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Legal Challenges Arising From Climate Change Impacts on the Oil and Gas Industry and Legal Solutions to Mitigate Negative Effects in the Islamic Republic of Iran

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Abstract: *Climate change, as one of the major global challenges in recent decades, has had widespread effects on various industries, including the oil and gas industry, especially in countries like the Islamic Republic of Iran, which is heavily dependent on these resources. The aim of this paper is to provide suitable legal frameworks to address the threats posed by climate change and to enhance international cooperation in environmental protection and sustainable development in this industry. To achieve this objective, this paper examines the legal challenges arising from climate change impacts on the oil and gas industry in Iran and seeks to analyze legal solutions to mitigate these negative effects. Therefore, various topics were explored, including the obligation to comply with environmental standards, the legal responsibilities of oil companies in relation to environmental degradation, and the role of macro-policies in confronting climate challenges. Additionally, recommendations were made for amending laws and strengthening monitoring mechanisms to promote sustainable development and reduce pollutants in the oil and gas industry. Finally, it is suggested that Iran strengthen international cooperation in clean and innovative technologies and take effective steps to reduce the negative effects of climate change by adopting and enforcing stricter laws on environmental protection. Furthermore, improving regulatory processes and raising public awareness about the importance of sustainable development and legal responsibilities in the oil and gas industry are of special significance.*

Keywords: *Legal challenge, climate change, oil and gas, legal solution, Iran.*

1. Introduction And Problem Statement

Climate change is one of the greatest contemporary environmental threats affecting the oil and gas industry. Extreme weather events, such as rising temperatures, tidal changes, and thermal expansion, lead to frequent heavy rainfall, increased storm occurrences, and regular flooding, which significantly impact the oil and gas industry (Adelekan, 2010; Adesola, 2014; Akinwale, 2010). These events impose a heavy burden on the industry, hindering adaptation strategies and negatively impacting the oil and gas-dependent economies of some countries (Hitz, 2004; Udie, 2018). On the other hand, it should be noted that the industry can be divided into upstream, midstream, and downstream sectors. The upstream sector includes five main stages: exploration (searching for oil and gas) (Fetisov, 2023), evaluation (feasibility study of wells or fields and their commercial production potential) (Barkindo, 2022), development planning, oil and gas recovery, and decommissioning (abandoning or closing fields) (Dvoynikov, 2022). The midstream sector involves the processing and transportation of produced oil products to refineries (for crude oil) and gas plants for refining, processing, compression, and various technical processes. Greenhouse gas (GHG) emissions occur across different phases and sectors of the oil and gas industry. In 2019 alone, fuel combustion led to 33,622 million tons of carbon dioxide (CO2) emissions globally (IEA, 2021). Oil and gas consumption accounted for 55.4% of this figure, while coal accounted for 44%, and even the end-use phase, which requires serious intervention, may warrant more immediate regulatory attention compared to other areas contributing to increased emissions. This paper focuses on the upstream sector in comparison to the downstream sector, which contributes more to emissions and is, therefore, more heavily impacted by climate change. Identifying the primary sources of greenhouse gas emissions in the upstream sector and addressing them through effective legal interventions is essential (Benjamin, 2024). In the United States alone, upstream industries account for 20 to 21 million tons of CO2 equivalent in annual greenhouse gas emissions. By mid-2020, satellite

data and estimates indicated a 3% increase in climate change driven by global gas consumption, rising from 145 billion cubic meters in 2018 to 150 billion cubic meters in 2019 (World Bank, 2020).

In this context, legal and judicial regulations in the oil industry should require operators to identify and repair sources of greenhouse gas emissions (Eman, 2015, Mohajeri, 2021). From a legal perspective, the oil and gas industry faces a range of challenges in transferring responsibilities, complying with environmental laws, and the need for reforms in national and international regulations. For example, weaknesses in existing regulations and the inability to respond to the consequences of climate change create uncertainty for investors and pose a threat to natural resources. Additionally, social and human rights pressures resulting from climate change, such as the displacement of communities and inequalities due to environmental vulnerabilities, have created new challenges. On the other hand, climate change, as a global process, has profound and significant impacts on all aspects of human life, and Iran, as one of the rich countries in the oil and gas industry, is particularly facing new challenges (Mehri Babadi, 2022, Naderi, 2021). Given the country's economic dependence on oil and gas revenues, this industry not only represents one of the largest energy sources but also, as a major emitter of greenhouse gases, is directly impacted by the consequences of climate change. Phenomena such as rising temperatures, water scarcity, dust storms, and severe flooding each influence oil and gas extraction, production, and processing activities in various ways (Airom, 2023, Nargesian, 2024). Environmental changes and the increasing sense of responsibility among society towards environmental protection have put additional pressure on the oil and gas industry (Hajzadeh, 2020). The legal challenges related to these changes include contradictions between national laws and international requirements, lack of clarity in civil and human rights responsibilities, and difficulties in effectively implementing environmental policies and regulations. Specifically, the rights of local communities and the impacts of climate change on their lives have not been adequately addressed in existing laws (Hamidi, 2022, Salehi, 2021, Mousavi Shafaei, 2016).

Therefore, examining the legal challenges resulting from climate change in Iran's oil and gas industry and identifying legal solutions to mitigate its negative effects is of great importance. This research analyzes the various aspects of these challenges and, drawing on both global and domestic experiences, seeks to propose appropriate legal solutions for managing and combating the impacts of climate change on the oil and gas industry, as well as recommending necessary reforms in national laws. In this regard, the ultimate goal of this study is to enhance international and national interactions in better utilizing legal capacities to protect the environment and improve the quality of life in vulnerable communities.

2. LEGAL ANALYSIS

Examining international agreements such as the Kyoto Protocol and the Paris Agreement, and their impact on the oil and gas industry.

