Department of Political Science

Master's Degree in International Relations

Track of Diplomacy

A comparative analysis of the energy-based development policies of two oil-rich countries: Saudi Arabia and Norway's race towards sustainable economic growth and environmental preservation.

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O.Introduction

i. Historical background

During the 19th and early 20th centuries, energy-based development policies concentrated on the use and acquisition of fossil fuels, specifically coal and later on oil. These policies aimed to obtain access to these resources and encourage their extraction and consumption to propel industrialization, infrastructure development, and economic expansion. Following World War II, many countries established national energy strategies to ensure energy security and meet surging energy demands. This era saw the inception of state-owned energy firms, nationalization of energy resources, and the development of vast energy infrastructure to support economic growth. The 1970s marked a significant shift in energy policies, with the oil price shocks and ensuing energy crises. These incidents exposed the vulnerability of nations that heavily relied on imported oil and triggered a move towards energy diversification and conservation. The policies focused on decreasing dependence on oil, promoting energy efficiency, and exploring alternative energy sources. In the late 20th century, concerns about climate change, environmental degradation, and the finite nature of fossil fuels led to a heightened attention on renewable energy sources. Numerous countries have taken steps to incentivize the use of renewable energy technologies, such as solar, wind, hydro, and geothermal power. Policies were put in place to encourage the adoption of these technologies, including feed-in tariffs, tax incentives, and renewable portfolio standards. In recent years, there has been a shift towards promoting sustainability and transitioning to low-carbon and climate-resilient economies. The Kyoto Protocol and the Paris Agreement have influenced policy frameworks and commitments towards reducing greenhouse gas emissions, promoting energy efficiency, and increasing investments in renewable energy. Countries have set targets for renewable energy usage, implemented carbon pricing mechanisms, and adopted energy efficiency standards to drive sustainable development. Advancements in energy technologies, such as improvements in renewable energy generation, energy storage, and smart grid systems, have played a crucial role in shaping energy-based development policies. These policies have supported research and development, innovation, and the integration of emerging technologies into energy systems to enhance efficiency, reliability, and environmental performance. The crucial issues of providing universal access to inexpensive and clean energy, and tackling energy poverty have become more prominent in energy-focused development policies in recent years. Endeavors have been made to provide energy services to populations that have been underprivileged in this area, particularly in developing nations. Rural electrification programs, off-grid renewable energy solutions, and community-based energy projects are some of the initiatives being taken to accomplish this goal.

ii. Aim of the study and research question

However, a closer look reveals that the two case studies have taken divergent paths towards ensuring sustainable development and environment conditions. While the Kingdom of Saudi Arabia implemented a autocratic governance and follows the system to accommodate sustainable development, the Kingdom of Norway established a democratic governance. After being the signatories of the Paris Agreement on Climate change. These initiatives of these countries resulted in a dis-proportionality in terms of sustainable development success. How can one account for these puzzling divergent success rates between two countries with very similar political, economic, ecological conditions? To answer this question, the dissertation will leverage a "most similar cases" comparative research design. Such a design carries explanatory weight by allowing me to hold constant key similarities in the socioeconomic and political context of the two countries while tracing the variation in key explanatory factors which shall account for the countries' divergent outcomes.

The aim of the study is therefore to investigate why two countries with similar structural characteristics end up with very disproportional success rates in accommodating sustainable economy. The dissertation will cover the period ranging from 2016 after the 21st Conference of the Parties (COP21) under the United Nations Framework Convention on Climate Change until the end of last year 2022. The empirical evidence on which the dissertation will rely is based on the combination of various secondary sources such as academics materials, newspaper analysis and reports from international organizations and research institutions reports.

iii.Research design

In order to coherently discuss and answer the research question, the present analysis will be divided in four chapters and it is structured as follows.

In the Chapter 1 the importance of energy resources is outlined, especially in the European and Middle East context . Then, it is presented the energy system of Saudi Arabia and Norway, exploring their energy resources importance on their economy and how diversification is being established in both countries to preserve the environment and accommodate sustainable development.

In the Chapter 2 the logic of case selection is considered. The structural similarities of the two countries from an politico-economic and ecological perspectives are then analyzed. And lastly. The explanations of key concept are provided.

Chapter 3 discusses the theoretical framework and methodology applied to the study. The theory of political systems and governance is used to interpret the different outcome. It is therefore the independent variable. The significance of the research and main objectives of the research are explored. Then, two hypotheses and the period covered by the research are then made explicit.

Chapter 4, also called empirical chapter, is the study of the two cases. In the Saudi Arabian and Norwegian cases, the overview of energy development policies is provided along with analysis of political influences on energy based development policies and finally the assessment of policies outcomes in relation with the economic and environmental sustainability is conducted.
In the conclusion, the findings to which the analysis led will be presented. In particular, the reasons behind the dis-proportionality in achieving sustainable development and recommendations will be discussed, while presenting the limitations of the research and offering new perspectives for future research on the same topic.

Chapter 1: Sustainable development: The role of energy policies

Energy has been a major factor in the rise and fall of nations throughout history.

The reliance on energy sources continued since the Industrial Revolution and has been fundamental for a polity to supporting economic and social progress and build a better quality of life. The introduction of fossil fuels revolutionized the way people lived, worked and traveled. The ability to generate electricity through non-renewable and renewable energy sources, allowing for more efficient production of goods and easing transportation, generating electricity to power the homes and factories. This reliance had far reaching implications, as it allowed for the growth of economies, the development of cities, and a new found mobility of people. The availability of power sources such as coal, oil and natural gas enabled unprecedented levels of efficiency, allowing for greater production and economic growth. Also, it enabled the development of new technologies which have transformed our lives. Automobile engines powered by gasoline allowed for greater mobility, while electricity enabled the development of machines to increase production and efficiency. In addition, the use of oil and natural gas have allowed for the development of global economies, allowing for the import and export of products and services more efficiently. In depth, this chapter broadly provides a wide peek on energy. In details, the structure of this chapter revolves around couple of energy-related sections. Firstly, it explores more profoundly the importance of energy at the regional level, particularly where the countries in question are geolocated. At this stance, the contributive role of the energy sources in the socio-economic context of the regions. Second, it tackles the harmful impacts generates by energy primary sources within the respective regions and finally, goes on with diversified initiatives taken to alleviate the impacts towards a green economy and sustainable environmental conditions through energy transition process. At this end, the examination of the implementation level is questionable.

1.1. The vital role of diversified energy availability (Middle East and Europe Framework)

Energy has become a fundamental pillar in the modern world. Its role is immensely immeasurable energy. The consistent industrial and technological innovations put the world population into the need of sufficient energy to guarantee sustainable and steadfast development of people lives in general. Examples of energy consumption for our daily needs are the operation of household appliances, lighting, transport, heating homes and electronics. So far, Energy carriers are divided into primary energy carriers and secondary energy carriers: the former is naturally generated energy, such as oil, natural gas, coal, and renewable energy, while the latter is energy generated through

primary energy conversion, such as electricity or gasoline. About the main source, there is another important difference. So-called exhaustible or non-renewable resources are coal, oil and natural gas that are mined from the ground and take a long time to regenerate. On the other hand, wind, water and sun are inexhaustible or renewable resources because they are readily available on earth; solar energy, wind power, hydro energy, tidal energy, geothermal energy, biomass energy are production of renewable resources. The abundance of energy resources has been a determinant factor to the world, regions and states economies, politics and environment conditions. The climate change issues shake the entire globe and in particular, countries who cut throat of lots of primary energy resources. They have proved engagement towards the fight against the repercussions through energy transition as a channel to maintain the sustainable environmental conditions and guarantee the consistent economic growth.

a. Middle East

. By the 1950s, the Middle East emerged as one of the world's largest oil producers. As the region entered the modern era, the oil industry began to take on a more prominent role. In the 1950s and 1960s, the Middle East experienced a period of rapid growth in oil production, driven largely by the discovery of new reserves and the development of modern industry infrastructure. The discovery and extraction of oil has drastically impacted the region's economy, environment and global politics. The abundance of oil in the Middle East has enabled countries such as Saudi Arabia, to become major oil-producing nations with significant global influence. The oil industry has also led to the development of modern infrastructure and urbanization in the region. Therefore, as it is renowned for its energy-rich environment, with conventional hydro-carbon energy being the primary source of energy in the region, the region's abundance of oil reserves has made it a major player in the global energy market. In addition to oil, natural gas is also a major contributor to energy production in the Middle East.[1] These energy sources are complemented by renewable sources such as solar, wind and geothermal power, which are becoming increasingly important in the region.[2] The Middle East is also home to some of the world's most advanced energy infrastructure, allowing for efficient and

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[1] Clemens Hoffmann, "*Beyond the resource curse and pipeline conspiracies: Energy as a social relation in the Middle East"*,Energy Research & Social Science,Volume 41,2018,Pages 39-47,ISSN 2214-6296, https://www.sciencedirect.com/science/article/pii/S2214629618303876 Accessed 2023-04-28

[2] Susan Sunila Sharma,"*The relationship between energy and economic growth: Empirical evidence from 66 countries*",Applied Energy,Volume 87, Issue 11, 2010,Pages 3565-3574, ISSN 0306-2619, .https://www.sciencedirect.com/science/article/pii/S0306261910002291 Accessed 2023-04-28

reliable energy supply[3]. As the energy industry continues to develop in the Middle East, its impact on regional economic growth and global energy markets is widely significant. The region has become a major supplier of energy to both the developed and developing world, and it is expected that this trend will continue over the coming years[4]. This will have a direct impact on global energy prices, as well as regional growth and development. Due to increased production of energy sources in the region, energy prices are likely to drop, giving consumers access to more affordable energy. This is potentially opening up new markets in the developing world, allowing countries with limited energy resources to invest in more sustainable sources of energy. Additionally, the abundance of energy in the Middle East is driving global economic growth through increased foreign investment.[5] The effects of the Middle East's energy dynamics on regional growth are expectedly significant. Investment in energy infrastructure and renewable energy sources stimulate economic activity, creating jobs and boosting economic growth. Notably, Britain and China have invested heavily in the region's infrastructure. For instance, China's Belt and Road Initiative (BRI) focused its attention particularly in relation to energy interests.[6] Improved access to energy also provides the region with opportunities to diversify its economy and reduce dependency on oil and natural gas exports. The Governments of the Middle East have recognized the potential for growth in the region and have begun to invest heavily in energy infrastructure. The Middle East has a long history of producing traditional forms of energy such as oil, gas, and coal. However, the recent push by Middle Eastern nations towards renewable energy sources has seen a major shift in the energy dynamics of the region. In the past few years, several countries in the region have made significant investments in renewable energy sources, such as solar and wind power. The impact of this shift towards renewable energy sources is already being seen in the Middle East.[7] Countries like Saudi Arabia and the United Arab Emirates (UAE) have become major players in global renewable energy markets, with their investments and initiatives driving down the cost of renewable energy in the region. This has resulted in an overall decrease in the cost of energy in the Middle East, which has

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[3] Mohamed El Hedi Arouri, Adel Ben Youssef, Hatem M'henni, Christophe Rault,"*Energy consumption, economic growth and CO2 emissions in Middle East and North African countries*", Energy Policy, Volume 45, 2012, Pages 342-349,ISSN 0301-4215,
https://www.sciencedirect.com/science/article/pii/S0301421512001590 Accessed 2023-04-28

[4]Kais Saidi, Sami Hammami,"*The impact of CO2 emissions and economic growth on energy consumption in 58 countries"*,Energy Reports,Volume 1, 2015, Pages 62-70, ISSN 2352-4847,
https://www.sciencedirect.com/science/article/pii/S235248471500013X Accessed 2023-04-28

[5] Ibid

[6] Alterman J., Garver J., "*The Vital Triangle: China, the United States, and the Middle East*", Volume 30, 2008, Center for Strategic and International Studies Washington, D.C, Pages 19-21, ISSN 0736-7136

[7] Paresh Kumar Narayan, Russell Smyth*,"Multivariate granger causality between electricity consumption, exports and GDP: Evidence from a panel of Middle Eastern countries*",Energy Policy,Volume 37, Issue 1,2009, Pages 229-236, ISSN 0301-4215.
Retrieved May 4, 2023, from www.sciencedirect.com/science/article/pii/S0301421508004242

enabled the region's economies to benefit from the savings and use it to spur economic growth. The emergence of renewable energy sources in the Middle East, such as the solar and wind industries, has the potential to increase energy security and reduce dependence on traditional sources. [8]This shift can facilitate the integration of the region into global energy markets, and contribute to the steadfast regional economic growth. With the development of new renewable energy sources, countries in the region are likely to experience significant economic benefits. For example, solar and wind power can be used to reduce the reliance on traditional sources of energy, leading to increased energy security and cost savings. Additionally , the region could increase its exports of electricity and other energy-related products.[9] The potential for growth and development in the Middle East through renewable energy sources is immense. For example, as renewable energy becomes more affordable, countries could shift from fossil fuels to new clean energy sources, leading to improved air quality, increased energy efficiency, and reduced energy costs. This shift could also reduce reliance on existing energy sources, potentially creating economic independence and more equitable access to energy resources.

b. Europe

The Europe is one of the leading regions in terms of energy consumption, as it accounts for 20% of the global energy demand . This indicates the importance of energy in the European economy. The region has faced massive challenges in recent decades due to the declining availability of oil and the rising cost of other energy sources.[10] In addition, the Europe's energy sector is characterized by different types of energy sources and technologies from oil, gas and coal to renewables like wind and solar. The Europe has therefore taken a proactive approach towards ensuring energy security and developing its own energy policy.[11] In the past decade, the Europe (EU) has introduced several initiatives such as the Renewable Energy Directive, the Energy Efficiency Directive and the Energy Performance of Buildings Directive. These measures have seen an increase in the use of renewable energy sources, such as wind and solar, in the EU. The increased use of renewable energy sources is important for the European economy, as it helps to reduce dependence on imported energy sources, which can be expensive and unreliable. It also helps to reduce emissions, which is important for the

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[8] Ibid

[9] Ibid

[10] Mahmood, T.,Ahmad, E. "*The relationship of energy intensity with economic growth: Evidence for European economies*", 3rd World Conference on Technology, Innovation and Entrepreneurship (WOCTINE), Procedia Computer Science 158 (2019), Pages 523-532
https://www.sciencedirect.com/science/article/pii/S2211467X18300051 Accessed 2023-04-29

[11]Ibid

environment, and helps to create jobs in the renewable energy industry. In addition , renewable energy sources can provide energy security when other energy sources are not available. [12] In recent years, the number of jobs in the renewable energy sector has tripled, and investments in the sector have grown significantly. This has been driven by advances in technology, such as the development of cost-effective storage solutions, which have made renewable energy sources more reliable and cost-effectiveThe use of these renewable energy sources has also enabled European countries to become more energy independent, reducing their reliance on imported energy and strengthening their energy security. Additionally, the use of renewable energy sources has allowed the European Union to meet its goal of reducing greenhouse gas emissions by 20 percent in the next decade.[13] Additionally, renewable energy sources helped to reduce emissions of harmful pollutants, thus minimizing the Energy production from conventional sources is mainly observed in countries that joined the EU after 2004.[14] So far, energy is a key factor that drives economic growth in Europe. It provides the electricity or fuel needed to power industry and transportation, heating, and cooling for homes and businesses. The use of energy in Europe is rapidly increasing due to population growth and rising demand from industry. The demand for electricity and natural gas has been growing steadily as people use more and more devices that rely on electricity. In addition, transportation is becoming increasingly dependent on fuel, with many countries in Europe now relying heavily on imported oil for their energy needs.[15] Indeed, the European economy is heavily reliant on energy, and its importance to the region cannot be overstated. It is a necessary part of modern life and a crucial factor in the success of any economy. Without a reliable and affordable supply of energy, businesses would suffer However, the dependence on energy is a major concern for European countries due to its potential impact on economic stability and welfare of the population.[16] The energy intensity can be negatively correlated with economic growth in European economies, and there is a need to improve energy efficiency to ensure sustainable economic growth in Europe. The diversity of energy potential among European countries is well-documented and the

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[12] da Graça Carvalho, Maria, 2012. *"**EU energy and climate change strategy**,"* Energy, Elsevier, vol. 40(1), pages 19-22.

[13] Bluszcz, A.“ *European economies in terms of energy dependence*”. *Qual Quant* **51**, 2017, Pages 1531–1548. **https://rdcu.be/db6UQ**

[14] Musiał, W.; Zioło, M.; Luty, L.; Musiał, K. “*Energy Policy of European Union Member States in the Context of Renewable Energy Sources Development”*. *Energies* **2021**, *14(10):2864*. https://doi.org/10.3390/en14102864

[15] Mahmood, T.,Ahmad, E.,”*The relationship of energy intensity with economic growth:Evidence for European economies”, 3rd World Conference on Technology, Innovation and Entrepreneurship (WOCTINE), Procedia Computer Science 158 (2019), Pages 523-532*
https://www.sciencedirect.com/science/article/pii/S2211467X18300051 Accessed 2023-04-29

[16] Bluszcz, A.“ *European economies in terms of energy dependence*”. *Qual Quant* **51**, 2017, Pages 1531–1548. **https://rdcu.be/db6UQ**

adoption of more efficient techniques and alignment of domestic product mix to changing comparative advantage patterns can bring about productivity growth and per capita output growth. Therefore, energy is a significant factor that plays a crucial role in economic processes, political stability, social welfare, and environmental sustainability in European countries.[17]. This shows that the vitality of energy in the European economy is not a new phenomena. Despite the improvements in efficiency, aggregate energy consumption has been increasing due to the growth of the European economy. The reliance on energy has a significant impact on the European economy, with the cost of energy constituting a significant part of the expenditure of many businesses. As the cost of energy rises, businesses are forced to make adjustments to their operations in order to remain competitive. This could include relocating production to areas with cheaper energy costs or investing in more efficient technologies. Another factor that affects the European economy is the availability of energy. The European Union is heavily reliant on imported energy, and any disruption in supply or rise in price can have significant effects. This is particularly concerning for countries that are dependent on a single source of energy, as they are more vulnerable to external shocks[18].

1.2. Environmental Impact of Conventional Energy Sources

The Middle East region has been known for its vast oil and gas reserves, which have been the primary conventional energy sources for decades. However, the region is also known for its arid climate and limited freshwater resources. To meet the demand for freshwater, multi-stage flash (MSF) desalination units operating on seawater are commonly used in the Arabian Gulf countries and North Africa, where seawater is abundant but freshwater is scarce. The MSF process is considered the workhorse of the desalination industry due to its proven reliability and flexibility over almost 50 years of plant design and operation.[19] Furthermore, Conventional energy sources are associated with various environmental concerns such as air pollution, acid precipitation, ozone depletion, forest destruction, and emission of radioactive substances. For instance, the burning of fossil fuels, such as coal and petroleum, contributes to global warming, carbon dioxide and other

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[17] Gheorghe H. Popescu, Mihai Mieila, Elvira Nica, Jean Vasile Andrei, "*The emergence of the effects and determinants of the energy paradigm changes on European Union economy*",Renewable and Sustainable Energy Reviews,Volume 81, Part 1,2018,Pages 768-774,ISSN 1364-0321, https://www.sciencedirect.com/science/article/pii/S1364032117311899

[18]Samuel Thomas, Jan Rosenow, "*Drivers of increasing energy consumption in Europe and policy implications*", Energy Policy, Volume 137, 2020, 111108,ISSN 0301- 424215, https://www.sciencedirect.com/science/article/abs/pii/S0301421519306950

[19] Negewo, B. "*Renewable energy desalination: an emerging solution to close the water gap in the Middle East and North Africa*", World Bank Publications, 2012, pages 23-31.

greenhouse gases released by these sources trap heat in the atmosphere and cause the earth's temperature to rise and this has caused a wide range of climate-related issues, including an increase in extreme weather events and sea level rise in the Middle East, rapid desertification which has resulted in dust storms, water shortages, and other environmental problems.[20] The environmental impact of conventional energy sources in the Middle East extends far beyond climate change. The production and use of oil and natural gas has caused extensive problems, a factor which has had a serious effect on the region's health and economy. In addition, the burning of fossil fuels also led to acid rain, which has damaged crops and ecosystems in the area. The health of the population living in the Middle East is particularly at risk from these pollutants, as studies have shown that there is an increased risk of respiratory diseases, cancer, and other illnesses related to air pollution.[21] Also, local water sources are often contaminated by the discharge of industrial pollutants and the chemicals used in oil and gas production. The negative environmental impacts of conventional energy sources are not limited, killing off fish and other wildlife who are being faded.[22] This situation is only likely to worsen in the coming years unless urgent action is taken. Governments in the region must look to alternatives to conventional energy sources, such as renewable energy sources, in order to reduce their dependence on fossil fuels and protect the environment because oil spills, natural gas leaks, and other accidents associated with oil and gas production certainly have long-term environmental impacts that can last for centuries. For example, a large oil spill in the Persian Gulf in 1991 destroyed the habitats of local species and caused lasting disruptions to the marine ecosystem.[23] The after-effects of this disaster are still felt to this day. Therefore, there is still an inverse relationship between energy efficiency and carbon emissions, which highlights the importance of implementing energy-efficient technologies, and reducing carbon emissions through greater use of renewable energy sources. As the world's major oil companies in the region widen their focus to include solar energy resource development to consider the seasonal effects and environmental effects of energy production in order to minimize environmental impacts, there is a long trajectory to go. One way currently in use in the region is to approach this phenomenon by considering co-impacts when analysing technology transition scenarios to avoid tension between climate change and air quality policies.[24] Unfortunately, all

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[20] Ibrahim Dincer, "*Environmental impacts of energy*", Energy Policy, Volume 27, Issue 14, 1999, Pages 845-854, ISSN 0301-4215, https://www.sciencedirect.com/science/article/abs/pii/S0301421599000683

[21] Ibid

[22] Ibid

[23] C. Temizel *Et Al.* , "*Technical and Economical Aspects of Use of Solar Energy in Oil Gas Industry in the Middle East*," SPE International Heavy Oil Conference and Exhibition , 2018

[24] Nakhwa, A.D., Huggins, K and Sweatman, R, "*New Technologies in fracturing for shale and gas wells are addressing environmental issues*" SPE International, SPE 164270,2013: 1-9

these alternatives need the implications of natural sustainable environment to successfully respond and it has been destroyed in all its forms. People hugely spend their savings for long-term treatment and this is holding down the households' financial means, which would be invested or contribute for consistent growth of living standards. Certainly, the request of a sustainable environment is hurting the political landscape of the region as the basic needs for human beings are hardly acquired.

On other hand, particularly in Europe, the generation of energy from conventional sources is a major contributor to the negative environmental effects on the European economy and the consumption of energy.[25]The environmental impacts of generating electricity from conventional sources, such as coal and natural gas, have been well documented. A study on the environmental impacts of generating electricity from photovoltaic systems in Europe has shown that damage to ecosystem quality.[26] The reports have concluded that the environmental impacts of conventional energy sources are significant. The burning of fossil fuels produces significant amounts of carbon dioxide, causing global warming, the acidification of oceans, and the destruction of habitats. In addition, the extraction and use of fossil fuels are leading to water pollution, land degradation, and air pollution.[27] This has severe consequences for public health, especially for those who live in close proximity to power plants or other sources of pollution. In addition, coal mining and oil drilling are like contaminating nearby water sources with toxic chemicals and heavy metals, posing a threat to aquatic ecosystems and human health. Moreover, conventional energy production has negative impacts on soil quality. These impacts can be particularly severe where many conventional energy sources are concentrated near densely populated areas.[28] The health risks are just the beginning of the problems associated with conventional energy sources in Europe. The emissions produced by burning fossil fuels have a devastating effect on the environment, contributing to global warming and climate change. Ice caps are melting, weather patterns are shifting, and sea levels are rising at an alarming rate. As the effects of climate change become more and more apparent, it is clear that Europe needs to look into alternate forms of energy that are more sustainable. The reality of the situation is that the use of conventional energy sources in Europe has had a major impact on air quality in the region. The extraction of fossil fuels also generates air

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[25]Umberto Desideri, Stefania Proietti, Francesco Zepparelli, Paolo Sdringola, Silvia Bini, "*Life Cycle Assessment of a ground-mounted 1778kWp photovoltaic plant and comparison with traditional energy production systems*", Applied Energy, Volume 97, 2012, Pages 930-943, ISSN 0306-2619, https://www.sciencedirect.com/science/article/abs/pii/S030626191200061X

[26] Ibid

[27] António Cardoso Marques, José Alberto Fuinhas, "*Drivers promoting renewable energy: A dynamic panel approach*",Renewable and Sustainable Energy Reviews,Volume 15, Issue 3, 2011, Pages 1601-1608, ISSN 1364-0321 https://www.sciencedirect.com/science/article/abs/pii/S136403211000417X

[28] Ibid

pollutants such as particulate matter and nitrogen oxides, which can have serious health implications. For example, the burning of fossil fuels releases airborne emissions, including carbon dioxide, which contributes to global climate change In addition to these negative impacts, conventional energy production can also raise the levels of harmful radiation[29]. This has serious health implications, particularly for workers in the nuclear industry and those living near nuclear power plants. Overall, the negative consequences of conventional energy production on air, water, and soil in Europe highlight the urgent need to transition to cleaner and more sustainable forms of energy production. Finally, the influence of conventional energy production on CO2 emission is a major concern that harms the environment. Several studies have explored the effects of energy usage on CO2 emissions in Europe and have found that it has a significant impact on the environment-energy-growth relationship[30]. Agricultural environments in Europe are also critical to environmental conservation. For instance, in northern Europe, the switch from traditional winter rye to maize cultivation has had a significant impact on the environment.[31] The CO2 emission in Europe is an issue to be dealt with immediately in order to create a more sustainable environmental conditions for all living beings in general. The current energy and environmental problem in Europe is pressing.

