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## Different Modes of Provisioning Decarbonization of the Oil and Gas Industry in Modern Societies

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**Abstract.** In the EU, a particular feature of decarbonization is that companies formerly focused on petroleum-producing and petroleum-processing are now in the process of being transformed into energy companies with a broad range of activities feeling significant pressure from the government, investors, and NGOs. However, ambitious climate policies pursued by their American counterparts, as a rule, assume neither reduction nor slowing of hydrocarbons production. Carbon footprint reduction is to be achieved mainly by carrying out carbon capture, utilisation and storage (CCUs) projects on the industrial scale.

While the energy transfer is an effective solution in the EU countries due to political background and the lack of accessible petroleum resources, in Russia, a promising strategy seems to be a combination of greenhouse gases capture with hydrocarbons production and processing. It is important to emphasize that, all recent challenges notwithstanding, including global ecological trends and accelerating energy transfer processes in European countries, Russian companies are in a continuous search for efficient decarbonization tools, although many of them are forced to make certain corrections in their decarbonization roadmaps.

**Keywords:** climate policy, oil and gas companies, decarbonization, energy transfer.

Research area: social structure, social institutions and processes (sociological sciences); economics.

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## Социальные факторы декарбонизации индустрии нефти и газа

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**Аннотация.** В работе обсуждается дифференциация территориальных стратегий декарбонизации международных нефтегазовых компаний в контексте превалирующих в локальных сообществах политико-экономических, правовых, культурных и этических норм. На основе анализа современных практик показано, что ключевые региональные стейкхолдеры, оказывая влияние на компании и правительства, определяют локальные траектории декарбонизации нефтегазовой отрасли.

Сравнительный анализ климатических стратегий нефтегазовых компаний, осуществляющих свою деятельность на территории Северной Америки и Европы, показал, что европейская модель сокращения углеродного следа предполагает в первую очередь постепенное сокращение добычи углеводородов и переход к преимущественной реализации низкоуглеродных газовых проектов и электрогенерации, тогда как основу американской стратегии декарбонизации составляет использование передовых технологий улавливания и хранения углерода и сокращение операционных выбросов парниковых газов. Сделан вывод о том, что в России регуляторы, инвесторы и потребители не оказывают заметного влияния на климатическую политику и не способствуют смещению фокуса внимания предприятий индустрии ископаемого топлива в пользу низкоуглеродных стратегий.

**Ключевые слова:** климатическая политика, нефтегазовые компании, декарбонизация, энергетический переход.

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### Introduction

Achievement of carbon neutrality by the middle of the current century is the target set by many developed countries whose total share in the global economy had exceeded 80 per cent in 2021 (Anderson et al., 2021, p. 6). Such ambitious obligations cannot be fulfilled without large-scale

use of innovative green technologies and taking radical steps towards fundamental restructuring of the economy including decarbonization of the oil and gas industry responsible for 42 per cent of the global anthropogenic greenhouse gases emission taking into account indirect causes (Beck et al., 2020).

Perfecting existing technological solutions, as well as development of new ones, require investments on a significant scale. The exact size is directly influenced by the climate policy carried out by the government. National climate programs that correct market failures in solving the problem of global warming aim either at the internalization of harm inflicted upon the society by the production of goods with large carbon footprint or at providing support for companies that pursue active climate policy. For these purposes, government bodies introduce various carbon pricing mechanisms including taxes and tradable carbon offsets, undertake large-scale infrastructure projects, support decarbonization of production processes, energy conservation, and the introduction of innovative green technologies.

The concern expressed by the world community about the climate change dangers yields significant alterations in the scale and the directions of investment flows. During the last four years only, the six largest oil and gas companies have divested more than \$ 44 billion from the fossil fuels industry while in the nearest future this number may reach \$ 128 billion, according to some estimates. In particular, in March, 2022, *ExxonMobil* announced its plans to put on sale its shale oil and shale gas businesses in Canada while *Shell* put all its Nigerian oilfields up on the market, notwithstanding the fact that fossil fuel production projects have a far higher expected rate of return than projects in the area of alternative energy, 20 per cent against 10 per cent, according to *Shell* estimates (Who buys..., 2022).

