CHAPTER III

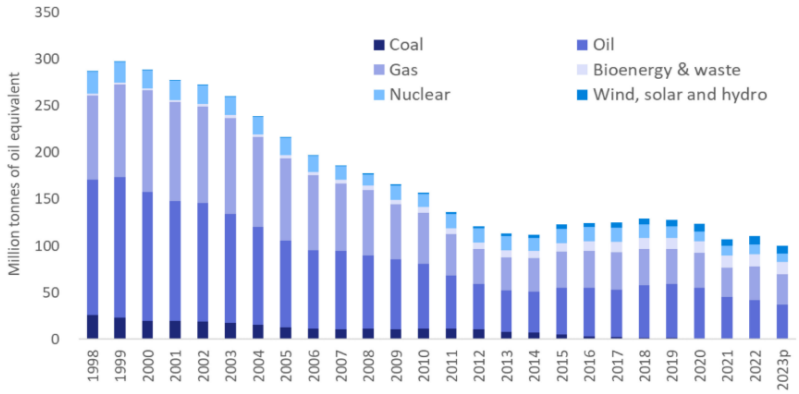
BRITISH ENERGY PRIVATE SECTOR'S ROLE IN ACHIEVING ENERGY SECURITY THROUGH THE ADVANCEMENT OF SUSTAINABLE ENERGY DEVELOPMENT

Prior to uncovering the energy private sector's role in achieving energy security through sustainable energy development, this research needs to explain fossil fuel current conditions to prove the fossil fuels' inability and irrelevancy in achieving energy security. Later, if proven will have a significant impact on what role private sectors in helping the government move towards a faster energy transition.

3.1 Fossil Fuel and Energy Mix Current Conditions for the UK

The United Kingdom still heavily relies on certain fossil or non-renewable energy in many vital and non-vital areas such as domestic and international transportation, building heat mechanisms, industrial power, and general electricity (the United Kingdom Parliament, 2023). Accounted that about 78% of this energy comes from energy that is derived from fossil fuels, those non-renewable energy has been crucial for the United Kingdom to power combustion engines, power stations, and boilers across the United Kingdom territories by burning its high-carbon fuels. In addition to that, around 1/5 or one-fifth of UK Primary energy consumption was from low-carbon sources. Those types of energy have been

assisting the UK to produce domestic electricity accounted 56.2 % from low carbon sources, however, fossil fuels dependency is still high in producing electricity with 40.8% coming from non-renewable energy. (Pyonting, 2024)

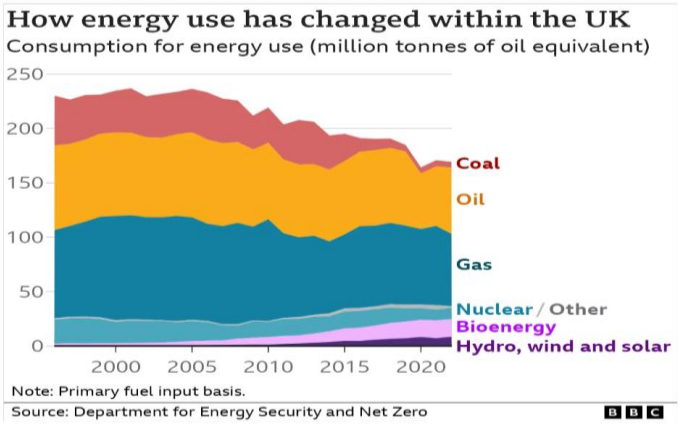


Graph 3.1 Energy Production in the United Kingdom decreased

(Department for Energy Security & Net Zero, 2024)

The United Kingdom's dependency on oil and gas is not a recent problem, other instances from the 1970s mentioned that the United Kingdom has been digging its own grave by relying solely upon oil and gas when there was a global price shock that shook the United Kingdom to its knees due to the prices that are higher than the usual. The same instances have become a huge nightmare for the United Kingdom government when in 2022 the price of oil and gas had shockingly increased at the same level of worseness as it was in 1970, the prices for petrol and

diesel in the United Kingdom had shockingly increased to hit the all-time high record in 2022 (the United Kingdom Parliament, 2023).