1.3. Transition Energy

A.The key to sustainable economic growth and environmental preservation in Middle East

Despite the desire for diversification, oil remains the backbone of the Middle East's economy and its primary source of energy. Certainly, this shift requires a significant amount of investments in infrastructure and technology, as well as the development of renewable energy policies and regulations. remain complex, many countries are now looking to transition from reliance on fossil fuels to tapping into the region’s abundant renewable energy sources. This shift has the potential to transform the energy landscape of the Middle East, contributing to the development of regional

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[29] Ibid

[30] A. Mérida García, J. Gallagher, A. McNabola, E. Camacho Poyato, P. Montesinos Barrios, J.A. Rodríguez Díaz, “*Comparing the environmental and economic impacts of on- or off-grid solar photovoltaics with traditional energy sources for rural irrigation systems*”, Renewable Energy, Volume 140, 2019, Pages 895-904, ISSN 0960-1481. https://www.sciencedirect.com/science/article/abs/pii/S0960148119304343

[31] C. Stoate, A. Báldi, P. Beja, N.D. Boatman, I. Herzon, A. van Doorn, G.R. de Snoo, L. Rakosy, C. Ramwell, “*Ecological impacts of early 21st century agricultural change in Europe*”, A review, Journal of Environmental Management, Volume 91, Issue 1, 2009, Pages 22-46, ISSN 0301-4797. https://www.sciencedirect.com/science/article/abs/pii/S0301479709002448

economies and enhancing global energy securitys. As the region continues to develop renewable energy sources, there is a greater chance for Middle Eastern countries to become net exporters of energy. This could bring about greater economic stability and growth in the region, as well as increased revenue from international energy trade. It could also provide the Middle East with the potential to become a major player in the global energy market, creating a new source of stability in a region that has long been fraught with instability. In addition, the potential for the Middle East to become a major player in the global energy market has been seen by many nations and organizations as a major opportunity. The International Energy Agency (IEA) has identified the Middle East as an area of high potential, and has begun to invest in renewable energy projects in the region. The primary goal of setting renewable energy targets and policies in most Middle East countries is to reduce dependence on fossil fuels. To this end, 18 Middle East countries have introduced renewable energy promotion policies, and nearly all Middle East governments have realized the importance of renewable energy. Firstly, the region has a substantial potential for renewable energy sources, including strong breezes throughout the year and a significant amount of solar radiation.[32]Secondly, the region has some of the highest electricity prices in the world due to the limited availability of natural resources. Therefore, renewable energy offers an economic opportunity for the countries in the Middle East. The implementation of renewable energy in the Middle East yields significant economic growth. By investing in renewable energy, the countries in the region are expected to create more jobs and generate more income, helping to reduce poverty.[33]
Despite this, the cumulative use of renewables in the Middle East is minimal at present. However, research by the Energy Information Agency anticipates 15-25 GW by 2035 from each of the three primary renewable energy sources: wind, photovoltaics, and concentrated solar power.[34]
For instance, the projected potential for photovoltaics and concentrated solar power in Saudi Arabia during the next two decades is approximately 28 GW. However, only a few countries in the region have tapped into this potential, with non-renewable energy still dominating the total energy mix of these countries. Given that the region is likely to be most vulnerable to the effects of climate change, renewable energy is important in the Middle East as a means to decarbonize the energy industry and abate environmental damage[35]. Renewable energies are preferable to fossil fuels in the Middle East due to being free, widely available and producing minimal pollution.[36]

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[32]usay Hassan, Mohammed Al-Hitmi, Vahid Sohrabi Tabar, Aws Zuhair Sameen, Hayder M. Salman, Marek Jaszczur, "*Middle East energy consumption and potential renewable sources: An overview*", Cleaner Engineering and Technology, Volume 12, 2023, 100599, ISSN 2666-7908.
[33] Ibid
[34] Ibid
[35] Ibid
[36]ehdi Jahangiri, Reza Ghaderi, Ahmad Haghani, Omid Nematollahi, "*Finding the best locations for establishment of solar-wind power stations in Middle-East using GIS: A review*", Renewable and Sustainable Energy Reviews, Volume 66, 2016, Pages 38-52, ISSN 1364-0321.

Renewable energy sources, such as wind and solar power, have the potential to provide important benefits in the development of future power supply systems and could be one of the main contributors to overcoming the difficulties faced by the region's current energy system. Overall, investing in renewable energy has the potential to increase economic growth and improve the sustainability of energy systems in the Middle East, which can ultimately increase demand for renewable energy sources.[37] The renewable energy industry is expected to become a key driver of growth in the Middle East region. Investments in renewable energy will help increase energy access and reduce air pollution, thereby improving public health. Therefore, renewable energy is an integral part of any long-term energy strategy in the Middle East as it can help reduce reliance on oil and gas while also contributing to economic development.[38] Additionally, Renewable energy targets to improve energy security in the Middle East, as it can reduce reliance on imported fuels and provide a source of energy that is not subject to the price volatility of traditional energy sources. This would help reduce the risk of supply disruptions and price shocks, while also providing a more reliable source of energy. [39] For instance, increasing the amount of electricity generated from renewable sources would reduce the amount of carbon dioxide emitted into the atmosphere. This would result in regional temperature moderation and a decreased risk of extreme weather events.[40] Further, given that the Middle East and North Africa region have high levels of ecological footprint and urbanization, the adoption of renewable energy technologies can help in reducing the dependence on fossil fuels and decreasing the ecological footprint by providing clean energy alternatives.[41] In particular, as suggested by the Green Middle East Initiative that aims to contribute to the environmental component of sustainable development in Saudi Arabia, the proposed model estimates the impact of implementing this initiative on the environmental component of sustainable development and shows that renewable energy is a prominent source to diminish carbon emissions in the Middle East. By reducing carbon emissions, the use of renewable energy can help in environmental preservation in the Middle East.[42] So far, renewable energy is also an integral element for sustainable economic growth in the Middle East, given that the region is rich in oil and

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https://www.sciencedirect.com/science/article/abs/pii/S1364032116304105

[37] iaofeng Xu, Zhifei Wei, Qiang Ji, Chenglong Wang, Guowei Gao, "*Global renewable energy development: Influencing factors, trend predictions and countermeasures*", Resources Policy, Volume 63, 2019, 101470, ISSN 0301-4207.
https://www.sciencedirect.com/science/article/abs/pii/S0301420719303174

[38] Ibid
[39] Ibid
[40] Yunpeng Sun, Haoning Li, Zubaria Andlib, Mesfin G. Genie, "*How do renewable energy and urbanization cause carbon emissions? Evidence from advanced panel estimation techniques*", Renewable Energy, Volume 185, 2022, Pages 996-1005, ISSN 0960-1481
[41] Ibid
[42] Ibid

natural gas reserves. In recent years, the demand for energy has been increasing in the Middle East and the availability of fossil fuels is not expected to increase. Meantime, the Middle East faces several challenges in the implementation of renewable energy policies. The dominance of the oil and gas industry in the region creates vested interests that may resist the transition to renewable energy.[43] Furthermore, political instability and conflicts in the region pose a significant challenge to the implementation of renewable energy policies. There is also a lack of clear regulatory frameworks and standardized policies and regulations for renewable energy across the region, which creates uncertainty for investors and impedes the growth of the sector.[44] Limited access to financing and the high cost of renewable energy technologies are additional obstacles to the adoption of renewable energy in the Middle East.[45] In addition, rising electricity demand due to population growth, economic development, rising living standards, and subsidies is rapidly increasing CO2 emissions in the region, which highlights the importance of implementing low-carbon electricity to address these challenges. Doubling generation capacities until 2030 and quadrupling until 2050 requires significant infrastructure investments.[46] The development of necessary electricity transmission capacity and cross-border interconnections is also a challenge in implementing renewable energy policies in the Middle East.

b. Sustainable Growth through Renewable Energy Policies in Europe: A Path to Environmental Conservation and Economic Prosperity

The primary sources of energy in Europe include fossil fuels, but renewable energy sources are becoming increasingly important in new energy policies and future energy pathways. It is evident that the fossil fuel energy consumption indicator is higher than 60% for most countries. Many European countries are still heavily dependent on fossil fuels for their energy needs.[47]

Interestingly, Iceland, Sweden, and Norway are exceptions in terms of their primary sources of energy. Norway mainly generates electricity from hydro resources. Therefore, the shift towards alternative energy sources has been driven by a multitude of factors. One of the most significant factors is the need to reduce the environmental impacts of energy conversion, including pollution

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[43] Luigi Carafa, Gianleo Frisari," *Georgeta Vidican,Electricity transition in the Middle East and North Africa: a derisking governance approach*", Journal of Cleaner Production,Volume 128, 2016, Pages 34-47, ISSN 0959-6526

[44] Ibid

[45] Ibid

[46] Ibid

[47] Martins F, Felgueiras C, Smitkova M, Caetano N."*Analysis of Fossil Fuel Energy Consumption and Environmental Impacts in European Countries*". *Energies*. 2019; 12(6):964.

and greenhouse gas emissions, and mitigate the effects of climate change.[48] Additionally, there is a growing awareness of the potential benefits of renewable energy, including increased energy security, sustainable economic growth, and pollution reduction, among others.[49]The depletion of fossil fuels, increasing demand, and geopolitical uncertainties also contribute to the shift towards alternative energy sources. Europe has been at the forefront of the global effort to transition to sustainable energy sources. Various ambitious targets have been set for reducing greenhouse gas emissions and increasing the share of renewable energy in its mix. Certainly, economic growth and environmental preservation are not mutually exclusive, and energy is a key component of achieving bot goals. So far, in the continent, many initiatives are in place to promote sustainable energy and reduce carbon emissions. One of the significant initiatives is the European Green Deal, which aims to produce clean, secure, and affordable energy while improving the climate.[50] Furthermore, the European Green Deal aims to transform the European Union into a modern, resource-efficient, and competitive economy that respects social justice. The concept of a green deal in Europe has been shaped since the Paris Climate Agreement signed in 2018.[51] These initiatives are essential in ensuring sustainable energy practices that can promote economic growth while preserving the environment. This will ensure that Europe is on track to become a climate-neutral continent by 2050. To achieve this, the European Green Deal sets ambitious targets, including achieving a zero-emission target by 2050 and reducing greenhouse gas emissions by at least 50% (and potentially up to 55%) compared to 1990 levels by 2030.[52] This shift could provide a range of economic, environmental, and social benefits, such as employment, reduced pollution, and improved health outcome. In addition, Emissions Trading System, which sets a cap on emissions from large industries and power plants and allows them to trade emission permits. Also, funding programs have been established such as the Horizon 2020 program, which supports research and innovation in sustainable technologies. Certainly, sustainable energy is essential for achieving economic growth and environmental preservation in Europe.[53] Through initiatives and policies, Europe is transitioning to a sustainable energy system that benefits both the economy and the environment.

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[48] Alessandro Marra, Emiliano Colantonio, "*The path to renewable energy consumption in the European Union through drivers and barriers: A panel vector autoregressive approach*", Socio-Economic Planning Sciences, Volume 76, 2021, 100958, ISSN 0038-0121

[49][49].António C. Marques, José A. Fuinhas, J.R. Pires Manso, "*Motivations driving renewable energy in European countries: A panel data approach*", Energy Policy, Volume 38, Issue 11, 2010, Pages 6877-6885, ISSN 0301-4215,

[50] Adamowicz M. "Green Deal, Green Growth and Green Economy as a Means of Support for Attaining the Sustainable Development Goals". *Sustainability*. 2022; 14(10):5901

[51] Xue, Chaokai & Shahbaz, Muhammad & Ahmed, Zahoor & Ahmad, Mahmood & Sinha, Avik, 2022. "*Clean energy consumption, economic growth, and environmental sustainability: What is the role of economic policy uncertainty*?" Renewable Energy, Elsevier, vol. 184(C), pages 899-907.

[52] Ibid

[53] Ben Jebli, M., Ben Youssef, S. & Apergis, N. "The dynamic linkage between renewable energy, tourism, CO2 emissions, economic growth, foreign direct investment, and trade". Lat Am Econ Rev 28, 2 (2019).

Sustainable sources such as wind, solar, hydropower, and geothermal are key to reaching the objectives. Heavy investments in renewables resources has a potential to create more job opportunities and boost economic.[54] For example, the renewable energy sector in Europe has employed 1.2 million people in 2018, and this number is expected to continue to grow. However, energy transition is a complex and ongoing process. There are still challenges to be overcome, such as ensuring energy security and affordability while reducing greenhouse gas emissions. Despite this, with continued commitment and investment, the continent has the potential to become a leader in sustainable energy and a model for other region to follow and significant progress has been made. Meantime, renewables are nearing 40% of total electricity generation and wind and solar power generated 22% of the EU's electricity, overtaking gas for the first time in 2022. Solar was the one the biggest drives of this increase, with a record growth of 38 terawatt-hours (TWh) compared with 2021. That growth was due to a high installation rate; 41GW of solar power generation capacity was added to the grid in 2022. Wind saw a similar rise, with an increase of 33TWh compared with 2021.[55]However, extreme droughts across Europe resulted in the lowest hydropower generation in more than two decades. Generation fell to 283TWh much lower than the average annual of 331TWh between 2000 and 2021. Besides the recognition of the current various policies in place to promote the use of renewable energy sources, their effectiveness depends on thoughtful examination and strategic implementation to achieve desired objective because the continent is one of the largest CO2 emissions producer and unfortunately, this likely lead to smaller commitments to renewable energy and higher pollutant activity, bearing in mind how expensive is energy transition process.

1.4. Energy Strategy of Saudi Arabia and Norway

It's worthy to go through the conventional energy sources (oil and gas production strategies), energy transition, economic reliance on energy, and balanced policies for a green energy-based economy and sustainable environmental conditions of these countries. So, Saudi Arabia is home to the

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[54] Aqib Mujtaba, Pabitra Kumar Jena, Festus Victor Bekun, Pritish Kumar Sahu, "*Symmetric and asymmetric impact of economic growth, capital formation, renewable and non-renewable energy consumption on environment in OECD countries*", Renewable and Sustainable Energy Reviews, Volume 160, 2022, 112300, ISSN 1364-0321

[55] EU solar deployment rate soars by almost 50% in 2022, Report, January 2023. Solar was one of the biggest drivers of this increase,

world's largest oil reserves, and oil exports have historically made up a significant portion of the country's GDP and government revenue. The country possesses about 30% of global crude oil and is ranked second in terms of global production.[56] Its energy sector is dominated by petroleum and natural gas, with the country being one of the largest producer and exporter of oil globally.[57] The petroleum sector accounts for approximatively 87% of Saudi budget revenues, 90% of export earnings, and 42& of GDP.[58] The country's oil and natural gas production is primarily controlled by state-owned company Saudi Arabian Oil Group, formerly Arabian-American Oil Company or simply Aramco based on Dhahran, and is one of the largest in the world. It's responsible for the exploration, production and distribution of Saudi Arabia's oil and gas resources. Therefore, advanced technologies in oil extraction can contribute to revenue generation in Saudi Arabia.[59] To this end, the Saudi government has been investing in research and development of technologies that improve oil extraction ability. This includes efforts to develop smart wells and advanced computer systems to monitor and control oil fields.[60] Additionally, the government has been investing in the development of artificial intelligence and predictive analytics solutions to help identify and optimize sources of oil reserves. For instance, Saudi Arabian Oil Group has invested in various advanced group technologies for oil extraction including; horizontal drilling " *The process of drilling a well from the surface location just above the target oil or gas reservoir called the "kickoff point", then deviating the well bore from the vertical plane around a curve to intersect the reservoir at the entry point with a near-horizontal inclination, and remaining within the reservoir until the desired bottom hole location is reached*"[61], hydraulic fracturing " *Hydraulic fracturing, commonly known as fracking, is the process of injecting water, sand, and/or chemicals into a well to break up underground bedrock to free up oil or gas reserves*", and enhanced oil recovery techniques.[62] These technologies have helped to increase the efficiency of oil extraction and enable the production of previously inaccessible oil reserves. In the near future, such efforts could help the country to extract more oil from existing fields, as well as discover new sources of oil. In addition, investing in technologies to explore and extract oil, the Saudi Arabian government has been focusing on the development of refineries and other infrastructure to support their oil production and export. This

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[56] Fredj Jawadi, Zied Ftiti, "*Oil price collapse and challenges to economic transformation of Saudi Arabia: A time-series analysis*", Energy Economics, Volume 80, 2019, Pages 12-19, ISSN 0140-9883

[57] Ibid

[58] Ibid

[59] Fredj Jawadi, Zied Ftiti, "*Oil price collapse and challenges to economic transformation of Saudi Arabia: A time-series analysis*", Energy Economics, Volume 80, 2019, Pages 12-19, ISSN 0140-9883, www.sciencedirect.com/science/article/pii/S01

[60] Ibid

[61] Lynn Helms, Horizontal Drilling, Explanation, page 1 https://www.dmr.nd.gov/ndgs/documents/newsletter/2008Winter/pdfs/Horizontal.pdf

[62] Water Resources Mission Area, "Hydraulic Fracturing", Science for a changing world, March 2019 https://www.usgs.gov/mission-areas/water-resources/science/hydraulic-fracturing

includes upgrading the existing refineries and building new ones to handle the increased production. Also, the government is investing in increasing storage and transport capacity to meet the global demand for Saudi Arabia's oil. This investment in infrastructure and technology will ensure that Saudi Arabia is able to keep up the ever-growing global demand for oil and continue to be a major source of income for the country. Moreover, the government is also investing in researching advanced technologies which will help them extract the maximum amount of oil from the reserves and further increase their profits of oil.[63]

Despite being heavily dependent on its oil sector, Saudi Arabia is actively diversifying its economy by investing in renewable energy sources to reduce its dependence on oil. It has invested heavily in solar and wind power, and is already exporting solar energy to other countries. Saudi Arabia has also invested in research and development in renewable energy technologies, and is actively looking for innovative ways to further reduce its reliance on the oil sector.[64] This move is indicative of the country's commitment to reducing its carbon footprint, as well as its efforts to reduce the economic impact of the global oil market. However, the nation's economy is still heavily reliant on oil production and export as a major source of revenue.[65] Saudi Arabia has the world's second-largest proven oil reserves, and it is expected that the country will continue to be a major player in the global oil market for some time to come. As oil accounts for more than 80% of government revenues, making the Saudi economy heavily dependent on oil production and export, the government's Vision 2030 plan aims to transform the economy from oil-based to knowledge-based through diversification.[66]Recently, the country has taken steps to increase foreign direct investment (FDI), embrace private sector investments, and introduce new regulations in a bid to attract more investments. To increase FDI, the government has reduced taxes, increased infrastructure spending, and offered incentives for foreign companies to set up operations in the country. The government has also taken steps to ensure that the oil industry remains profitable, such as subsidizing the cost of oil production. In 2016, the Saudi government implemented a number of reforms to diversify the economy away from oil dependence. These reforms have included the development of new industries such as petrochemicals, renewable energy, tourism and agriculture, to supplement its

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[63] Mahmood, H., Alkhateeb, T.T.Y. & Furqan, M. Oil sector and CO_2 emissions in Saudi Arabia: asymmetry analysis. *Palgrave Commun* **6**, 88 (2020). www.nature.com/articles/s41599-020-0470-z

[64] Michael Bradshaw, Thijs Van de Graaf, Richard Connolly, "*Preparing for the new oil order? Saudi Arabia and Russi*a", Energy Strategy Reviews, Volume 26, 2019, 100374, ISSN 2211-467X www.sciencedirect.com/science/article/pii/S221

[65] Ibid

[66]Nurunnabi, M. Transformation from an Oil-based Economy to a Knowledge-based Economy in Saudi Arabia: the Direction of Saudi Vision 2030 . J Knowl Econ 8, 536–564 (2017), link.springer.com/article/10.1007/s13132-017-0479-8

income from oil production and export. The government has also encouraged foreign investment and has opened up the Saudi stock market to foreign investors. The goal is to diversify the economy away from oil production and export, which has been the main source of income for Saudi Arabia for decades. To achieve this, the government is encouraging the formation of joint ventures between local and international companies to facilitate investment in new industries. However, this dependence poses challenges to the country's economic diversification efforts.[67] Non-oil revenues accounted for only 13% of the Saudi general budget in 2018, and Saudi Arabia's deficit budget is 4.6% of its total 2018 GDP. The COVID-19 pandemic and fall in global oil prices have affected Saudi Arabia's foreign exchange reserves negatively.[68] Furthermore, it's expected that Saudi Arabia's oil resources will be depleted in the coming two decades, which underscores the importance of diversification to the country's economy. Overall, Saudi Arabia's economic dependence on oil production and export poses challenges for diversification, but the government's Vision 2030 plan is a step in the right direction.[69]The Saudi government hopes that Vision 2030 will help the country transition to a post-oil economy. The plan includes measures to create new jobs and increase the contribution of non-oil sectors to the GDP. To this end, the government is investing significantly in infrastructure, education, technology and other industries such as tourism and manufacturing. As of 2021, natural gas and oil were the primary energy sources used in Saudi Arabia, with oil accounting for about 60.09% of total primary energy consumption and natural gas accounting for about 39%. However, renewable energy sources accounted for only 0.1% of total primary energy consumption in Saudi Arabia in 2021.[70] The economy of Saudi Arabia is primarily oil-based producing a quarter of the world's proven oil reserves.[71]. Only 8% of electricity generation comes from steam and 40% from oil. It is essential to note that Saudi Arabia uses natural gas that was once flared off oil wells.[72] Although electricity is one of the primary energy sources used in Saudi Arabia, approximately 70 percent of potable water in the country comes from desalinating seawater. The energy system in Saudi Arabia is heavily dependent on fossil fuel sources, particularly petroleum and natural gas, with limited usage of renewable energy sources. Saudi Arabia's energy mix is entirely dominated by fossil fuels (99.9%), one of the highest levels in the G20: the G20's average fossil fuel share of the energy mix is 81%. The share of renewable energy is almost zero (in 2021, it constituted 0.1% of total primary energy consumption).

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[67] Ibid

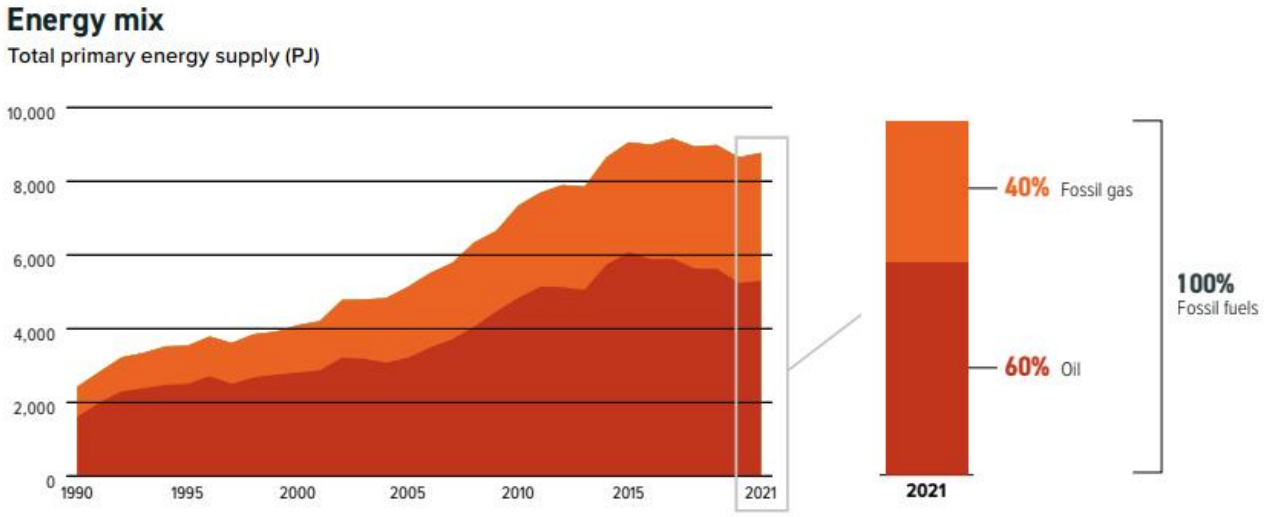
[68] Al Naimi, S.M. Economic Diversification Trends in the Gulf: the Case of Saudi Arabia. *Circ.Econ.Sust.* **2**, 221–230 (2022). link.springer.com/article/10.1007/s43615-021-00106-0

[69] Ibid

[70] Aldhubaib HA (2022) Electrical energy future of Saudi Arabia: Challenges and opportunities. *Front. Energy Res.* 10:1005081 www.frontiersin.org/articles/10.3389/fenrg.2022

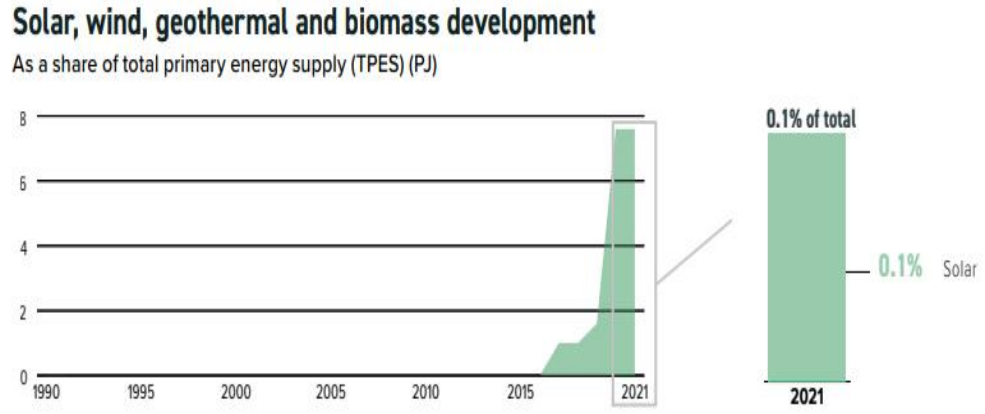
[71] *The Royal Embassy of Saudi Arabia*, About Saudi Arabia, Washington, D.C www.saudiembassy.net/energy

[72] Ibid



Source: Enerdata, climate transparency report, Saudi Arabia, 2022

This graph shows the fuel mix for all energy supply, including energy used not only for electricity generation, heating and cooking, but also for transport fuels. Fossil fuels (oil and gas) make up 99.9% of the Saudi Arabian energy mix, the highest level in the G20. Increased energy supply was mainly driven by increased fossil gas and oil use since 1990. Solar energy started to come online in 2020, but renewables remain a negligible share of the energy mix.[73]



Source: Enerdata, climate transparency report, Saudi Arabia, 2022

Solar is the only renewable energy source in Saudi Arabia. It accounts for 0.1% of Saudi Arabia's total energy supply. The share in total energy supply has increased by around 1,573% in the last 5 years (2016–2021), from zero in 2015.[74]

[73] Enerdata, climate transparency report, Saudi Arabia, 2022. P.6-8
[74] Ibid

Yes, Saudi Arabia has heavily invested in advanced technologies for oil extraction. However, the myriad environmental repercussions of its energy sector are harmful. The key environmental concerns associated with the country's reliance on oil are.

- Greenhouse gas emissions: burning fossil fuels, including oil, releases carbon dioxide (CO2) and greenhouse gases into the atmosphere. These gases contribute to climate change and global warming, leading to various environmental and societal impacts such as rising temperatures, sea-level rise, and extreme weather events.

- air pollution: oil extraction, refining, and combustion processes release pollutants into the air, including sulfur dioxide (SO2), nitrogen oxides (NOx), volatile organic compounds (VOCs), and particulate matter. These pollutants have detrimental effects on air quality, human health, and ecosystems, leading to respiratory problems, cardiovascular diseases, and ecological disruptions.

- water pollution: oil spills and leaks from oil production, transportation, and storage facilities contaminate water bodies, including close oceans, rivers, and groundwater. Oil have severe ecological consequences, harming marine life, contaminating water sources, and impacting coastal ecosystems.

- Land degradation: Oil exploration and extraction activities leads to land degradation and habitat destruction. Infrastructure development, such as drilling sites, pipelines, and roads, can fragment ecosystem and disrupt wildlife habitats.