With the onset of the Industrial Revolution in the early 19th century and the rapid growth of human development, various changes occurred in human lifestyles. The increasing need for energy and the consumption of fossil fuels such as oil and coal have significantly contributed to the rise of greenhouse gases, including carbon dioxide. This is because the combustion of these fossil fuels leads to an increase in the emission of greenhouse gases into the atmosphere (Mazini, 2020). About 60% of the effects of the greenhouse phenomenon and the rise in Earth's temperature caused by human activities are related to the emission of carbon dioxide. In 1951, the World Meteorological Organization conducted studies on the impact of carbon dioxide on the atmosphere and the connection between global warming and greenhouse gases (Pish Bahar, 2019). The results of these studies emphasized the major role of human activities in increasing the concentration of these gases in the atmosphere. The most significant greenhouse gases include methane, nitrogen dioxide, and carbon dioxide. The increase in the Earth's temperature has various impacts in different areas. Its effect on the agricultural sector and water resources can be a notable concern. Additionally, this has caused biological changes in the environment, leading to damage to plants, animals, and ecosystems. As a result of these changes, several developed countries committed to implementing the Kyoto Protocol. This protocol is essentially the implementation of one of the articles of the UN Framework Convention on Climate Change, where in 1997, industrial countries committed to reducing their greenhouse gas emissions by 5.2% and providing financial assistance to developing countries for the adoption of renewable energy sources such as solar and wind energy. According to this protocol, it was agreed that the average global greenhouse gas

emissions would be reduced by 5.2% during the years 2008 to 2012, bringing it below the levels of 1990 emissions. The Kyoto Protocol introduced new approaches to reduce greenhouse gases, such as "Emission Trading (ET)," "Joint Implementation (JI)," which can be carried out between developed countries, and the "Clean Development Mechanism (CDM)" which encourages the implementation of joint emission reduction projects between developed and developing countries (Falehgari, 2023).

According to the agreements made under this protocol, countries are divided into two categories:

The first group, the industrial countries or Annex I countries, are required to reduce their greenhouse gas emissions. The largest producing countries in this group include the USA, Japan, Russia, Germany, Italy, Spain, Poland, Canada, the UK, Australia, Ukraine, and France. Among these, the USA, with the highest share of 20.3%, ranks first, followed by Russia and Japan with shares of 5.5% and 4.6%, respectively. The second group includes developing countries that are outside of the annex (they were exempted from obligations during the first implementation phase of the Kyoto Protocol). Developing countries are further divided into two groups:

Group A consists of developing countries with strong economies, which are required to provide the necessary costs and technology to reduce greenhouse gas emissions. The largest greenhouse gas-producing countries in this group are China, Brazil, India, Mexico, Indonesia, Thailand, South Africa, and South Korea. Among these eight countries, China ranks first with the largest share of 21.5%, followed by India and South Korea with shares of 5.3% and 1.7%, respectively. Group B consists of developing countries that are not required to reduce their greenhouse gas emissions.

In this regard, concerning Iran, it must be stated that the law on the accession of the Islamic Republic of Iran to the Kyoto Protocol regarding the United Nations Framework Convention on Climate Change has granted the government of the Islamic Republic of Iran the authority to accede to the Kyoto Protocol, an annex to the 1992 United Nations Framework Convention on Climate Change, with respect to Articles 50 and 139 of the Constitution of the Islamic Republic of Iran. The government is required to proceed with the accession, which includes a preamble, twenty-seven articles, and two annexes, and submit the related documents accordingly. The government of the Islamic Republic of Iran is authorized to use Article 18 of the Protocol and Article 14 of the Convention concerning the settlement of disputes only if the matter is approved by the Islamic Consultative Assembly (Parliament). The impacts of this Protocol on Iran, considering various laws and details, are as follows: The Kyoto Protocol establishes commitments for industrialized and developed countries to reduce greenhouse gas emissions. However, as Iran is a developing country, it was not directly bound by these commitments, and according to the Kyoto Protocol's provisions, it had only general responsibilities related to reducing greenhouse gas emissions. In other words, as a non-member country in the list of developed nations, Iran was not required to reduce CO2 emissions.

Although Iran was not directly obligated under the Kyoto Protocol to reduce greenhouse gas emissions, the economic and industrial impacts of this Protocol on Iran were significant, especially through international pressures and changes in the energy market. One of the main impacts on Iran's oil industry was the international pressure to reduce greenhouse gas emissions during the extraction and consumption of fossil fuels. The industrialized countries, bound by the Protocol’s obligations, particularly in relation to purchasing oil and gas from countries like Iran, paid more attention to environmental standards and pushed oil and gas producers to optimize processes and reduce pollution. This could indirectly influence global demand for Iran's oil. With the Kyoto Protocol emphasizing the use of clean and renewable energy, Iran, as a major producer of oil and gas, faced changes in global energy demand. The increased focus on renewable energy sources such as solar and wind energy led to greater competition in the global energy market and a reduction in the demand for fossil fuels. This could particularly have long-term negative impacts on Iran’s oil and gas industry.

The Kyoto Protocol encouraged industrialized countries to invest in green technologies and optimize fuel production processes. This resulted in Iran needing to invest more in research and development of technologies related to reducing pollution in its oil and gas sector. Although Iran was not directly subject to the commitments of the Kyoto Protocol, the country unofficially followed programs to reduce greenhouse gas emissions and address global climate concerns in order to enhance its international reputation. Iran began initiatives to reduce energy consumption in various economic sectors, particularly in energy-intensive industries and transportation. These measures included improving

energy efficiency and developing renewable energy sources such as solar and wind energy. In the oil and gas sector, efforts were made to adopt technologies like carbon capture and storage (CCS) to reduce greenhouse gas emissions.

Implementing the Kyoto Protocol and adhering to environmental requirements in Iran faced several challenges. Iran's oil and gas industry, particularly in terms of technical and environmental infrastructure, was faced with outdated infrastructure and traditional technologies, which led to high levels of pollution in fossil fuel production processes. Economic and trade sanctions imposed on Iran at various times limited access to modern technologies and foreign investments in sectors related to energy optimization and pollution reduction. Under difficult economic conditions and the urgent need for revenue from oil exports, Iran might have prioritized economic growth and energy exports over environmental concerns.

