THE IMPACT OF U.S. ENVIRONMENTAL POLICY ON THE FINANCIAL STRATEGIES OF OIL AND GAS COMPANIES

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Abstract: *The article examines how U.S. environmental policies, such as the Clean Air Act and the Paris Agreement, influence the financial strategies of oil and gas companies. Focused on laws like the National Environmental Policy Act (NEPA), these policies mandate environmental impact assessments before initiating major projects, helping to mitigate potential risks. Carbon Capture, Utilization, and Storage (CCUS) plays a crucial role in reducing greenhouse gas emissions by capturing CO_2 from power plants and industrial facilities, often storing it in depleted oil and gas reservoirs. The article also analyzes Shell's carbon capture and storage project in Pennsylvania as a case study, demonstrating policy effectiveness in reducing emissions while maintaining economic growth. Shell's carbon capture and storage project in Pennsylvania serves as a case study demonstrating the effectiveness of such policies in reducing emissions while supporting economic growth. The article highlights tighter environmental regulations, rising fiscal pressures on emissions, and increasing public demand for cleaner technologies as driving forces behind the industry's adaptation. It discusses how proactive adoption of eco-friendly technologies enhances corporate reputation and opens opportunities for accessing government funding and entering new markets. The article states that balancing economic interests with environmental responsibilities remains challenging amidst fluctuating energy demands and market uncertainties.*

Keywords: *CCUS, DAC (Direct Air Capture), Environmental Policy, Law on National Environmental Policy, the Environmental Protection Agency (EPA), U.S. Department of Energy (DOE), oil companies.*

Introduction

In today's reality, where the emphasis on sustainable development is increasing, oil and gas companies are forced to adapt to transforming environmental regulations. These metamorphoses have a significant impact on their financial planning, prompting them to revise established business models and seek innovative competitive advantages.

Tightening environmental regulations, increasing fiscal pressures on greenhouse gas emissions and growing public pressure for cleaner technologies are all shaping the new environment for the oil and gas industry.

Oil and gas continues to be a key sector of the global economy, providing a significant portion of the energy used. Nevertheless, active oil and gas production and refining pose

serious environmental threats. Sustainability issues are becoming increasingly important in light of climate change and global initiatives to reduce carbon dioxide emissions. Oil and gas operations result in greenhouse gas emissions, water pollution and ecosystem degradation, especially in vulnerable regions such as the Arctic. This necessitates the introduction of advanced approaches and technologies to reduce the negative impact on the environment. [1].

Part 1

Basic theoretical part

In the American model of environmental policy, two directions can be distinguished: preventive policy and incentive policy. The preventive policy is characterized by the application of measures to prevent the commission of crimes and offenses.

The U.S. Preventive Environmental Policy encompasses several laws enacted by the U.S. Congress and state legislatures, along with supplementary regulations issued by various ministries, departments, and local authorities. Early examples include the Water Pollution Prevention and Control Law passed on June 30, 1948[1], and the Clean Air Act signed into law on July 14, 1955[2]. Central to the current framework of American environmental legislation is the National Environmental Policy Act[3], ratified by Congress in 1969 and implemented on January 1, 1970. This act serves two primary purposes: firstly, to impose upon federal agencies the obligation to protect the environment, integrating this duty with their principal responsibilities, and secondly, to establish a mechanism for fulfilling this mandate, including environmental standards, licensing procedures, preliminary assessments of environmental impacts, and long-term programming for environmental preservation activities. The act also mandated the formation of the Council on Environmental Quality within the Executive Office of the President, functioning as an auxiliary consultative body.

In December 1970, in line with the President's Reorganization Plan, a specialized governmental entity – the Environmental Protection Agency (EPA)[4] – was created. Headed by a director who reports directly to the President, the EPA consolidated numerous pre-existing and newly established federal programs designed to combat air and water pollution, manage radiation and solid waste disposal, reduce noise levels, and oversee the use of toxic substances. Scholars frequently describe the EPA's activities as regulatory, given its substantial influence on environmental quality via the establishment of environmental standards, emissions benchmarks, and enforcement measures. The EPA acts as the chief coordinator of the state's regulatory apparatus for safeguarding the environment across all sectors by setting environmental quality standards.