- Water consumption: Oil extraction requires significant amounts of water for drilling well maintenance, and extraction processes. In arid regions like Saudi Arabia, water scarcity is a pressing concern, and the high water demands of oil production exacerbates the issue in the country.[75]

So far, in order to address these environmental concerns, the Kingdom has taken steps to mitigate the impacts. The country has initiated projects to reduce gas flaring, increase energy efficiency, and invest in renewable energy sources like solar power.[76] The development of the renewable energy sector is gaining momentum in Saudi Arabia, as the country aims to have 50% of its energy

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[75] Mahmood, H., Alkhateeb, T.T.Y. & Furqan, M. Oil sector and CO_2 emissions in Saudi Arabia: asymmetry analysis. *Palgrave Commun* **6**, 88 (2020). https://www.nature.com/articles/s41599-020-0470-z

[76] Ibid

production linked to renewable sources by 2030.[77] To meet this ambitious target, the country has plans to invest heavily in solar, wind and geothermal energy sources.[78] It is estimated that the investment in renewable energy projects will be over $50 billion by 2030. The government is promoting carbon capture and storage technologies to reduce emissions "*a well-known process for trapping CO2 from stationary sources of carbon emissions and storing it permanently to prevent its release into the atmosphere"*[79] and it has established solar parks and wind projects, as well as plans to build nuclear power plants to further decrease its reliance on fossil fuels.[80] Implementation of the technologies is still in its early stages and the government is also investing heavily in research and development of energy efficiency technologies, such as smart grids, which will help reduce energy consumption and increase the efficiency of energy production.[81]To further balance economic growth with environmental sustainability, Saudi Arabia is exploring ways to improve energy efficiency in households and businesses and reduce domestic emissions.[82] The country is also investing in technology supporting carbon capture, utilization, and storage (CCUS) and hydrogen development. The government developed strategies to achieve economic diversification and environmental sustainability, as acknowledged in the Saudi Green Initiative launched by Crown Prince Mohammed bin Salman in March 2021, are at the center of the roadmap towards the achievement of the initial objectives.[83] Despite the progress made so far, there are still several challenges that need to be addressed in order to ensure a successful energy diversification in Saudi Arabia. While the discovery of the first significant oil deposit in Norway occurred on December 23, 1969, just one day shy of Christmas Eve, Norway began to pursue the development of its oil and gas production in the early 1970s. It's worth noting that, before this discovery, Norway's economic status was very similar to that of its neighboring Nordic countries and much of Western Europe. It's important to acknowledge that Norway was not a poor society before discovering oil.[84] Norway's oil and gas industry has a relatively short history, but it has created significant value and become Norway's largest industry in terms of value added, government revenues, investments, and export value. The industry has been operational in Norway for almost 50 years, and the first fields to be

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[77] *Saudi Arabia's environmental sustainability strategy*, Asia House, 2021 asiahouse.org
[78] Ibid

[79]Bartosz Dziejarski, Renata Krzyżyńska, Klas Andersson, "*Current status of carbon capture, utilization, and storage technologies in the global economy: A survey of technical assessment*", Fuel, Volume 342, 2023, 127776, ISSN 0016-2361 www.sciencedirect.com/science/article/pii/S0016236123003897

[80] *Ibid*
[81] *A Sustainable Saudi Vision*. Retrieved May 10, 2023, from www.vision2030.gov.sa/v2030/a-sustainable-saudi-vision/
[82] *Saudi Arabia's environmental sustainability strategy*, Asia House, 2021 asiahouse.org
[83] *Saudi Arabia's environmental sustainability strategy*, Asia House, 2021 asiahouse.org
[84] *Norway's petroleum history*. Retrieved May 12, 2023, from offshorenorge.no/en/about-us/oljehistorien/

developed were in the North Sea.[85] The production of oil and gas began on the Norwegian continental shelf in the early 1970s, and some of the early fields are still producing up to this day.[86] Historically, the industry was dominated by state-owned companies, which gradually transitioned to internationally competitive multinationals in the oil and gas sector. Norway's oil and gas industry is dominated by a few major players. Equinor ASA, the leading company in Norway's natural gas production market, is also one of the major players in Norway's oil and gas industry. Other significant players in Norway's natural gas production market include Petoro AS, BASF SE, Total Energies SE, and Shell plc, as well as Aker BP ASA. ConocoPhillips is another major player in Norway's oil and gas industry along with Aker BP ASA, Total SA, and Royal Dutch Shell PLC. [87]The market research report provides information about these major companies in Norway's oil and gas industry. Although investments and policies for new oilfields are expected to be the biggest and most dominating drivers for the Norwegian oil and gas upstream market, some of the most important assets in Norway's oil and gas industry include Snorre, Ekofisk, Balder, Edvard Grieg, Johan Sverdrup, and Troll.[88] Troll accounted for the highest natural gas production in Norway in 2022 and was one of the major assets analyzed for Norway's natural gas production along with Ormen Lange, Snøhvit, Aasta Hansteen, Skarv, and Oseberg.[89] Norway holds the largest share of total oil reserves among European countries; however, the major oilfields in Norway are reaching their maturity. In fact, Norway is a major gas exporter to Europe and Norwegian gas accounts for about 25% of the EU's gas demand.[90] The UK is a major consumer of Norway's gas, with almost 40% of their consumption being supplied by Norway. Norway is the world's third-largest exporter of natural gas Since then, Norway has become the world's third-largest exporter of natural gas, with the Norwegian Oil and Gas Association reporting that the Norwegian sector of the North Sea was responsible for more than 40% of Europe's total production in 2019.[91] This growth can be attributed to several factors, including the development of new technologies and the expansion of Norway's continental shelf. In addition to its oil and gas production, Norway has also become an important player in the renewable energy sector. The Norwegian government has invested heavily in research and development to promote a transition to renewable energy sources, such as wind and solar power. This focus has led to the emergence of several innovative companies, such as Stat.

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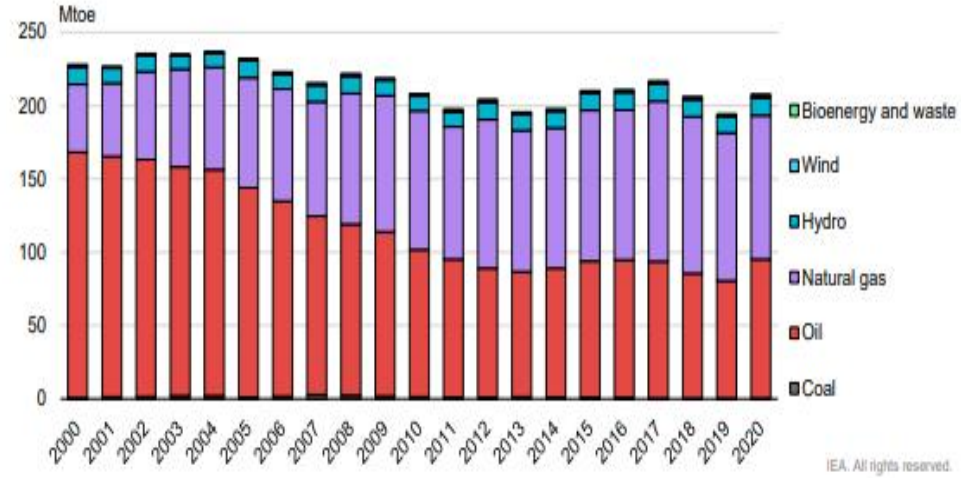
[85] *Norway's petroleum history*. Retrieved May 12, 2023, from www.norskpetroleum.no
[86] *Norway's oil history in 5 minutes*.2021 Retrieved May 12, 2023, from www.regjeringen.no
[87] *Norway Oil and Gas Exploration and Production Market Volumes and Forecast by Terrain, Assets and Major Companies, 2021-2025*, 2023, from www.globaldata.com
[88] Ibid
[89]Ibid
[90] *Norway Oil & Gas Upstream Market Size & Share Analysis*, Industry Research Report ,Growth Trends (2023-2028) from www.mordorintelligence.com
[91] *Black Gold: Norway's Oil Story*. Retrieved May 12, 2023, from www.lifeinnorway.net/norway-oil-history/

Energy production by sources in Norway, 2020



Source: IEA (2022).

Norway, the majority of domestic energy production in 2020 was derived from oil and natural gas, which accounted for 93% of the total.In that very year, the production of energy reached a total of 208 million tonnes of oil equivalent. The total primary energy supply, measured in Mtoe, has risen by 7% compared to the previous year, while still remaining consistent with the average value of the last decade.In 2012, gas production surpassed oil production, and there was a slight decrease of 0.1% from the gas production levels in 2010.[92]Currently, gas stands as the primary source of domestic energy production, amounting to 98 Mtoe or 116 billion cubic units.In the year 2020, nearly half of the total production was attributed to the output of metres [bcm].In the year 2020, the production of oil amounted to 95 Mtoe (equivalent to 1,950 thousand barrels per day [kb/d]).Over the past decade, there has been a consistent decline, resulting in a 5% decrease in 2020 compared to 2010, and a significant 43% drop.[93] By 2020, hydro power covered 44% of energy production. Overall, in Norway renewable sources supply 98% of electrity.

The Norwegian government emphasized building up domestic expertise in the industry while foreign companies were responsible for developing the first oil and gas fields in Norway. The government also wanted these foreign companies to remain in the industry[94]. The development of Norwegian oil companies and oil service industry occurred in two phases: protectionist and liberalization/financialization. The protectionist phase had a strong focus on local content that fostered skilled Norwegian oil companies and a national oil service industry. Meanwhile, the liberalization/financialization phase laid the basis for internationally oriented Norwegian oil

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93 International Energy Agency, Norway 2022, Energy Policy Review, pages 16-19.

94 *Norway's petroleum history*. Retrieved May 12, 2023, from offshorenorge.no/en/about-us/oljehistorien/

companies and oil supply and service firms.[95] The growth of Stavanger as the third largest city in Norway has been largely due to the oil and gas industry, and it is considered the oil and gas capital of Europe. The oil and gas industry has been a significant contributor to Norway's economy, playing a key role in the development of Norway's welfare state.[96] Therefore, energy transition in Norway has won the bets and now on, renewable sources has covered electricity demands. In 2020, Norway's electricity system was predominantly powered by renewable resources, making up 98% of electricity generation, with hydro being the leading source at 92%. Throughout history, Norway has consistently been a country that exports more electricity than it imports to neighboring countries. In fact, in 2020, Norway reached a new milestone of 20.5 TWh of net exports, cementing its status as one of Europe's foremost electricity exporters. This has enabled Norway to be deeply integrated in the European and Nordic electricity markets.[97] Norway is in an advantageous position with regards to its energy transition, since electrification is a fundamental aspect of this process. The country has already made considerable progress in electrification, with almost half of its total final consumption (TFC) being met by electricity in 2019.[98] In order to achieve Norway's climate targets, further electrification will be necessary across different sectors, which will demand additional renewable generation capacity, including the expansion of hydro capacity, as well as upgrades to existing plants. Over the past decade, the proportion of wind energy in Norway's power grid has risen tenfold, reaching 6.5% of the total electricity output in 2020, and becoming the second-largest source of power generation in the country.[99] Nevertheless, Norway has encountered opposition from local communities regarding onshore wind power initiatives, which is based on the effect on natural landscapes and ecological systems. After a temporary halt on granting onshore wind licenses in 2019, the administration disclosed in April 2022 that it would restart granting licenses for new projects with the approval of local municipalities. The Norwegian government has set its sights on the development of offshore wind capacity and supply chains. At present, Norway is constructing the largest floating offshore wind farm in the world, known as Hywind Tampen, utilizing Equinor's innovation in floating wind technology.[100] The wind farm will have an 88 MW capacity upon completion. While two areas have been designated for offshore wind power development, one utilizing high-cost floating technology in deep waters and the other using a bottom-fixed solution, the government is still in the process of devising a framework for licensing offshore wind projects. The objective of this effort is to streamline the licensing process, allowing for more efficient

[95] Ryggvik H. "*A Short History of the Norwegian Oil Industry: From Protected National Champions to Internationally Competitive Multinationals*". Business History Review. 2015;89(1):3-41 from www.cambridge.org

[96] *Black Gold: Norway's Oil Story*. Retrieved May 12, 2023, from www.lifeinnorway.net/norway-oil-history/

[97] International Energy Agency, Norway 2022, Energy Policy Review, pages 16-19.

[98] Ibid

[99] Ibid

[100] Ibid

operation of offshore wind projects before 2030.[101] As a result, offshore wind will not contribute significantly to Norway's power mix during this decade.

In connection with this, Norway's most significant sector in terms of value added, revenues, investments, and export value is the oil and gas industry. This critical sector plays an essential role in sustaining the Norwegian economy, as well as funding the country's welfare state. [102]According to projections, the petroleum industry's export revenues in Norway exceeded NOK 800 billion (equivalent to EUR 80 billion) in 2021 and doubled in the following year. The Government Pension Fund Global, supported by oil and gas production revenues, finances public pension expenditures, ensures benefits for both current and future generations from petroleum revenues, and safeguards the country's long-term economy against fluctuations in the oil and gas revenue market. Norway's oil and gas industry is a major contributor to its economy, accounting for 28% of GDP, 17% of total investments, 42% of state revenues, and 58% of total exports (not including the service and supply industry). Norway is the 7th largest natural gas producer in the world and ranks as the world´s 3rd largest exporter of natural gas. Similarly, Norway accounts for 2.3 percent of global oil production in 2020 and ranks as the 10th largest exporter of oil in the world.[103] The petroleum sector is the single largest industry in Norway, indirectly contributing around 200,000 jobs throughout the country. Additionally, the petroleum sector plays a crucial role in financing the Norwegian welfare state.[104] Foreign direct investment into the petroleum sector has been strong over the last decade, despite the overall decline in oil and liquids production. The Norwegian government has also taken steps to ensure the long-term sustainability of the oil and gas industry by investing in new technologies and research. The Norwegian government has invested heavily in research and development of new technologies to ensure the sustainable future of the nation's oil and gas industry.[105] This includes the development of renewable energy sources such as offshore wind, solar and tidal energy to reduce Norway's dependence on fossil fuels. Additionally, the government is also investing in carbon capture and storage (CC S) technology to reduce the environmental impact of Norway's oil and gas industry. Norway has also taken steps to ensure that its oil and gas industry is more efficient and sustainable. The government has implemented several regulatory measures to improve the industry's environmental performance, such as reducing emissions and

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[101] Ibid
[102] Ibid
[103] ITA, *Norway, Offshore Energy- Oil, Gas and Renewables*, 2022
https://www.trade.gov/country-commercial-guides/norway-offshore-energy-oil-gas-and-renewables

[104] International Energy Agency, Norway 2022, Energy Policy Review, pages 121-139
[105] Ibid

increasing the use of renewable energy sources.[106] In fact, the sector has been having a growing significance on Norwegian GDP and government cashflow. As an oil-rich country, it has implemented policies to ensure the benefits of oil production would stay in Norway. From the mid-1990s, the state has been receiving all the revenue generated by oil and gas production, which is now collected by sovereign wealth fund. [107]This fund is the largest of its kind globally and has a net worth exceeding one trillion dollars. When this vast sum is divided by the country's approximate population of five million, each generation can be seen to possess considerable wealth through the sovereign wealth fund.[108] The concept behind the fund is to ensure that the money generated is not immediately expended. Rather, it is a means of preserving revenue for the future so that only profits are spent. The continuous transfer of funds into the economy has given Norwegian leaders the freedom to augment spending without facing the difficult financial constraints that other nations are force to ensure.[109] Its widely understood that Norway's savings cans serve as a source of comfort for its citizens during difficult times, such as the recent COVID-19 pandemic. The oil-based wealth fund is therefore vital to Norway both economically and politically.

But at the same time, the country wants to play a prominent role in addressing climate change. Oil and gas production in Norway had significant environmental impacts. These include emissions of greenhouse gases, oil spills, and land use changes. However, the industry has made progress in reducing emissions and improving environmental performance.[110] Despite these efforts, there are still concerns about the long-term impacts of oil and gas production on Norway's environment, particularly in terms of climate change and the potential for oil spills. Offshore oil and gas activities have been established on the Norwegian Continental Shelf (NCS) over the past 40 years.[111]The Norwegian government has implemented strict regulations and policies to mitigate these environmental impacts, including requiring operators to conduct environmental impact assessments and establishing protected areas. As per its updated nationally determined contribution (NDC), under the Paris Agreement, Norway has pledged to decrease its greenhouse gas emission by no less than 50% and up to 55% by 20230 in comparison to the levels recorded in 1990. The Climate Change Act was passed by the Norwegian parliament in June 2017, which legally enshrines the

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[106] ITA, *Norway, Offshore Energy- Oil, Gas and Renewables*, 2022 https://www.trade.gov/country-commercial-guides/norway-offshore-energy-oil-gas-and-renewables

[107] Jariel Arvin, Norway's climate change paradox, Vox, 2021. https://www.vox.com/22227063/norway-oil-gas-climate-change

[108] Ibid

[109] Ibid

[110] Torgeir Bakke, Jarle Klungsøyr, Steinar Sanni, "*Environmental impacts of produced water and drilling waste discharges from the Norwegian offshore petroleum industry*", Marine Environmental Research, Volume 92, 2013, Pages 154-169, ISSN 0141-1136

[111] Marco Grasso, "*Oily politics: A critical assessment of the oil and gas industry's contribution to climate change*", Energy Research & Social Science, Volume 50, 2019, Pages 106-115, ISSN 2214-6296,

aforementioned NDC goal in addition to the objective of transitioning to a low-emissions society by 2050.[112] This target is tantamount to a decrease in emissions by approximately 90-95% from the levels measured in 1990. Norway is a participant in the European Union's (EU) internal energy market, and this is a result of its Agreement on the European Economic Area. Consequently, Norway works closely with the EU on matters concerning climate and energy. From 2021 to 2030, Norway has a treaty with the EU that allows it to engage in EU climate legislation. This agreement covers the regulation of land use, land-use change and forestry (LULUCF), the Effort Sharing Regulation (ESR) for non-ETS emissions, and the EU Emissions Trading System (EU ETS). [113] The current agreement between Norway and the EU stipulates that all three regulations will be updated with the EU's Fit for 55 package, which Norway intends to follow within its borders. The Norwegian policy on climate change is founded on the principle of the polluter-pays. Norway was among the pioneers in the world to introduce a carbon tax way back in 1991, which addressed the consumption of fossil fuels and the petroleum sector.[114] Presently, nearly 85% of emissions of domestic GHG (Greenhouse Gas) are under the purview of either the EU ETS or a GHG tax (such as CO2 tax) or both. Emissions outside of the EU ETS are levied a national CO2 tax of approximately 766 Norwegian krone per tonne of CO2 equivalent (NOK/t CO2-eq) (76 EUR/t CO2-eq).[115] Meanwhile, sustainable energy-based economy and sustainable environment are public concerns and they led to the change in perception towards renewable energy. As of 2022, the country's energy supply is made up of 50 percent renewable energy, which has been favorable for CO2E reduction and improving the quality of the environment. Norway has reduced emissions by utilizing electric vehicles and its extensive hydropower capabilities, among other measures.[116] Renewable energy policies have attracted investment and contributed to economic growth, while reducing the country's dependence on oil and gas.[117] Furthermore, Norway's transition to green energy has led to a reduction in greenhouse gas emissions and has created new jobs in the renewable energy sector. The shift towards sustainable renewable energy has mitigated climate change and improved air quality and public health.[118] Norway is a main exporter of both electricity and green hydrogen, contributing to the country's economic growth. Norway's transition to

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[112] International Energy Agency, Norway 2022, Energy Policy Review, Pages 35-57.
[113] Ibid
[114]
[115]
[116] Kirikkaleli D, Castanho RA, Genc SY, Oyebanji MO, Couto G. The Asymmetric and Long-Run Effect of Financial Stability on Environmental Degradation in Norway. *Sustainability*. 2022; 14(16):10131.
[117] Atle Christer Christiansen, "*New renewable energy developments and the climate change issue: a case study of Norwegian politics"*, Energy Policy, Volume 30, Issue 3, 2002, Pages 235-243, ISSN 0301-4215
[118] Skjølsvold, T., Ryghaug, M., Dugstad, J. "*Building on Norway's Energy Goldmine: Policies for Expertise, Export, and Market Efficiencies",* Renewable Energy Governance, 2013, Volume 23
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link.springer.com/chapter/10.1007/978-1-4471-5595-9_20

renewable energy has resulted in a low carbon electricity system, which serves as a cornerstone of its climate change policies.[119]

In concluding, in order to ensure long-term economic growth while also protecting the environment, Saudi Arabia and Norway have acknowledged the importance of balancing these two objectives. Both nations have implemented strategies designed to expand their economies and decrease reliance on non-renewable resources, while simultaneously increasing their utilization of sustainable energy sources. Saudi Arabia's Vision 2030 plan aims to decrease the country's reliance on oil by focusing on the growth of other sectors within the economy such as healthcare, tourism, and renewable energy. Furthermore, the government has launched two initiatives, the Saudi Green Initiative and the Middle East Green Initiative, with the objective of safeguarding the environment and encouraging sustainability in the area. These initiatives will involve the planting of billions of trees, the reduction of carbon emissions, and the promotion of renewable energy sources. Norway has taken several steps to decrease its reliance on fossil fuels, including the creation of a sovereign wealth fund to finance other areas of the economy. Additionally, Norway has set high targets to reduce greenhouse gas emissions, with the objective of achieving a carbon-neutral society by the year 2030. Norway has made significant investments in renewable energy sources, such as hydropower, wind power, and solar power, which has positioned the nation as a global leader in generating offshore wind energy. Although strides have been made, there remain obstacles to overcome in Saudi Arabia and Norway. The shift towards sustainable energy resources is a multifaceted undertaking that necessitates substantial investment in emerging technologies and infrastructure. Furthermore, the environmental consequences of oil and gas development cannot be overlooked, and both nations still persist to decrease the harmful impact on environment of their conventional energy production, but on different levels.

Chapter II. The logic of case selection

In this chapter, I will articulate on similarities of Saudi Arabia and Norway systems from a political, economic and ecological outlooks. With regards to the former, I have pinpointed four main points in common: both are oil-rich countries who established governmental structures with significant control over energy policies; the establishment of state-owned oil companies that play a crucial role

[119] Ibid

in the energy sector; the presence of governments that exert substantial control and influence energy policies and regulations, both countries face calls for diversification away from fossil fuels and towards sustainable sources. Regarding the second, the heavy reliance on oil revenues to support their economies; establishment of sovereign wealth funds; the implementation of economic diversification strategies to reduce dependence on oil and foster sustainable economic growth. Lastly, from an ecological viewpoint; the challenges associated with oil extraction, such as carbon emission, habitat destruction, and pollution are alarming; the demonstration of commitments to addressing environmental issues through the adoption of renewable sources and environmental regulations. Thereafter, the reasons for the selection of cases will be explicitly presented. Later on, I will explore different alternatives hypotheses and demonstrate how they fail to provide the reality.

2.1 Attitudes towards Economic and environmental sustainability

The study articulates on two oil-rich countries, Norway and Saudi Arabia, and their initiatives towards the sustainable economy and environment. The reason I decide to address these two countries is the political influence in shaping and implementing energy development policies. The paradox lies in the fact that these two kingdoms have very similar characteristics from a politico-economic and ecological viewpoint, and one would therefore also expect parallelism in sustainable economy and environment context, but it is not the case (Table 1). The two kingdoms have implemented political stability with strong government influence over energy development policies and an oil-dependent economy. Also, they have economic stability and are built on traditional values and beliefs, and have implemented several initiatives to alleviate oil extraction impacts on environment through energy transition. Despite these, Norway follows a democratic governance system to implementing a sustainable economy and environment, while for Saudi Arabia follows autocratic governance system.

MOST-SIMILAR CASES

Political Influence over energy-based policies	Strong government's influence	Strong government's influence
Economic model	Oil-dependent economy	Oil-dependent economy
Oil-based environmental impacts	Harmful impacts	Harmful impacts
Governance system(IV)	Autocratic	Democratic
Sustainable Economy and Environment (DV)	Mediocre	Excellent
	Saudi Arabia	**Norway**

Table 1. Personal elaboration of data showing the similarities, the independent variable and the dependent variable of Saudi Arabia and Norway.

The logic applied to the selection of cases studies follows the method of "most similar cases, different outcomes" invented by Mill and later modernized by Bob Hancké.[120]

It's legitimate to ask why Saudi Arabia was chosen rather than any other country which is struggling to adopt successful energy development policies. To clear more doubts over this, Saudi Arabia is now on boosting immensely its efforts to diversify its economy and address its environmental challenges. Besides, it has significant oil reserves. To start with, its economy has historically been heavily reliant on oil exports.its efforts towards economic diversification and alleviation of oil-dependence revenue through initiatives like Vision 2030 demonstrate a significant transformational

[120] Hancké, Bob. *Intelligent Research Design.* (Oxford: Oxford University Press, 2009)

agenda.[121] It faces various environmental challenges due to its rapid urbanization, arid climate and industrial growth. So far, water scarcity, waste management and air pollution are among the critical environmental concerns.[122] additionally, it possesses significant potential for renewable energy development, particularly wind and solar energy due to its abundant wind and sunlight resources. It occupies a unique position in global energy dynamics following its geopolitical influence in the Middle East and its role as a major oil producer.[123]

Through this method, it was analyzed the dependent and independent variables to explain the different degree of success between Norway and Saudi Arabia in the race towards a sustainable economy and environment. The dependent variable aims to examine the success in achieving sustainable economy and environment high (Norway) or low (Saudi Arabia). The independent variable is the democratic structure of governance and its influence on the implementation of a sustainable economy: Norway's governance is democratic; on other hand, Saudi Arabia's governance is autocratic. While trying to track on these two political concepts , I proceed with complete understanding by starting with definitions provided by scholars and move on with structure,establishment, characteristics and evolution in order to understand the genesis of the current reality.

