

# SUSTAINABLE TRANSFORMATION OF THE UNITED ARAB EMIRATES OIL AND GAS SECTOR

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## Summary

The global economy is facing a paradigm shift owing to the increasing issues of sustainability. The oil and gas sector is at the centre of this change as it produces a significant amount of carbon emissions through burning of fossil fuels. As a large producer of oil and gas, UAE must act accordingly, to ensure sustainability in its oil explorations activities. This will ensure the surface temperatures are kept below 2°C as championed by Paris Agreement, COP28, and national sustainability targets. This research aims to critically review the sustainable transformation of the United Arab Emirates oil and gas sector by exploring the issues, strategies, challenges and barriers in the implementation of sustainability measures. This will also involve the appraisal of the status of nationally set targets to promote environmental, social and economic sustainability of the energy sector in UAE. This research will follow both the qualitative and quantitative analysis of data. Data will be obtained by conducting a systematic review of literature to complement the secondary data sources

**Keywords:** Sustainability, UAE oil and gas sector, climate change, GHG emissions

**Track:** Sustainability

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## **Chapter 1: Introduction and background study**

### **1.1. Background and Justification**

The global economy is being revolutionized through innovations and companies are now striving to adopt sustainability in their operations (Hák et al., 2016). With the wide adoption of renewable technologies to generate energy and power, the gas and oil sector has to adopt sustainability to keep up with the competition (Köksal et al., 2017). The global sustainable development goals stipulate the need to preserve the natural environment, reduce carbon emissions and adopt measures to combat climate change (Okeke, 2021). In line with these goals, the global sectors are required to acquire innovative ways that will enhance a sustainable culture. The general public and workers are more enlightened on sustainability and organisations are under pressure to mitigate social and environmental impacts of the projects (Kannegiesser and Günther, 2014).

Due to the dominance of petroleum and crude oil, gas and oil sector has been widely adopted as the major resource in the global economy. However, its wide adoption has raised a lot of global concerns about carbon emissions and other economic and social sustainability issues. To achieve the competitive approach in the contemporary global market, the industry is required to integrate economy and environment domains of their business with sustainability (Köksal et al., 2017). Extensive exploration of oil and gas has also increased risks of degradation of the environment and depletion of natural resources. The UAE has indicated a move towards sustainability in the oil and gas sector when it first join the Paris climate agreement in 2015 and declared its sustainability targets of net zero carbon emissions by 2050. As a measure to reduce emissions in the oil industry, the country has since reduced the burning of hydrocarbons in oil extraction, reducing methane emissions and capturing global warming carbon emissions (Ansari, 2022).

Oil and gas industry makes about 33 percent of the total GDP in UAE and 13 percent of its total exports. The country produces approximately 3.2 million barrels of Petroleum and liquid daily and ranks among the top 10 oil producers globally (Krzymowski, 2020). Also, 96 percent of the country's oil reserves are located in Abu Dhabi, which holds about 100 billion barrels and ranks 6<sup>th</sup> globally. Therefore, oil and gas remains a critical sector of the UAE's economy and sustainability becomes a major area of focus. The aspect of sustainability aims to cover the extraction process, the supply chain, and the use of oil and gas products (Krzymowski, 2020).

Per capita, UAE is one of the highest energy consumers in the world. At the wake of these statistics, the company faces environment pollution owing to the unprecedented population growth and high economic growth (Gandhi et al., 2022). The rapid economic growth in UAE has posed significant environmental challenges which are majorly propagated by a high demand of energy. High energy demands increases the exploitation of oil and gas mines which thus cause greenhouse gas emissions if the processes are not sustainable (Sgouridis et al., 2013). The Country's water, carbon and energy footprints are among the highest globally due to the hot and dry climate that increases energy demand and high importation of goods. Air pollution has been a challenge for the environmental authorities in UAE which is majorly attributed to human activities and combustion of fossil fuels that produce oil and gas. The country is also affected by desertification, drought and degradation which hinders the measures that accord for sustainable developments (AlNuaimi et al., 2020). Desertification and drought coupled with carbon gas emissions from fossil fuels creates sustainability challenges that can be difficult to combat. To mitigate these issues, UAE developed National strategy to combat desertification in 2014 that was aligned alongside the global efforts to fight desertification (Ansari, 2022).