Occasionally, environmental laws emerge as reactions to specific ecological crises. A notable instance is the passage of the Superfund Act – or the Comprehensive Environmental Response, Compensation, and Liability Act – in 1980. This legislation sought to govern the identification and remediation of abandoned hazardous waste sites. Similarly, the Emergency Planning and Community Right-to-Know Act, enacted in 1986, was a response to the

[1] LII. 33 U.S. Code Chapter 26 – WATER POLLUTION PREVENTION AND CONTROL – DOI: https://www.law.cornell.edu/uscode/text/33/chapter-26 (Accessed June 20, 2025).
[2] EPA. Clean Air Act Overview – DOI: Evolution of the Clean Air Act | US EPA (Accessed June 20, 2025).
[3] EPA. National Environmental Policy Act – DOI: National Environmental Policy Act | US EPA (Accessed June 21, 2025).
[4] EPA. U.S. Environmental Protection Agency – DOI: U.S. Environmental Protection Agency | US EPA (Accessed June 22, 2025).

catastrophic incident at a chemical plant in Bhopal, India, in 1984. Dubbed the „Indian Hiroshima", the disaster resulted in the deaths of over 4,500 individuals and left approximately 50,000 survivors permanently disabled, visually impaired, paralyzed, or afflicted with neurological disorders.

In addition to the preventive policy, the incentive policy is actively operating in the United States, which is divided into three branches: tax deduction, preferential lending and grant provision.

Federal tax incentives for green businesses in the United States have become a powerful tool for stimulating sustainable development and innovation in environmentally friendly technologies. The Investment Tax Credit (ITC)[5] allows you to deduct up to 30 per cent of the cost of solar, wind and other renewable energy systems from federal taxes. The full 30 per cent loan rate is provided for projects started before 2033. The Production Tax Credit (PTC) provides a credit for a kilowatt-hour of renewable energy produced for 10 years after the facility is put into operation. It is especially beneficial for large-scale wind and solar projects.

The provision of grants is a popular tool of environmental policy among large investors. The Prize for the Development of Electronic Waste Recycling (E-SCRAP)[6] is a competition launched by the U.S. Department of Energy (DOE). The goal is to support projects that reduce the amount of electronic waste by creating and developing recycling chains. The total budget of the program is $4 million, and the maximum award for each winner is $600,000.

Additionally, you can apply for the tax breaks usually provided for certain types of businesses and reduce the taxes you have to pay. For example, if you purchase a testing robot or other equipment for your business, you can use a modified Accelerated Cost Recovery System (MACRS) to amortize this asset. Other tax relief options that may be suitable for your business include the Section 179 Deduction[7], the energy-efficient commercial buildings deduction (Section 179D), the business expenses deduction, and others. Accelerated depreciation allows companies to write off the cost of certain energy-efficient equipment faster, which reduces taxable profits in the early years of operation.

The most popular and effective tool in the United States is tax deductions and incentives for the introduction of CCUS technologies. Section 45Q of the U.S. Internal Revenue Code[8] provides a tax benefit for CO_2 storage. As amended in 2022, this entitles you to receive an income tax deduction: up to $85 per 1 ton of stored CO_2 and $60 per 1 ton of CO_2, which is used to enhance oil recovery or in other industrial activities. If the method of direct CO_2 capture from atmospheric air (DAC) is implemented, the tax benefit may amount to $180 per 1 ton of stored CO_2 and $130 per 1 ton of used CO_2. Projects that have started building facilities before January 2033 are eligible for tax benefits. The United States also has paragraphs 48A, 48B and 48C of the Tax Code, which provide tax incentives to

[5] NYC My City. Investment Tax Credit – DOI: Investment Tax Credit | City of New York (Accessed June 23, 2025)

[6] U. S. Department of Energy. Electronics Scrap Recycling Advancement Prize – DOI: https://www.energy.gov/eere/ammto/electronics-scrap-recycling-advancement-prize (Accessed June 19, 2025).

[7] NYC My City. Section 179 Deduction – DOI: Section 179 Deduction | City of New York (Accessed June 23, 2025).

[8] LII. 26 U.S. Code § 45Q – Credit for carbon oxide sequestration – DOI: 26 U.S. Code § 45Q – Credit for carbon oxide sequestration | U.S. Code | US Law | LII / Legal Information Institute (Accessed June 24, 2025).

companies investing in carbon capture technologies. They provide a tax refund within a certain percentage of the investment in the range from 15 to 30 per cent.