At first glance, there seems to be little economic reasoning behind the intent to get rid of all oil and gas assets. However, national climate programs adopted in leading fuel consumer countries, with such measures as introduction of carbon pricing mechanisms, or government financing of infrastructure projects, effectively create pecuniary demand for a new product, namely, the carbon footprint reduction, which can be supplied by investing in alternative energy, biofuel, or carbon capture use and storage technologies (CCUS)

### **Energy companies on the EU territory**

From the viewpoint of the oil and gas industry, the key result of the European climate policy has been a decrease in the aggregate demand for fossil fuels due to general reduction in energy intensity of the economy, a more widespread use of electric power, and diversification of energy consumption. The noticeable change in consumer preferences has made oil and gas companies reconsider corporate strategies and give up some petroleum exploration and production projects for the benefit of renewable power sources focusing on complex energy solutions (BP, 2022).

Currently, the attractiveness of renewable energy projects is based not only on the government subsidies or tax exemptions, but also on a noticeable production cost reduction, which, in the last decade, has been estimated at about 70 per cent in the solar power generation and almost two-thirds, in the wind power generation (Beck et al., 2020). Besides, the recent rise in fossil fuel prices caused by international relations difficulties has influenced the competitive position of renewable energy. In the EU, the wholesale prices of the electric power have risen by a factor of 6 in comparison with the 2016/2020 averages (Smirnov, 2022). Although one cannot expect the complete abandonment of traditional electricity generation in a foreseeable future, due mainly to a fundamentally higher volatility of power supply from renewable sources that makes its integration in the existing electric grid problematic (BP, 2022), the International Energy Agency forecasts an increase in the total renewable energy supply capacity by more than 8 per cent in 2022 (Smirnov, 2022).

Decarbonization processes in the European oil and gas industry cannot be reduced only to the transformation of companies specialized in hydrocarbon production and processing into general energy enterprises. In particular, *BP*, *Eni*, *Equinor*, *National Grid*, *Shell* u *Total*, after signing a cooperation agreement, the *Northern Endurance Partnership (NEP)* in October, 2020, have been actively participating in the construction of infrastructure objects with the aim to provide

safe transportation and burial of significant volumes of carbon dioxide in the British sector of the North Sea (BP, 2020a).

In 2019, Spanish *Repsol* was the first oil major in the world to make the commitment to achieve carbon neutrality by 2050. It started a program of transformation of seven large-scale industrial assets located in Spain, Portugal, and Peru, into multi-energy centers planning to increase their power-generating capacities to 7.5 GWt by 2025, and to 15 GWt by 2030 (Repsol, 2020). The company is going to reduce its carbon intensity by 12 per cent by 2025 by using advanced technologies, decreasing overall energy intensity, and optimizing the production portfolio. Pursuing the aim of its investment portfolio decarbonization, *Repsol* announced in 2021 the sale of its shares in Russian oil projects, *Eurotek-Yugra* and *ASB GEO*, to its Russian partner *Gazpromneft* and its subsidiary, *Gazpromneft-Service* (Kozlov, 2021). Approximately 30 per cent of its 2021–2025 capital investments, *Repsol* is planning to spend on the expansion of low-carbon businesses, waste recycling, and lowering energy intensity of production processes. During that period, more than € 400 million will be invested in energy efficiency improvement projects to achieve the goal of reducing annual carbon dioxide emission by 0.8 million tonnes and build a base for transforming industrial complexes into zero-emission facilities.