II.1.1 Autocracy in Saudi Arabia

To begin with, Larry Diamond, a scholar of democracy, defines autocracy as "a *system where a single ruler or a small group exercises unchecked or unaccountable power. Autocracies are characterized by the absence of meaningful political competition, restrictions on civil liberties and freedom of expression, and a lack of institutionalized mechanisms for popular participation in governance".*[124]

Saudi Arabia's government structure is characterized by an absolute monarchy. Here, I describe the origin and distinctive features of this form of government considered as its pillars. Therefore, historical emergence of this political system can be traced back to the establishment of the modern Saudi state in the early 20th century and the subsequent consolidation of the power of the Saudi Family. In 1932, Abdulaziz ibn Saud unified the regions and establishes the Kingdom of Saudi Arabia, thus giving birth to modern Saudi state. This marked the beginning of the Saudi family's

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[121] Al-Yousef, N., Radhi, H., & Rehan, R. M. Saudi Arabia's Vision 2030: An assessment of strengths, weaknesses, opportunities, and threats. Sustainability, (2020), 12(7), 2624.
[122] Al-Ghamdi, S. G., Al-Mulhim, A., & Rahman, S. A review of air pollution and health impacts in Saudi Arabia. Environmental Science and Pollution Research, (2020)27(6), 6063-6080
[123] Saudi Arabian General Investment Authority. Renewable Energy. (2021) Retrieved from https://sagia.gov.sa/investment-opportunities/sectors/renewable-energy/ What are some specific initiatives?
[124] Dahl, R. A. Polyarchy: Participation and opposition.(1971) Yale University Press.

political dominance in the country. The monarchy's legitimacy is rooted in the A1 Saud family'd alliance with conservative religious leaders, known as the Wahhabis, which gives the ruling family religious legitimacy.[125] Saudi Arabia's authoritarian structure is characterized by the an absolute monarchy (Monarchical rule), with the king having ultimate authority over the executive, legislative, and judicial branches. The King serves as the head of the state and his decisions and policies determine the governance of the country. Traditionally, in the Saud family, succession to the throne is passed from brother to brother.[126] Furthermore, the Council of Ministers is the main executive body of Saudi Arabia. It is consisted of senior members of the royal family and other designated officials. Parliament assist the king in decision-making, policy formulation and administration. The King has power to appoint and remove members of parliament.[127] Then,the Shura Council " *Majlis al-Shura*" is a consultative body in Saudi Arabia. Its members are appointed by the King and advise on legislative matters. However, its powers are limited and it does not have the power to independently formulate or enforce laws. Lastly, Sharia law and Religious Institutions marked also a significant impact. Saudi Arabi's authoritarian government structure is closely tied to Sharia "*Islamic Law*" and religious institutions. The country follows a conservative interpretation of Islam and religious institutions play an important role in shaping social and legal norms.[128]

The government system in Saudi Arabia, which is characterized by a concentration of power monarchical rule, has undergone significant changes and adaptations over time. While the fundamental elements of the system have persisted, certain developments reflect the evolving dynamics and demands within the kingdom. Notably, Saudi Arabia has taken steps to institutionalize its governance structures, as demonstrated by the establishment of formal institutions such as the Council of Ministers and the Consultative Assembly (*Majlis al-Shura*). these institutions, although their powers are restricted, offer avenues for broader participation and consultation within the context of an autocratic framework, and serve as mechanisms for policy formulation and advisory functions.[129] In addition, Succession and generational shifts are inevitable in any organization. Succession in the ruling AL Saud family has gone through generational changes with power passing from one king to another. Each new king introduces his priorities and initiatives, setting the direction of governance. Notably, the rise of the King Salman in 2015 marked a transition to a new generation of leadership, with hiss on Crown Prince Mohammed

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[125] Hertog, S. Princes, Brokers, and Bureaucrats: Oil and the State in Saudi Arabia. (2010) Cornell University Press
[126] Ibid
[127] Al-Rasheed, M. A History of Saudi Arabia. (2010).Cambridge University Press.
[128] Hertog, S. Princes, Brokers, and Bureaucrats: Oil and the State in Saudi Arabia. (2010)Cornell University Press.
[129] Ibid

bon Salman playing a prominent role in promoting economic and social reforms under Vision 2023.[130]

The transfer of power within the Al Saud family has undergone generational changes, with each king introducing their own objectives and programs to influence the course of governance. King Salman's rise to power in 2015 signified a transition to a newer generation of leadership, where his son, Crown Prince Mohammed bin Salman, has taken a significant role in spearheading far-reaching social and economic transformations as part of Vision 2030. Another aspect is found in social and economic reforms. In recent years, Saudi Arabia has launched a series of social and economic reforms to diversify the economy, increase social openness and reduce dependence on oil revenue. These reforms are also part of the Vision 2030 agenda and changes have been brought such as expansion of entertainment options, allowing women to drive, tourism promotion and foreign investment attraction, all these measures reflect efforts to accommodate social aspirations and respond to economic and social challenges within an authoritarian framework.[131] Finally, during 2017, Saudi Arabia initiated a well-publicized operation against corruption. This led to the detention and arrest of many notable figures, including influential members of the royal family and affluent business leaders. The campaign was viewed as a move to consolidate authority, put a stop to corruption, and establish a dedication to responsible governance. Despite being a subject of debate, the operation highlighted attempts made to tackle governance concerns within the autocratic framework.[132]

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[130] Hertog, S.Saudi Arabia's Emergent Crown Politics: Unraveling the Dynamics of Regime Change. International Journal of Middle East Studies, (2020), 52(4), 603-620.
[131] Al-Rasheed, M. Vision 2030: A Paradigm Shift in Saudi Arabia. Journal of Arabian Studies, (2020), 10(1), 9-27.
[132] Ibid
[133] Hertog, . Saudi Arabia's Emergent Crown Politics: Unraveling the Dynamics of Regime Change. International Journal of Middle East Studies, (2020), 52(4), 603-620.

II.1.2 Parliamentary democracy in Norway

Parliamentary democracy is a type of governance in which the legislative branch is responsible of overseeing the executive branch, and the government's legitimacy is based on the support it receives from the parliament. According to the political scientist Robert A. Dahl, "*parliamentary democracy is a system of governance in which the government is accountable to the parliament, and the parliament has the authority to elect and dismiss the government."*[134] This type of system guarantees that the executive branch is responsible to the people's elected representatives. Therefore, Norway's adoption of parliamentary democracy can be traced back to the late 19th and early 20th centuries after gaining independence from Sweden in 1905. the Constitution of Norway, which was ratified in 1814 and has undergone several amendments over time, establishes the legal framework for parliamentary democracy's operation. Over time, Norway's suffrage rights have expanded, promoting a more inclusive political system. In 1913, men were granted universal suffrage, while women were granted the right to vote in 1918. these developments contributed to the establishment of a more representative democratic system. A diverse range of political parties has emerged in Norway, and coalition governments have become a tradition. While, the Labour Party "*Arbeiderpartiet*" has been a dominant political force for several decades, other parties such as the Conservative Party "*Høyre*" and Progress Party "*Sosialistisk Venstreparti*" have also played significant roles. Norwegian Parliamentary democracy is characterized by a tradition of stability and consensus-oriented politics. Political parties rely on dialogue and negotiation to reach broad agreements on policies issues, with the aim of promoting stability, inclusivity, and social cohesion within the political system. In order to remain relevant in modern times, Norway has undergone constitutional reforms to adapt its parliamentary democracy. These reforms include the 1990 alteration of succession laws, allowing for gender-neutral succession to the throne, and the incorporation of the European Convention on Human Rights into the Norwegian Constitution in 1999. Public participation and engagement in the political process are encouraged in Norwegian parliamentary democracy. The right to vote is extended to all citizens, and political parties interact with the public through various means such as campaigns, debates, and public consultations. In recent years, the Norwegian parliamentary democracy has encountered multiple current-day issues and discussions. These include topics concerning social welfare, immigration, and climate change, gender equality, and the equilibrium between economic advancement and environmental preservation. Political parties and civil society organizations are actively involved in these conversations, playing a role in the establishment of policies and laws.

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II.1.3 Energy-based similarities

A. Political influence

From a political point of view, both countries demonstrate a common strong political influence over energy development policies.

Saudi Arabia's energy development policy is regulated by various government bodies. The Ministry of Energy (MOE) and Saudi Aramco are key regulatory bodies responsible for regulating petroleum and gas in Saudi Arabia, and developing the country's energy policy.[135] Ownership and control of energy resources is heavily dominant. In Saudi Arabia devoted the complete control of country's oil trough state owned company (Saudi Aramco), the dominant player in Saudi Arabia's energy sector, largely due to its immense oil reserves and vertical integration. The company was founded in the 1930s, and its first significant milestone came with the commencement of commercial oil production from Dammam No. 7 in 1938.[136] This event was pivotal in the foundation of Saudi Arabia's future prosperity and the success of Aramco. In 1960, Saudi Aramco played an instrumental role in the creation of OPEC, the most important organization in the oil market today, which coordinates oil production policy among the world's major oil producers, excluding the USA and Russia.[137] The second half of the 20th century saw Saudi Aramco reach an unrivaled scale and level of technological sophistication. The industrial revolution, made possible by the development of industrial infrastructures, constitutes major achievements of human creativity and engineering.[138] Today, Saudi Arabia is recognized worldwide as a key player in the oil industry, and Saudi Aramco has become the most powerful company in the global oil industry. In 1988, the Saudi Council of Ministers approved the creation of Saudi Arabian Oil Company (Saudi Aramco), which would take over all of Aramco's responsibilities.[139] Additionally, in 1980, the Saudi government increased its interest in Aramco to 100%, and in 1988, His Excellency Ali I. Al-Naimi became the first Saudi president and CEO of Saudi Aramco. Over time, Saudi Aramco has grown in size and influence, playing a pivotal role in the modernization and development of Saudi Arabia.[140] Saudi Aramco has several strengths that

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[135] Saudi Arabia - Power. (n.d.) Retrieved May 21, 2023, from www.trade.gov/country-commercial-guides/saudi-arabia-power

[136] Driven by the curiosity to explore. (n.d.) Retrieved May 21, 2023, from www.aramco.com/en/who-we-are/overview/our-history

[137] From an unexplored desert to a near $2 trillion IPO: The 86-year history of Saudi Aramco in pictures. (n.d.) Retrieved May 21, 2023, from www.businessinsider.com

[138] The Oil Industrial Heritage in Saudi Arabia. (n.d.) Retrieved May 21, 2023, from whc.unesco.org/en/tentativelists/6639/

[139] From an unexplored desert to a near $2 trillion IPO: The 86-year history of Saudi Aramco in pictures. (n.d.) Retrieved May 21, 2023, from www.businessinsider.com

[140] The Oil Industrial Heritage in Saudi Arabia. (n.d.) Retrieved May 21, 2023, from whc.unesco.org/en/tentativelists/6639/

position it as a dominant player in the oil and gas industry. For instance, it has massive reserves, an expansive network of facilities and infrastructure, and a skilled workforce with advanced technology.[141] Moreover, Saudi Aramco consistently expands its market reach and diversifies its business through strategic investments, joint ventures, and international partnerships.[142] The company generates massive revenues by extracting, producing, and selling crude oil, natural gas liquids, and natural gas. It is also involved in the downstream sector, including refining, processing, and distribution of oil-based products like petrochemicals and lubricants. With vast oil and gas reserves, Saudi Aramco profits immensely from supplying both local and international markets.[143] Saudi Aramco's operations and strategies have evolved significantly over time to shape Saudi Arabia's energy sector. The company has been producing carbon-based fuel since 1938.[144] Additionally, the Ministry of Energy, Industry and Mineral Resources (MEIM) is involved in promoting and deploying renewable energy technologies, and is responsible for leading the National Renewable Energy Program (NREP).[145] The Renewable Energy Project Development Office (REPDO), which is part of MEIM, is responsible for the delivery of the NREP.[146] Another regulatory body involved in Saudi Arabia's energy development policy is the Water and Electricity Regulatory Authority (WERA), which is mandated to implement electricity and water desalination rules and regulations in the Kingdom with the support of other state and provincial institutions. Moreover, the Saudi Power Procurement Company (SPPC) plays a role in regulating energy development policy in Saudi Arabia but does not offer an online procurement portal.[147] The Ministry of Finance oversees the procurement law and its implementation, as well as administering the procurement portal, Etimad. The Ministry of Energy is another key regulator in Saudi Arabia's energy development policy. It is responsible for the implementation of various energy policies and the oversight of the National Energy Efficiency Program (NEEP).[148] The ministry also oversees the development of renewable energy sources and the promotion of energy

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[141] Saudi Aramco: Business Model, SWOT Analysis & Competitors 2023. (n.d.) Retrieved May 21, 2023, from blog.gitnux.com/companies/saudi-aramco/

[142] Ibid

[143] Ibid

[144] Net Zero Saudi Arabia: How Green Can the Oil Kingdom Get? (n.d.) Retrieved May 21, 2023, from www.bakerinstitute.org

[145] Processes | Free Full-Text | Renewable Portfolio Standard Development Assessment in the Kingdom of Saudi Arabia from the Perspective of Policy Networks Theory. (n.d.) Retrieved May 21, 2023, from www.mdpi.com/2227-9717/9/7/1123

[146] export.gov. (n.d.) Retrieved May 21, 2023, from www.export.gov/apex/article2?id=Saudi-Arabia-Power

[147] Saudi Arabia - Power. (n.d.) Retrieved May 21, 2023, from www.trade.gov/country-commercial-guides/saudi-arabia-power

[148] ? Processes | Free Full-Text | Renewable Portfolio Standard Development Assessment in the Kingdom of Saudi Arabia from the Perspective of Policy Networks Theory. (n.d.) Retrieved May 21, 2023, from www.mdpi.com/2227-9717/9/7/1123

efficiency. Furthermore, it works closely with Saudi Aramco and the Ministry of Finance to ensure that the country ’s energy plans are effectively implemented. The Saudi Electricity Company (SEC) is one of the most important regulatory bodies in Saudi Arabia's energy development policy. The SEC is responsible for the country's electricity production and supply, as well as the development of related technology and services.[149] It works in cooperation with the Ministry of Energy to ensure that the country's electricity needs are met and Previously, the Electricity and Cogeneration Regulatory Authority (ECRA) was involved in Saudi Arabia's energy development policy before it was changed to WERA.

Deep down, Regulatory bodies play a pivotal role in ensuring the effective implementation of energy policies and programs. The Ministry of Energy (MOE) is responsible for preparing policies and strategies for the electricity sector, with the Electricity & Co-Generation Regulatory Authority (ECRA) coordinating with the MOE in this regard.[150] One of the main responsibilities of regulatory bodies is to supervise the implementation of policies and strategies in a manner that protects consumer rights and nurtures economic growth. This includes ensuring electrical service reliability, lowering costs, strengthening the power grid, encouraging fair and active private sector development, and ensuring power supplies reach previously under served areas.[151] The MOE also determines the Kingdom's energy mix and localizes jobs while supporting research and development activities related to the electricity sector.[152] Regulatory bodies have different approaches to achieving emissions reductions. For instance, prescriptive requirements are commonly used to regulate emissions, with operators being required to replace high-bleed pneumatic valve controllers with low-bleed or no-bleed alternatives and prohibit installation of high-bleed equipment.[153] Regulatory bodies are also responsible for implementing methane-specific regulations in most jurisdictions. Additionally, they provide licenses to energy service companies to implement projects to audit and renovate buildings. The regulatory bodies have implemented strict control measures for energy efficiency products and carried out awareness campaigns at the national level, while the Supreme Committee for Hydrocarbon Affairs plays a role in establishing energy policies and programs.The coordination between these regulatory bodies is part of the Kingdom's larger mission to diversify its energy sources. One example of this is the integration of solar and wind energy into the existing energy mix. The Saudi Energy Efficiency Center, or SEEC, was established to coordinate efforts towards this goal.[154] This

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[149] export.gov. (n.d.) Retrieved May 21, 2023, from www.export.gov/apex/article2?id=Saudi-Arabia-Power

[150] (n.d.) Retrieved May 21, 2023, from www.vision2030.gov.sa/thekingdom/explore/energy/

[151] Ibid

[152] Ibid

[153] Driving Down Methane Leaks from the Oil and Gas Industry. (n.d.) Retrieved May 21, 2023, from www.iea.or g

[154] The push for Alternative Energy - Lexology. (n.d.) Retrieved May 21, 2023, from www.lexology.com

center works to reduce greenhouse gas emissions, increase energy efficiency, and diversify energy sources through the development of renewable energy sources. The SEEC works closely with other regulatory bodies in Saudi Arabia to ensure that the country meets its energy targets. The Saudi Electricity and Co-generation Regulatory Authority (ECRA) is tasked with regulating the electricity and co-generation sector. This includes setting tariffs, licenses, and monitoring the performance of the companies engaged in the sector. ECRA has the authority to set tariffs and issue licenses, and has been instrumental in developing regulations for the energy industry in Saudi Arabia.[155] It establishes tariffs for energy providers and monitors the compliance of energy users with the regulations. ECRA also ensures that the energy industry meets the demands of energy consumers in the Kingdom.

Within this framework, Saudi Arabia's long-term energy planning focuses on Government Frameworks, Financial Support, and Subsidies. Saudi Arabia has taken various steps in recent years to ensure a sustainable and reliable supply of electricity to meet the growing demand for energy in the country. The Ministry of Energy, which is responsible for determining the energy mix, is working towards maximizing the supply of local electrical goods and services to lower costs and strengthen the Kingdom's power grid.[156] KA-CARE, a government agency, has introduced a long-term energy plan for Saudi Arabia until 2032. The proposed supply mix includes fossil fuels and clean sources, with nuclear, geothermal, waste-to-energy, and solar accounting for the remaining second half of electricity's generation capacity.[157] The aim of this plan is to diversify energy sources, reduce dependence on oil, and deploy environmentally-friendly sustainable energy sources.[158] The government is taking efforts and actions to address energy-related challenges and take advantage of available opportunities. The Ministry of Energy prepares policies and strategies for the electricity sector. A Saudi Energy Efficiency Program was launched in 2012 to oversee the implementation of standards and measures.[159] The Saudi government is committing to an ambitious subsidy-removal program for natural gas and oil, with retail power prices being increased for all customer types as a part of the program. Furthermore, Saudi Vision 2030 aims to diversify the economy away from oil while increasing the role of the private sector.[160] The Saudi Arabian government has recognized the need to transition from oil dependence to more sustainable energy sources. However, it argues that it needs oil revenue to

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[155] Ibid

[156] What Is Saudi Aramco? Its History, IPO, and Financials. (n.d.) Retrieved May 21, 2023, from www.investopedia.com/what-is-saudi-aramco-4682590

[157] Ibid

[158] Ibid

[159] Climatescope 2022 | Saudi Arabia. (n.d.) Retrieved May 21, 2023, from www.global-climatescope.org/markets/sa/

[160] Ibid

fund its energy transition strategy.[161] To help Saudi Arabia raise funds for emission reduction technologies, such as carbon capture, the government uses oil revenue to support research and development of new climate-friendly technologies. Oil revenue funds more than half of the government's budget in Saudi Arabia, and therefore the government intends to allow the oil-dependent country to continue running its rigs.[162] Despite this, the government's financial support for long-term energy planning does not affect Saudi Arabia's recent pledge to reduce its own emissions to net zero by 2060. One way the government is providing financial support for long-term energy planning is through an investment plan of USD$30 billion in the renewable energy sector by 2025, which aims to reduce domestic reliance on oil.[163] The government has also launched a $50 billion program to boost power generation and cut oil consumption.[164] As part of this program, the Saudi government is planning to develop 30 solar and wind projects over the next nine years. The National Renewable Energy Program (NREP) is a long-term renewable-energy strategy designed to balance the domestic power mix to deliver long-term economic stability and prosperity to the Kingdom. The NREP is being phased and rolled out in a systematic and transparent way to ensure that the Kingdom benefits from the cost-competitive nature of renewable energy. It is led by the Ministry of Energy, Industry, and Mineral Resources (MEIM) and is part of Saudi Arabia's National Transformation Program (NTP) and Vision 2030.[165] The government provides financial support for the NREP through tendering projects that procure a mix of renewable energy technologies. The NREP targets to generate 3.45 gigawatts (GW) of renewable energy by 2020 and 9.5GW by 2023, and the Renewable Energy Project Development Office (REPDO), part of MEIM, is responsible for the delivery of the NREP.[166]In addition, the Saudi Public Investment Fund has invested around SR1.5 trillion (US$400 billion) since 2016 in alternative energy, and foreign investments in Saudi Arabia's energy sector have increased significantly over the same period. Then, Saudi Arabia currently provides subsidies for a wide range of energy products, and these subsidies have been relied on by businesses for a competitive edge.[167] However, the government is now slowing down the subsidies as part of a new long-term fiscal program. Eliminating subsidies is key to making the country use energy more efficiently and curbing demand growth.[168] The plan involves raising the price of electricity and cutting subsidies through two phases, mainly targeting the residential sector. Under the new fiscal

[161] . Saudi Arabia's climate plan relies on more oil. (n.d.) Retrieved May 21, 2023, from www.eenews.net
[162] Ibid
[163] Saudi Vision 2030: What are Saudi Arabia's Plans for the Future? (n.d.) Retrieved May 21, 2023, from earth.org/saudi-vision-2030/
[164] export.gov. (n.d.) Retrieved May 21, 2023, from www.export.gov/apex/article2?id=Saudi-Arabia-Power
[165] Ibid
[166] Ibid
[167] UPDATE 1-Saudi Arabia slows phasing out energy subsidies under budget plan. (n.d.) Retrieved May 21, 2023, from www.reuters.com/article/saudi-energy-idAFL8N1OK2PQ
[168] Ibid

program, most domestic energy product prices will be linked to international benchmark prices over a longer period. The government provides continued subsidies for energy, but these subsidies cause a monetary burden to the government and threaten the sustainability of the Kingdom's energy sources, given that the economy of Saudi Arabia is oil-based.

Within the similar scope, Norway has a well-established legal framework governing the energy industry, with several regulatory bodies working together. The Ministry of Petroleum and Energy (MPE) holds the primary responsibility for Norwegian energy policy. The MPE ensures that the government's management is carried out according to guidelines set by the Storting and the Government.[169]The Norwegian Water Resources and Energy Directorate (NVE) manages energy resources and is the licensing, preparedness, and rationing authority. The Norwegian Water Resources and Energy Regulatory Authority (NVE-RME) regulates the electricity and natural gas markets, while the Norwegian Electricity Appeal Board is an independent appellate body for complaints filed against the NVE-RME's decisions.[170] Norway's renewable energy industry is regulated by the European Union's internal energy market, which is responsible for ensuring that the country follows several directives and regulations related to the sector.[171] Land use in Norway is managed through plans, which must be researched through planning programs, descriptions of plans, and environmental impact assessments (EIAs). The Planning and Building Act is one of the most important acts for the energy industry, and its requirements are in addition to those that follow from the Energy Act, the Water Resources Act, and the Watercourse Regulation Act.[172] The Ministry of Education and Research oversees the Research Council of Norway, which is involved in managing appropriations for energy research. The Ministry of Petroleum and Energy is the largest provider of funds to energy research and development programs within Research Council's programs. [173]Additionally, Norway cooperates closely with the EU on energy and climate matters, participating in the European Union's internal energy market. It has an agreement with the EU to participate in EU climate legislation for 2021-2030, including the EU Emissions Trading System (EU ETS) and the Effort Sharing Regulation (ESR) for non-ETS emissions, as well as the Fit for 55 package, which updates all three regulations.[174] The Ministry of Petroleum and Energy is also responsible for the country’s energy policy, including the development of the

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[169] In review: renewable energy policy and regulation in Norway - Lexology. (n.d.) Retrieved June 1, 2023, from www.lexology.com
[170] Ibid
[171] Executive summary – Norway 2022 – Analysis - IEA. (n.d.) Retrieved June 1, 2023, from www.iea.org/reports/norway-2022/executive-summary
[172] In review: renewable energy policy and regulation in Norway - Lexology. (n.d.) Retrieved June 1, 2023, from www.lexology.com
[173] The Energy Administration in Norway. (n.d.) Retrieved June 1, 2023, from www.regjeringen.no
[174] Ibid

national energy framework. This involves the implementation of the government's energy plans, the development of long-term strategies and measures to promote renewable energy, and the development of measures to improve energy efficiency and reduce emissions. Also, Equinor formerly known as Statoil, was established by the Norwegian parliament to develop the oil and gas industry in Norway.[175] Since its inception, Equinor has been a significant player in Norway's energy sector. It has helped to expand oil and gas production, making Norway one of the world's most prolific petroleum provinces.[176] Equinor's commitment to responsible oil and gas exploration, production and development is unwavering, but it is also investing in renewable energy projects such as offshore wind farm.[177]Equinor is the largest oil and gas operator on the Norwegian Continental Shelf (NCS), and it continues to scale up gas production from the NCS to meet growing demand. In June 2021, Equinor brought the Martin Linge field on stream, which was fueled by electric power from shore. This is a significant step for Equinor as they aim to become a net-zero company by 2050, including emissions from production to final energy consumption.[178] Equinor's commitment to renewable energy is further demonstrated by its decision to develop the third phase of the Dogger Bank offshore wind farm and the Northern Lights development for carbon transport and storage. In August 2021, Equinor developed the third phase of the Troll field, which produced from the Troll West gas cap.[179]As a company, Equinor is supportive of Norway's transition to a sustainable, low-carbon future, and it is playing a pivotal role in achieving this goal.[180]Additionally, Equinor has played a critical role in expanding Norway's oil and gas production, responsible for 70% of this sector's output in the country.[181] The company's energy development policies have been shaped by the need to fill the gap left by Russia's reduced oil and gas deliveries, a task that Equinor is well-equipped to handle due to its experience and expertise in the field of energy production.[182] Ultimately, Equinor is committed to continuing as Norway's energy champion and playing a crucial role in the country's energy industry. Overall, all the regulatory bodies play a crucial role in managing and overseeing various aspects of the energy industry. The Ministry of Petroleum and Energy (MPE) is the licensing authority for hydropower production, grid installations, and power plants over a certain capacity

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175 Our history. (n.d.) Retrieved June 1, 2023, from www.equinor.com/about-us/our-history

176 Ibid

177 Norway. (n.d.) Retrieved June 1, 2023, from www.equinor.com/where-we-are/norway

178 Our history. (n.d.) Retrieved June 1, 2023, from www.equinor.com/about-us/our-history

179 Ibid

180 Norway. (n.d.) Retrieved June 1, 2023, from www.equinor.com/where-we-are/norway

181 Norway's Energy Transition: Lessons for Europe. (n.d.) Retrieved June 1, 2023, from www.energypolicy.columbia.edu

182 Ibid

or voltage onshore.[183] The King in Council grants licenses for new and large grid installations, as well as electrical installations in conjunction with hydropower plants.[184] Regulatory bodies such as MPE and NVE are responsible for granting licenses based on the scale and effect of the projects. NVE grants licenses for smaller projects related to power plants and grid installations, while MPE is responsible for granting plant licenses for building, owning, or operating power plants and grid installations over a certain capacity or voltage onshore.[185] The government issues licenses for the acquisition of leasehold or ownership rights to waterfalls for power production, and the Waterfall Rights Act requires a license from the government for ownership rights to waterfalls for power production. The NVE-RME is responsible for granting trading licenses for electricity, while the DSO is responsible for building, owning, and operating installations in the distribution grid within its geographical area, under an area license that obligates the licensee to deliver electrical energy to all customers within the license area.[186] The Watercourse Regulation Act and the Water Resources Act require licenses for hydropower production over a certain capacity or that affect natural conditions/public interests. Licenses are issued based on the condition that the advantages of the project outweigh the damages and disadvantages to public or private interests, and are required for projects that may cause damage or disadvantage to public interests.[187] Environmental Impact Assessments (EIAs) are required for power plants and grid installations if the projects may have substantial effects on the environment, society, and nature conservation. The requirements for EIAs depend on the scale and effect of the projects.[188] Lastly, over 100 distribution system operators (DSOs) are responsible for power distribution in their respective geographical areas on the distribution level, while Statnett is responsible for operating and owning the transmission grid and maintaining balance between power production and consumption.