Graph 3.2 UK Domestic Energy Consumption

(Department for Energy Security and Net Zero, 2022)

Oil and Gas with all other non-renewable energy fossil fuels has been very hard to control and stabilize due to its nature of volatility in its prices and its limited availability of sources. Our interview with the President Director of INEOS Indonesia Mr. Fahrurrozi Zaini mentioned the same thing about the nature of fossil energy:

"*Fossil fuels is a commodity product is a very much upstream commodity that pretty much volatile, prices depend in a lot of factors. Economically to rely on fossil fuels will not be too easy because it keeps moving … the prices in hourly basis really volatile and at the same time the availability of fossil fuels is very limited … Some become parts of the war … that makes Fossil Fuels become very volatile*".

This over-volatility of fossil fuels is shown in many instances, one of them that affected the United Kingdom severely was when in February 2022 there was an unprecedented launch of an unprovoked invasion of Ukraine, this became one of the many reasons for oil and gas sudden surged of prices that makes the United Kingdom plunged into its worst energy price shock since the 1973 oil embargo by the Arabian countries (The United Kingdom Parliament, 2023). This is a pretty shocking fact especially when in 2022 fossil fuels generated about 40.8% of the United Kingdom's domestic electricity (BBC, 2024).

Figure 3.1 shows that roughly 8.9 percent decrease in 2023 compared to the year 2022 in total production of oil which was only 100.4 million tones, this figure was reported as one of the record lows in the United Kingdom published series in which its figure decreased 66% lower than the figure in 1999 (Department for Energy Security & Net Zero, 2024). Energy trade was also affected by several factors, mainly because of the dependency on non-renewable energy of crude oil, exports of crude oil reached a record low, and imports from Russia were also fully closure due to the invasion of Ukraine effect (Department for Energy Security & Net Zero, 2023).

The facts above show a concerning condition of the United Kingdom's consequences of relying mainly upon fossil fuels or non-renewable energy. Those figures raised concerns and questions on does fossil fuels are still quite relevant in these fast-changing social, economic, and environmental conditions. Not to mention, the fossil fuels nature that tends to be volatile and difficult to stabilize.

3.2 Why is Fossil Fuel No Longer Relevant to Achieve Long-term Energy Security?

In order to address the current state and correlation of non-renewable or fossil fuels with energy security, there is a need to take into account the 4 A's principle of energy security which are availability, accessibility, affordability, and acceptability. There is also a need to take into account the specific roles of government and private sectors in order to achieve energy security.

Interview with the President Director of INEOS Indonesia Mr. Fahrurrozi Zaini emphasizes the importance of using the principle of energy security when evaluating the use of certain energy. He mentioned:

"*We should look it into other perspective in energy security…their responsibility to provide and secure the energy for the population and for the country…the availability of energy in that area and country*".

The point of contention that he emphasized to us is about how the energy will be adequate for the population and the country by maintaining the state of availability of certain energy. Given the current conditions of fossil fuels, some changes will be concerning for the future availability of fossil energy. The world condition on fossil fuels energy supply is very different from back then, sooner than later the availability of fossil fuels is depleting from the surface of the earth.

To achieve energy security and to fulfill the four A's of energy security conditions, there is a need to also evaluate how controllable certain energy is. In this case fossil fuels, it is indeed very hard to control and stabilize by any means

and by any country. Especially for countries to protect their mass consumers and industries, there has to be cheap enough energy for households and businesses that require certain energies to operate, however, it also needs to be profitable enough to help the energy supplier and distributor in this case energy private sector to operate.

The president director of INEOS Indonesia also made a point of contention on how Fossil Fuels are categorized as global goods. He later mentioned about the limited power of government to control this type of energy:

"*Because this is a global product, many countries produce these, some countries produce a lot and some countries produce less. That means some countries are very much dependent on Imports of fossil fuels…still in the end…like the situations of Ukraine and Covid-19…these are all the situations that make the price of oil and gas keep changing…and that is not good for sure!*".