Other oil and gas companies have followed *Repsol* in making the obligation to achieve carbon neutrality by 2050. Particularly, in 2020, this goal was set by *BP* with a clarification that the obligation applies not only to all divisions of the company, with the total CO<sub>2</sub>-equivalent emission of approximately 55 million tons, but also to the annual 250 million tons of CO<sub>2</sub>-equivalent greenhouse gas emission due to the consumption of the oil and gas produced by the company (BP, 2020b). Also, *BP* made the obligation to facilitate at least a halfway reduction in greenhouse gas emission along the whole chain of supply by promoting new energy technologies in the process of the company's becoming an integrated international general energy supplier.

In 2012, *Royal Dutch Shell*<sup>1</sup> presented its Energy Transition Strategy with a declaration of the intent to reduce the carbon intensity of the company's energy products by 6 to 8 per cent by 2023, by 20 per cent by 2030, by 45 per cent by 2035, and by 100 per cent by 2050. The means to achieve these goals include more efficient use of energy, significant carbon intensity reduction of the energy portfolio, and emission reduction by the use of innovative greenhouse gases capture and storage technologies (Shell, 2021). However, the document came under heavy criticism from green NGOs. In May, 2021, a district court in the Hague had satisfied a legal claim against *Royal Dutch Shell* filed by the Netherlands division of Friends of the Earth International and several other environmentalist organizations with a support from 17 thousand citizens of the Netherlands. The court had stated that the targets announced in the strategy were not ambitious enough, and sentenced *Royal Dutch Shell* to achieve a 45 per cent carbon emission reduction by 2030 in comparison with the 2019 volume (Khan, 2021). Analogous legal actions were taken with respect to other European energy majors. Namely, in France, in 2020, a lawsuit was filed against *Total* by a group of fourteen French cities and four NGOs who accused the company of "climate inaction" (Vetter, 2020).

#### **Climate Strategies of U.S. oil and gas companies**

Unlike European oil and gas companies, which have been experiencing a considerable pressure from the side of governments, shareholders, and public associations, the U.S. fossil fuels industry adopts climate strategies that, being no less ambitious<sup>2</sup>, as a rule, imply neither reduction nor even slower rates of growth of hydrocarbon production.

<sup>1</sup> Since January, 2022 – Shell.

<sup>2</sup> Carbon neutrality commitments may differ in the announced scopes of greenhouse gas emission reduction. Scopes 1 and 2 cover direct emissions caused by a company's operational activities, as well as indirect emissions due to the consumption of energy in order to support these activities. Greenhouse gases emitted in the process of a company's output consumption are counted as Scope 3 emissions. More than 70 per cent of all emissions by the oil and gas industry are of Scope 3 type (Grushenko et al., 2021).

For instance, in 2020, *Occidental Petroleum (Oxy)* committed itself to the achievement of the zero greenhouse gases emission target by 2050 (Oxy, 2021). The company's decarbonisation program emphasizes investments in carbon capture utilization and storage (CCUS) of carbon dioxide emission from industrial sources. Among other priorities is the use of the innovative direct air capture technology (DAC) within the framework of bespoke collaborative projects aimed to produce small or zero carbon footprint output (Keith et al., 2018). An example is the method of oil recovery enhancing by injecting carbon dioxide (that comes from various sources including the *White Energy* ethanol-producing facilities in Texas) into the reservoir that allows *Oxy* not only to raise reservoir productivity by 10 to 20 per cent but also to reduce the company's overall carbon intensity, since most of the CO<sub>2</sub> used stays in the rock pores. Another interesting project by *Oxy* is the construction of an innovative electric power station that employs the Allam thermodynamic cycle utilizing carbon dioxide of anthropogenic origin (Oxy, 2021).