However, Norway has been at the forefront of energy diversification efforts, leveraging its existing strengths in the energy sector to explore new areas such as carbon capture and storage (CCS) and hydrogen.[189] The Norwegian government plays a crucial role in the country's energy diversification plans by investing in cleantech industries and channeling its oil wealth into new ventures. Equinor, the state-owned energy company in Norway, has played a critical role in

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183 The Energy Administration in Norway. (n.d.) Retrieved June 1, 2023, from www.regjeringen.no
184 Ibid
185 Ibid
186 In review: renewable energy policy and regulation in Norway - Lexology. (n.d.) Retrieved June 1, 2023, from www.lexology.com
187 Ibid
188 Ibid
189

expanding oil and gas production in the country while also investing in renewables, particularly offshore wind power.[190] Equinor's strategy for energy transition involves a balanced approach, investing in optimizing their oil and gas portfolio, renewables, and low-carbon solutions to provide high returns through energy transition while still increasing the production of oil and gas slightly up to 2026 and maintaining the same level after 2030.[191] With 98 percent of all electricity production in Norway coming from renewable sources such as hydropower, wind, and thermal energy, Norway is well-positioned to lead the world in new technologies for decarbonizing hard-to-abate sectors.[192] For the time being, Norway has been actively pursuing energy diversification efforts, and several projects are currently underway. One of the central projects is the Langskip project, which is being constructed with the aim of carbon capture and storage (CCS). The Langskip project comprises two full-scale capture facilities and one storage facility in the North Sea, and it is a critical part of the government's CCS policy.[193] Norway currently has two large-scale CCS projects operating, and another one is under development with the goal of supplanting oil and gas as the engine of the Norwegian economy. Start-ups in the cleantech sector are leading the charge in Norway's energy diversification efforts, and upgrades to existing hydro plants are also underway.[194] Furthermore, there is continued expansion of hydro capacity in Norway to diversify its energy portfolio. Norway is also cooperating with Germany to develop hydrogen gas power infrastructure by 2030, and the construction would facilitate the transfer of 'blue hydrogen' with an eye to eventually shifting to 'green hydrogen' capabilities between the two states.[195] Wind power has become a subject of greater interest in Norway's energy diversification efforts, and Norway continues to situate itself as a leader in the sale of electric vehicles (EVs). To support the development of low-carbon hydrogen, the Norwegian government offers several R&D-related support measures, and it published a Hydrogen Strategy in June 2020, followed by a white paper in 2021 that included a road map for hydrogen production and use in the 2025, 2030 and 2050 horizons.[196]The government's vision is to develop a coherent value chain where production, distribution, and use are developed in parallel, ultimately fostering energy diversification efforts. So far, one could question the progress of these efforts but Norway's energy diversification efforts

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[190] Norway’s Energy Transition: Lessons for Europe. (n.d.) Retrieved June 4, 2023, from www.energypolicy.columbia.edu

[191] Ibid

[192] . Renewable energy production in Norway. (n.d.) Retrieved June 4, 2023, from www.regjeringen.no

[193] Norway’s Energy Transition: Lessons for Europe. (n.d.) Retrieved June 4, 2023, from www.energypolicy.columbia.edu

[194] Inside Norway’s efforts to move on from oil and gas. (n.d.) Retrieved June 4, 2023, from www.energymonitor.ai

[195] The Black, the Blue and the Green: Norway’s Energy Dilemmas. (n.d.) Retrieved June 4, 2023, from overthecircle.com

[196] Norway’s Energy Transition: Lessons for Europe. (n.d.) Retrieved June 4, 2023, from www.energypolicy.columbia.edu

have made significant strides in recent years. One of the main initiatives includes investing in renewable energy projects, such as offshore wind farms, to support the country's transition to a sustainable, low-carbon future.[197] However, Norway's stubborn stance on petroleum has slowed down their progress in this area, as they have yet to reach a resolution with the EU on a Green Alliance for industry. The European Commission has further rejected Norway's attempts to secure a commitment to its oil and gas beyond 2030.[198] The country is positioning itself as a clean energy superpower and is diversifying its energy supply through investment in offshore wind, with Equinor, Norway's largest company, committing to investing USD 23 billion in renewables over the next five years. Norway's progress in energy diversification efforts is fast, with the country proving to the world that smart thinking and technology can bring about significant change when coupled with government will[199]. While renewable energy may not generate the same revenue as fossil fuels, projections estimate that Norway's renewable exports will reach €8 billion by 2030.[200] So far, Norway has earned around €1 billion from renewable exports. Furthermore, Norway has successful carbon capture and storage technology for 25 years, industries built to produce high-performing wind, hydropower, and hydrogen infrastructure, and expertise in building floating terminals for offshore wind development.[201] Despite the vast revenue difference between fossil fuels and renewable energy for Norway, their energy diversification efforts have been successful, and the country continues to earn dividends off of their expertise.

B. Oil-dependent economy model

Saudi Arabia's economy has historically been heavily dependent on oil production. The oil sector has contributed over 40% to Saudi Arabia's real GDP, with oil receipts accounting for around 85%

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197 Norway. (n.d.) Retrieved June 4, 2023, from www.equinor.com/where-we-are/norway
198 Norway - Offshore Energy - Oil, Gas and Renewables. (n.d.) Retrieved June 4, 2023, from www.trade.gov
199 Norway's leading the charge on a sustainable electric future. (n.d.) Retrieved June 4, 2023, from www.nationalgeographic.com
200 Norway Is Planning to Profit From Climate Change. (n.d.) Retrieved June 4, 2023, from foreignpolicy.com
201 Ibid

of exports and almost 90% of fiscal revenue.[202]The oil price boom from 2003 to 2014 provided strong growth, allowing the economy to grow by an annualized 5%, and Saudi Arabia's GDP more than tripled in size during this period. [203]However, the enduring problem of phasing out oil dependency is difficult because oil plays a major role in fiscal stability, with Saudi Arabia's external and fiscal break even oil prices in 2020 estimated by the IMF to be US $45.3 and US $66 per barrel, respectively. The entire economy of Saudi Arabia is different from a normal economy as the government does not tax the people, but instead, provides them with services and welfare state options. This makes it a distributive state rather than a productive state, where the government distributes wealth rather than the people producing it.[204] As of 2022, Saudi Arabia earns 80% of its export income through oil, which is still the main pillar of the country's economy, contributing to about three-quarters of the governmental revenues.[205]The discovery and exploitation of oil in Saudi Arabia are deeply intertwined with the history of the Kingdom and its global status, but also with world history and development in the 20th century.[206] In fact, Saudi Arabia is the world's leading exporter of oil, and the industrial legacy of its oil heritage relates not only to wells and refineries, but also to pipelines, sea terminals, and the ensemble of intellectual, human, and technical exchanges between East and West, South and North that permitted the global distribution of this resource throughout the world. The revenues from oil have been used for domestic development, including infrastructure projects such as transportation and sewer systems, which have contributed to the country's economic growth over time. It should be noted that oil has also contributed to social development, such as an increase in life expectancy from 40 in 1950 to 75 in 2022.[207]

In a bid to safeguard the oil wealth, Saudi Arabia established a sovereign wealth fund (Public Investment Fund). The Public Investment Fund (PIF) is a sovereign wealth fund that was established in 1971 by King Faisal bin Abdulaziz Al Saud through Royal Decree M/24.[208] Initially, the PIF only oversaw the Saudi state's equity in listed firms. However, the PIF has since evolved to become an active engine behind the diversification of Saudi Arabia's economy. PIF

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[202] The Loss of Raw Material Criticality: Implications of the Collapse of Saudi Arabian Oil Exports. (n.d.) Retrieved May 21, 2023, from www.intereconomics.eu

[203] . " rel="home">ISPI. (n.d.) Retrieved May 21, 2023, from www.ispionline.it

[204] . Saudi Arabia Confronts Its Oil Dependence. (n.d.) Retrieved May 21, 2023, from kleinmanenergy.upenn.edu

[205] What Saudi Vision 2030 Means for the Future of Oil-Dependent Economies. (n.d.) Retrieved May 21, 2023, from www.glimpsefromtheglobe.com

[206] The Oil Industrial Heritage in Saudi Arabia. (n.d.) Retrieved May 21, 2023, from whc.unesco.org/en/tentativelists/6639

[207] What Saudi Vision 2030 Means for the Future of Oil-Dependent Economies. (n.d.) Retrieved May 21, 2023, from www.glimpsefromtheglobe.com

[208] (n.d.) Retrieved June 2, 2023, from www.vision2030.gov.sa/v2030/vrps/pif /

aims to become one of the largest sovereign wealth funds in the world and consolidate its position in shaping the future of the global economy.[209] To achieve this, the PIF focuses on developing specific strategic sectors through cultivating and maximizing the impact of its investments, with a keen focus on sustainable investments, both domestically and internationally. PIF invests in various funds and has a world-class investment portfolio.[210] The PIF is a Gulf sovereign wealth fund that operates more like a private equity fund, with Saudi citizens considered as owners of the fund.[211] The PIF has expanded its staff from 50 in 2015 to almost 500 in 2018 and aims to be the preferred investment partner.[212] The PIF is related to the Crown Prince, Prime Minister, and Chairman of the Council of Economic and Development Affairs. The fund's ultimate goal is to diversify the kingdom's oil-reliant economy, which it is achieving by spreading Saudi Arabia's largesse through investing in sports teams, electric carmakers, new cities in the desert, and localizing technologies and knowledge.[213] In 2021, PIF invested $1 billion in a fund established by former Trump administration official Steven Mnuchin, demonstrating its global impact as an investor.

The Public Investment Fund (PIF) of Saudi Arabia has financed many significant projects and corporations that support the national economy and may contribute to the safeguarding of Saudi Arabia's oil wealth. The PIF provides financial support to strategic projects of national importance, including petroleum refineries, petrochemical industries, pipelines and storage, energy, minerals, water desalination, and infrastructural facilities. The fund also participates in the capital funding of bilateral and Pan Arab corporations.[214] Additionally, the transfer of funds to PIF contributes to safeguarding Saudi Arabia's oil wealth by ensuring that the government can generate revenues from crude oil exports to drive its reform program forward. The PIF's contributions may also help safeguard the economy from oil price fluctuations and stabilize it.[215] Furthermore, the PIF has received 4% of Saudi Aramco's shares worth $80 billion to tap into its vast profit pool. This not only strengthens PIF's presence within the global market but also potentially contributes to the safeguarding of Saudi Arabia's oil wealth.[216] Moreover, PIF could convert the extracted resource into a portfolio of other assets that yield a sustainable flow of income for current and future

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[209] Ibid
[210] (n.d.) Retrieved June 2, 2023, from www.pif.gov.sa/en/Pages/AboutPIF.aspx
[211] Saudi Arabia's Sovereign Wealth Fund: Borrowing Money to Make Money? (n.d.) Retrieved June 2, 2023, from www.aei.org
[212] . (n.d.) Retrieved June 2, 2023, from www.vision2030.gov.sa/v2030/vrps/pif /
[213] Ibid
[214] Public Investment Fund of Saudi Arabia: Definition and How Much. (n.d.) Retrieved June 2, 2023, from www.investopedia.com
[215] " rel="home">ISPI. (n.d.) Retrieved June 2, 2023, from www.ispionline.it
[216] Ibid

generations, thus expanding the investment strategy of the Saudi government well beyond oil and contributing to economic diversification [217].

The Public Investment Fund is a critical player in the global investment arena, with significant investments made across various sectors.[218] PIF employs a multi-pronged strategy to design and develop its initiatives, using investment pillars such as launching promising local sectors, developing local real-estate projects, launching and supporting major projects, and increasing and diversifying PIF's global assets. The fund is ambitious, with plans to propel the national economy forward and increase the percentage of international assets in its portfolio from 10% to 50% by 2030.[219] PIF's investment impact goes well beyond Saudi borders, with plans to invest $40 billion in infrastructure projects, mostly in the U.S. The fund is also incorporating loans and debt instruments into its long-term strategy.[220] PIF has purchased minority stakes in major US and Indian companies, including Boeing, Citigroup, Facebook, Disney, Bank of America, and Jio Platforms, and has invested in a diversified portfolio that includes construction, transportation, video game companies, luxury beach resorts, and even oil companies like BP. PIF has also committed $20 billion to a non-binding memorandum with Blackstone and aims to list 5% shares of Saudi Aramco by 2017.[221] Moreover, PIF is investing in giga-projects like NEOM, Qiddiya, and The Red Sea Project while exploring opportunities for foreign companies across various industry sectors.[222] While PIF reduced its holdings in US stocks in the third quarter of 2020, it still left a stake in Uber. Despite being secretive about its specific investment strategies, PIF's impressive portfolio demonstrates its robust presence in the global investment arena.

Saudi Arabia has historically relied on gas and oil exports for its economy, but since the 1970s, the country has been striving to diversify its economic base. The Saudi Vision 2030, launched in 2016, aims to reinforce and diversify the capabilities of the Saudi Arabian economy.[223] Despite having a tradition of planning, Saudi Arabia has not achieved any tangible outcomes in diversification. However, the country is now investing in other sectors such as tourism and

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[217] Ibid

[218] Saudi Arabia - Market Overview. (n.d.) Retrieved June 2, 2023, from www.trade.gov/knowledge-product/saudi-arabia-market-overview

[219] (n.d.) Retrieved June 2, 2023, from www.pif.gov.sa/en/Pages/AboutPIF.aspx

[220] Ibid

[221] Saudi Arabia - Market Overview. (n.d.) Retrieved June 2, 2023, from www.trade.gov/knowledge-product/saudi-arabia-market-overview

[222] Ibid

[223] Economic Diversification Trends in the Gulf: the Case of Saudi Arabia. (n.d.) Retrieved June 2, 2023, from www.ncbi.nlm.nih.gov/pmc/articles/PMC8397598 /

technology as part of its diversification efforts.[224] Significant investments have been made in the energy field and related industries, such as petrochemicals, chemicals, fertilizers, and aluminum. Aramco's vast revenues are crucial to realizing the Vision 2030 strategy, which seeks to reduce dependence on oil and increase the share of other productive sectors in GDP.[225] The government's success in diversifying the economy has been hampered by several factors, including the absence of a clear plan, government support for oil-dependent industries, private sector dependence on government spending, and lack of support for non-oil sectors like agriculture and service.[226] Nonetheless, since the launch of the Saudi Vision 2030, Saudi Arabia's economy has witnessed growth in multiple sectors, and the country is now one of the twenty largest global economies. The development plans aim to reduce dependence on oil and increase the share of other productive sectors in GDP.[227] To achieve this goal, several pillars have been identified, including the creation of a knowledge-based economy, encouraging entrepreneurship and enhancing private sector participation, achieving gender equality in the domestic job market, and investment in non-oil sectors such as tourism. The focus of the following section is on the progress of creating a knowledge-based economy in Saudi Arabia. The development plans have set out to create a knowledge-based economy that is focused on creating innovative and diverse sectors in the country. To achieve this, the government has taken steps to develop the education sector to train local talent and has invested heavily in research and development. This investment has seen a dramatic increase in the number of universities and research centres in the country.[228] In particular, the government has been focusing on higher education and research and development in the fields of science and technology to develop the local talent pool and ensure that the country is competitive in the knowledge economy. This has included the establishment of specialized institutes and universities for the purpose of advancing scientific and technological research. To further support its economic diversification efforts, the Saudi Arabian government has invested heavily in infrastructure projects. [229]This has included the construction of ports and airports as well as the development of roads and highways. These investments have helped to make the country more accessible to foreign businesses and investors. The government has also made efforts to attract foreign direct investment, which has helped to diversify Saudi Arabia's economy.

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[224] " rel="home">ISPI. (n.d.) Retrieved June 2, 2023, from www.ispionline.it
[225] Ibid
[226] Economic diversification in Saudi Arabia: Myth or reality?. (n.d.) Retrieved June 2, 2023, from www.sciencedirect.com
[227] Ibid
[228] Economic Diversification Trends in the Gulf: the Case of Saudi Arabia. (n.d.) Retrieved June 2, 2023, from www.ncbi.nlm.nih.gov/pmc/articles/PMC8397598/
[229] Ibid

Furthermore, the government has been working to develop the country's tourism sector.[230] It has invested heavily in infrastructure that will support visitors and attract more people to the country. This includes the construction of hotels, resorts, and other recreational facilities. It has also established several special economic zones to further encourage foreign direct investment. [231]These efforts have been successful in increasing the number of tourists who visit Saudi Arabia each year. The tourism industry in Saudi Arabia has been a major part of the country's economic diversification efforts. Recently, the government has been focusing on developing the cultural and religious tourism sectors by creating new tourist hubs such as the tourist city of Al-Ula. It has also undertaken several projects to enhance the infrastructure and services available to tourists. These include the completion of the Riyadh Metro, the expansion of the King Abdulaziz International Airport in Jeddah, and the creation of a new airport in Al-Ula.[232] Since the launch of its 'Vision 2030' initiative in 2016, Saudi Arabia has placed an even greater emphasis on diversifying its economy.

On a different track, Norway's economy has been heavily reliant on its oil and gas industry since its discovery in 1969. The oil and gas sector is the largest contributor to Norway's economy in terms of value added, government revenues, investments, and export value.[233] The Norwegian government has developed a financial and legal framework for the oil sector based on the principle of ensuring that future generations will benefit from Norway's petroleum wealth.[234] The State's Direct Financial Interest (SDFI) represents state-owned holdings in oil and gas fields, pipelines, onshore facilities, and 67% of the shares in Equinor. The Norwegian government collects a large portion of its revenue from the petroleum sector, which is used to fund government services and social programs.[235] The revenue from the petroleum sector is also used to finance the Government Pension Fund Global, which secures public pension expenditures and protects the country's long-term economy from volatility in oil and gas revenues.[236]

The oil and gas sector plays a pivotal role in the Norwegian economy, accounting for 17% of GDP in 2017, and generating over 50% of export revenue in 2018. The revenue generated by the gas sector in Norway has risen from 16% to 48% from 2001 to 2017, while the share of revenue

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[230] Ibid
[231] Ibid
[232] Ibid
[233] The government's revenues. (n.d.) Retrieved June 2, 2023, from www.norskpetroleum.no/en/economy/governments-revenues /
[234] Ibid
[235] Norges Bank. (n.d.) Retrieved June 2, 2023, from www.norges-bank.no
[236] Executive summary – Norway 2022 – Analysis - IEA. (n.d.) Retrieved June 2, 2023, from www.iea.org/reports/norway-2022/executive-summary

generated by the oil sector has declined from 84% to 52% over the same period.[237] Changes in energy prices can significantly impact the country's economic growth and employment rates. Furthermore, fluctuations in energy prices can also affect Norway's current account balance and trade surplus, which can have long-term repercussions.[238] In order to manage and invest oil wealth for the future the Norway's government established a sovereign wealth fund.

The Norway's SWF, officially named the Government Pension Fund Global, was established to ensure that both current and future generations of Norway benefit from oil wealth. The fund was established 19 years after production had started, in 1990, and initially created to hold surplus revenues from the country's oil trade.[239] Initially, the fund was called the National Insurance Scheme Fund (Folketrygdfondet) and was established in 1967 under the National Insurance Act. The name was changed to Government Pension Fund - Norway in 2006.[240] Norges Bank was delegated responsibility for managing the fund, with the Executive Board making the final decisions on exclusion, observation or active ownership. To perform ethical evaluations of companies, an independent Council on Ethics was set up by the Ministry of Finance. The Norwegian Parliament and the Ministry of Finance established rules for the management of the fund, which is broadly supported in the Norwegian Parliament, and its financial aspect is broadly accepted in Norwegian society.[241] It has a central role in the Norwegian economy, and the discussion about it has been ongoing since its establishment.

Norway's SWF, officially called the Government Pension Fund Global (GPFG), is one of the largest sovereign wealth funds in the world, with a value of NOK 240.2 billion at the end of 2017. The fund is primarily financed through the state's share of oil and gas revenues, making it a petroleum fund. The GPFG has several unique characteristics, including a sophisticated investment strategy, transparent institutional set-up, and strong political and ethical components when determining where to place investments.[242] The fund is managed by Norges Bank Investment Management (NBIM), a unit of Norges Bank, and holds nearly 1.5% of all shares within listed companies globally. The fund invests Norway's oil and gas revenue across the world

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[237] The dynamics of energy prices and the Norwegian economy: A common trends and common cycles analysis. (n.d.) Retrieved June 2, 2023, from www.sciencedirect.com

[238] Ibid

[239] CHAPTER 6 The Economics of Sovereign Wealth Funds: Lessons from Norway in: Beyond the Curse. (n.d.) Retrieved June 2, 2023, from www.elibrary.imf.org/view/book/9781616351458/ch006.xml

[240] Norway's Sovereign Wealth Fund. (n.d.) Retrieved June 2, 2023, from ideas.repec.org/h/spr/csrchp/978-3-030-56092-8_13.html

[241] About the fund | Norges Bank Investment Management. (n.d.) Retrieved June 2, 2023, from www.nbim.no/en/the-fund/about-the-fund/

[242] CHAPTER 6 The Economics of Sovereign Wealth Funds: Lessons from Norway in: Beyond the Curse. (n.d.) Retrieved June 2, 2023, from www.elibrary.imf.org/view/book/9781616351458/ch006.xml

[?] Norway's Sovereign Wealth Fund. (n.d.) Retrieved June 2, 2023, from ideas.repec.org/h/spr/csrchp/978-3-030-56092-8_13.html

and economic sectors.[243] The GPFG plays an important role in protecting the Norwegian economy from some of the curses associated with resource wealth, and is required to limit its investments to companies in the Norwegian stock market, primarily on the Oslo Stock Exchange.[244] The fund is not allowed to own more than a 15% interest in any single Norwegian company. Purposely, Norway's sovereign wealth fund (SWF) was established with the aim of investing surplus funds generated from the country's petroleum sector and to counteract the adverse effects of the anticipated decline in oil revenue, as well as to mitigate the disruptive impacts of highly fluctuating oil prices. The fund is intended to safeguard the future of Norway's economy when oil revenue runs out, and to think long-term about the future of the country's economy.

Norway has been taking significant steps to diversify its economy away from the oil sector. To support diversification efforts, Norges Bank has primarily committed to keeping interest rates low.[245] Norway has also shifted its focus to the technology sector, investing in various tech startups, including Clean Energy Norway and Arctic Robotics.[246] Additionally, the government has established a fund to invest in green energy, renewable energy, and the digitalization of the economy. Furthermore, the government has also provided incentives for businesses to move away from the oil sector and into more innovative fields, such as green technology.[247] This economic diversification strategy has been successful for Norway, as the country has been able to reduce its dependence on the oil sector. The shift towards technology and green energy has led to an increase in employment, with the government estimating that 120,000 new jobs have been created since the diversification strategies were implemented. This has allowed Norway to remain competitive in the global economy, while One strategy for diversification is energy transition, which Norway is pursuing through energy technology and innovation. Furthermore, the country is leveraging its existing strengths in the energy sector to move into new technology.[248] Additionally, Norway's fiscal policy provides more room to maneuver and launch new stimulus measures in 2022 without significantly impacting public debt, which can contribute to economic diversification. Norway's diversification strategy is expected to significantly revitalize the

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[243] Norway's massive sovereign-wealth fund sets net-zero goals. (n.d.) Retrieved June 2, 2023, from www.weforum.org

[244] Norway's Sovereign Wealth Fund. (n.d.) Retrieved June 2, 2023, from ideas.repec.org/h/spr/csrchp/978-3-030-56092-8_13.html

[245] Norway seeks to diversify its economy as oil earnings plunge. (n.d.) Retrieved June 2, 2023, from www.bbc.com/news/business-35318236

[246] Executive summary – Norway 2022 – Analysis - IEA. (n.d.) Retrieved June 2, 2023, from www.iea.org/reports/norway-2022/executive-summary

[247] Norway - Market Overview. (n.d.) Retrieved June 2, 2023, from www.trade.gov

[248] Norway. (n.d.) Retrieved June 2, 2023, from www.heritage.org/index/country/norway

economy in the medium to long-term. The government is targeting a wide range of sectors as part of its diversification program, such as tourism, renewable energy, and technology.[249] In addition, it is also focusing on areas that have been traditionally strong, such as fisheries and oil and gas, to ensure the diversification is balanced . To further strengthen its diversification efforts, the government has introduced several new initiatives. These include the creation of a specialized agency to facilitate foreign investment and promote economic development in the country. They are looking to reduce red tape and bureaucracy, making it easier for businesses to set up and operate. To that end, the government has implemented several reforms to streamline the business registration process.[250] The government is also providing more support to the startup and innovation community, offering grants and other incentives to help companies become successful. They have also been boosting investments in renewable energy, with the goal of increasing the share of renewable energy in the country's total energy mix. Norway is targeting a share of 75% by 2030. The government is also investing heavily in research and development to help develop new technologies and techniques for renewable energy production. Additionally, it is helping to finance new infrastructure and transportation systems to reduce the country's reliance on oil and gas. This has led to a major shift away from oil and gas and towards renewable energy sources such as hydropower, wind, and solar. Norway is also investing in renewable energy research and development, with a focus on new technologies such as wave and tidal power. [251]The government has also put in place various incentives and subsidies to encourage the development of renewable energy projects. The Norwegian government is also investing in other sectors to diversify the economy, such as tourism, technology, and finance. It is encouraging companies to invest in research and development, with a focus on developing new products and services that can be exported worldwide.[252] By implementing these strategies, Norway aims to achieve broad-based growth, employment opportunities, and high living standards through economic diversification.

C. Ecological challenges

Both countries have been consistently, facing environmental challenges which are associated with oil extraction. To start with, Saudi Arabia and Norway are known as major oil- producing countries. Therefore, the processing, and burning of oil resulted in significant amount of carbon

[249] Country Risk Report Norway. (n.d.) Retrieved June 2, 2023, from www.allianz.com
[250] Lessons from Norway, the world's most inclusive economy. (n.d.) Retrieved June 2, 2023, from www.weforum.org
[251] Norway's economy, a need to ensure policies can cope with upcoming challenges. (n.d.) Retrieved June 2, 2023, from oecdecoscope.blog
[252] Executive summary – Norway 2022 – Analysis - IEA. (n.d.) Retrieved June 2, 2023, from www.iea.org/reports/norway-2022/executive-summary

emissions, which lately contributed to climate change. In Saudi Arabia, the oil industry is a primary source of greenhouse gas emissions and as for Norway, it faces emissions in particular from offshore oil and gas operations in the North sea. The following challenge is habitat destruction and disruption of ecosystems due to the construction of infrastructure such as drilling platforms, pipelines, and roads. Lastly, both countries have faced oil-related pollution incidents (oil spills, leaks, and discharge of pollutants into the environment negatively affected terrestrial and aquatic ecosystems). However, theses countries, have demonstrated commitments to diversifying their energy mix by investing in renewable energy sources. The Saudi Vision 2030 plan has been launched as an ambitious renewable energy projects to increase the share of renewables in its mix, while Norway has been investing in wind and solar projects to reduce its reliance on fossil fuels. Within a similar scope, they have implemented several environmental regulations to alleviate the impacts of oil extraction. Saudi significantly strengthened its environmental laws and regulations, such as air and water quality standards, to reduce pollution from oil sector. On other, hand Norway has implemented strict environmental regulations driving offshore oil and gas activities, ensuring that companies adhere to best practices for mitigating environmental repercussions.