Ultimately, the Kyoto Protocol indirectly impacted Iran’s oil and gas industry. Although Iran, as a developing country, was not directly obligated to reduce greenhouse gas emissions, international pressures and changes in the energy market gradually led Iran towards adopting green technologies and improving energy efficiency. However, economic challenges and sanctions hindered rapid progress in this direction.

The Kyoto Protocol and subsequent agreements such as the Paris Agreement remain sensitive issues for Iran’s oil and gas industry, particularly as climate change and global obligations are rapidly evolving, and Iran needs to update its energy strategies according to international standards. Although the issue of climate change has become more evident over the years, it has been shown that the development and implementation of substantive and procedural regulations under such agreements remains one of the most challenging issues in the history of multilateral environmental agreements. This issue can be explained by the complexity of environmental commitments, the effort for unity among countries with significant differences, and considering the share of greenhouse gases in the atmosphere, social and economic development, and vulnerabilities arising from the impacts of climate change. These considerations affect the development, future commitments, as well as the implementation and adherence to current commitments (Pourhashmi, 2022). Examining the issue of implementation and adherence to commitments agreed upon by parties in all legal regimes is important because otherwise, it could weaken and limit the effectiveness of environmental commitments and also become a source of conflict and instability in the legal order. Therefore, adequate tools to promote adherence to commitments and respond to non-compliance, including the creation of mechanisms for compliance, are key issues in the negotiation and operationalization of multilateral environmental agreements (Sands, 2012: 136).

The Paris Agreement was adopted at the twenty-first Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) on December 12, 2015, and was opened for signature and ratification by countries. One of the main concerns of the architects of the Paris Agreement was how to draft a treaty that could attract broad participation while also being effective. Although these two aspects are interrelated, participation is not the only element of effectiveness; participation defines effectiveness by attracting actors who have the moral or causal responsibility, as well as the capacity to confront the problem in question. The firmness of commitments and their binding nature can increase effectiveness, even in the absence of the ability to seek legal redress (Abbott, 2000: 421). However, the firmness of the commitment and the level of ambition can be detrimental to broad participation (Voigt, 2016). Therefore, the Paris Agreement had to strike a delicate balance between broad participation and the level of commitment needed to address climate change. To achieve this balance, the Agreement had to draw upon a combination of two existing approaches in the structure of treaties: the bottom-up approach and the top-down approach. The bottom-up approach is based on transparent voluntary commitments that are subject to regular review, while the top-down approach addresses issues related to ensuring compliance with binding core commitments (Jacquet, 2016). This document achieved this by creating generally ceremonial but legally binding commitments, leaving the substantive content largely to the discretion of the parties. This is reflected in the bottom-up approach of nationally determined contributions (NDCs), which emerged at the nineteenth COP in Warsaw in 2013, based on the concept of voluntary country participation as per the Copenhagen Agreement (2009). By outlining this approach along with specific parameters for participatory programs and recurring processes for greater collective ambition over time (i.e., the five-

year cycles set forth in Article 4, paragraph 9, the transparency framework in Article 13, and the global stocktake in Article 14), the Agreement sought to establish this balance. Thus, legally binding commitments are largely linked to the regular updating and reporting of participatory programs, as well as providing essential information in accordance with the rules established under the transparency system (Ayrom, 2021, 2023).

Although the effectiveness of the Agreement also depends on the extent to which parties adhere to these commitments, until the parties fulfill what they have committed to and refrain from neglecting their obligations, participation and ambition alone have limited value (Arab Asadi, 2022). Therefore, compliance with the international commitments outlined in the Agreement by the parties is a crucial factor in determining its effectiveness. Additionally, the more trust and confidence between the parties, which is essential, increases, the more participation and ambition will grow. For these reasons, some environmental treaties, including the Paris Agreement, now include mechanisms to ensure compliance with their regulations, aiming to prevent non-compliance and facilitate their implementation by the parties (Redgwell, 2012: 177).

Although including a compliance mechanism in any treaty can also have a deterrent effect on participation and ambition, when non-compliance leads to sanctions, parties may show reluctance to commit to overly ambitious actions. In worse cases, they may even decide not to join the Agreement at all. Therefore, the compliance mechanism in the Paris Agreement had to be intricately woven into the structure of self-determined participation, the nuanced differences among the parties, and the processes established for increased transparency and sustained enthusiasm over time. This balance is seemingly achieved through the establishment of a mechanism to facilitate compliance with the regulations of the Agreement (Asadollahi, 2024).

The impact of the Paris Protocol on Iran's oil and gas industry can be outlined as follows. Iran's oil and gas industry, being one of the most important sectors of the economy and a major source of energy, has been directly affected by the Paris Protocol and its related climate change limitations. As one of the largest oil and gas producers in the world, Iran derives a significant portion of its revenue from this sector. The impact of the Paris Protocol on Iran's oil and gas industry stems from several aspects. The Paris Protocol has specific goals for reducing the consumption of fossil fuels, including oil and gas, to decrease greenhouse gas emissions, particularly carbon dioxide. Since Iran relies heavily on fossil fuels for its energy needs, it will be required to take steps to reduce carbon emissions. This means that Iran will gradually need to transition towards renewable energy sources like solar, wind, and hydroelectric power. The adoption of new technologies to improve energy efficiency and reduce greenhouse gas emissions from Iran’s oil and gas facilities (such as carbon capture processes) will also be necessary. One of the most significant aspects of the Paris Protocol is the restriction on new oil and gas extraction projects, especially in areas with significant environmental impacts. For instance, due to environmental pressures and the need to reduce pollution, industrialized countries and financial institutions may refrain from investing in new oil and gas projects in Iran. This issue, particularly following sanctions and within the framework of international laws, could affect Iran’s access to financing and advanced technologies. Given the global pressure to reduce fossil fuel consumption, Iran may face decreased demand for oil and gas exports. The Paris Protocol directly influences the policies of different countries and also pressures Iran, within global diplomacy, to comply with international agreements. Especially, European countries and international companies in the energy sector may avoid collaborating with Iran on oil and gas projects. Paris Agreement signatories may impose stricter regulations against the use of fossil fuels, which will impact Iran's oil and gas exports. As a result of the Paris Agreement, some governments may impose restrictions on purchasing oil and gas from countries with high fossil fuel consumption, which will especially affect Iran.