Thus, the American model of environmental regulation is based on the main legislative act – the Law on National Environmental Policy, in which the most important place is given to the environmental assessment of economic projects. This approach is characterized by a shift from the general to the particular, from the general idea of testing all industrial and economic facilities in terms of their impact on the ecological balance to specific issues of preserving the quality of individual natural objects. And incentives allow the introduction of modern technologies on preferential terms, so that compliance with environmental standards becomes a cost-effective action, which is typical of the American model.

Stricter environmental regulations, including emission limits, waste treatment regulations and liability for environmental damage, have a direct impact on the operating costs of oil and gas companies. Compliance with these regulations requires significant investment in upgrading technology, implementing environmentally friendly practices and creating effective approaches to waste management. Ignoring environmental requirements threatens serious penalties, litigation and reputational damage, which, in turn, adversely affects an organization's financial performance. [2].

Nevertheless, environmental regulation presents challenges as well as opportunities. Organizations that proactively adopt environmentally friendly technologies and show a commitment to sustainability gain a competitive advantage. This manifests itself in improving the company's image, attracting socially oriented investors, as well as in the possibility of entering new markets and participating in government programs to support environmental initiatives.

The main trend affecting the financial planning of the oil and gas sector is adaptation to a low-carbon economy. This implies reassessing investment priorities and refocusing on projects related to renewable energy sources, improving energy efficiency and reducing greenhouse gas emissions. [3]. A notable number of major players in the oil and gas industry are already actively investing in solar and wind generation, developing carbon capture and storage (CCS) technologies, and developing alternative fuels such as hydrogen.

This transformation process requires substantial financial investment and careful strategizing. Companies not only need to direct investments in new technological solutions, but also need to analyze the risks posed by the depreciation of traditional assets such as oil and gas fields. Diversifying the investment portfolio and developing a long-term strategy for the transition to a low-carbon economy are becoming critical factors in ensuring the financial stability of oil and gas companies. [4].

The application of carbon-free production techniques and the active use of renewable energy can significantly reduce the harmful impact on the ecological system. At the same time, organizations face difficulties due to the need to maintain profitability in the global transition to clean energy. Nevertheless, the effective application of environmentally sound technologies will enable oil and gas firms to remain competitive and meet international environmental standards. [5].

A significant environmental problem of the oil and gas sector is the vast amount of waste generated during the extraction and processing of hydrocarbon raw materials. [5]. Modern approaches to waste recycling, such as thermal neutralization, remediation of contaminated land and drilling mud reuse, provide an opportunity to reduce the negative impact on the environment. An example of efficient utilization is the use of waste for restoration of damaged ecosystems or as raw materials for construction works.

Significant harm to the environment is caused by oil and gas production and processing – 12 per cent of worldwide emissions[9]. Substantial amounts of greenhouse gases, including methane and carbon dioxide, enter the atmosphere, increasing the effect of global warming. In addition, oil spills and pollutant emissions have devastating effects on water bodies and land cover. Long-term environmental consequences of these incidents require large-scale works on the restoration of natural ecosystems.

The oil and gas industry has seen increased attention from government institutions and the public pushing for stricter regulation of emissions and compliance with environmental standards. [6]. In response, many companies are implementing emission monitoring systems, advanced industrial water treatment methods, and land remediation programs. For example, carbon capture and storage (CCS) technology demonstrates a significant reduction in the amount of carbon dioxide entering the atmosphere.

Today there is a particularly acute dilemma: who has a greater negative impact on the environment while maintaining the current state of affairs - environmental organizations or companies involved in the extractive industry. [7]. It is important to remember that the oil sector is the cornerstone of the world economy, and the key task of any commercial enterprise is to make profit. However, the significant amount of greenhouse gases emitted into the atmosphere by extractive companies cannot be ignored, despite international agreements to reduce emissions adopted in 2015. [8; 10]. Despite substantial investments by large extractive companies in environmental protection measures, environmentalists consider these efforts to be clearly insufficient.

On the other hand, environmental organizations advocating for stricter environmental regulations and restrictions on oil and gas companies often resort to radical methods, including protests, blockades of infrastructure and the spread of misinformation. Such actions can lead to economic losses, delays in the implementation of important projects and even social tensions. In addition, excessive pressure on the oil and gas industry, especially in the context of instability in the global energy markets, may provoke energy shortages and price increases, which will negatively affect the welfare of the population. [11; 12].