*Conoco-Phillips* has also presented a plan of achieving carbon neutrality by 2050 that covers Scopes 1 and 2 greenhouse gas emissions (ConocoPhillips, 2022). Similar to *Oxy*, the company supports the Zero Routine Flaring by 2030 Initiative by World Bank (ZRF), having made an extra commitment to achieve the declared target by 2025. At the starting stage of the decarbonization process, the company's business model focuses on a cleaner production of hydrocarbons by modernization of equipment and introduction of novel technologies implying a 75 per cent reduction of methane emission by 2025 in comparison with the 2019 volume. Also, the company is planning partial electrification of operations and the use of renewable energy. At the second stage, the leading role will be given to innovative technologies and hydrogen. The company intends to actively engage in the development of CCUS technologies while providing services to industrial emitters. For this purpose, in 2021, the company had carried on the appraisal of potential locations for carbon dioxide disposal in the Gulf of Mexico along the coasts of Texas and

Louisiana. The company is financing applied research in the area of hydrogen, with the prospect of industrial production of high-quality hydrogen and ammonia, and large-scale sales on the national and global markets.

Main points of the climate strategy of *Chevron* are very similar to those of *Oxy* and *Conoco-Phillips*; the company has declared the achievement of Scopes 1 and 2 carbon neutrality by 2050. Since a significant part (about 70 per cent) of Scopes 1 and 2 emissions is related to energy consumption and methane emission, at the first stage of decarbonization, the main attention is paid to energy intensity reduction, elimination of CH<sub>4</sub> leaks, and switching to renewable energy sources in as many *Chevron* divisions as possible. Altogether, about 70 per cent of the energy consumed in the Permian basin is supposed to be provided by wind or solar power. In addition, the company is betting on increasing hydrogen production and innovative CCUS technologies (Chevron, 2021).

The portfolio of *Chevron Technology Ventures*, a special-purpose division of the company, includes more than twenty climate projects including the ones based on the use of the DAC technology mentioned above. In May, 2022, with a participation of *Chevron*, on the territory of Kern River facility, San Joaquin Valley, California, a pilot plant was launched with the capacity of 30 tonnes per day in order to test an innovative technology of capturing CO<sub>2</sub> from smoke fumes with its consecutive burial in deep underground rock formations (Welch, 2022). *Chevron* has supported the development and introduction of a technology to synthesize the Blue Planet artificial building stone from carbon dioxide and calcium obtained from production waste. Unlike some other industrial CCU technologies, the Blue Planet process requires no preliminary cleaning or beneficiation of CO<sub>2</sub>, and guarantees permanent storage of carbon within the construction material (*Chevron invests in...*, 2021). In Mendota, California, Schlumberger New Energy, Microsoft, и Clean Energy Systems *Chevron* are implementing a project of generating bioenergy from agricultural waste. At full capacity, the station is expected to sequester 300 thousand tons of CO<sub>2</sub> annually by burying combustion products in

deep rock formation while consuming approximately 200 thousand tons of almond tree biomass (Comey, 2021).

These examples indicate the intention by U.S. companies to preserve, or even, depending on market tendencies, to increase the volumes of hydrocarbon production. Corporate decarbonization strategies, as a rule, focus on the reduction of carbon footprint of their operational activities by creating corporate venture funds to finance large-scale CCU projects. While continuously investing in fossil fuel assets, oil majors, nevertheless, invest also in solar and wind power generation to satisfy the energy needs of operational activities.

### **Decarbonization of Russia's Oil and Gas Industry**

Unlike many other countries, in Russia, major stake holders in the oil and gas industry so far don't consider the climate change problem to be of a top priority. Only 52 per cent of Russian citizens consider the global warming a really significant issue. About two-thirds of poll respondents state that they are not ready to pay more for goods or services knowing that the money would be spent on renewable energy or improvements in energy efficiency. Hence, the voters' attitude towards the climate change issue is far from uniform. At the same time, because of weakly developed civic society institutes and low activity of rare climate NGOs, there is no noticeable pro-climate pressure either on the government or on businesses from the side of the electorate, unlike in other parts of the world. Decarbonization is not yet on the government's list of the most important problems, climate-related issues are given a low priority in the federal policy (Grushevenko et al., 2021, p.121).

