-called circular carbon economy into their business models.

In order to make progress in addressing the sustainability challenges of the oil and gas sector, such as the depletion of natural resources, increasing greenhouse gas emissions, and high rates of waste generation, it is necessary to move from the usual linear economy model (extraction – production – distribution – consumption – waste) to a circular economy model (circular economy), which uses optimization of the production process, reuse or sharing of the product and recycling Waste

Since the late 1970s, the concept of a circular economy has been gaining momentum in modern economic systems and production processes. According to experts from the Ellen MacArthur Foundation, by 2025 the circular economy could provide an annual increase in the income of the world economy of more than $1 trillion. Moreover, the transition to a circular economy will create huge opportunities for modernizing production and introducing industrial innovations, ensuring an annual productivity growth of 3%, and, as a result, an increase in GDP – in Europe alone by 7 percentage points relative to the baseline scenario. Such impressive figures are the best motivation for the transition to a circular economy.

The main tasks facing the oil and gas sector are to ensure a stable supply of hydrocarbon resources to various consumers, as well as to develop and ensure the reliable operation of the oil pipeline system.

In the circular economy, an ecosystem of materials is created – what used to be considered waste acquires value. But such ecosystems are complex and involve many dependencies and feedback loops. Therefore, digital transformation is especially needed to build such ecosystems, effectively manage them and make business decisions.

Digital transformation is the introduction of modern digital technologies into the business processes of socio-economic systems at all levels. This approach implies not only the installation of modern hardware or software, but also fundamental changes in approaches to management, corporate culture, and external communications.

In the course of digital transformation, electronic technologies and services, as well as voluminous, multi-sectoral data presented in digital form, the processing and analysis of which make it possible to significantly increase efficiency and quality in the production and consumption of goods, works and services, as well as in management procedures, in comparison with traditional forms of management, become key factors of economic activity.

On a global scale, the oil and gas industry produces a large amount of waste in the form of associated water, oil sludge and flue gases. Converting waste into value-added products, reducing environmental impact, and supporting sustainability in the oil and gas industry is paramount.

The role of digital technologies in creating a circular economy in the oil and gas sector implies the use of digital tools, platforms and systems to facilitate the transition to a more sustainable and circular economic model. This involves harnessing the power of technology to optimize resources, reduce waste, and promote the reuse and recycling of products and end-of-life equipment.

Digital tools allow for better tracking, control, and management of assets throughout their lifecycle. This includes real-time data collection, analysis, and optimization of resource flows, allowing for more efficient use of oil and gas, energy, and water.

Digital platforms and blockchain technology provide greater transparency and traceability of supply chains. This helps to identify inefficiencies, reduce waste, and ensure responsible procurement and production practices.

Digital solutions enable efficient waste management processes, including tracking, sorting and recycling. Smart waste management systems can optimize collection routes, reduce waste in landfills, and promote recycling and recovery.

CONCLUSION

The circular economy can be looked at from the point of view of the principles and corresponding solutions that its apologists intend to extend to the entire economy of our planet. We usually think that the circular economy is only about how to turn waste into income. Circular economy or a closed cycle is about optimizing processes, and about shared use, and about the availability of services, and about the environment.

The transition to a circular economy for the oil and gas sector is now gradually gaining momentum. Despite budget constraints and vague government environmental policies, green innovations are regularly invented by scientists around the world. It should be noted that it is impossible to do without traditional energy sources, but it is necessary to gradually introduce innovations and invest in the creation of low-carbon and energy-efficient technologies, increase the share of alternative energy sources in the fuel and energy complex and introduce drilling waste management systems.

Thus, by harnessing the potential of digital technologies, oil and gas companies are helping to accelerate the transition to a circular economy, which will reduce resource consumption, minimize waste generation and improve sustainability.

For example, digital technologies can contribute to energy efficiency, and can also be used to reduce greenhouse gas emissions in the transport, construction, agriculture and energy sectors.

Societal benefits of circular business models include: – reduced consumption of primary raw materials; – energy savings and reduction in the cost of products; – reduction of pollutant emissions and the volume of production and consumption waste.

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