Iran, as one of the major producers of greenhouse gases, can fulfill its international obligations under the Paris Agreement by joining global pollution reduction initiatives and supporting clean technologies in this regard. This action could present an opportunity for Iran to contribute to global environmental preservation by reducing the emissions from its oil and gas industry while also benefiting from trade advantages and modern technologies. In line with the implementation of the Paris Agreement and related international laws, Iran may be required to enact new domestic laws dedicated to reducing pollution from the oil and gas sector. These laws could include:

- Raising environmental standards for oil and gas facilities
- Stricter regulations for the use of fossil energy resources
- Encouraging the use of clean energy and reducing dependence on oil and gas

Given the pressures exerted by the Paris Agreement on fossil fuel-producing countries to reduce fossil fuel consumption, Iran may utilize incentives for its oil and gas industry to sustain and develop this sector. These incentives could include support for modern technologies aimed at reducing carbon emissions and improving resource efficiency in the oil and gas sector. Ultimately, the Paris Agreement will indirectly have significant impacts on Iran's oil and gas industry. On one hand, Iran may face investment restrictions and diplomatic challenges due to reduced demand for oil and gas. On the other hand, it could create an opportunity to shift policies towards the development of renewable energy and reducing pollutant emissions. In this process, Iran needs to take fundamental steps to align with the requirements of the Paris Agreement to prevent climate change-related crises and achieve a sustainable future.

3. National Laws

3.1. Legal Requirements to Combat Climate Change in Domestic Laws

From the early years of the establishment of the Iranian Parliament (in 1907), Iranian lawmakers have been concerned with the environment and setting regulations for its protection, as reflected in Articles 179 and 182 of the Civil Code (approved in 1928), the Hunting Law (approved in 1956), the Wildlife Protection Law (approved in 1967), the Forests and Rangelands Protection and Utilization Law (approved in 1967), the Ministry of Agriculture and Natural Resources Reorganization Law (approved in 1971), the Environmental Protection Law (approved in 1974), the Air Pollution Control Regulation (approved in 1975), the Green Space Protection Law (approved in 1980), the Water Distribution Law (approved in 1982), the Water Pollution Control Regulation (approved in 1984), the Natural Resources and Forests Protection Law (approved in 1992), the Marine Resources Protection Law (approved in 1995), the Air Quality Law (approved in 2017), and more.

A significant change after the Islamic Revolution of 1979 in Iran's domestic laws regarding the environment was the "institutionalization" of attention to environmental protection. This means that, like leading countries in environmental protection, this issue was incorporated into the Constitution of the Islamic Republic of Iran, reflecting the new political system's perspective on environmental preservation. According to Article 45 of the Constitution, "public assets and resources such as wastelands, mines, seas, lakes, rivers, and other public waters, mountains, valleys, forests, wetlands, natural groves, and pastures that have no private ownership are under the control of the Islamic government to act according to the public interest." Furthermore, according to Article 50 of the Constitution, "In the Islamic Republic, environmental protection, in which current and future generations should live in a socially evolving environment, is considered a public duty. Therefore, any economic or other activities that cause environmental pollution or irreparable damage are prohibited" (Mashhadi, 1393: 563).

Moreover, in the realm of constitutional law, it is important to note the "general policies for the prevention and reduction of risks arising from natural disasters and unexpected events" (approved on 25/6/2005) and the "general policies for environmental protection" (approved in 2015) by the Supreme Leader, which are higher than laws and regulations. All lower-level laws and regulations must be aligned with these policies.

In terms of ordinary laws and government regulations, there are generally two different approaches in Iran's legal system regarding climate change:

3.2. First Approach: A Negative Approach to Climate Change

This means that some laws, through civil, criminal, and administrative enforcement mechanisms, focus on combating environmental degradation and pollution. These laws have a narrow focus, meaning that combating climate change is not directly addressed, but they aim at maintaining social order, security, and public rights in the environmental domain. Laws such as the prohibition of hunting, deforestation, and the provisions in the Islamic Penal Code (Articles 675, 697, 680, 686, 688), the Hunting Law

(1956), the Forest Protection and Utilization Law (1974), the Clean Air Law (2017), etc., reflect this approach.

3.3. Second Approach: A Positive Approach to Climate Change

This approach involves some laws that, by defining specific standards and regulations for various economic activities, as well as outlining the roles and roadmaps for different executive agencies, aim to fulfill Iran's international commitments regarding the reduction of greenhouse gases.

The laws related to combating various types of pollution are as follows:

According to Article 9 of the Environmental Protection and Improvement Law (approved in 1974), "any action that causes environmental pollution is prohibited. Environmental pollution refers to the dissemination or mixing of foreign substances into water, air, soil, or land to such an extent that it changes its physical, chemical, or biological quality in a way that harms humans, other living beings, plants, or historical and architectural structures."

Additionally, Articles 11-15 of this law and Article 12 of the Clean Air Law (approved in 2017) give the Environmental Protection Organization the authority to prevent the continuation of operations in factories or workshops that cause environmental pollution, with prior notice. It is also authorized to impose fines for the creation and dissemination of pollution.

According to Paragraph 1, Article 1 of the Clean Air Law (2017), "Air pollution is defined as the release of one or more pollutants, whether solid, liquid, gas, ionizing radiation, non-ionizing radiation, odor, or sound into the open air, whether naturally or man-made, in a quantity and duration that alters the air quality in a way that is harmful to human health, other living organisms, ecological processes, or historical and architectural sites, or causes a decline in public well-being." Global warming and acid rain are considered two fatal effects of air pollution (Firoozi, 2005: 176).