These challenges thus hinder UAE in achieving great success and Sustainability in the oil and gas industry. While large scale extraction of oil and gas in the country has generated large income and boosted the national GDP, countries should remain wary of the dangers caused by unmanaged oil and gas excavation (AlNuaimi et al., 2020). Compared to other sectors, oil and gas caused high environmental effect and destruction of human life. Oil and gas drilling entail extraction of high amounts of methane which has a higher global warming capacity compared to carbon (Jayaraman et al., 2015). There are also cases of spillages which accounts for considerate deaths of aquatic and marine habitats. With these issues in mind, there has been an increasing need for sustainability in the industry (Anis & Siddiqui, 2015). This research thus outlines the sustainability approaches that the UAE oil and gas industry has taken to ensure that the practises of oil and gas drilling are sustainable socially, environmentally and economically (Shahbaz et al., 2014).

There has been an increase in the cost of oil and gas in the UAE since 2022. Before that, the country has enjoyed fuel deregulation for 7 years which has kept the cost of fuel low (Shahbaz et al., 2014). Since the fuel prices in UAE are now affected by the market prices, the rising cost of crude oils globally is likely to increase the cost of oil and gas in the country (Soto & Haouas,

2012) Therefore, the rising cost of fuels in UAE evokes the aspect of economic sustainability if consumers struggle to keep up with the cost of fuels. The major threat however, is the rising campaign towards renewable energy which aims to reduce the dependence on fossil fuels. The UAE oil and gas industry has no option but to device better strategies of sustainability to survive in the industry.

## **1.2. Research methodology**

This research will follow both a qualitative analysis and a quantitative analysis. Data will be analysed through a qualitative method which entails the adoption of non- numerical data to evaluate the sustainable strategies in the UAE oil and gas industry. The process will involve gathering data by conducting a systematic review of literature to complement the secondary data sources. In obtaining the secondary data, the research will follow a qualitative analysis to determine an overview of the sustainability report of strategies that have been adopted in the oil and gas industry.

Also, the research will utilize quantitative analysis to determine the association of dependent variables such as industry strategies and the independent variables such as sustainability. The methodology will be achieved by posing questions to the sustainability strategies being conducted currently in UAE oil and gas industry. This method is aimed at acquiring information that has not been documented in the recent studies

The data adopted in this research will be sourced from systematic review of literature from both peer reviewed and non-peer reviewed publications. This will give both qualitative and quantitative data that will aid in discussion and drawing conclusions. The articles and publications to be reviewed will be obtained from sources such as google scholar and researchgate. The articles will then be filtered to obtain articles that were published between 2015 to date on sustainability of oil and gas sector.

## **Chapter 2: A critical review of literature**

### **2.1. Introduction**

This section explores the study of literature obtained from past studies regarding the oil and gas sector in Qatar. A review of literature is critical in building a strong rationale for the research and exploring the gap identified previously. From here, secondary data which is needed for discussion and drawing conclusions will be obtained. The literature review introduces the aspect of global sustainability, the sustainability of the UAE oil and gas sector and the challenges faced by the sector in sustainable development.

### **2.2. Sustainable development**

According to World Commission on Environment and Development (1987), sustainable development implies meeting the demands of the present without compromising the needs of the future generations. The goal of sustainable development is to ensure that practises are economically viable, environmentally friendly, and socially responsible. This serves to create a harmonious living environment, prosperity and well-being for all.

In environmental sustainability, people are required to preserve natural resources, reduce pollution, and mitigate climate change in their developments. This requires transitioning to low-carbon energy source by improving resource efficiency, and adopting sustainable land use practices. The nations are mandated to conserve biodiversity, protect ecosystems, and mitigate environmental risks in order to safeguard the natural ecosystems and protect future generations (Sutton, 2004).