Objective analysis shows that both parties are responsible for the environmental situation. Oil and gas companies must recognize the need for fundamental changes in their operations, abandoning short-term profits in favor of long-term sustainability and environmental safety.

Ultimately, striking a balance between economic development and environmental protection requires the joint efforts of all stakeholders. [13; 4]. There is a need to develop clear and transparent rules of the game that incentivize enterprises to implement innovative technologies and reduce emissions, as well as ensure effective control over compliance. Only then will it be possible to avoid environmental catastrophe and ensure sustainable development of the global economy.

Continuous improvement of environmental responsibility strategies in oil production companies contributes not only to a significant reduction of damage to nature, but also to strengthening the image of the sector. The extraction of hydrocarbons has a significant impact on natural complexes and the diversity of living organisms. The territories with fragile ecosystems, such as the Arctic and equatorial zones, where the operations of oil and gas companies can cause irreversible transformations in the natural environment, are at particular risk. In particular, accidental oil releases can destroy entire biosensors, which entails long and costly cleanup and restoration works. [15; 18].

[9] IEA. CO_2 Emissions in 2022 – DOI: CO_2 Emissions in 2022 – Analysis - IEA (Accessed June 18, 2025).

The implementation of technological solutions that reduce the risk to natural systems is of paramount importance. Oil and gas organizations must implement surveillance and tracking systems that allow them to respond quickly to any environmental incidents. An important aspect is the creation of projects to restore natural complexes, such as returning land to its original state and cleaning up water bodies after oil spills.

World transformations in the energy sector, exemplified by the Paris Agreement, are aimed at reducing CO_2 emissions and counteracting climate change. [19]. These development vectors create a tangible burden on the oil and gas industry, obliging companies to reduce environmental impact and switch to alternative energy sources. In this regard, companies are forced to make large investments in research and development of innovative technologies to adapt to new market conditions[10].

Part 2

Practical and Applied Part

The prospects for stable development of the industry lie in the active implementation of environmental policy, which has an increasing influence on the financial planning of oil and gas corporations. Adapting to changing standards, investing in environmentally friendly technologies and applying specialized financial instruments are becoming key to ensuring long-term financial sustainability and competitiveness. Organizations that can successfully integrate sustainability into their operations will gain significant competitive advantages and contribute to a greener future.

The effectiveness of the U.S. environmental policy can be assessed using the example of the Shell Polymers Monaca plant for the production of high-density polyethylene (HDPE) and linear low-density polyethylene (LLDPE) from natural gas in Pennsylvania, which was launched in 2022 near the city of Pittsburgh and became the largest in the northeastern region of the country. Due to the economic necessity of such a plant for the region, the company received a tax credit of $1.65 billion. The installed capacity of the plant is 1.6 million tons of polyethylene per year. The state of Pennsylvania allows the plant to produce 2.2 million tons of carbon dioxide each year, while numerous air quality violations were detected at the plant in June 2024.[11] As a result, Shell will pay almost $10 million to the Pennsylvania Department of Environmental Protection (DEP) and communities in western Pennsylvania, of which the company will allocate more than $5 million to environmental projects of local communities.[12] The civil fine amounted to $4.9 million, with a fine for excessive CO_2 emissions of two thousand dollars per ton[13], according to the U.S. Code, section 42, paragraph 7651, exceeding emissions is 2,470 tons of CO_2. Taking into account the average increase in emissions by companies producing

[10] Ryabova, M.I. Features of the strategies of Russian oil and gas companies in the context of energy transition. Bulletin of MGIMO University, 5, 2023.
[11] Shell. Shell Polymers Monaca – DOI: Shell Polymers Monaca | Shell Global (Accessed June 24, 2025).
[12] Apnews. Environmental groups sue Shell over air quality at massive new Pennsylvania petrochemical plant – DOI: Environmental groups sue Shell over air quality at massive new Pennsylvania petrochemical plant | AP News (Accessed June 24, 2025).
[13] LII. 42 U.S. Code § 7651j - Excess emissions penalty – DOI: 42 U.S. Code § 7651j – Excess emissions penalty | U.S. Code | US Law | LII / Legal Information Institute (Accessed June 24, 2025).

polyethylene of 1.6%[12], in six years the volume of emissions will increase to 2,717 tons of CO_2. The company has two options: to pay fines or install CO_2 capture technology. DAC-based carbon removal (Direct Air Capture) is the use of chemical or physical processes to extract carbon dioxide (CO_2) directly from the surrounding air. The technology works on the principle of air intake and carbon removal using chemicals. The extracted carbon can be pumped deep underground, reused, or converted into solid products. Here is an assessment of the attractiveness of purchasing CO_2 removal equipment.