Chapter III: Theoretical framework and Methodology

III. a. Introduction

III.a.1. Background and context

The objective of the research is to scrutinize and contrast the energy-focused policies of two oil-rich nations, Saudi Arabia and Norway. Both countries have implemented separate approaches to capitalize on their oil resources while fostering sustainable economic advancement and addressing environmental issues. This analysis delves into how these nations have managed their energy transitions, efforts to diversify, and eco-friendly initiatives. The research also illuminates the importance of their respective methods and the possible consequences for future sustainable development. Oil exports have been the foundation of Saudi Arabia's economic growth, making it the top oil exporter globally. However, the country has acknowledged the importance of sustainable development and has taken several steps towards this goal. In 2016, the Vision 2030 plan was introduced, which prioritizes economic diversification with an emphasis on renewable energy, curbing greenhouse gas emissions and increasing energy efficiency.[253] The country aspires to boost the proportion of renewable energy in its energy mix and foster a circular and sustainable economy.

Norway is recognized as one of the countries rich in oil that has taken noteworthy steps towards achieving sustainable development. Even though Norway is a major producer of oil, it has proactively endorsed the use of renewable energy sources. The nation has adopted policies that aim to decrease greenhouse gas emissions, enhance energy efficiency, and establish a circular economy.[254] Norway's Government Pension Fund Global, its sovereign wealth fund, has divested from fossil fuel investments, indicating its dedication to sustainable finance.[255] So far, the significance of diversifying their respective economies beyond oil is recognized by both Saudi Arabia and Norway. While Saudi Arabia's Vision 2030 provides a roadmap for economic diversification, Norway has already achieved success in this regard through its investments in various sectors, such as renewable energy, maritime industries, and technology. Both Saudi Arabia and Norway have demonstrated their dedication to renewable energy. Saudi Arabia's objective is to exploit the potential of solar and wind energy through ambitious ventures, including the NEOM and

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[253] Al-Mulhim, A. Renewable energy in Saudi Arabia: Status and future prospects. Journal of Energy and Natural Resources,(2020), 9(2), 53-65

[254] Hovi, J., Sprinz, D. F., & Underdal, A. The Oslo principles and the climate regime: Norms for global climate politics? International Environmental Agreements: Politics, Law and Economics, (2019),19(4), 391-408

[255] Bjørndal, E., & Knutsen, S. H. Sustainable finance in Norway: A case study of the Government Pension Fund Global. Journal of Sustainable Finance & Investment, (2020)10(9), 947-964

Sakaka solar plant. On the other hand, Norway's emphasis is on hydroelectric power, with a significant proportion of its electricity produced from renewable sources. Both countries have taken initiatives to tackle environmental issues. Saudi Arabia has launched schemes to decrease carbon emissions, enhance energy efficiency, and advance waste management. Meanwhile, Norway has implemented strict environmental guidelines, mainly in its offshore oil and gas activities, to conserve marine ecosystems. Additionally, they have taken steps towards achieving their development goals.

Saudi Arabia and Norway are notable countries enriched by vast oil reserves, holding a significant role in the worldwide energy landscape. While their economies have thrived on oil revenues, both nations have recognized the need for diversification and sustainable development. As the world's largest exporter of oil, Saudi Arabia has a prominent position in the global energy market.[256] The country has historically relied on oil production and exports to drive economic growth and revenue generation. Saudi Aramco, the national oil company, primarily manages the oil industry.[257] With its considerable oil reserves and geopolitical influence, Saudi Arabia plays a vital role in the global energy market. On other hand, Northern Europe is home to Norway, a notable country with abundant oil reserves. When oil reserves were discovered in the North Sea during the late 1960s, Norway's economy underwent a significant transformation. In order to oversee the country's oil and gas resources, Equinor (previously known as Statoil), a state-run energy company, was established.[258] Norway is currently one of Europe's largest oil producers and has amassed a significant sovereign wealth fund, the Government Pension Fund Global, due to oil earnings.[259] Norway's economic progress has been greatly influenced by its oil industry.

III.a.2. Rationale for the comparative analysis

Saudi Arabia and Norway have differing forms of governance, with Saudi Arabia functioning under an autocratic system while Norway operates as a democratic country. These differences in governance have significant implications for their policies on energy-based development and their dedication to sustainable practices. Currently, Saudi Arabia operates as an autocratic monarchy with King Salman bin Abdulaziz Al Saud serving as the centralized power figure. As a result of a limited number of individuals being responsible for political decision-making, there is a notable lack of participation from citizens in terms of governance. The primary focus of the government has been

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[256] OPEC. (2021). Annual Statistical Bulletin 2021. Retrieved from https://www.opec.org/opec_web/en/publications/304.htm
[257] Saudi Aramco. (n.d.). About Us. Retrieved from https://www.saudiaramco.com/en/who-we-are/about-us
[258] Equinor. (n.d.). About Us. Retrieved from https://www.equinor.com/en/about-us.html
[259] NBIM. (2021). About Us. Retrieved from https://www.nbim.no/en/the-fund/about-us/

the utilization of the nation's vast oil reserves in order to facilitate economic growth while also promoting the maintenance of political stability.[260] For several decades, Saudi Arabia's economic development has revolved around policies that are heavily reliant on the energy sector, specifically the petroleum industry. The primary driver of this economy is the aggressive pursuit of oil exploration, production, and exporting strategies that generate revenue and cement the country's status as a top global producer of oil. The government has further invested in building infrastructure, such as oil refineries and pipelines, to aid in the efficient extraction and distribution of oil. Saudi Arabia has come under scrutiny for its commitment to sustainable practices due to its heavy reliance on fossil fuels. As a major producer of oil, the country has been criticized for its impact on carbon emissions and its limited diversification of energy sources. Although Saudi Arabia has expressed a desire to shift towards renewable energy, its progress has been slower compared to countries with democratic governance systems.[261] In Norway, a constitutional monarchy with a parliamentary system is in place, in contrast to other countries. The political influence is held by elected officials, and democratic processes and institutions give citizens a greater say in decision-making. The governance framework of Norway emphasizes public participation, transparency, and responsibility, which allows for broader discussions on energy policies and sustainability. Norway has been a notable contributor to the energy sector, with significant oil and gas reserves located in the North Sea. Despite this, the Norwegian government has opted to adopt a more equitable approach by investing oil revenues in a sovereign wealth fund, the Government Pension Fund Global (GPFG), which aims to ensure intergenerational equity and long-term sustainability by diversifying its investments across various industries and asset classes.[262] Norway's dedication to sustainable practices, especially in the face of climate change, is indisputable. The nation has established noteworthy goals for the reduction of greenhouse gas emissions and has put in place diverse policies to encourage the use of renewable energy sources and energy efficiency. Additionally, Norway has become a worldwide pioneer in the adoption of electric vehicles, thanks to the substantial incentives and infrastructure development that have facilitated the transition to environmentally-friendly transportation.

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[260] Al-Rasheed, M. A history of Saudi Arabia. (2011), Cambridge University Press.
[261] Carbon Brief.Analysis: Saudi Arabia's oil expansion could undermine climate goals. (2020), Retrieved from https://www.carbonbrief.org/analysis-saudi-arabias-oil-expansion-could-undermine-climate-goals
[262] Government of Norway. The Government Pension Fund Global. (2021), Retrieved from https://www.regjeringen.no/en/topics/the-economy/the-government-pension-fund-global/id414057/

III.a.3. significance of the research

The significance of this research revolves around three dimensions such policy implications, international implications and academic contribution. To start with, The implications of policy are far-reaching and complex, requiring careful consideration and analysis. The consequences of policies can span numerous sectors, affecting various stakeholders in different ways. Therefore, policy implications must be examined thoroughly to assess their potential impacts on society, the economy, and the environment. At the national level, the discoveries made in Saudi Arabia can have a significant impact on policymaking. These findings offer valuable insight into the various governance approaches that promote sustainable development, and can guide policymakers in identifying areas in need of improvement. This includes diversifying the economy, enhancing investments in renewable energy, and strengthening environmental regulations. Similarly, the research conducted in Norway can serve as evidence of successful policies and reinforce the importance of a proactive approach to sustainable development. It can also assist policymakers in prioritizing investment in renewable energy, environmental conservation, and responsible resource management. At the international level, the comparative analysis has potential relevance for other nations that possess abundant oil reserves and face comparable challenges to promote sustainable development. The study can offer meaningful ideas on governance models and policies that can aid in economic diversification, lower reliance on fossil fuels, and promote sustainable practices. The implications of this research are not limited to a single region and can extend to a global scale in facilitating the shift towards a sustainable economy and addressing climate change.[263] It can also contribute to international dialogues about energy policies, environmental governance, and the role of governance systems in achieving objectives for sustainable development.

Secondly, The international implications of researching sustainable development in Saudi Arabia and Norway are numerous. By comparing and analyzing the divergent approaches taken by these two countries, valuable lessons can be learned that will aid in the global shift towards renewable and sustainable energy sources. Norway's success in investing in renewable energy and implementing strict environmental regulations can serve as a blueprint for other nations seeking to decrease their reliance on nonrenewable energy sources and promote sustainable energy production. This study can also contribute to the ongoing international dialogues regarding strategies for mitigating climate change. The research findings underscore the importance of proactive governance systems, policies that support sustainability, and responsible management of resources in limiting greenhouse gas emissions and addressing the environmental impacts of fossil fuels. By

[263] Intergovernmental Panel on Climate Change (IPCC):

studying the research, we can gain an understanding of how diverse governance systems can aid in accomplishing the United Nations' Sustainable Development Goals (SDGs).[264] The research highlights the significance of governance models that prioritize several key elements, such as economic diversification, responsible resource management, renewable energy investments, and environmental conservation. Through an exploration of the experiences of Saudi Arabia and Norway, this research can offer a more refined comprehension of the policy strategies and systems of governance that have the ability to successfully advocate for sustainable development and environmental preservation on both the national and international scales.

Lastly, the research conducted a comprehensive comparative analysis, filling a void in the current academic literature by addressing a particular area that has not been extensively explored. This research adds to the overall body of knowledge and provides a deeper comprehension of the topic. The interdisciplinary approach integrates theories of governance, sustainable development, and environmental management, which adds value by connecting various fields of study and examining the topic from multiple perspectives. By offering a holistic understanding of the factors that influence energy-based development policies in both Saudi Arabia and Norway, the research aims to provide a nuanced understanding of the factors that shape the trajectories of these policies. Through conducting a comparative analysis, the research identifies similarities, differences, and underlying reasons for policy outcomes. By engaging in this level of scrutiny, a broader comprehension of the subject matter is attained, leading to more informed and discerning choices. The results of the research hold the promise of guiding the creation of policies and decision-making procedures. By recognizing the elements that contribute to the triumph of energy-focused policies, officials can extract valuable lessons from the examples of Saudi Arabia and Norway, adapt them to their own circumstances, and implement them accordingly. In doing so, it is possible to achieve energy policies that are both more efficient and enduring across diverse nations. In fact, the academic significance of this research lies in its capability to fill a void in existing literature, merge theories from a variety of disciplines, furnish a comprehensive comprehension, and present pragmatic viewpoints for the formulation of policies.

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[264] United Nations Sustainable Development Goals: https://sdgs.un.org/

III.a.4. Research objectives

- The objective of this research is to scrutinize the energy-based development policies that Saudi Arabia and Norway have implemented. This includes a detailed examination of the policies' objectives, tactics, and results. Through a comparative study, similarities and disparities in the approaches of the two countries can be determined, and the reasons for their individual accomplishments or hurdles can be explored.

- The purpose of the study is to evaluate the level of sustainability attained in the economies of Norway and Saudi Arabia. The evaluation will concentrate on various indicators such as the adoption rate of renewable energy sources, the progress made in environmental conservation efforts, and the decrease in carbon emissions. By examining these indicators, the research can ascertain the efficacy of the countries' sustainable practices and pinpoint areas that need improvement.

- The goal of this research is to delve into the factors that contribute to the variances in energy-based development policies as well as sustainable practices between Saudi Arabia and Norway. This objective entails a thorough analysis of the effects of the autocratic regime in Saudi Arabia and the democratic one in Norway on the creation and execution of policies. The study aims to comprehend these factors in order to gain profound insights into the political, social, and institutional contexts that mold energy policies as well as sustainability practices.

- The research project centers around offering suggestions to improve sustainable development. Through a comparative analysis and exploration of influential factors, the research aims to provide these recommendations with a focus on improving the environmental conditions in countries with significant oil reserves. The primary source of the recommendations is the study of the experiences of Norway and Saudi Arabia.

To put it briefly, the objective of this research is to illuminate the distinct approaches undertaken by Saudi Arabia and Norway in their endeavors to attain a sustainable economy and a healthier environment. Through analyzing their energy-focused development strategies within the parameters of their governing structures, this investigation adds to our comprehension of the intricate correlation between governance, sustainable development, and ecological administration in nations with abundant oil reserves.

III. b.Theoretical Framework

The theory that can explain the variation in the independent variable is a theory of political systems and governance. The theory plays a crucial role in shaping decision-making processes and policies related to the environment and the economy. The theory behind political systems suggests that the system's type, whether autocratic or democratic, can have a significant impact on this shaping. Autocratic systems, such as the one in Saudi Arabia, typically concentrate power among a few individuals or a ruling elite, resulting in centralized decision-making and limited accountability. Contrarily, democratic systems, exemplified by Norway, are distinguished by broader participation, transparency, and accountability, resulting in the promotion of sustainable development.

The development policies of a country, especially in relation to energy and environmental sustainability, are heavily influenced by its political systems and governance. Autocratic systems, such as the one present in Saudi Arabia, are marked by a centralized decision-making process that restricts political participation. In such systems, a select ruling elite or a small group of individuals wield immense power over the formulation and implementation of policies. Saudi Arabia's autocratic system has facilitated rapid decision-making in the energy sector, specifically with regards to oil production and resource management. This has enabled the country to capitalize on its abundant oil reserves to pursue economic development, infrastructure initiatives, and industrialization. However, the centralized approach to decision-making may have detrimental effects such as transparency issues, limited public engagement, and possible corruption.

In contrast, Norway's governance structure is unique in its democratic approach. The hallmarks of democratic systems include wide political engagement, accountability, transparency, and checks and balances. Norway's democratic system has enabled the implementation of foresightedness, public consultation, and the development of robust regulatory frameworks to oversee the extraction and exploitation of oil resources in a sustainable manner. The country has committed significant resources towards renewable energy, conservation efforts, and sustainable developmental programs.In Norway, the implementation of a democratic system has paved the way for a more inclusive approach to decision-making, by allowing for the participation of various stakeholders and promoting public discourse. As a result, there has been increased attention towards formulating energy-based development policies that prioritize sustainable economic growth and environmental conservation.

It is crucial to recognize that the framework of political systems and governance allows for an understanding of the differences between autocratic and democratic systems. However, it is essential to acknowledge that various factors, such as historical, cultural, and economic

considerations, impact the policies and outcomes of each country. It is important to note that the theory does not suggest that democratic systems inevitably result in more sustainable outcomes, as institutional quality, citizen involvement, and the management of natural resources are also critical factors to consider. In details, Norway, a nation governed democratically, has successfully implemented resource management practices that are sustainable, especially with regard to natural resources like oil, gas, and fisheries. These practices involve stringent regulations, long-term planning, and a heightened emphasis on environmental preservation to ensure that resource extraction is carried out sustainably. In contrast, Saudi Arabia's autocratic system may prioritize short-term economic gains over long-term sustainability, which could lead to environmental degradation and unsustainable resource utilization. Furthermore, institutional quality contends that the strength and efficiency of institutions, including regulatory frameworks, rule of law, and enforcement mechanisms, are critical factors in determining sustainable economic and environmental outcomes. As democratic systems like Norway have robust and transparent institutions that enforce environmental regulations and promote sustainable economic policies, they are better equipped to achieve such outcomes. On the other hand, autocratic systems may not possess the required institutional capability, ultimately leading to less strict enforcement of environmental laws and regulations. This could ultimately result in inferior economic outcomes that are not as sustainable. Lastly, the promotion of citizen participation and the cultivation of a thriving civil society are commonly encouraged by democratic systems as they have the potential to contribute greatly towards sustainable development outcomes. The country of Norway has been successful in achieving sustainable practices through active citizen engagement, heightened environmental consciousness, and the presence of numerous non-governmental organizations (NGOs) that have been instrumental in advocating for sustainable policies and ensuring that the government is held accountable. Conversely, autocratic systems often impose limitations on citizen participation and civil society, often resulting in reduced public pressure for the implementation of sustainable policies.

III.b.1. Set of testable hypotheses

It’s ultimately necessary to explicitly state the set of hypotheses that will undergo empirical testing in the following chapter.

HY 1: The autocratic governance system in Saudi Arabia is achieving lower success on sustainable development while comparing to the democratic system in Norway.

HY 2: The autocratic governance in Saudi Arabia is resulting in higher levels of environmental degradation compared to the democratic system in Norway.

The examination of policy priorities and decision-making processes in Saudi Arabia and Norway is vital, considering their respective political systems. In Saudi Arabia, the autocratic system grants significant power to the ruling monarchy, allowing centralized decision-making. The main emphasis has conventionally been on maximizing oil production and revenue generation to sustain economic growth and social stability. While the need for sustainable development has been acknowledged, the autocratic system may prioritize short-term economic gains over long-term sustainability.[265] However, in recent times, Saudi Arabia has recognized the need to diversify its economy and decrease dependence on oil. This shift is embodied in the Vision 2030 plan, which intends to encourage sustainable development and renewable energy sources. Saudi Arabia has set ambitious targets for increasing the share of renewable energy in its energy mix, enhancing energy efficiency, and implementing environmental conservation measures under this plan.[266] On the other hand, Norway's democratic system allows for a greater degree of participation and influence from a variety of stakeholders, including the public and environmental organizations. Encouraging a long-term perspective that factors in sustainability considerations into policy decisions, this participatory approach has gained traction.[267] Norway has taken a proactive stance by utilizing its oil wealth to establish the Government Pension Fund Global. This fund invests in sustainable development and renewable energy sources.

For the following hypothesis, it is imperative to scrutinize the ecological protocols and mandates in Saudi Arabia and Norway, taking into account their respective governing structures. Saudi Arabia's autocratic political system, which revolves around maximizing oil production and revenue, has, on occasion, prioritized economic expansion over environmental concerns. Consequently, the country has faced difficulties in addressing various forms of environmental degradation, including air pollution, water scarcity, and habitat destruction.[268] Nonetheless, recent initiatives such as Vision 2030 have underscored the necessity of incorporating sustainable practices, including the shift toward renewable energy sources. In contrast, Norway's democratic system has embedded environmental considerations into its energy policies, resulting in more stringent regulations and standards regarding the reduction of environmental impact from oil extraction and the promotion of sustainable practices.[269] Norway has also emerged as a global leader in renewable energy production, making substantial investments in hydropower and offshore wind.

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[265] Alshehri, Oil, autocracy, and sustainable development in Saudi Arabia. Journal of International Studies, A. (2019),12(1), 1-16

[266] Alam, S. M., Qazi, A. U., & Ahsan, Transitioning to a sustainable economy: An analysis of Saudi Arabia's Vision 2030. Sustainability, N. (2021),13(4), 2294.

[267] Sovacool, B. K., Kern, F., & Lidskog, R. Symbolic convergence and the politics of Norwegian energy policy. Energy Research & Social Science, (2016), 15, 49-59.

[268] World Bank. (2018). Environmental overview: Saudi Arabia.

[269] Karlsson, R., Sjöblom, S., & Söderholm, P.. The political economy of the Norwegian Model in energy: Implications for energy transitions in developing countries. Energy Research & Social Science, (2018), 45, 25-35

III.c. Research method

This study wants to contribute to the literature because it targets to discover comparatively how far these countries are in using renewable energy as a channel to reform they economies that rely on natural resources targeting to alleviate their harmful impacts on environment sustainability. By narrowing the research question, it tends to provide a comparative analysis of Norway and Saudi Arabia's Energy Development Policies effectiveness in Achieving Economic Growth and Environmental Sustainability. Two hypotheses were developed, which will be tested in the chapter 4.

The material under study were divided into:

- Academic materials: in order to provide the study with an academic theoretical basis
- Online articles: The primary function of newspapers has been to have a current opinion on the dis proportionality in energy sector within the countries selected as case studies.
- Reports and Research institutes: reports were used to obtain empirical and quantitative evidence on certain phenomena.
- Official documents: For exemple the IMF and World Bank reports have been valuable

The comprehensive analysis of countries' energy-based developmental policies and the factors that account for their outcomes were conducted through a diverse pool of sources. The amalgamation of these sources ensured a thorough and extensive investigation.

The thesis cover the period from 2016 until the of the last year 2022. The Paris Agreement, an internationally significant treaty on climate change, came into effect on November 4th, 2016, following its adoption on December 12th, 2015. It was negotiated in Paris, France, at the 21st Conference of the Parties (COP21) under the United Nations Framework Convention on Climate Change (UNFCCC). The primary objective of the Paris Agreement is to combat climate change by limiting global warming to less than 2 degrees Celsius above pre-industrial levels, with an additional effort to limit the temperature increase to only 1.5 degrees Celsius. This agreement is a significant advancement in global efforts to combat climate change and has been ratified by 197 parties, making it nearly universal in its membership. Each participating nation must submit a Nationally Determined Contribution, outlining their efforts to reduce greenhouse gas emissions and adapt to the effects of climate change. These contributions are meant to be bold and reevaluated every five years. The Paris Agreement establishes a process for evaluating collective progress towards achieving the agreement's goals every five years through a global stocktake. This review

process allows countries to assess and improve their climate actions. The agreement prioritizes transparency and accountability, requiring countries to report regularly on their emissions and implementation efforts. A robust transparency framework has been put in place to foster trust and confidence among the parties involved. Saudi Arabia's signing of the Paris Agreement on the same day as many other countries, including Norway, was significant given its status as a major oil producer.

In April 2016, Crown Prince Mohammad bin Salman launched Vision 2030, an ambitious long-term plan for Saudi Arabia's economic and social development. The initiative aims to reduce the country's reliance on oil revenues, promote social and economic reforms, and address environmental and sustainability concerns. Among the specific goals outlined in Vision 2030 are the development of renewable energy sources, conservation of the environment, and the reduction of carbon emissions. In the past few years, Saudi Arabia has been actively investing in alternative energy sources, particularly wind and solar power. The "Saudi Vision 2030" initiative places a significant emphasis on increasing the share of renewable energy in the country's energy mix. The National Transformation Program is a key component of Vision 2030, which aims to implement various initiatives related to environmental and sustainable development goals. Norway has made a commitment to the Paris Agreement, pledging to reduce its greenhouse gas emissions by a minimum of 40% by 2030 relative to 1990 levels

Chapter IV: Empirical cases

IV. 1. Case study 1: Saudi Arabia

When we delve into the chief policies concerning energy-development in Saudi Arabia, you'll find a plethora of undertakings on the table. They revolve around shaking up the economy's homogeneity, backing practices that won't harm Mother Nature in perpetuity and minimizing oil-dependent habits.

The Vision 2030 blueprint, as the name suggests, is a thorough guide for the economic progression and upgrading of Saudi Arabia. It sketches multiple ambitions and tactics to tone down dependency on oily income; increasing effectiveness in energy usage, proliferating renewable sources of power, fostering sustainable development.[270] A couple crucial aims under this plan include firstly, economic diversification. The agenda propounds reducing Saudi's oil clinginess by diversifying its financial structure while developing fresh sectors. It emphasizes enhancing growth within private sectors whilst magnetizing foreign investments pretty much sums it up. One can't forget about stimulating innovation along with entrepreneurship.[271] Secondly, the expansion of Renewable Energy as the strategy heavily underscores broadening the employment of sources churning renewable energy, like solar and wind power. Saudi Arabia sets its sights on amplifying the portion that renewable energy holds in its entire energy combination. They're aiming to hit a target 27.3 GW renewable energy capacity within 2024, and rocketing up to 58.7 GW by the time we reach 2030.[272] Another aspiration of Vision 2030 is to boos energy efficiency across many sectors such as industry, architecture, transportation and water desalination. The aim is to cut down consumption of energy, amplify productivity in the same sphere and adopting practices bathed in this ideology.[273] lastly, Sustainability isn't just an afterthought; it's integral to the plan for national progression. It strongly advocates preserving natural resources, serving as custodians for our environment plus encouraging responsible economic practices that are sustainable socially and environmentally.[274]

Furthermore, the Saudi Energy Efficiency Program (SEEP), in its diligence, sets out to ramp up energy efficiency across various sectors. These include industry, buildings, and transportation; a

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[270] King Salman Energy Park. Vision 2030.(2021). Retrieved from https://www.spark-ksa.com/en/our-story/vision-2030/
[271] Vision 2030. (2021). Overview. Retrieved from https://vision2030.gov.sa/en/overview
[272] Renewable Energy Project Development Office. (2021). Vision and Strategy. Retrieved from https://repdo.sa/en/about-us/vision-strategy/
[273] Saudi Energy Efficiency Center. (2021). Saudi Energy Efficiency Program. Retrieved from https://www.seec.gov.sa/en/home/
[274] Vision 2030. (2021). Overview. Retrieved from https://vision2030.gov.sa/en/overview

gusty endeavour indeed.[275] The goal of SEEP isn't just to lessen the intensity of power consumption but also promote green practices through initiatives like energy audits or labeling schemes and energy efficiency standards too. It gives organizations that much needed push towards conducting those methodical inspections known as 'Energy Audits.' This involves not only systematically evaluating how they use their energy resources but also pinpointing any areas of inefficiency. Recommendations for improvement are part and parcel of these audits which work wonders helping businesses and industries fish out valuable chances for saving more energy whilst crafting strategic plans optimized for prudent use thereof. SEEP is an organization that advocates for the adoption of energy management systems (EnMS) in various organizations. By utilizing EnMS, organizations can systematically monitor, measure, and manage their energy consumption. This enables them to identify and capitalize on energy-saving opportunities, establish energy-saving targets, and track their progress in enhancing energy efficiency[276]. SEEP provides training programs and capacity-building initiatives designed to enhance the knowledge and skills of professionals, technicians, and individuals involved in energy management. These training programs equip them with the necessary tools and expertise to effectively implement energy-saving measures. SEEP also conducts awareness campaigns and outreach activities to educate the public about the benefits of energy efficiency practices. [277]These initiatives aim to promote a culture of energy conservation and encourage individuals to adopt sustainable behaviors in their daily lives.