Economic sustainability entails the adoption of practices that focuses on innovation, diversification, and inclusive growth. This encompasses a paradigm shift from non-renewable sources of energy to the renewable sources which fosters sustainable tourism, spearhead knowledge-based industries, and build a dynamic and resilient economy for all (Spangenberg, 2005).

Social development constitutes the practises such as social justice, Inclusion, and equity to create a socially responsible society. Social sustainability ensures access to education, healthcare, and basic services for all citizens, regardless of background or socioeconomic status. To build resilience and cohesive societies, nations should device initiatives to empower marginalized groups and vulnerable groups, promote gender equality, and protect human rights (Vallance et al., 2011).

### **2.3. UN Sustainable development goals (SDGs)**

In 2015, the UN member states formulated the 2030 agenda for sustainable development which entailed a shared footprint for peace and prosperity among the member states. The summit gave rise to 17 goals that were to be focused upon by the member states. The major goals touching on manufacturing and production are; climate action, responsible consumption and production, affordable and clean energy, and sustainable cities and communities (Weiland et al., 2016).

The SDGs represent a comprehensive framework that integrates economic, social, and environmental dimensions of development, aiming for a more holistic approach to sustainable development (Sachs, 2015).

At the heart of UN sustainable development goals (SDGs), lies climate action which can cause far reaching consequences with implications on humans and the ecosystem if not mitigated. This particular intervention aims to mobilize urgent and ambitious efforts to mitigate greenhouse gas emissions, adapt to climate impacts, and build resilience to climate-related hazards. According to CHANGE (2007) climate action seeks to transition towards renewable energy which helps in the reduction of carbon emissions.

As a signatory of these provisions, countries that largely explore oil and gas are required to find more sustainable ways of obtaining energy while keeping the carbon footprint at bay. According to Lyon (2018) countries can mitigate effects of climate change and transition to a more sustainable future by investing in low-carbon technologies, setting emission reduction targets, and implementing climate policies as stipulated by UNFCCC.

Affordable and clean energy is also at the core of sustainable development. This SDG aims to foster access to reliable and sustainable energy sources while advancing energy efficiency and renewable energy deployment. Transition from fossil fuels to renewable energy, countries will be able to mitigate climate change while offering long-term clean energy solutions.

However, transition to clean energy requires collaboration among member states in incentivizing investment in renewable energy projects, removing policy and regulatory barriers, and promoting energy access and affordability (UNEP, 2022). Furthermore, countries that still majorly depend on fossil fuels should be supported to ensure a smooth transition to renewable energy without causing economic deprivations.

### **2.4. COP28 and UAE**

The 28 conference of parties (COP28) is a pivotal event within the United Nations Framework Convention on Climate Change (UNFCCC) process. It has been established alongside other

sustainability landmarks such as Paris Agreement (PA) which was adopted in 2015 during the COP21. This alongside other global frameworks seeks to address climate change and advance global efforts towards sustainability and environmental resilience.

COP28 provides an initiative in which countries within the 28 Nations can appraise the sustainability targets within the PA framework. One of the key targets is to keep the surface temperatures below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit it to 1.5 degrees Celsius (Romanello et al., 2018). In line with this agenda, member states are required to align their Nationally Determined Contributions (NDCs) with the provisions of the global sustainability goals.

As a hosting nation of COP28, UAE plays a vital role in ensuring global energy transition, climate action and sustainable transition. Despite being one of the largest producers of fossil fuels, the country expressed its commitment to diversify the existing energy sources and transition to a clean and sustainable energy (Nevitt, 2023).

The country is inculcating a culture of innovation in the renewable energy sector by investing in research and development. For instance, Dubai Electricity and Water Authority's Research and Development Centre are working on innovative technologies in areas such as solar power, energy storage, and smart grids. This alongside commitments on NDCs expedites their transition towards a sustainable oil and gas sector.

## **2.5. Sustainability in the UAE's oil and gas sector**

UAE has an ambitious renewable energy target that aims to generate 50 percent of its electricity from renewable energy sources by 2050. This will enhance the status of the country as a global leader through diversified economy and reduced dependence on non-renewable energy sources such as fossil fuels (Sgouridis et al., 2013).