Article 17 of the Clean Air Law requires all users of stationary air-polluting resources to comply with the permissible emission limits for pollutants in their boiler rooms and combustion systems. These centers must also adopt necessary measures to prevent the emission of pollutants into the open air, use appropriate fuel (preferably natural gas), and ensure that annual technical inspections of their systems are conducted by accredited companies as per the permissible pollutant emission limits.

In addition, owners, managers, or heads of administrative, health, medical, service, public, and commercial centers that cause air pollution are subject to a financial penalty if, after one written warning by the organization, no action is taken to mitigate the pollution within the specified time. Repeat offenders may face temporary closure for a period of 6 months to 2 years, in addition to the maximum financial penalty.

Based on Article 45 of the Constitution, public bodies such as seas, lakes, rivers, and other public waters are under government control. This principle is outlined in the "Water Law and Its Nationalization Procedure" (approved in 1968), which states that all flowing waters in rivers, natural streams, valleys, creeks, and other natural channels, both surface and underground, as well as floodwaters, sewage, drainage waters, lakes, swamps, ponds, natural springs, mineral waters, and underground water resources are national assets and belong to the public. The responsibility for protecting and utilizing these national resources and constructing and managing water development facilities is assigned to the Ministry of Water and Electricity.

Chapter 7 of this law (Articles 55-58) deals with preventing water pollution. According to Article 56, polluting water means mixing foreign substances into water to an extent that its physical, chemical, or biological quality is altered in a way that harms human health, livestock, aquatic life, and plants. Foreign substances include oil, coal, acid, harmful chemicals (solid or liquid) from refineries, gas sources, painting facilities, distilleries, chemical and mineral factories, industrial, food, and municipal wastewater.

Furthermore, based on Article 60, Section 5, offenders causing water pollution face penalties such as imprisonment and fines. Additionally, according to Article 46 of the "Fair Distribution of Water Law" (approved in 1982), the responsibility for preventing, obstructing, and reducing water pollution is assigned to the Environmental Protection Organization.

Other related laws include:

General Environmental Policies: These were announced in 2015 as a comprehensive policy for the country's environmental planning system, especially in post-consultation with the Expediency Discernment Council and communicated to the three branches of government by the Supreme Leader in 15 clauses. It emphasizes a low-carbon economy and the management of environmental threats like desertification, dust storms, and climate change.

Accession of the Islamic Republic of Iran to the Climate Change Convention: This international agreement on climate change was approved at the Earth Summit in Rio de Janeiro in 1992. Iran ratified it in 1996.

Kyoto Protocol: An amendment to the UN Climate Change Convention, the Kyoto Protocol was adopted in Kyoto, Japan, in 1997. Iran ratified this protocol in 2005.

Executive Regulation of the Climate Change Convention and Kyoto Protocol: Approved by the Cabinet in 2009, this regulation provides the framework for implementing the climate change convention and Kyoto protocol in Iran.

Regulation for Approval of Clean Development Mechanism (CDM) Projects under the Kyoto Protocol: In 2009, the Iranian Cabinet approved the regulation for the approval of CDM projects, helping Iran to meet international commitments on climate change.

These laws and regulations demonstrate the government's commitment to controlling pollution, conserving resources, and addressing climate change both at the national and international levels.

Article (22) of the Seventh Development Plan Law of the Islamic Republic of Iran:

Based on Clause "8" of the general policies on the environment and with the aim of developing a green economy, a low-carbon industry, and strengthening adaptability and reducing the damages caused by climate change, the Department of Environment is required, in collaboration with the Ministries of Oil, Energy, Industry, Mine and Trade, Roads and Urban Development, and Health, Treatment, and Medical Education, to draft a national climate change management plan within the first year of the program and implement the necessary legal arrangements.

Article 50 of the Constitution after stating the necessity of protecting the environment in a way that ensures sustainable development, also includes a ruling most relevant to the oil and gas industry. According to this ruling, "Economic activities and others that result in environmental pollution or its irreparable destruction are prohibited." Article 50 refers to the most significant environmental damages, namely pollution and destruction. Therefore, it is necessary to define these two concepts. Due to the variety of pollutions, there are several definitions of pollution in international documents, each of which merely refers to certain aspects of it. In contrast, Article 9 of the 1974 Environmental Protection and Improvement Law provides a more comprehensive definition of pollution. This article defines environmental pollution as "the spread of harmful substances into air or water."

It should be noted that the Iranian Environmental Impact Assessment plan (submitted on December 3, 2013, and revised on July 25, 2016) defines sustainable development as: "Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs." Sustainable development consists of three main components: economic growth, social justice, and environmental protection. Attention to these elements leads to a growing economy that is harmonized with environmental balance and social equity.

For example, the 1973 MARPOL Convention identifies discharge as one of the forms of pollution, stating that any discharge from a ship, regardless of the reason, including releasing, dumping, spilling, leaking, pumping, spreading, or emptying, is considered pollution. In contrast, the Convention on Long-range Transboundary Air Pollution defines air pollution as the direct or indirect introduction of substances or energy into the air by human activities that causes harmful effects, endangering human health, harming living resources and ecosystems, and hindering the use of environmental resources for social welfare and other lawful purposes.

"Mixing foreign substances into water, air, soil, or land to an extent that their physical, chemical, or biological quality is harmfully altered, affecting humans, other living organisms, plants, or buildings,"

defines pollution. On the other hand, the term "environmental destruction" in Article 1 of the Executive Regulations of Clause C of the Third Economic, Social, and Cultural Development Plan of the Islamic Republic of Iran refers to any change in natural resources that disrupts the balance of nature and endangers biodiversity.

Despite this, it seems that "destruction" is a general term that encompasses any activity that eradicates or negatively alters the natural biological state, which may be caused by pollution, combustion, improper use of natural resources, or their destruction for economic gain, among other things. Since the term "irreparable" follows the word "destruction," the question arises whether this description also applies to pollution. The answer is likely affirmative, as there is no reason to believe that the legislator would treat pollution and destruction differently, and if that was the intention, an explicit threshold for pollution would have been set. Since no specific threshold is provided for pollution, if the term "irreparable" does not extend to pollution, then any economic activity involving any degree of pollution should be prohibited according to Article 50. However, this interpretation cannot be correct. Therefore, it can be said that the legislator has prohibited any form of irreparable pollution and destruction under Article 50.