Since fossil fuels are a global product, some countries are producing less than other parts of countries, for instance, Western European countries have less oil than countries in the Middle East which has an abundance of fossil fuels energy underneath its territory. In this case, for countries that have less oil than the other parts of the world, many of which really rely on Imports. It is indeed a lie if people do not need this type of energy in this short period of time, people still need this type of energy to achieve or acquire energy which still consumes fossil fuels for it to be working. Nowadays, even with the amount of *just stop oil movement* and many

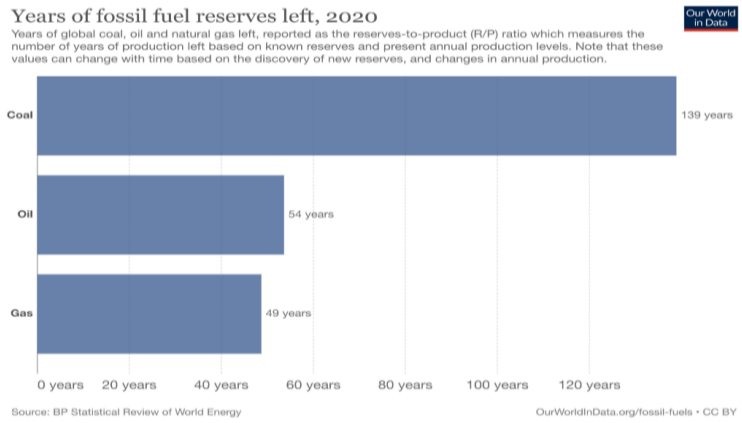
environmental movements that demanded the discontinuity of fossil fuel usage, Global fossil fuel consumption still rising steadily by at least 1% each year.

3.2.1 Fossil Fuels Availability

However, although it seems like it is impossible to stop using fossil fuels, people need to consider the depleting state of fossil fuels, sooner than later those types of energies will be vanished from Earth. To begin with, fossil fuels are sources of energy that formed millions of years ago sadly people used them very quickly for only 200 years and now it is beginning to be depleted sooner than people might have thought. Quoting the Former Saudi Oil Minister, Sheikh Ahmad Zahi Yamani (MET Group, 2021):

> "*The stone age comes to an end, not for lack of stones, and the oil age will end, but not for lack of oil*"

In other words, it is indeed a blatant sign that our fossil fuel reserves across the world are considered as low. In this state, sooner we will see the sign that the government and private sectors can no longer meet its people's needs with the current and expected future levels of usage.



Graph 3.3 Years of Fossil Fuels Reserves Left

Source: BP Statistical Review of World Energy

Graph 3.3 mentions the state of availability of main fossil fuels energy which shows very worrying numbers, important to mention that these are all of the world reserves combined, people need to worry about how those reserves can be distributed evenly across the whole wide world which still mainly depends on fossil fuels (MET Group, 2021). As Mr. Fahrurrozi Zaini mentioned:

"*Their (Government) responsibility to provide and secure the energy for the population and for the country…the availability of energy in that area and country"*

This is not a good sign for any country in this whole wide world, in other words, this should be and should have been a global problem. The

threats of fossil fuels scarcity are real and should have been our whole wide world concern, especially when its estimated time of full depletion is soon in 2052.

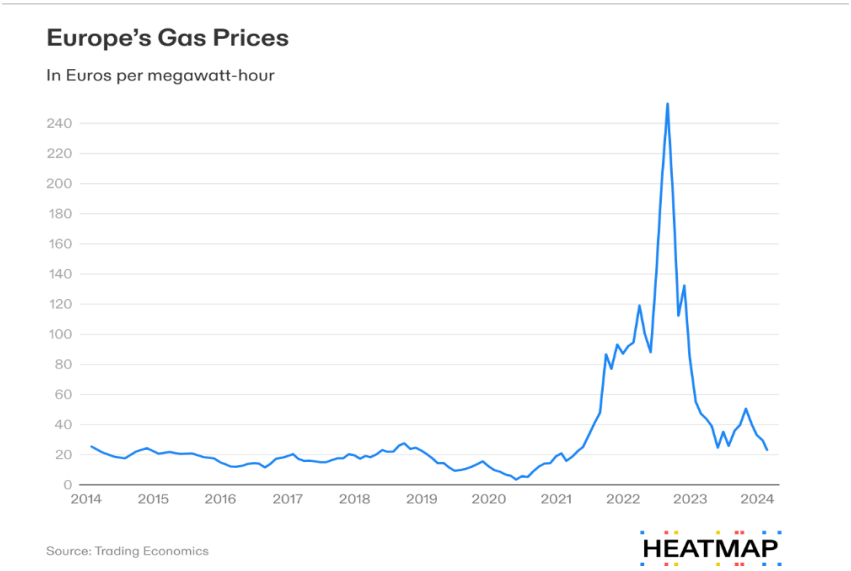
The question lies in the fundamental parts of energy security, it is a clear sign that people in this whole wide world can no longer solely rely on non-renewable energy, particularly fossil fuels. It is indeed a very much waiting game until people around the world see other means of energy to achieve long-term energy security. There is also a clear sign that there needs to be advancement of new sources of energy which become more reliable to be relied upon than fossil fuels which can no longer become a source of energy that can secure high demands of human energy.