Consequently, UAE has delved into generation of electricity from sources such as solar and wind for instance Mohammed bin Rashid Al Maktoum Solar Park in Dubai, which will have a capacity of 5,000 MW by 2030. This will diversify the energy sources with a clean and sustainable alternative.

The country is also committed towards climate mitigation and adaptation while also seeking to foster International Corporation and support. As a result, it has taken steps to reduce its greenhouse gas emissions and adapt to the impacts of a changing climate. Investments in carbon capture and storage program, energy efficiency measures, and in climate-resilient infrastructure has enabled the country meet its commitment under PA (Santos et al., 2022).

UAE is also internationally committed through participating in global forums such as United Nation Framework Conventions on Climate Change (UNFCCC). The involvement in these global forums ensures the country's commitment and cooperation in the fight against climate change and spearheads the implementation of clean energy solutions. Alongside these commitments to international forums, UAE has national goals aimed at achieving both short-term and long-term goals of sustainability.

### ***2.5.1. UAE Green Agenda 2015-2030***

The government of UAE created the Green Agenda in 2015 to promote sustainable development by ensuring the economy is environmentally friendly. The main objectives of the agenda include the adoption of green life and sustainable use of resources, while fostering green energy and sustainable use of resources.

The agenda has initiatives to reduce carbon emissions, increase renewable energy capacity, and enhance environmental protection measures. Consequently, the country aims to reduce the country's emissions to less than 100kilowatt-hour as part of its long-term strategy (Umar et al., 2020).

### ***2.5.2. National Climate Change Plan of the UAE 2017–2050***

This is a comprehensive framework to combat the address the causes of climate change, transition into a climate resilient green economy and achieve an improved quality of life. As the population and economy of UAE grows, there is a projected increase in greenhouse gas (GHG) emissions. This action plan aims to mitigate the emissions.

The action plan also aims to improve the adaptation to climate change through protecting the people, infrastructure, economy and ecosystems from climate-related impacts. UAE's oil and gas sector are central to the realization of these objectives. By implementing carbon capture and storage, energy efficiency improvements, and investments in renewable energy, the sector ensures a climate resilient economy (Holmbukt, 2021).

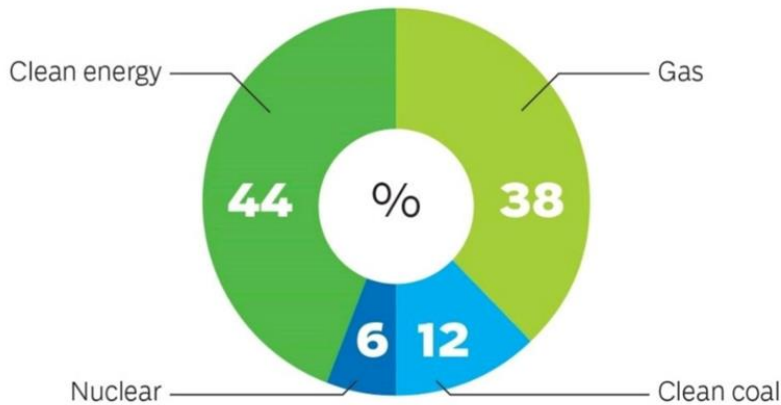
### ***2.5.3. UAE Energy strategy 2050***

The energy strategy entails long-term vision that outlines the country's goals and targets for transitioning towards a sustainable energy future. These strategies target an energy mix clean renewable and nuclear energy sources to meet the country's economic and environmental targets. These action plan entails a move to generate 44 percent clean energy, 38 percent gas and 12 percent clean coal (UAE Embassy, 2024).

*Figure 1: UAE 2050 energy goals*



### **UAE 2050 energy goals**



Source: (UAE Embassy, 2024)

The country reviewed its National Energy Strategy (NES) in 2023 and came up with new objectives to triple renewable energy capacity to 14 GW by 2030, create 50,000 new green jobs by 2030, increase clean energy percentage to 30 percent by 2031, and to become carbon neutral by 2050.