Furthermore, it is important to note that the prohibition of irreparable environmental pollution and destruction cannot be interpreted as implying that economic activities causing irreparable damage to the environment are not prohibited.

Given the explanations above, and considering that the oil and gas industry is a significant part of the country's economy and has a notable impact on the environment, it is a clear example of the ruling in Article 50 of the Constitution. Therefore, all activities related to the oil and gas industry, including exploration, drilling, and other upstream activities that cause irreparable pollution or destruction of the environment, are prohibited. In contrast, the principle is silent on activities related to the oil and gas industry that have environmental impacts but cannot be described as irreparable pollution or destruction. Other laws must clarify the legal status of these activities.

Benefit from a favorable environment: The document "The 20-Year Vision of the Islamic Republic of Iran by 1404 (Solar Hijri Calendar)" was issued by the Supreme Leader in November 2003 and has since been the basis for the development of five-year development plans. This document, due to brevity or other reasons, has not focused significantly on environmental protection, merely stating that "in Iranian society, in the perspective of this vision... the people will benefit from a favorable environment." The general phrasing of this statement does not diminish its importance, as achieving the goal of benefiting from a favorable environment, as one of the goals outlined in the document, requires not only other factors but also the formulation and implementation of extensive and targeted environmental policies, particularly for the oil and gas industry, which is the most polluted sector of the economy.

The necessity of adhering to environmental regulations in the development of oil and gas resources: According to Article 14 of the Fourth Development Plan Law, the National Iranian Oil Company (NIOC) was granted permission to sign exploration and field development contracts with external parties or qualified domestic companies, while meeting the conditions outlined in this article and securing financial resources, according to the circumstances of each field. One of the conditions mentioned in Article 14 is that the exploration and field development contracts must comply with environmental regulations and considerations. The requirement to observe environmental criteria was also incorporated in the Fifth Development Plan. According to Clause "B" of Article 129 of the Fifth Development Plan, the Ministry of Oil is obligated to issue operating licenses without ownership rights to the oil and gas produced by its subsidiary companies and qualified companies engaged in exploration, development, extraction, and production, with the adoption of conservation production standards. The Ministry must also supervise exploration, development, and production operations by these companies, considering production quantities, reservoir conservation, health, safety, and environmental standards.

The commitment to adhere to environmental regulations in exploration and development contracts in the oil and gas industry is realized when environmental obligations are regarded as part of the public order in the Islamic Republic of Iran and are included as an inseparable part of all oil and gas contracts signed with domestic and foreign contractors. The Cabinet of the Islamic Republic of Iran, in its decision of 13/05/1395 (5th of May, 2016), titled "General Conditions, Structure, and Model of Upstream Oil and Gas Contracts," addressed this issue. According to Clause "H" of Article 3 of this decision, which

was communicated to the Ministry of Oil and the Ministry of Economic Affairs and Finance, all oil contracts based on this resolution must include the requirement for conducting environmental impact assessments and complying with safety, health, environmental, and social regulations during the implementation of the projects. Environmental considerations, according to the provisions of this decision, have been taken into account in the sample oil contract. For example, according to Article 1-15 of the sample contract: "The contractor is obligated to comply with all relevant national and international laws and regulations... concerning all environmental, safety, security, social, and health assessments...". Additionally, the contractor is required to develop and implement environmental guidelines. These guidelines must cover a wide range of issues, including air pollution, preservation of surface and groundwater, waste management, prevention of a reduction in the quality of life around the facilities, compensation for damages to individuals and property, minimizing the effects of drilling operations, preventing oil and chemical spills, protecting vegetation and wildlife, and preserving historical and cultural sites.

The necessity of collecting associated gas: The flaring of associated gas is considered one of the major factors contributing to air pollution. The reason for flaring associated gas is the lack of facilities to either consume the gas or inject it back into the reservoir (Shirouei, 2014, p. 566). Article 229 of the Fifth Development Plan Law had foreseen that 10% of the value of crude oil and gas condensates produced would be allocated for: a) conservation extraction from oil reservoirs through water or gas injection, and b) increasing natural gas production, particularly by implementing planned phases of the South Pars gas field and other shared gas fields, and collecting flaring gas from operating fields, so that, in addition to ensuring sufficient gas for injection into oil fields, domestic consumption and the committed export volume are guaranteed. Despite the approval of this regulation and similar arrangements provided in development laws, a significant amount of the country's associated gas continues to be flared. The Islamic Consultative Assembly, considering this issue, adopted a more progressive approach in the Sixth Development Plan and obligated the government to transfer all associated gas collection, flaring control, and utilization projects in oil fields to the non-governmental sector. The goal is that by the end of this program—by the year 1400 (2021)—90% of the flaring gas must be controlled and utilized.

Sixth Development Plan Law (1396-1400): This law is one of the most important economic and social frameworks in the country, emphasizing the reduction of greenhouse gas emissions and environmental considerations in various industries, including oil and gas. Based on this law, Iran is obligated to reduce carbon intensity in various industries, including oil and gas.

Environmental Protection Law (1348): This law, enacted to protect the country's environment, pays special attention to pollutants and the negative impacts of industrial activities, including the oil and gas industry. It requires oil companies to comply with environmental standards and minimize environmental damage. It mandates the environmental impact assessments of projects before their commencement, controls and reduces pollution caused by drilling and oil and gas production operations, and encourages the use of new technologies to mitigate environmental impacts.