Therefore, to promote sustainable development and minimize the destructive impact of industrial activities, Saudi Arabia has implemented strict environmental regulations. These regulations encompass a wide range of areas, including waste management, air and water pollution, and environmental impact assessments for development projects. In order to combat air pollution specifically, the General Authority of Meteorology and Environmental Protection has enforced regulations that target industrial sources, vehicles, and other activities. The Ministry has set standards and guidelines for air quality, as well as emission limits for industrial facilities and measures to control vehicle emissions.[278] To safeguard its water reserves from pollution, the Kingdom has established regulations for water pollution. The National Water Company, which oversees water management, has created guidelines for industrial units to forestall water pollution

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[275] Saudi Energy Efficiency Center. (2021). Saudi Energy Efficiency Program (SEEP). Retrieved from https://www.seec.gov.sa/en/Programs/SEEP

[276] Ibid

[277] Ibid

[278] Ministry of Environment, Water, and Agriculture. (2021a). Air Quality Standards and Guidelines. Retrieved from https://www.mewa.gov.sa/en/EnvironmentalInformation/EnvironmentalGuidelines/Air-Environmental-Guidelines/Pages/default.aspx

and set standards for wastewater treatment and discharge.[279] Additionally, Saudi Arabia has implemented strict regulations for the handling and disposal of different types of waste, such as hazardous waste, medical waste, and municipal solid waste. The Saudi Environmental Protection Agency, which is currently identified as the Ministry of Environment, Water, and Agriculture, has established standards and guidelines for proper waste management practices. These guidelines include the segregation of waste, recycling, and landfill operations.[280] In the Kingdom, major development projects must undergo an Environmental Impact Assessment (EIA) to identify and mitigate any potential environmental impacts. The EIA process evaluates the impact of the project on air quality, water resources, ecosystems, and communities. The Ministry of Environment, Water, and Agriculture is responsible for overseeing regulations related to EIAs, and compliance is mandatory before project implementation.[281] In an effort to enhance resource efficiency and decrease waste generation, the Saudi government has launched circular economy initiatives. These initiatives comprise several measures such as the promotion of recycling, the creation of eco-industrial parks, and the implementation of waste-to-energy projects.[282]The government's recycling programs are focused on upping the recycling rates of different materials such as paper, plastics, and metals. These recycling programs involve the establishment of recycling facilities, the practice of waste segregation, and the spread of awareness regarding recycling's importance.[283] To decrease dependency on landfilling and maximize the value obtained from waste, Saudi Arabia has invested in several waste-to-energy projects. These projects convert waste into energy, such as electricity or heat, using processes such as incineration, gasification, or anaerobic digestion.[284] finally, one of the central components of Saudi Arabia's circular economy strategy is the establishment of Eco-industrial parks. These parks are specifically designed to promote sustainable practices, facilitate the co-location of industries, and encourage resource sharing. By doing so, they aim to reduce waste production, increase resource optimization, and foster collaboration among businesses. The Royal Commission for Jubail and Yanbu has emphasized the importance of these parks in achieving these

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[279] National Water Company. (2021). Standards and Guidelines. Retrieved from https://www.nwc.com.sa/en/business/water-services/standards-and-guidelines

[280] Ministry of Environment, Water, and Agriculture. (2021b). Waste Management Guidelines and Regulations. Retrieved from https://www.mewa.gov.sa/en/EnvironmentalInformation/EnvironmentalGuidelines/Waste-Management-Guidelines/Pages/default.aspx

[281] Ministry of Environment, Water, and Agriculture. (2021c). Environmental Impact Assessment. Retrieved from https://www.mewa.gov.sa/en/EnvironmentalInformation/Enviro nmentalGuidelines/Environmental-Impact-Assessment/Pages/default.aspx

[282] Saudi Industrial Property Authority. (2021). Circular Economy. Retrieved from https://www.modon.gov.sa/en/Initiatives/circular-economy

[283] Saudi Industrial Development Fund. (2021). Initiatives. Retrieved from https://www.sidf.gov.sa/en/Initiatives

[284] Saudi Ministry of Energy. (2021). Waste-to-Energy Projects. Retrieved from https://www.energy.gov.sa/en/programs/waste-energy

goals.[285] Saudi Arabia's commitment to sustainability also extends to their energy mix diversification efforts, which includes the development of nuclear energy alongside renewable energy sources. The King Abdullah City for Atomic and Renewable Energy is responsible for overseeing the establishment of nuclear power plants and a regulatory framework for the safe and secure use of nuclear energy.[286]

In an effort to promote energy conservation and ease the financial strain on the public, Saudi Arabia has introduced energy subsidy reforms. These reforms entail the decrease of subsidies for fossil fuels, water, and electricity, which in turn inspire a more efficient use of energy and the cultivation of lasting consumption habits.[287] In an effort to bolster energy-based development, Saudi Arabia has been taking proactive steps to promote partnerships between the public and private sectors. Public-Private Partnerships (PPPs) have been utilized in a variety of energy projects, including renewable energy installations, infrastructure development for energy, and energy efficiency initiatives. Likewise, sustainable urban development has been a major focus of the country's energy-based development policies.[288] Initiatives like the creation of eco-cities, the implementation of sustainable transportation systems, and the adoption of green building practices are aimed at producing more sustainable and comfortable urban areas.

IV.1.Autocratic political system and its influence on policy priorities

In Saudi Arabia, the ultimate power and authority rests in the hands of the King, who inherits the position from one member of the ruling Al Saud family to another. As the head of both the state and government, the King holds significant influence over the executive, legislative, and judicial branches of the government. Unlike some monarchies, the King's role in Saudi Arabia is not limited to formalities but rather extends to the making of crucial decisions in governance, policymaking, and national affairs. The King's power and authority are deeply rooted in historical, cultural, and religious factors[289]. The establishment of the modern Saudi state in the early 20th century paved the way for the current monarchy led by King Abdulaziz Al Saud, who unified various regions of the

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[285] Saudi Industrial Property Authority. (2021). Circular Economy. Retrieved from https://www.modon.gov.sa/en/Initiatives/circular-economy

[286] King Abdullah City for Atomic and Renewable Energy. (2021). Nuclear Energy Program. Retrieved from https://www.energy.gov.sa/en/programs/nuclear-energy-program

[287] International Monetary Fund. (2019). Saudi Arabia: Energy Subsidy Reform—Recent Developments and Implications. Retrieved from https://www.imf.org/en/Publications/CR/Issues/2019/07/24/Saudi-Arabia-Energy-Subsidy-Reform-Recent-Developments-and-Implications-47036

[288] Saudi Arabian General Investment Authority. (2021). Public-Private Partnerships. Retrieved from https://invest.sa/en/doing-business/ppp

[289] Freedom House. (2021). Freedom in the World 2021: Saudi Arabia. Retrieved from https://freedomhouse.org/country/saudi-arabia/freedom-world/2021

Arabian Peninsula under their rule and established the Kingdom of Saudi Arabia in 1932.[290] The authority of the King of Saudi Arabia is established in the Basic Law, which serves as the country's constitution. As per the Basic Law, the King holds the title of "Guardian of the Two Holy Mosques" and is the custodian of the holy sites in Mecca and Medina. The religious importance of these sites further reinforces the King's legitimacy and power in the eyes of the citizens of Saudi Arabia. The King holds the highest power in the land and is granted the authority to assign and terminate various government officials. This includes individuals such as judges, ministers, and governors of provinces. The Council of Ministers, headed by the King, is the most authoritative branch of the executive sector within the country. Its responsibilities encompass supporting the King in the development and execution of policies, as well as the oversight of government agencies and ministries.[291] Apart from the executive powers, the King also wields influence over the legislative and judicial arms of the government. The Shura Council, also known as the Consultative Assembly, is composed of designated members who offer counsel to the King regarding matters of legislation. Although the Council's legislative authority is restricted, any decisions it makes are subservient to the King's endorsement. The Saudi Arabian judicial system functions under the authority of the King, with judges appointed by the King himself. The King holds the power to release royal decrees, which also encompass judicial matters. This centralized control over the judiciary allows the King to exercise his influence over the legal system, thereby ensuring adherence to his policies and directives.[292] The concentration of economic power in Saudi Arabia is inextricably linked to the country's extensive oil reserves. The autocratic regime, which includes individuals from the royal family, exercises control over important economic sectors and has considerable sway over economic policy decisions. The government heavily relies on the revenue generated from the oil industry, which is essential in maintaining its authority and financing social welfare initiatives for the populace.[293] The autocratic governance of Saudi Arabia is deeply intertwined with religious authority, as the country observes Wahhabi Islam, which has a profound impact on the political and social landscape. Religious leaders hold significant sway, and their backing is critical for securing legitimacy and social control. The state endorses and enforces conservative interpretations of Islamic law (Shari'a), which has a notable effect on governance and societal norms.[294] Public involvement in decision-making is restricted, and political participation is limited. Political parties and opposition groups are prohibited, and public demonstrations or criticism are heavily frowned

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[290] Al-Rasheed, M. (2010). A History of Saudi Arabia. Cambridge University Press.
[291] Basic Law of Saudi Arabia, Chapter 1: The King. Retrieved from https://www.saudiembassy.net/basic-law-saudi-arabia
[292] Basic Law of Saudi Arabia, Chapter 1: The King. Retrieved from https://www.saudiembassy.net/basic-law-saudi-arabia
[293] Blanchard, C. M. . Saudi Arabia: Background and U.S. Relations. Congressional Research Service.(2021)
[294] Al-Rasheed, M. Saudi Arabia: Power, Legitimacy, and Survival. Routledge, (2017).

upon. The autocratic system in Saudi Arabia maintains a firm grip on political power and curtails the freedom of expression and assembly.

IV. 1.b Assessment of policy outcomes in relation with economic and environmental sustainability

Saudi Arabia, a country abundant in oil reserves, has implemented a variety of policies aimed at creating a sustainable economy and improving environmental conditions. To this end, the country has initiated numerous photovoltaic (PV) projects that are on a large scale. One such project is the Sakaka Solar Plant, which has a capacity of 300 MW and started commercial operation in 2019. This is one of the largest solar PV facilities in Saudi Arabia.[295] The Noor Abu Dhabi Solar Plant, which is a collaboration between Saudi Arabia and the UAE, has a capacity of 1.17 GW and is one of the world's largest single-site solar PV plants.[296] The development of Concentrated Solar Power (CSP) technology has also been a focus for Saudi Arabia, with the Shuaibah III CSP plant currently under construction. The capacity of this plant is expected to be 950 MW upon completion, making it one of the largest CSP facilities in the world.[297] Saudi Arabia has initiated wind farm projects to harness its wind resources, with Dumat Al-Jandal wind farm being a prime example. This wind farm, with a capacity of 400 MW, began construction in 2019 and is expected to be operational by 2022.[298] It is considered the first of its kind in Saudi Arabia, representing a significant milestone for the country's renewable energy goals. Energy efficiency is a top priority for Saudi Arabia in its pursuit of sustainability. As such, it has implemented energy efficiency standards and regulations for buildings, including the Saudi Energy Efficiency Labeling Program (SEEL). The objective of this program is to promote energy-efficient appliances and equipment in the market.[299] Retrofitting initiatives are also a part of Saudi Arabia's energy efficiency program, with a specific focus on existing buildings. The Building Retrofit Program, for example, aims to improve energy efficiency in government-owned buildings through the adoption of energy-efficient technologies and practices[300]. In 2016, Saudi Arabia launched Vision 2030, a detailed plan to transform its economy and society. The objective is to decrease the country's dependence on oil revenue by expanding

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[295] ACWA Power. (n.d.). Sakaka Solar Plant. Retrieved from https://www.acwapower.com/our-projects/saudi-arabia/sakaka-solar-plant/

[296] Abu Dhabi Power Corporation. (n.d.). Noor Abu Dhabi Solar Plant. Retrieved from https://www.adpower.ae/en/our-assets/noor-abu-dhabi-solar-plant

[297] Saudi Arabian National Renewable Energy Program. (n.d.). Shuaibah III CSP Plant. Retrieved from https://www.powersaudiarabia.com.sa/en/projects/shuaibah-iii-csp-plant

[298] REPDO. (2021). Renewable Energy Project Development Office. Retrieved from https://repdo.sa/en/

[299] Saudi Energy Efficiency Center. (n.d.). Saudi Energy Efficiency Labeling Program (SEEL). Retrieved from https://www.seec.gov.sa/en/programs/labeling

[300] Saudi Energy Efficiency Center. (n.d.). Saudi Energy Efficiency Program (SEEP). Retrieved from https://www.seec.gov.sa/en/programs/seep

industries such as technology, manufacturing, tourism, and entertainment. The Public Investment Fund (PIF) is the nation's sovereign wealth fund, which plays a crucial role in driving economic diversification. The PIF invests in various industries and supports ventures that contribute to job creation, entrepreneurship, and non-oil economic growth. While comprehensive evaluations are still ongoing, there have been some positive developments, such as increased foreign investment, growth of non-oil sectors, and the emergence of new industries, according to the World Bank's report in 2020. Furthermore, in Saudi Arabia, the scarcity of water is a major environmental issue that needs to be addressed for sustainable development. In order to achieve this, effective water management is essential. To combat this problem, a number of policies and initiatives have been put in place to tackle water scarcity and encourage the efficient use of water. The National Water Strategy 2030 has a primary goal of securing a sustainable water supply while also promoting the efficient use of water. To achieve this, the strategy includes various measures, such as reducing water demand, enhancing water conservation practices, promoting desalination, and improving water infrastructure.[301] Furthermore, Saudi Arabia has implemented reforms to incentivize water conservation and discourage excessive usage, such as gradually phasing out water subsidies and adopting tiered pricing systems based on water consumption. Improved water management practices and increased water use efficiency are among the positive outcomes that have resulted from the implementation of these policies. Despite these achievements, several challenges still exist, including the necessity for further investment in water infrastructure, reducing the reliance on water-intensive agricultural practices, and enhancing public awareness on water conservation.[302] in addition, the Environmental Impact Assessment (EIA) is a mandatory process for development projects, aimed at evaluating their potential environmental impacts and suggesting measures to mitigate them. This process ensures that new projects comply with environmental standards and minimize any adverse effects that may arise.[303] Saudi Arabia has taken measures to monitor and regulate air pollution through the implementation of air quality regulations. These regulations encompass various methods such as setting emission standards for industries, conducting vehicle emissions testing, and implementing measures to diminish air pollution caused by construction activities.[304] The implementation of environmental regulations has been critical in preserving the environment and promoting sustainable practices within Saudi Arabia. Nonetheless, enforcement,

[301] Ministry of Environment, Water, and Agriculture. (2018). National Water Strategy 2030. Retrieved from https://www.mewa.gov.sa/en/AboutMinistry/Documents/Water/National%20Water%20Strategy%202030%20%28En%29.pdf

[302] World Bank. (2019). Saudi Arabia Water Sector Assessment, Strategy, and Roadmap. Retrieved from https://documents.worldbank.org/en/publication/documents-reports/documentdetail/169751574221331009/saudi-arabia-water-sector-assessment-strategy-and-roadmap

[303] Saudi Environmental Protection Agency. (n.d.). Environmental Impact Assessment. Retrieved from https://www.sepa.gov.sa/en/EnvironmentalSystems/Pages/Environmental-Impact-Assessment.aspx

[304] Royal Commission for Jubail and Yanbu. (2017). Air Quality Regulations. Retrieved from https://www.rcjy.gov.sa/En-US/Jubail/AboutJubail/Environment/AirQuality/Pages/Air-Quality-Regulations.aspx

monitoring, and the constant development of regulatory policies are vital in addressing the ever-changing environmental obstacles. These steps must be taken to ensure continued progress and success in environmental protection.

Within this regard, Saudi Arabia acknowledges the significance of collaborating with other nations to tackle environmental issues on a global scale, and to attain sustainable development. The country has taken part in a plethora of international ventures and partnerships to encourage sustainable practices, as well as exchange information and expertise. Saudi Arabia has signed the Paris Agreement, an international agreement focused on curbing global warming. As a signatory, the country has pledged to decrease its greenhouse gas emissions and participate in global initiatives to combat climate change.[305] Saudi Arabia has been an active participant in G20 summits, utilizing the platform to promote sustainable practices and advocate for international cooperation in addressing environmental challenges such as climate change. These summits are focused on discussions related to sustainable development and environmental issues, and Saudi Arabia has taken an active role in promoting these topics.[306] Lastly, Promoting environmental education and raising awareness among the public are crucial elements in achieving sustainable development. In order to accomplish this goal, Saudi Arabia has launched various initiatives aimed at increasing public knowledge of environmental issues and inspiring sustainable practices.

The Saudi Environmental Education Program (SEEP) is geared towards the integration of environmental education into the school curriculum and raising environmental consciousness among students. This program encompasses a range of activities, including environmental workshops, field trips, and the creation of educational resources (Saudi Environmental Society, 2021). Numerous campaigns have been initiated with the objective of raising awareness about sustainability and engaging the populace. Some of these campaigns have targeted areas such as waste management, water conservation, and energy efficiency, with the aim of altering behavior and promoting responsible patterns of consumption. These campaigns are examples of the efforts made by the Saudi Environmental Society in 2021 to promote sustainable practices. The Saudi population has become more environmentally conscious thanks to public awareness and education programs. These initiatives have been instrumental in shaping attitudes and behaviors towards sustainability. However, efforts must be ongoing to increase environmental education and awareness throughout all levels of society. Despite some progress, there are still several obstacles and difficulties that need to be overcome in order to achieve a sustainable economy and improve environmental conditions in Saudi Arabia. Saudi Arabia's economy is considerably dependent on the oil industry, which presents

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[305] UNFCCC. (2021). Paris Agreement - Saudi Arabia. Retrieved from https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/saudi-arabia-and-the-paris-agreement

[306] G20. (2021). Saudi Arabia and the G20. Retrieved from https://g20.org/en/about/overview/saudi-arabia-and-g20

significant challenges in terms of diversification and moving towards sustainable practices. To achieve economic diversification, substantial investments must be made in infrastructure development and the creation of new industries. Saudi Arabia is faced with a persistent challenge of water scarcity, caused by various factors such as population growth, limited water resources, and agricultural demands.[307] Balancing water usage, improving water management practices, and encouraging water conservation are still major obstacles that need to be addressed. Saudi Arabia is confronted with the difficulty of harmonizing economic advancement and ecological preservation.

IV. 1. Case study 2: Norway

Norway is widely recognized for its comprehensive energy-focused development policies, which prioritize the use of sustainable and renewable energy sources. These policies are fueled by the country's unwavering commitment to reducing greenhouse gas emissions, implementing energy-efficient measures, and harnessing its abundant natural resources. For many years, Norway has been utilizing its plentiful water resources to generate electricity. Hydropower is the foremost source of electricity in the country, accounting for roughly 95% of its total energy production. Norway has created an extensive network of hydropower plants that offer reliable and renewable energy. The Norwegian Water Resources and Energy Directorate (NVE) is responsible for regulating and promoting the hydropower sector in the country. Norway's hydropower capacity is a result of its geographic features, providing an estimated technical potential of around 200 TWh/year for hydropower generation. This makes it one of the most abundant resources for hydropower in Europe. Presently, Norway's installed hydropower capacity is around 31 GW, with over 1,600 hydropower plants scattered throughout the country.[308] Hydropower is a dependable and sustainable energy source for Norway, as it offers a steady electricity production, ensuring a stable energy supply. Furthermore, hydropower is an eco-friendly and renewable energy option, as it does not emit greenhouse gases during operation. The Norwegian Water Resources and Energy Directorate (NVE) plays a crucial role in the licensing and permitting process for hydropower projects, assessing applications for new hydropower development, and considering its technical, economic, and environmental aspects. NVE is committed to collaborating with relevant authorities and stakeholders in order to guarantee adherence to environmental regulations and standards.[309]

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[307] Alshehri, S., et al. The Role of Sustainable Development Goals in the National Transformation Programs of Saudi Arabia. Sustainability, (2021) 13(4), 2309.
[308] Norwegian Water Resources and Energy Directorate (NVE) - https://www.nve.no/english/
[309] Norwegian Water Resources and Energy Directorate: Hydropower Licensing https://www.nve.no/licensing/

Norway places great importance on finding a balance between hydropower development and environmental conservation. To achieve this, the NVE has implemented comprehensive assessments and guidelines to minimize the environmental impact of hydropower projects. These assessments take into account factors such as preserving aquatic ecosystems, maintaining the quality of water, and safeguarding biodiversity.

Norway is a strong advocate for international cooperation in the field of hydropower. Initiatives such as the International Energy and Climate Initiative, which is spearheaded by the Norwegian Energy Agency, enable the sharing of knowledge and expertise with other countries. Norway's expertise in hydropower technology has been shared with several nations, significantly contributing to the global development of sustainable energy.[310] [311]Norway has earned a reputation as one of the major producers of oil and natural gas in the world. Even though the oil and gas industry is a significant contributor to the Norwegian economy, it has implemented strict environmental regulations to ensure responsible extraction and reduce the carbon footprint of the industry. The Ministry of Petroleum and Energy has the responsibility of managing the sector and formulating policies that balance economic gains with environmental considerations. Norway has also established the Climate and Energy Fund, which aims to finance research and development of clean energy technologies. The country has put in place extensive environmental regulations that cover various aspects of oil and gas activities, including drilling operations, waste management, emissions control, and oil spill prevention and response. The enforcement of these regulations is overseen by the Ministry of Petroleum and Energy and other relevant authorities working in tandem.[312] The Norwegian government takes a comprehensive and far-reaching approach to managing their oil and gas sector. Their objective is to ensure sustainable and efficient extraction of petroleum resources while maximizing long-term value for the country. The Ministry of Petroleum and Energy is responsible for managing the sector, which includes licensing for exploration and production. Norway recognizes that reducing greenhouse gas emissions associated with their oil and gas activities is critical. To become a global leader in transitioning to a low-carbon economy, Norway established the Climate and Energy Fund (Enova). Enova provides financial support for the research, development, and implementation of clean energy technologies. The fund encourages innovative solutions to reduce emissions and enhance energy efficiency in the oil and gas sector. Norway's commitment to promoting sustainable practices in the oil and gas industry is manifested through its investment in research and technology development. The country's endeavors are focused on the creation and implementation of innovative technologies that achieve three objectives: reduce

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[310] Norwegian Ministry of Foreign Affairs: Energy and Climate https://www.reeep.org/norway
[311] Ministry of Petroleum and Energy - https://www.regjeringen.no/en/dep/oed/id750/
[312] Climate and Energy Fund (Enova) https://www.iea.org/policies/2617-climate-and-energy-fundenova-industry

greenhouse gas emissions, increase energy efficiency, and minimize environmental impact. The Norwegian Research Council and the Norwegian Petroleum Directorate are among the research institutions and organizations that provide support for research efforts in the sector.[313] Norway's dedication to addressing climate change and promoting sustainability in the oil and gas sector is evidenced by its involvement in international initiatives such as the Oil and Gas Climate Initiative (OGCI) and the Methane Guiding Principles. The country cooperates with other nations, industry stakeholders, and environmental organizations to exchange best practices and collaborate on developing solutions that reduce emissions and improve sustainability.[314] Furthermore, Norway has been making significant strides in its efforts to diversify its energy sources with a focus on renewable options. One of the main areas of emphasis is wind power, with both onshore and offshore wind farms experiencing considerable growth in recent years. To achieve renewable energy goals, the Norwegian government plans to increase the capacity of wind power installations. In addition to wind power, Norway has been exploring the potential of other renewable sources such as solar power, biomass, and geothermal energy. Onshore wind farms are primarily located in regions with favorable wind conditions such as coastal areas and high-altitude regions. Meanwhile, offshore wind farms are being developed in suitable locations such as the North Sea. The government has set ambitious targets for wind power capacity as part of its efforts to meet renewable energy targets.[315] Despite its relative lack of popularity compared to hydropower and wind power, solar energy has been gaining momentum in Norway. The country has been actively exploring the potential of solar energy, especially in areas with high solar irradiation. To promote the adoption of solar photovoltaic (PV) systems, the Norwegian government has introduced support schemes, like net metering and investment incentives. Solar energy has been utilized for both residential and commercial applications, which has contributed to the overall renewable energy mix.[316]Biomass is another renewable energy source that Norway has been utilizing. Biomass can include organic materials such as wood, agricultural residues, and organic waste. The country has been making use of biomass for various applications, like heat and power generation. In rural areas with ample biomass resources, biomass power plants and district heating systems are common.[317] Norway has been investigating the possibilities of geothermal energy, which involves harnessing the energy generated from the Earth's internal heat. This source of energy can be used for a variety of applications, such as heating, generating electricity, and for industrial purposes. Despite the early stages of developing large-scale geothermal power plants, Norway has been conducting research

[313] Norwegian Research Council https://www.forskningsradet.no/en/
[314] Norwegian Petroleum Directorate https://www.npd.no/en/
[315] Norwegian Wind Energy Association (NORWEA) https://www.cleanenergywire.org/experts/norwegian-wind-energy-association-norwea
[316]Norwegian Solar Energy Cluster https://solenergiklyngen.no/
[317] Ibid

and pilot projects in specific regions to determine the feasibility of utilizing geothermal energy. If favorable geological conditions exist, geothermal energy has the potential to provide a sustainable and renewable source of energy.[318] Thereafter, Norway prioritizes energy efficiency and conservation efforts as a means of reducing energy consumption and promoting sustainable development. Through various initiatives and regulations, the government has made strides in bolstering energy efficiency in buildings, transport, and industry. For instance, the Norwegian Energy Efficiency Fund provides financial backing for projects aimed at conserving energy. The Norwegian Energy Agency (Enova) plays a pivotal role in advocating for energy efficiency and facilitating relevant programs. Furthermore, Norway adheres to strict building codes and standards to improve energy efficiency in the construction sector. The Norwegian Green Building Council (NGBC) champions sustainable building practices and issues certifications such as BREEAM-NOR for energy-efficient buildings. Additionally, the government offers incentives such as tax exemptions and grants for energy-efficient renovations and installations.[319] Finally, One of Norway's objectives in reducing carbon dioxide emissions from industrial activities is through investing in carbon capture and storage (CCS) technologies. The largest ongoing CCS project in the country is the Longship project, which is located at the Norcem cement factory. Its goal is to capture and store CO2 emissions underground. The Norwegian government actively supports CCS research and development through Gassnova and other organizations.[320]Norway has made considerable investments in the development of carbon capture and storage (CCS) technologies to address the issue of CO2 emissions generated by industrial activities. One of the noteworthy ongoing CCS initiatives in the country is the Longship project, which is centered around the Norcem cement factory. The project's primary objective is to capture and store CO2 emissions underground, thereby reducing the cement industry's carbon footprint. The Longship project, previously referred to as the CCS full-scale project, is spearheaded by Equinor and has multiple partners, including Norcem, Gassnova, a state-owned company, Shell, Total, and the Swedish utility Vattenfall. The Norwegian government granted the Longship project final approval in 2020, and it has a total budget of approximately NOK 25 billion (equivalent to USD 2.8 billion).[321] The Longship project has a primary goal of seizing the CO2 emissions from the Norcem cement factory, situated in Brevik, near Oslo. Cement production is notoriously carbon-intensive, resulting in a significant amount of CO2 emissions. The CO2 that is captured will be transported via a dedicated pipeline to a permanent storage site located in the North Sea. This CO2 will then be injected and

[318] Ministry of Petroleum and Energy https://www.regjeringen.no/en/dep/oed/id750/
[319] Norwegian Green Building Council (NGBC): https://worldgbc.org/gbc/norwegian-green-building-council/
[320] Gassnova - Carbon Capture and Storage (CCS): https://ccsnorway.com/
[321] Equinor - Longship Project https://norlights.com/about-the-longship-project/

stored underground in geological formations such as depleted oil and gas fields.[322] The Longship project is viewed as a model demonstration project for CCS in Europe. It has garnered widespread international attention and support from the European Union's Innovation Fund as a potential large-scale CCS deployment. The project aspires to capture and store around 400,000 tons of CO2 annually, which will be a significant contribution to Norway's overarching emissions reduction goals.