On a long-term perspective, the strategy aims at increasing the share of clean energy sources to 50% of the nation's total energy mix by 2050, achieve 40 percent improvement in energy efficiency, and to reduce the carbon footprint by 70% by 2050 in its energy sector. This will contribute to global efforts to limit global warming and transition to a low-carbon and energy efficiency economy (UAE Embassy, 2024)

### **2.6. Sustainability in UAE oil and gas sector**

UAE is largely an arid area with vast valleys mountains and desert sand dunes(LTS REF). With a relatively low annual rainfall compared to other regions the region is at risk of adverse effects of climate change. The population is expected to increase to about 20 percent by 2050 while the economy is projected to increase by 90 percent compared to the 2022 values (UAE Gov, 2023).

The oil and gas sector has been one of the highest contributors to the counties GDP. With the booming economy and the rapidly growing population, there is a growing demand in the oil and gas sector to power the economy. Unsustainable large-scale exploration of oil and gas increase GHG emissions which poses risks of adverse climate change effects (Nadig, 2023). Therefore, the country realized the need for sustainable explorations, reduced dependence on fossil fuels and diversified their energy sources to meet both the national and international sustainability targets.

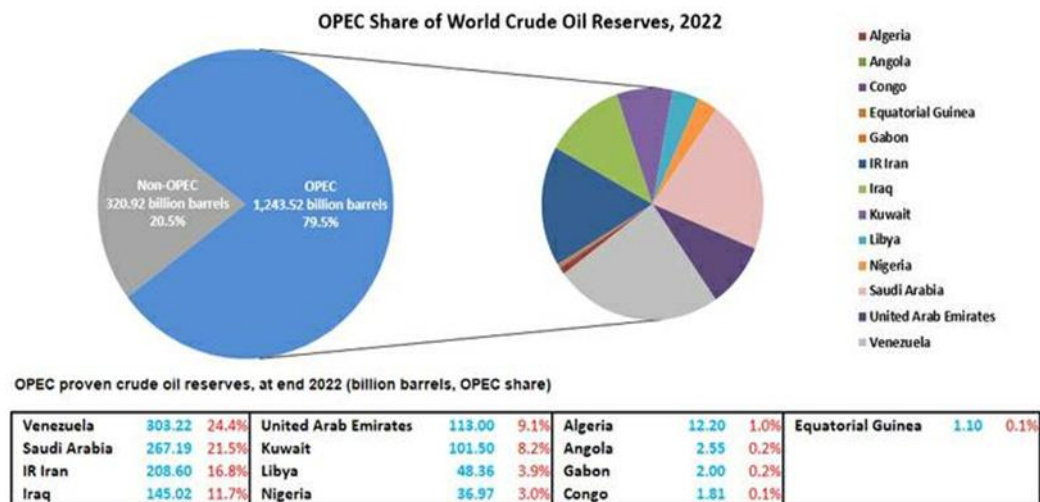
In line with these issues, UAE joined global sustainability frameworks such as COP28, Paris Agreement, and adopted the UN sustainable development goals to adapt and mitigate against climate change effects. Nationally, the country formed the UAE green agenda 2015-2030, National Climate Change Plan of the UAE 2017–2050, and UAE national strategy 2050 to foster sustainable, green and energy efficiency economy.

## 2.7. UAE oil and gas production

The UAE is among the 10 largest oil and gas producers in the world. The production amounts to about 3.2 million barrels daily in which about 96 percent of the reserves are located in Abu Dhabi. The Abu Dhabi National oil company (ADNOC) is among the top oil producers as they regulate the large oil and gas reserves in Abu Dhabi (Sgouridis et al., 2013).

The oil and gas reserves are estimated at about 215 trillion cubic feet. In the recent years, the county announced the discovery of more than 80 trillion cubic feet at Jebel Ali. Furthermore, ADNOC also announced the discovery of additional natural gas offshore. In 2022, the organization of petroleum exporting countries (OPEC) ranked the countries according to the reserves they hold. UAE was ranked 5<sup>th</sup> with 9.1 percent of the total OPEC reserves behind Venezuela, Saudi Arabia, Iraq and Iran as shown below (OPEC, 2022).