Business Environment Improvement Law (1393): This law aims to improve the business environment in the country, emphasizing environmental principles and sustainable development across various industries, including oil and gas. Different sectors of the oil and gas industry are required to adhere to global standards and maintain their commitments to reducing negative environmental impacts. While Iran has addressed climate change management and its effects on the oil and gas industry in several laws and policies, challenges still remain. These include a lack of access to advanced technologies to reduce pollution and improve energy efficiency, economic pressures, and sanctions that might hinder progress in implementing environmental policies in the oil and gas sector. In some cases, the short-term interests of the oil and gas industry may conflict with the long-term goals of environmental protection and climate change mitigation. Overall, Iran needs to effectively align its national policies with international standards and take effective actions to reduce the negative impacts of the oil and gas industry on climate change.

4. Review Of Legal Solutions

Reviewing and Proposing Legal Solutions to Mitigate the Negative Effects of Climate Change on the Oil and Gas Industry:

To reduce the negative effects of climate change on upstream oil and gas industries, it is necessary to implement legal and practical solutions that align with environmental and economic requirements. These solutions can include various measures, some of which are outlined below:

4.1. Strengthening Environmental Laws and Regulations

Strengthening Environmental Standards: Enacting stricter laws and regulations to reduce pollution caused by oil and gas extraction, especially regarding greenhouse gas emissions, in order to mitigate the effects of climate change.

Implementing Sustainable Production Standards: Enacting specific standards for the sustainable extraction of oil and gas resources and using advanced technologies to reduce environmental impacts.

4.2. Encouraging the Use of Green Technologies

Supporting Research and Development: Establishing programs and policies to support research and development in carbon-reducing technologies and the use of clean energy sources. This includes technologies such as Carbon Capture and Storage (CCS) and other methods for reducing greenhouse gases.

Improving Energy Efficiency: Supporting projects that enhance the efficiency of oil and gas extraction processes and reduce energy consumption.

4.3. Enhanced Monitoring and Supervision

Monitoring Environmental Performance: Establishing more comprehensive monitoring systems for industrial activities, particularly in the oil and gas sector, to ensure compliance with environmental laws and prevent excessive pollution.

Assessing Climate Change Impacts: Requiring environmental impact assessments and analyses of the effects of climate change on oil and gas projects before their initiation and during their operations.

4.4. Creation of Carbon Markets and Financial Incentives

Development of financial policies to reduce carbon emissions: Creating markets for buying and selling carbon credits and encouraging companies to reduce greenhouse gas emissions through financial incentives.

Providing financial facilities for green projects: Offering loans and financial facilities on special terms to projects that help reduce the effects of climate change in the oil and gas industries.

4.5. Developments in Energy Policies and Resource Diversification

Renewable energy development: Formulating policies to reduce dependence on fossil fuels and encouraging oil and gas industries to invest in renewable energy projects such as solar, wind, and hydrogen.

Encouraging the transition to clean energy: Requiring a gradual reduction in the use of fossil fuels and promoting the shift to clean and sustainable energy sources.

4.6. Social Responsibility and Education

Education and awareness-raising: Creating educational programs for oil and gas industry employees on climate change and best practices for reducing its impacts.

Corporate social commitments: Requiring companies to undertake responsible social projects that contribute to improving environmental conditions in local communities and ecosystems.

4.7. International Cooperation

Collaboration with global organizations: Cooperating with international organizations and institutions to exchange knowledge and experiences on policies and technologies for mitigating climate change.

Joining international agreements: Joining agreements and international commitments to reduce greenhouse gas emissions, such as the Paris Agreement, which pressures countries to take actions to mitigate climate change.

4.8. Increasing Transparency and Reporting

Environmental reporting requirements: Creating legal requirements for transparent reporting on the environmental impacts of oil and gas projects, including greenhouse gas emissions, and providing solutions for reducing them.

Reporting on climate risks: Requiring reports on climate-related risks for planning and managing long-term risks.

Ultimately, a combination of these legal and executive measures can help reduce the negative impacts of climate change on upstream oil and gas industries. These solutions should be implemented in a coordinated manner with strict oversight to improve the long-term situation of the oil and gas industry, both environmentally and economically.

Analysis of the Role of Governments and International Organizations in Creating Effective Policies

Reducing the negative impacts of climate change on upstream oil and gas industries is a complex, multifaceted challenge that requires coordinated and joint efforts from governments, international organizations, and various industries. This analysis is conducted in two main parts: 1) the role of governments in formulating national policies and regulations, and 2) the role of international organizations in creating global collaborations and environmental standards.

The Role of Governments in Reducing the Impacts of Climate Change in Upstream Oil and Gas Industries

Governments play a central role in mitigating the negative impacts of climate change because, on the one hand, they set environmental laws and regulations and, on the other hand, through financial policies, research and development, and oversight, they guide the oil and gas industries towards sustainability.

- **Formulating and Enforcing Strict Laws and Regulations**

Governments must set precise environmental laws that prevent the emission of greenhouse gases and pollution from oil and gas extraction. These laws include:

Carbon emission reduction regulations: Setting legal limits on the amount of greenhouse gases, such as CO2, emitted by oil and gas industries.

Environmental and safety standards: Establishing stringent criteria for managing pollution from oil extraction operations, such as preventing oil spills, groundwater contamination, and managing industrial waste.

Environmental reporting requirements: Requiring companies to provide transparent reports on the environmental impacts of their oil and gas projects and the actions they are taking to reduce them.

- **Supporting Technological Innovation and Research**

Governments should encourage research and development in green technologies by providing financial and supportive resources. These technologies include:

Carbon capture and storage: To reduce greenhouse gases produced in the extraction and refining processes of oil and gas.

Improving energy efficiency: Enhancing oil and gas extraction processes to reduce energy consumption and environmental impacts.

Developing renewable energy resources: Supporting investment in renewable energy projects that can gradually replace fossil fuel use.

- **Creation of Financial and Economic Incentives**

Governments can encourage companies to use low-carbon and sustainable technologies by offering financial incentives such as tax breaks, providing low-interest loans, or promoting investments in green projects.