A. Democratic political system and its influence on energy-based development policies

Norway's political system takes the form of a parliamentary democracy and constitutional monarchy. The democratic principles of representative government, rule of law, and the protection of individual rights and freedoms form the bedrock of this system. To prevent any one branch of government from gaining too much power, Norway's political structure is designed to ensure the separation of powers and a system of checks and balances. The parliamentary democracy in Norway is operated through several electoral districts, with the citizens electing representatives to the Storting, which is the Norwegian parliament. The Storting is responsible for lawmaking, budget approval, government oversight, and representing the interests of the people. The Prime Minister, who belongs to the political party or coalition that holds the majority in the Storting, leads the executive branch, which is appointed by the monarch.[323] Norway operates under a constitutional monarchy system, in which a hereditary monarch serves as the head of state. The monarch's role is mainly symbolic, with limited political authority. The Norwegian Constitution outlines the rights and duties of the monarchy, as well as the basic tenets of democracy and individual liberties. The democratic process in Norway emphasizes the importance of the rule of law, which ensures that all citizens, including government officials, are held accountable to the same legal standards. The Norwegian Constitution also safeguards a range of individual freedoms and rights, such as freedom of speech, assembly, and religion. These rights are protected by an independent judiciary, which guarantees the impartial and equitable administration of justice.[324] Norway's political system is characterized by a multi-party structure with various parties advocating for different ideologies and representing diverse interests. Regular elections provide citizens with the opportunity to engage in the democratic process by casting their vote for their preferred representatives. Political parties play a critical role in shaping public policy and the formation of government through negotiations and coalition-building. The democratic political system in Norway has also played a pivotal role in shaping energy development policies in the country. Norway is widely recognized for its abundant

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[322] Bellona Europa - The Longship Project https://network.bellona.org/content/uploads/sites/3/2020/10/Longship-Briefing_Bellona-1.pdf

[323] Norwegian Parliament (Storting) https://www.stortinget.no/en/In-English/About-the-Storting/

[324] Freedom House - Norway Country Report 2021: https://freedomhouse.org/country/norway/freedom-world/2021

natural resources, particularly its oil and gas reserves, and its democratic system has facilitated a well-balanced and sustainable approach to energy development. Transparency and accountability are integral components of a democratic system's impact on the creation of energy development policies. Norway is a prime example of a country that has created sturdy institutions and regulatory frameworks to govern responsible resource management and environmental stewardship. The Ministry of Petroleum and Energy, among other relevant agencies, is responsible for overseeing the exploration, production, and distribution of petroleum resources in a manner that is consistent with democratic principles and the public interest. In addition, public participation and engagement in decision-making processes related to energy development are made possible by the democratic system. The Norwegian government values open dialogue and consultation with stakeholders, including local communities, environmental organizations, and indigenous groups. By adopting this participatory approach, diverse perspectives and concerns are taken into consideration when shaping energy policies. Norway's stance on democratic principles has greatly influenced its strategy in renewable energy development.[325] Despite being a prominent producer and exporter of oil and gas, the country has made strides in transitioning towards a more eco-friendly energy system. This shift has been facilitated by the democratic political structure, which has allowed for the necessary political will and public backing to prioritize renewable energy sources and minimize greenhouse gas emissions. Additionally, this political system has paved the way for the establishment of sovereign wealth funds, such as the Government Pension Fund Global, which is financed by the revenue from Norway's oil and gas industries. These funds are managed with transparency and serve to promote intergenerational equality, ensuring that the benefits of energy production are shared amongst generations and used to support sustainable long-term objectives. The impact of Norway's democratic political system on energy development policies is noteworthy. [326]The system's emphasis on transparency, public participation, and sustainability has played a pivotal role in shaping a balanced approach to energy development. This approach takes into account both economic growth and environmental stewardship, ensuring that both are given equal consideration. In summary, the democratic political system in Norway has had a considerable impact on energy development policies. The political system of Norway has been greatly influenced by democratic principles, specifically in regards to the development of energy policies. By prioritizing transparency, public involvement, and a dedication to environmental sustainability, the democratic system has played a pivotal role in creating a balanced approach to energy development that takes into account both economic progress and ecological preservation.[327] Norway's

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[325] Norwegian Ministry of Petroleum and Energy. (n.d.). Retrieved from https://www.regjeringen.no/en/dep/oed/id750/
[326] Norwegian Ministry of Climate and Environment. (n.d.). Retrieved from https://www.regjeringen.no/en/dep/kld/id750/
[327] Ibid

democratic political system is characterized by its strong emphasis on building consensus and promoting broad political representation. This approach also extends to energy policy, where inclusive processes are used to make decisions that involve a variety of stakeholders such as political parties, governmental agencies, industry professionals, environmental groups, and local communities. This participatory approach ensures that a wide range of perspectives are considered, in turn promoting responsible decision-making and accountability.

B.Assessment of policy outcomes in relation with economic and environmental sustainability

To start with, Economic sustainability has been successful in Norway. Norway's economic sustainability has been bolstered by its energy policies, which have prioritized diversification of the energy mix and the promotion of renewable sources. Norway's support for wind energy, hydropower, and bioenergy has encouraged innovation and job creation within the renewable energy industry (Norwegian Ministry of Petroleum and Energy, 2021). The shift towards renewable sources has reduced Norway's reliance on fossil fuel imports, which has enhanced energy security while also promoting economic resilience (Norwegian Ministry of Climate and Environment, 2020). Norway's energy sector has been strategically diversified, with a strong emphasis on renewable sources, especially hydropower. This approach has yielded numerous advantages, including increased energy security, economic stability, and decreased dependence on imported fossil fuels. The significant capacities and usage of hydropower in Norway have played a critical role in achieving these outcomes.[328] Norway has achieved a remarkable level of energy security and independence through the utilization of hydropower as a domestic and renewable energy source. Their vast water resources, including rivers and lakes, have been effectively leveraged to create a significant hydropower capacity. The International Energy Agency (IEA) reports that in 2020, approximately 95% of Norway's electricity production was generated by hydropower (IEA, 2021). Due to this strong reliance on hydropower, Norway's dependence on imported fossil fuels has been substantially reduced, greatly enhancing their energy security and reducing vulnerability to price fluctuations and supply disruptions. Norway's emphasis on renewable energy and hydropower has also played a significant role in the stability and growth of their economy. Their investments in hydropower infrastructure and technology have led to a thriving renewable energy industry, creating ample employment opportunities and driving economic growth. Norway has found a significant source of income through exporting electricity that is generated through hydropower. The country

[328] Oslo Centre for Research on Environmentally Friendly Energy (CREE).. Sustainable Energy in Norway: Experiences and Challenges. (2021)

has established connections with neighboring nations, which allows them to export extra electricity when there is a high production of hydropower. This export-focused method has helped boost Norway's economy and contributed to its fiscal stability.[329] Additionally, the emphasis on hydropower in Norway's energy sector has led to numerous environmental benefits and has helped with climate change mitigation efforts. Hydropower is an eco-friendly and sustainable energy source that produces minimal amounts of greenhouse gas emissions during electricity generation. By relying heavily on hydropower, Norway has been able to reduce its carbon footprint and minimize its dependence on fossil fuels, which aligns with their commitment to combat climate change. Norway's status as a leader in terms of sustainable energy practices is largely due to its use of renewable energy sources, particularly hydro power. This has also bolstered the country's reputation as a nation that is environmentally aware.[330]

In the development of a thriving electric vehicle (EV) industry, reduction of greenhouse gas emissions and promotion of economic growth, Norway's incentives have played a significant role. They have also had a positive impact on multiple aspects of the industry. Norway's policies and incentives have been created to encourage EV adoption. One of the incentives is the elimination of purchase and import taxes, reduced road tolls, free parking, and access to bus lanes.[331] These incentives have made EVs more attractive and affordable for consumers. Moreover, Norway has invested heavily in developing a reliable charging infrastructure network that includes public charging stations, incentives for private charging infrastructure installation, and the establishment of fast-charging networks. The availability of charging infrastructure relieves range anxiety and further encourages EV adoption.[332] Norway's electric vehicle (EV) industry has catalyzed job growth across several sectors, including but not limited to EV manufacturing, battery production, installation and upkeep of charging infrastructure, and related technologies. This has fueled the country's economic development.[333] The demand and incentives for EVs have stimulated innovation within the industry, with Norwegian companies emerging as pioneers in battery technology, charging solutions, and electric drivetrain systems. As a result of this technological advancement, Norway has become an epicenter of EV-related innovation and has enticed

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[329] Lahn, G., & Stevens, P. . Norway's renewable advantage. Oxford Review of Economic Policy,(2018), 34(3), 450-471. doi: 10.1093/oxrep/gry020

[330] Ulsrud, K., & Hanssen, G. S.. Norway's transition to a low-carbon society: A review of the energy transition in the Norwegian power sector. Renewable and Sustainable Energy Reviews, 81(Part 2), (2018), 1889-1898. doi: 10.1016/j.rser.2017.06.011

[331] Sierzchula, W., Bakker, S., Maat, K., & van Wee, B. The influence of financial incentives and other socio-economic factors on electric vehicle adoption. Energy Policy, (2014),.68, 183-194.

[332] Günther, M., & Wagner, U. J. The impact of financial incentives on electric vehicle adoption: Evidence from Germany. Transportation Research Part D: Transport and Environment, (2017), 55, 39-53.

[333] Klier, T., & Linn, J. Technological change in the motor vehicle industry: Evidence from the greenhouse gas emissions of new vehicles. Journal of Environmental Economics and Management, (2016), 79, 121-141.

investments from international firms.[334] The large-scale adoption of EVs in Norway has led to substantial reductions in greenhouse gas emissions and air pollution. EVs do not produce any tailpipe emissions and, when charged using renewable energy, contribute significantly to emissions reductions within the transportation sector.[335]Compared to conventional vehicles with internal combustion engines, electric vehicles (EVs) are more energy-efficient. The reason for this is that electricity is used as the primary energy source for transportation, which greatly reduces energy waste, resulting in an overall improvement in energy efficiency.[336] Another success is Norway's practice of managing revenue produced by the oil and gas industry which has been widely acknowledged as a prime example of economic sustainability. This success story is largely due to the role played by the Government Pension Fund Global, commonly referred to as the Norwegian Sovereign Wealth Fund. The fund was established in 1990 with the aim of investing excess oil and gas revenue for the benefit of forthcoming generations.[337] The main aim of the fund is to uphold Norway's fiscal stability for the long term by saving and investing income generated from petroleum. It is managed under a set of principles known as the "Petroleum Fund Guidelines," which details the ethical standards, risk management tactics, and investment strategies of the fund. The fund prides itself on operating transparently, being accountable, and practicing responsible investment methods. The primary goal of the Government Pension Fund Global is to diversify its portfolio. To accomplish this, the fund invests across a wide variety of asset classes, including equities, fixed income, real estate, and infrastructure, all on a global scale.[338] By diversifying its investments in this way, the fund aims to minimize risk and optimize returns over time. Norway's sovereign wealth fund has achieved remarkable success due to a multitude of contributing factors. Firstly, the country has established firm fiscal rules and a steadfast commitment to saving a considerable amount of its oil and gas revenues, which has provided a stable financial foundation. Secondly, the implementation of effective governance and transparency mechanisms has fostered trust among stakeholders and the public. Equally important, the Norwegian government's unwavering dedication to intergenerational equity and long-term perspective has proved critical. The fund's assets are managed with the future in mind, ensuring the preservation and sustainable

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[334] Sato, M., & Akimoto, K.. Economic and environmental impacts of electric vehicle diffusion in Japan. Energy Policy, (2017), 101, 228-239

[335] Hafner, M., & Tagliafico, L. A. Electric vehicles and smart grids: Challenges and opportunities. Energy Procedia, 105, (2016), 151-156

[336] Axsen, J., & Kurani, K. S. Interplay of technology and policy: A case study of battery-powered electric vehicles. Energy Policy,(2017), 107, 433-440.

[337] Dahl, R. A., & Lindseth, P. L. Norway's Sovereign Wealth Fund: Evolution and Performance. In The Oxford Handbook of Sovereign Wealth Funds,(2018), (pp. 179-198). Oxford University Press.

[338] Gulbrandsen, L. H., & Overland, I. The Norwegian Government Pension Fund: Ethics Overboard? Journal of Environmental Policy & Planning, (2012), 14(3), 349-366

use of resources for generations to come.[339] Norway has been consistently dedicating resources towards the research and development of clean energy, acknowledging the potential for economic growth and the creation of innovative technologies in this field. The Research Council of Norway is a key player in funding research and innovation in clean energy, supporting projects that center around energy efficiency, renewable energy, and sustainable energy systems. Their programs include the ENERGIX program, which is geared towards renewable energy research, and the CLIMIT program, which focuses on the development of carbon capture and storage technologies.[340] SINTEF, one of the largest independent research organizations in Europe, has also been actively involved in clean energy research in Norway, working closely with industry partners, universities, and research institutions to create sustainable and innovative solutions in areas such as renewable energy, energy storage, and technology.[341] Lastly, Carbon pricing, whether it be in the form of a carbon tax or cap-and-trade system, presents businesses with financial motives to diminish their greenhouse gas emissions. By assigning a monetary value to carbon emissions, the environmental impacts of pollution are brought into the equation, prompting companies to explore cleaner technologies and procedures. [342]Research has shown that carbon pricing can act as a catalyst for innovation and the creation of low-carbon technologies. Firms are encouraged to explore cost-effective approaches to minimize their emissions and may even invest in research and development to stay competitive.[343] Finally, Shifting towards a more sustainable energy sector, which includes renewable energy and energy efficiency, has the potential to create job opportunities and foster economic development. The renewable energy industry, including solar, wind, and hydro power, has displayed incredible potential for generating jobs.[344] Clean technology investments and renewable energy project deployment can lead to employment opportunities in manufacturing, construction, installation, and maintenance across multiple industries.[345] The transition to electric vehicles (EVs) and the associated charging infrastructure also presents job possibilities in the automotive sector, battery manufacturing, and charging station installation. Norway has made commendable strides in decreasing emissions. Despite this progress, there are still obstacles to overcome, especially in the shipping and industrial sectors where reducing emissions is particularly difficult. While natural gas

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[339] Østerud, Ø.The Norwegian Government Pension Fund: A Model for Other Countries? Global Policy, (2016), 7(1), 109-111.

[340] Research Council of Norway. (2021). Energy. Retrieved from https://www.regjeringen.no/en/topics/energy/energy-and-petroleum-research/research-policy-within-energy-and-petrol/id443525/

[341] SINTEF. (n.d.). Energy. Retrieved from https://www.sintef.no/en/sintef-energy/

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[344] International Renewable Energy Agency. (2020). Renewable Energy and Jobs - Annual Review 2020. Retrieved from https://www.irena.org/publications/2020/Sep/Renewable-Energy-and-Jobs-Annual-Review-2020

[345] Bassi, A. M., Gallagher, K. S., & Lecocq, F. Scaling up investment in renewable electricity: Macro-economic challenges and options. Global Environmental Change, (2019), 59, 101990.

is a cleaner option compared to coal or oil, it still adds to greenhouse gas emissions. To achieve greater environmental sustainability, Norway may need to implement stricter regulations concerning the use of natural gas. As the economy evolves, the country must ensure that the transition is seamless for workers in affected industries. There should be an emphasis on reskilling and retraining to accommodate the shift to cleaner energy. Norway's policies focused on energy have led to outcomes that are favorable to both economic and environmental sustainability. The nation has been successful in reducing emissions, promoting responsible management of resources, and encouraging economic growth in clean energy sectors. Despite these successes, there are still challenges that need to be addressed, and ongoing efforts will be necessary to continue advancing these objectives while maintaining a sustainable equilibrium between the economy and the environment.

IV. 2. Conclusion

A. Research findings

Saudi Arabia's economy has long depended on oil as its primary source of revenue and growth. The country boasts one of the largest oil reserves in the world and has consistently sought to increase oil production and exports. Energy policies in Saudi Arabia have prioritized maintaining a stable oil supply, attracting foreign investment in the energy sector, and using oil revenues to maintain social stability. In contrast, Norway, another oil-producing nation, has taken a different approach to energy-based development. Norway has pursued a diversified energy strategy that includes renewable energy sources in addition to oil. The Norwegian government has implemented policies to develop sustainable energy systems, reduce greenhouse gas emissions, and promote energy efficiency. Additionally, Norway has established the Government Pension Fund Global, which invests in sustainable development and renewable energy projects worldwide. Compared to Norway, Saudi Arabia has placed less emphasis on sustainable development throughout history. The autocratic system in Saudi Arabia prioritizes economic expansion and social stability, often at the expense of long-term sustainability. However, the Saudi Arabian government has acknowledged the necessity of sustainability and diversification through its Vision 2030 initiative. This program aims to transition to renewable energy sources, enhance energy efficiency, and implement measures for environmental conservation. In contrast, Norway prioritizes sustainable development to a great extent. The democratic system in Norway allows for stakeholder engagement, resulting in a long-term perspective that incorporates sustainability into policy decisions. Norway has implemented stringent regulations in mitigating the environmental impact of oil extraction. In terms of

renewable energy, the country has invested considerably in sources such as hydropower and offshore wind, and has been a global leader in promoting sustainable energy practices. Despite this, Saudi Arabia continues to struggle with a number of environmental challenges, including air pollution, water scarcity, and habitat destruction. Rapid industrialization, increased energy consumption, and the limited availability of water resources all contribute to these issues. The Saudi government has implemented measures to address these concerns, but there are still challenges to be faced in terms of enforcing and complying with these measures. In comparison, Norway has relatively lower levels of environmental degradation than Saudi Arabia. This is due in part to the strict environmental regulations and standards put in place to mitigate the environmental impact of oil extraction. Furthermore, Norway's democratic system has facilitated a proactive approach to environmental protection and sustainability. The Norwegian government has made investments in environmental monitoring, research, and renewable energy sources, which have helped to reduce the level of environmental degradation. On the other hand, the autocratic system in Saudi Arabia enables a top-down approach to energy-policy priorities due to its centralized decision-making power. The monarchy plays a significant role in shaping energy policies, with a longstanding focus on maximizing oil production and revenue generation. However, recent policy changes, such as those outlined in Vision 2030, signal a growing recognition of the need for sustainable practices and diversification. Unlike Saudi Arabia, Norway's democratic system allows for greater stakeholder participation, which leads to a long-term perspective and emphasis on sustainability in energy-policy priorities. The Norwegian government engages with various stakeholders, including the public and environmental organizations, to shape energy policies. Although Saudi Arabia's autocratic system may have led to a lower priority for sustainable development and higher levels of environmental degradation at first, recent changes in policy suggest a growing awareness of the significance of sustainability. The democratic system of Norway, on the other hand, prioritizes stakeholder engagement and environmental concerns, resulting in a proactive stance towards safeguarding the environment and developing sustainable energy. Oil-producing countries must prioritize incorporating renewable sources of energy such as wind, solar and hydropower into their energy mix. This will decrease the reliance on fossil fuels, reduce environmental damage and promote sustainability in the long run. Governments should set ambitious targets for the deployment of renewable energy to guide investment, technological progress and policy frameworks to support the transition to cleaner energy. To ensure responsible resource extraction and minimize environmental degradation, robust environmental regulations must be enforced. This includes setting emission standards, requiring environmental impact assessments and promoting sustainable land and water management. Implementing energy efficiency measures across all sectors, such as

industry, transportation, and buildings, will decrease energy consumption, reduce greenhouse gas emissions and promote resource efficiency.

The difference of success rate in implementing sustainable economy and environment conditions in Saudi Arabia and Norway is explained by two hypotheses. HY 1 “The autocratic governance system in Saudi Arabia is achieving lower success on sustainable development while comparing to the democratic system in Norway”, HY 2 “The autocratic governance in Saudi Arabia is resulting in higher levels of environmental degradation compared to the democratic system in Norway.” Therefore, in an autocracy system in Saudi Arabia, the power to make decisions is concentrated in the hands of a select few individuals or an elite ruling class. This leads to a lack of transparency and public involvement in the creation and implementation of policies. The absence of diverse stakeholders, including civil society groups and environmental organizations, resulted in sustainable development priorities not receiving the necessary attention. Saudi Arabia's economy is heavily reliant on oil production and exports. The autocratic system has historically prioritized generating revenue from oil, which resulted in a focus on short-term economic gains rather than long-term sustainability. This emphasis on maximizing oil production and revenue detracts from investing in sustainable development practices and transitioning to renewable energy sources. Saudi Arabia's autocratic system lacks robust checks and balances on decision-making processes, which resulted in a lack of accountability and oversight, allowing unsustainable practices to go unchecked. In contrast, democratic system, such as Norway, have mechanisms like independent regulatory bodies, environmental impact assessments, and public scrutiny, which help ensure that sustainable development goals are considered and enforced. The Autocratic system tends to prioritize the stability and continuity of power above all else. While this approach may foster a sense of political stability, it often hinders the implementation of radical policy changes or reforms that are necessary to address sustainability challenges. In contrast, Norway's democratic system operates under periodic elections and changing governments, which bring about new perspectives and priorities, allowing for policy shifts that align with evolving sustainability goals. The democratic system in Norway provides a more favorable environment for sustainable development for several reasons. One such reason is that it encourages public participation, stakeholder engagement, and broader consultations in policy-making processes, which allows for diverse perspectives and interests to be considered, including environmental concerns. Further, Norway's democratic system promoted inclusivity and ensures that sustainable development goals are more likely to be integrated into policies and decisions. Finally, Norway has implemented strict environmental regulations for various industries, including oil and gas extraction, to minimize environmental impacts. These regulations are enforced through independent bodies and mechanisms, ensuring compliance and

accountability. Norway has made notable strides in renewable energy by investing in sources like hydro power and offshore wind. Their democratic system enables the creation and execution of policies and incentives that promote renewable energy, hastening the shift towards a more sustainable energy model. Thus, all hypotheses are verified and confirmed.

B.Recommendations

Oil-rich countries can learn about successful sustainable development models and environmental practices through international cooperation and knowledge sharing. Collaborative initiatives can facilitate technology transfer, capacity building, and exchange of policies. Governments should allocate resources for research and development in clean technologies, sustainable practices, and environmental conservation. Encouraging innovation, diversifying the economy, and creating a knowledge-based society are all supported by this. When the public, civil society groups, and other relevant stakeholders are involved in the decision-making process, it promotes transparency, accountability, and inclusivity. Public participation ensures that sustainable development strategies are reflective of society's needs and aspirations. Governments can create specific funds to support sustainable development initiatives and incentivize businesses and individuals who adopt environmentally friendly practices. These funds can facilitate the shift towards sustainable energy and encourage green investments. Developing comprehensive programs for environmental education and increasing public awareness of the importance of sustainability and environmental protection fosters a culture of responsibility and empowers individuals to make informed decisions. It is crucial to establish effective monitoring and evaluation mechanisms to assess progress towards sustainable development goals. Regular evaluations identify gaps, measure performance, and enable timely corrective actions. By implementing these recommendations, oil-rich countries can promote sustainable development, reduce environmental degradation and benefit from their natural resources in a responsible and environmentally conscious manner. It is essential to recognize that political systems are not the only factors that determine energy policies and outcomes. Various other factors such as cultural, economic, and historical contexts also play a role in shaping these policies' direction.

C.Limitations of the research and suggestions for future studies

- Limitations of the research

The focal point of this research is a specific comparison between two countries, Saudi Arabia and Norway, both of which are oil-rich. It should be noted that the findings of this research may not be generalizable to all oil-rich countries since each country has its unique political, economic, and cultural factors that influence their approach to sustainable development and environmental conditions. The analysis conducted in this research relies solely on available data and studies until September of 2022, and any new developments or policy changes that may have occurred since then may not be entirely incorporated into the analysis. The relationship between the political system, energy policies, sustainable development, and environmental conditions is a complex and intricate one. Although the research attempts to simplify and compare these factors, it may fail to account for certain nuances and complexities that exist within each country's context. The research presents hypotheses about the impact of political systems on sustainable development and environmental situations. However, it is challenging to establish a direct causal relationship due to the presence of numerous confounding variables, such as economic factors, technological advancements, and international collaborations.

- *Suggestions for future studies*

To achieve a more comprehensive understanding of the relationship between political systems and sustainable development and environmental conditions, a broader comparative analysis is necessary. This analysis should include a more extensive set of oil-rich countries to allow for a comprehensive perspective on the variations and similarities across different contexts. To assess the long-term effects of political systems and energy policies on sustainable development and environmental conditions, longitudinal studies that track the evolution of policies and outcomes over time should be conducted. To gain a deeper understanding of the decision-making processes, stakeholder perspectives, and contextual factors that shape energy policies and their environmental impact, it is recommended to complement quantitative analysis with qualitative research methods, such as interviews, surveys, and case studies. Evaluating the effectiveness of specific policies and initiatives implemented by oil-rich countries for sustainable development and environmental protection is also crucial. Assessing the outcomes and impacts of these policies can provide valuable insights for future policy formulation and implementation. Finally, analyzing the policy frameworks, institutional arrangements, and governance structures in oil-rich countries can help identify best practices and lessons learned. In order to promote sustainable economies and enhanced environmental conditions, it is imperative to enable knowledge exchange and policy transfer between nations.

Thus, by overcoming the current limitations and conducting additional research, a more detailed and thorough comprehension of the correlation between political systems, energy policies, sustainable development, and environmental conditions in countries abundant in oil can be attained.

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6.Tables and figures

-Table 1. Personal elaboration of data showing the similarities, the independent variable and the dependent variable of Saudi Arabia and Norway.

Figures

- Source IEA: Energy production by sources in Norway, 2020

- Source: Enerdata, Energy mix of Saudi Arabia, 2021

-Source: Enerdata, climate transparency report, Saudi Arabia, 2022