Figure 2: OPEC share of World crude oil reserves



Source: OPEC (2022)

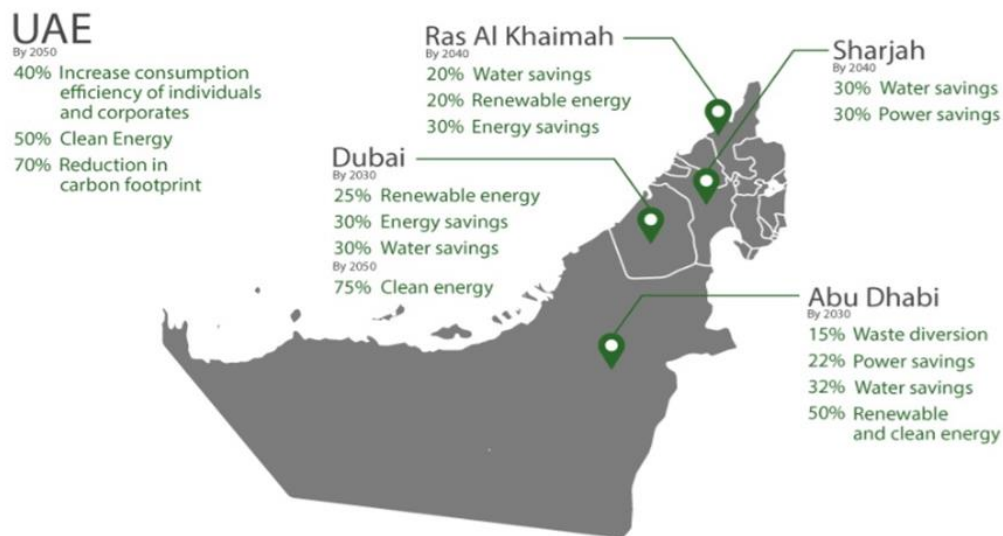
## 2.8. Sustainability strategies of UAE oil and gas sector

UAE was the first Arab states to set net zero targets to address the challenges majorly witnessed in the oil and gas sector. Also, Abu Dhabi devised low-carbon solutions to advance towards clean and efficient energy economy.

For instance, it has incorporated carbon capture and storage (CCS) initiatives in collaboration with international partners to capture and store carbon dioxide from industrial facilities. These strategies are aimed towards reducing the sectors carbon footprint and mitigating climate change.

The country has also diversified its energy sources through integrating renewable energy sources such as solar and wind power into the oil and gas sector. By 2050, UAE strives to increase consumption efficiency of individual and corporate by 40 percent, generate 50 percent of clean energy, and reduce carbon footprint by 40 percent as shown in the figure below (UAE Gov5, 2023).

Figure 3: UAE initiative map



Source: UAE Gov (2023)

Also, the industry is investing in renewable energy technologies in its oil explorations such as solar-powered oilfield facilities and offshore wind energy projects.

The government of UAE has also promoted the move towards energy efficiency by providing soft loans for clean energy projects in 70 countries worldwide while also investing about \$16.8 billion in renewable energy ventures (UAE Gov (2023)). Alongside these interventions, the country is also investing in low-carbon hydrogens to demonstrate the potential for green hydrogen in the region. These low carbon hubs include TA'ZIZ - Ruwais chemical hub and the

Masdar demonstration plant. Furthermore, UAE's hydrogen hub strives to build low-carbon hydrogen production facilities.

The Abu Dhabi National Oil Company (ADNOC Group) has affirmed its dedication to achieve net-zero objectives, committing to invest \$15 billion in efforts to decarbonize its operations. The company's targets include a 25% reduction in greenhouse gas (GHG) intensity by 2030, limiting freshwater usage to less than 0.5% of total water consumption, and attaining an In-Country Value of 50% throughout its entire value chain (Nevitt, 2023).