Although, within the country borders, non-ambitious national climate policy puts little constraint on the traditional way of doing business, export-oriented companies are forced to take measures in the direction of decarbonization of their activities. Nevertheless, climate strategies of Russian oil and gas companies so far haven't gone farther than mere regulation of Scopes 1 and 2 greenhouse gas emissions. In 2020, the concept of sustainable development

was mentioned in annual corporate reports of leading Russia's oil and gas companies including *Gasprom*, *Rosneft*, *Lukoil*, *Gasprom Neft*, *Tatneft*, and *Novatek*. Among the key decarbonization measures listed in these reports, the most noticeable ones are the introduction of greenhouse gas emission accounting systems, energy efficiency improvements, associated petroleum gas utilization, and further expansion of the natural gas business segment as an alternative to the oil segment. Some renewable energy and reforestation projects are also put on the list of decarbonization measures. It also has to be said that many of the listed energy efficiency-related activities have been conducted by the companies for many years without mentioning the cause of the greenhouse emission mitigation (Grushevenko et al., 2021, p.134).

Currently, only two companies, namely, *Lukoil* and *Transneft*, have declared their intention to pursue carbon neutrality. In particular, the 2021 Sustainable Development Report by the *Lukoil* Group includes a statement that the company "shares the ambition to achieve the net zero controlled emission target by 2050, and works on the means of its achievement" (Lukoil, 2022, p.36). The *Tatneft* Group has continued its search of effective instruments of decarbonization even in recent challenging times. In June, 2022, the company had confirmed its commitment to the target of achieving carbon neutrality by 2050 through the reduction of greenhouse gas emissions by such measures as methane emissions reduction, elimination of flaring, and the introduction of novice energy-saving technologies. One also has to note that many Russian firms have had to make some changes in their decarbonization roadmaps due to the need to minimize unforeseeable imposed costs, the overall reduction of the amount of loanable funds available on the market of ESG-financing, and the departure of foreign partners who earlier provided the access to frontline technologies (Aldanov, 2022).

In September, 2022, first carbon units (CU) were registered at the Russian Carbon Units Registry while first auctions were conducted on the National Commodity Exchange (a branch of the Moscow Exchange). In January, Rosneft'

and the Saint-Petersburg International Commodity Exchange had agreed on co-operation in the area of organized trade of CUs obtained from the realization of greenhouse gas emission reduction projects (Vetrova, 2022).

Nevertheless, economic sanctions imposed on Russian companies do diminish the prospects for the carbon market development in Russia since they limit the access to up-to-date technologies that may be used in realization of such climate-related projects as building greenhouse gas sinks or developing hydrogen energy. Besides, since internationally recognized ISO-accredited third-party verifiers are not present in Russia, domestic companies have no access to European or American marketplaces to trade their carbon offsets.

As a concluding remark, we would like to note that the re-orientation of the Russian oil and gas industry towards Asian markets caused by the Ukraine-Russia conflict doesn't remove the sustainable development goals from the business agenda. Asia holds the second place among the world regions by the number of ESG-regulation<sup>3</sup> initiatives conceding only to Europe while approximately 70 per cent of Asian companies run greenhouse gas emission reduction programs (Il'ina, 2022).

<sup>3</sup> Regulation related to ecology, society, and governance.

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## Concluding Remarks

Climate strategies of oil and gas companies aim not only at the reduction of greenhouse gas emission but also at obtaining some competitive advantage on the market. They are designed taking into account specific features of the regions of a company's presence. For instance, the U.S. companies prefer to keep their traditional *modus operandi* of investing mainly in the exploration and production of petroleum while European ones are betting on the development of alternative, low-carbon energy.

While the development of alternative energy is on the top of the list of the EU climate policy priorities, Russia's national strategy of adapting to the climate change emphasizes taking advantage of the country's vast sylvan areas as natural carbon sinks. In Russia, as elsewhere, companies must optimize their own decarbonization roadmaps within subject to the government policy. Hence, while the transformation of former oil and gas businesses to energy companies (so-called energy transfer) is the efficient solution on the territory of EU due to political reasons and exhaustion of local resources, in Russia, a combination of CO<sub>2</sub> capture with petroleum production and processing could be a promising strategy.

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