- **Cooperation with Other Countries to Implement Global Agreements**

Governments should participate in international agreements, such as the Paris Agreement, and fulfill their commitments to reduce greenhouse gas emissions. These binding agreements encourage countries to take joint action to mitigate the impacts of climate change and protect the environment.

The Role of International Organizations in Creating Effective Policies

International organizations play a significant role in fostering global coordination and environmental standards. They act as intermediaries, facilitators, and regulatory bodies.

- **Defining Global Standards**

International organizations, such as the United Nations (UN) and the International Energy Agency (IEA), can set global standards for the oil and gas industry, encouraging countries to follow best environmental practices. These standards may include:

Carbon reduction and greenhouse gas emission criteria

Guidelines for managing industrial waste

Specific regulations on biodiversity protection in oil and gas extraction areas

- **Promoting International Cooperation**

International organizations can assist countries in sharing green technologies and best practices by creating collaboration networks. These collaborations also enable developing countries to benefit from the experiences of advanced nations in controlling the impacts of climate change.

- **Creating and Monitoring Global Carbon Markets**

Some international organizations, such as the European Union and the World Bank, can encourage oil and gas companies to reduce their greenhouse gas emissions through carbon markets and trading mechanisms, such as carbon credit exchanges. These markets help create economic incentives to reduce pollution.

- **Supporting Developing Countries**

International organizations should support developing countries in reducing the negative effects of climate change and achieving sustainable development. This support may come in the form of financing green projects, transferring clean technologies, and building local capacities to implement environmental policies.

- **Providing a Diplomatic Space for Global Negotiations**

Finally, international organizations can encourage countries to make greenhouse gas reduction commitments and collaborate on environmental issues through global agreements like the Paris Agreement. These agreements not only help mitigate climate change but also create pressure on the oil and gas industries to align their activities with greater environmental considerations.

Reducing the Negative Impacts of Climate Change on Upstream Oil and Gas Industries

Reducing the negative impacts of climate change on upstream oil and gas industries requires close and coordinated cooperation between governments, industries, and international organizations. Governments, through the formulation of strict laws and regulations, supporting green innovations, and providing financial incentives, can play a crucial role in guiding the oil and gas industry toward sustainability. Furthermore, international organizations can help accelerate the process of mitigating climate change by setting global standards, creating carbon markets, and facilitating international cooperation.

The Role of the Iranian Government in Reducing the Negative Impacts of Climate Change on Upstream Oil and Gas Industries

Iran's government plays a significant role in reducing the negative impacts of climate change in upstream oil and gas industries. These industries are among the largest contributors to climate change due to their production of greenhouse gases, extraction of natural resources, and heavy industrial processes. Therefore, analyzing the role of the Iranian government in this area can include several aspects:

Regulation and Implementation of Environmental Policies

The Iranian government can help reduce the negative effects of climate change by creating and implementing environmental laws and policies. These policies can include:

Setting limits on greenhouse gas emissions: Establishing specific caps on the emission of CO2, methane, and other greenhouse gases in the oil and gas industries.

Environmental standards for production processes: Requiring the use of modern technologies that reduce pollutant emissions.

Supporting renewable energy projects: Encouraging oil and gas companies to invest in clean energy projects such as solar or wind energy to meet some of their energy needs.

Technological Transformation and Use of Green Technologies

The government can help improve industrial processes by encouraging innovation and the transfer of green technologies. This can include:

Using technologies to reduce greenhouse gas emissions: Implementing technologies like carbon capture and storage (CCS) and reducing fossil fuel consumption in extraction operations.

Optimizing processes: Encouraging the optimization of refining and extraction processes to reduce energy and water consumption.

Advancements in producing clean energy from oil and gas resources: Developing methods for generating electricity and heat from natural gas that produce fewer emissions than other fossil fuels.

Resource Management and Environmental Protection

Developing and implementing natural resource management programs can play an important role in reducing the negative impacts of climate change:

Protection of water resources: Since oil and gas industries operate in dry and semi-arid regions, managing water resources and preventing contamination of underground water sources is critical.

5. Conclusion And Recommendations

Reducing the impacts of climate change on the oil and gas industry requires a comprehensive approach based on coherent laws and policies that need to be implemented at global, national, and industrial levels. The following analyzes legal strategies to mitigate the effects of climate change on the oil and gas sector. One of the most important legal measures to reduce the impacts of climate change is the establishment of strict regulations regarding greenhouse gas emissions. Governments can enact laws to reduce greenhouse gas emissions in the oil and gas industry. For example, European Union countries and many others have passed laws to reduce carbon emissions. Mandating improvements in energy efficiency within the oil and gas industry, such as the installation of advanced technologies and reducing energy consumption in production and transmission processes, is another important measure. Regulations to increase transparency and more accurate reporting regarding climate impacts and related actions can guide the oil and gas sector toward reducing the negative effects of climate change. Companies should be required to report their greenhouse gas emissions periodically and publish them publicly. Mandating environmental certifications, including ISO, EMAS, and other standards that emphasize reducing environmental and climate change impacts, is also important.

Another legal strategy to mitigate climate change impacts is the implementation of carbon taxes or the creation of carbon trading systems. In this regard, many countries have imposed taxes on carbon dioxide emissions to reduce pollution. These taxes provide companies with an incentive to reduce greenhouse gas emissions. Carbon trading systems (Cap-and-trade): In these systems, governments set limits on the amount of greenhouse gases that can be emitted and issue emission permits to companies. Companies with lower emissions can sell their permits to others. Legal support for innovations and clean technologies in the oil and gas industry can help reduce climate impacts. Support for CCS technologies (Carbon Capture and Storage) allows oil and gas companies to collect and store CO_2 emissions underground. Governments can also create supportive laws for integrating renewable energy into oil and gas production processes. For example, using solar or wind energy in oil refining operations. Finally, it must be stated that reducing the impacts of climate change on the oil and gas industry requires coordination between national and international policies, technological innovations, and the enforcement of strict environmental regulations. On the other hand, given the global dependence on fossil fuel resources, this process must be designed in a way that ensures global energy security while simultaneously mitigating climate impacts.

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