The country has also invested in advanced technologies such as digitalization, automation, and artificial intelligence to optimize production processes and enhance resource utilization in the industry (Umar et al., 2020). This strategy involves collaboration with partners in incorporating technologies that promote sustainable energy development

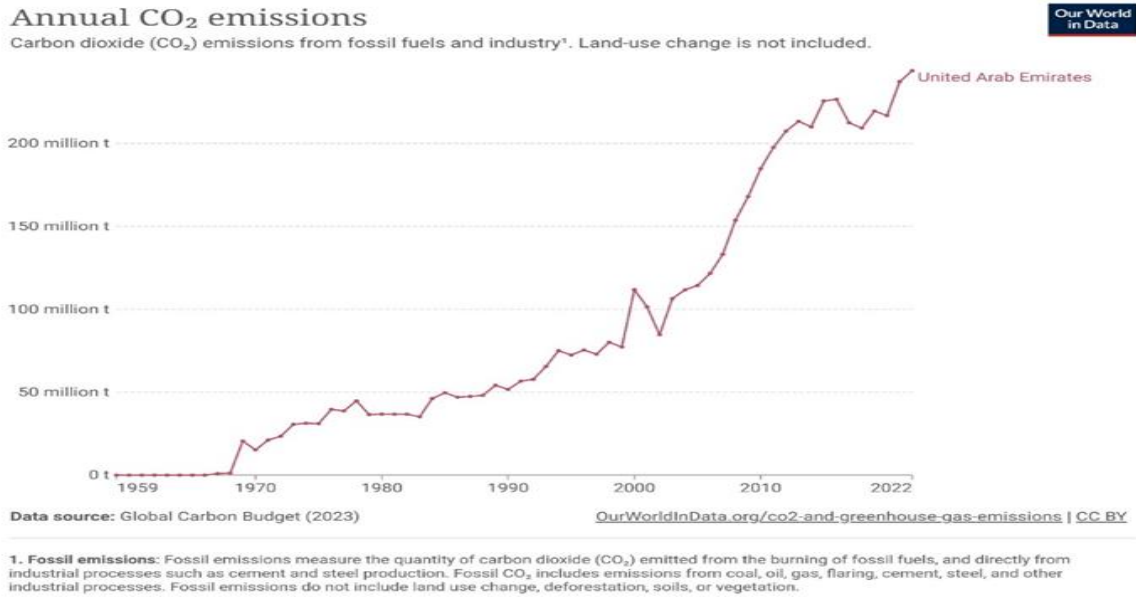
## **2.9. Sustainability challenges faced by UAE oil and gas sector**

Combustion of fossil fuels in the production of oil and gas result in methane gas which poses negative environmental effects. Global methane gas production is estimated at 570 million Mt in which 40 percent is produced through natural sources while 60 percent results from anthropogenic sources.

About 43 percent of the global methane emissions results from just 30 fossil fuel companies (Romanello et al., 2023). This indicates that the major oil producers in which UAE is part should adapt to sustainable energies to promote sustainability.

More than 90 percent of the total GHG emissions in the UAE is generated in the oil and gas sector. The rising population created a high demand in the sector which translates to an increase in GHG emissions. The figure below shows the annual GHG emissions from fossil fuels from 1959 to 2022. Despite the aforementioned measures to ensure suitable explorations of oil and gas, the contributions of the industry are still high (Ritchie and Roser, 2022).