The following data is illustrated in table 1 and 2:

Table 1

Key indicators of DAC technology implementation

Indicator	**Value**
Financial Penalty	$4.9 million
Average annual increase in CO_2 emissions	1,6%
The cost of capturing 1 ton of CO_2	$1,000[13]
The cost of transporting 1 ton of CO_2	$31[14]
The cost of storing 1 ton of CO_2	$40[22]
Project duration	6 years
Tax deduction for the use of CO_2 capture equipment (Section 45Q)	85$/ton
Tax deduction for equipment commissioning (Section 179)	$1,250,000
Weighted Average Cost of Capital (WACC)	5.88%[15]

Author's database

Table 2

Dynamics of CO_2 without DAC implementation

Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
CO_2 volume, ton	2 470	2 510	2 550	2 590	2 632	2 674	2 717

Author's database

[12] Energy Institute. Statistical Review of World Energy – DOI: Home | Statistical Review of World Energy (Accessed June 23, 2025).
[13] IEA. Direct Air Capture – DOI: Direct Air Capture – Energy System - IEA (Accessed June 24, 2025).
[14] Scoltech. Carbon dioxide capture, useful use and storage technology (CCUS) – DOI: CCUS-Skolteh-2022-11-10.pdf (Accessed June 24, 2025).
[15] GuruFocus. WACC calculator – DOI: WACC Calculator | GuruFocus.com (Accessed June 24, 2025)

Table 3
Discounting of cash flows (USD million) of DAC implementation

Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
Outlay	(2.717)						
Increased costs of product		(0.419)	(0.547)	(0.333)	(0.172)	(0.083)	(0.698)
Storage costs		(0.125)	(0.127)	(0.130)	(0.132)	(0.134)	(0.136)
Transportation costs		(0,078)	(0,079)	(0,080)	(0,082)	(0,083)	(0,084)
Tax deduction		1.702	0.459	0.466	0.474	0.481	0.489
Discounted cash flow	(2.717)	1.019	(0.263)	(0.065)	0071	0.137	(0.305)

Author's calculations

Thus, the total cost of implementing CCUS technologies is $2.12 million, with a fine of $4.94 million, which shows the financial attractiveness of this technology for the production of polyethylene and the efficiency of ecological stimulation of oil companies (table 3). However, practice shows that even large businesses are reluctant to introduce such technologies, despite the availability of all the benefits and incentives. Currently, there is no business model that could provide large-scale financing of CCUS by the private sector. Cooperation can be built on the basis of separation of the technological chain, which will allow different market participants with different risk appetite to cooperate in the field of CCUS. In this scheme, the risk of interdependence will also need to be managed, and governments will need to assume long-term responsibility for CO_2 retention in the subsurface, although the likelihood of CO_2 leakage from well-chosen and managed storage facilities is very low. About 43% of the announced CCUS projects have been cancelled or suspended. Moreover, of all large-scale pilot and demonstration projects, that is, those with a volume exceeding 0.3 million tons of CO_2 per year, 78% were canceled or suspended. [20]. Thus, the impact of increasing the design capacity by 1 million tons of CO_2 per year may increase the risk of project failure by an average of 45.5%.[16] At the same time, the risk can be offset by the entry of the state into the project as the main owner and the beneficial use of CO_2, rather than its storage, for example, to increase oil recovery, or other methods. Also, the low level of technological readiness has caused the failure of many of the CCS projects ever under construction.

Instead of a conclusion

Effective collaboration among stakeholders, clear regulatory frameworks, and continued technological advancements are essential for achieving sustainable development in the oil and gas sector.

[16] Scoltech. Carbon dioxide capture, useful use and storage technology (CCUS) – DOI: CCUS-Skolteh-2022-11-10.pdf.

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