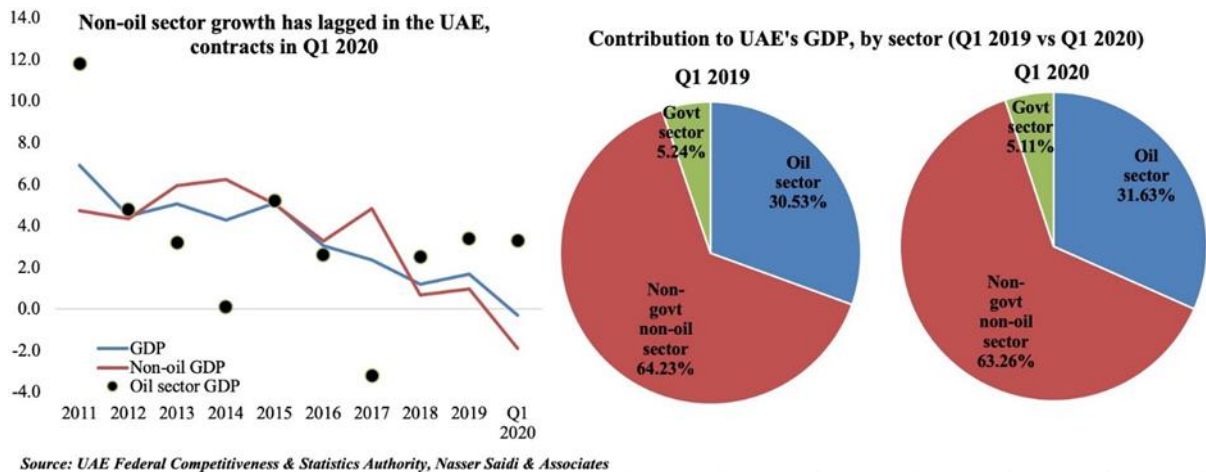
*Figure 4: UAE annual CO<sub>2</sub> emissions*



Source: Ritchie and Roser (2022)

To meet the growing demand for energy needed to run the economy, there have been continued explorations of new oil and gas mines hence resulting in increased emissions.

Oil and gas sector plays a vital role in sustaining the economy of the UAE. The country has built wealth and economic stability as a result of this sector which contributes about 30 percent of the total national GDP going by the 2020/21 statistics seen below (Saidia, 2020).



Source: Saidia (2020)

Calling for total phase-out of the oil and gas sector will deprive the country of its major contributor to the economy. While environmental sustainability is a growing global concern, countries should transition without crippling their economy given more finances are required to support cleaner development paths. More countries are calling for total phase-off of fossils and fuels to hold global warming to 1.5°C (Weiland et al., 2021). Going into future summits UAE still remains at crossroads in transitioning away from fossil fuels in energy systems.

## Conclusion

The increasing explorations of oil and gas continue to pose sustainability issues whose effects are felt globally. Countries like UAE that depend majorly on this sector for GDP, have devised ways of ensuring the sector remains socially responsible, environmentally sound, and economically viable. The nationally set targets and global strategies are all aimed at ensuring sustainability in oil and gas sector. The economic sustainability of the oil and gas sector in UAE and OPEC countries overall have been at stake. This has majorly been propagated by the increasing cost of crude oil and petroleum products since 2022. With the end of 7 year fuel deregulation that saw the fuel prices capped lower, the market is now volatile and its pricing is dependent on the global market. Therefore, UAE will face high fuel prices in the coming years which poses a threat to the oil and gas sector. Consequently, the industry is needed to develop more sustainable alternatives of energy such as venturing in renewable energy technologies.

The need to create a harmonious living environment and well-being requires that sectors and industries conserve biodiversity, protect ecosystems, and mitigate environmental risks. As one of the countries covered in the UN Sustainability goals, UAE and any other oil and gas producing country is required to accord for climate action, responsible consumption and production, affordable and clean energy, and sustainable cities and communities. The sustainability agenda in the UAE is also propagated by COP 28 which is central to UAE's sustainability goals. The country has expressed its commitment to diversify the existing energy sources and transition to a clean and sustainable energy.

This paper has explored background information and theoretical literature on the sustainability issues in the oil and gas sector. The information is crucial in the realization of the study objectives. The literature identified that UAE has made strides in ensuring sustainability of the oil and gas sector. The country has committed towards climate mitigation and adaptation through national strategies such as; Green agenda, National climate change plan and energy strategy. These national goals ensures the oil explorations are in line with international strategies such as Paris Agreement and UN Sustainability goals. From these sustainability targets UAE are keen to increase consumption efficiency of individual and corporate by 40 percent, generate 50 percent of clean energy, and reduce carbon footprint by 40 percent. However, UAE still faces sustainability issues in the oil and gas sector since it accounts for a significant amount of total GHG emissions. While there is pressure for the sector to completely

transition to renewable energies, total phase off may not be an option as this will deprive the country of its major source of income.

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