3.2.2. Fossil Fuels Affordability

Prices of fossil fuels become increasingly worrying due to the volatile state of prices, its prices can go up and down in a matter not weeks, not days, but hours. As a commodity that can be traded across the globe, people somehow surrender themselves to its price volatility even when they cannot do any means to stop its prices from going higher or lower than usual. This is very worrying when suddenly there are lots of external factors that could move the needle up or crash the prices to their lowest level.

From the United Kingdom government's point of view, there are several instances when dependency on fossil fuels can be further questioned, but it is still in the luck of the United Kingdom. In 2022, due to the invasion

of Ukraine by the Russian Federation impacted the global price to the point it was as high as the price of the 1970 oil embargo by the Middle Eastern countries (The UK Parliament, 2023). This is also an eye-opening event for the rest of the world not only because the United Kingdom is hugely reliant on fossil fuels energy, but the world suffered five times this damage due to the oil prices rising for almost five months. Estimated the world suffered 2.85% of the annual Gross Domestic Product of $2.7 Trillion (Yagi, M. & Managi, S. 2022).



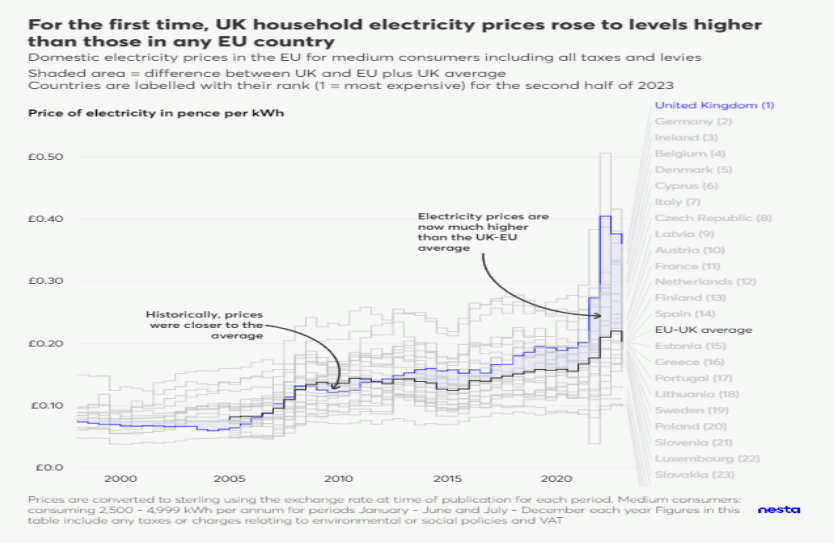
Graph 3.4 Europe's Gas Prices per Megawatt-hour

(Wagner, G. 2024)

This price of gas prices per Megawatt-hour in Europe was a challenging time for every country in this region. In 2021, the price of

energy is roughly at about 20 to 40 EUR per megawatt-hour. However, prices of gas went high in no time towards the level of as high as 240 EUR per megawatt-hour. This devastating price shock is not limited to the European region but also gives an economic upshot with extreme fluctuation in fossil fuel prices or they called with the term "*fossilflation*" (Wagner, G. 2024).

As for the United Kingdom, this phenomenon has been influencing consumer spending, high electricity affects UK households which are currently priced higher than the entire 27 European Countries at 0.36 GBP per kWh with all taxes included (electricity included as carbon taxes in the UK).



Graph 3.5 UK Household Electricity Price

(Orso et.al, 2024)

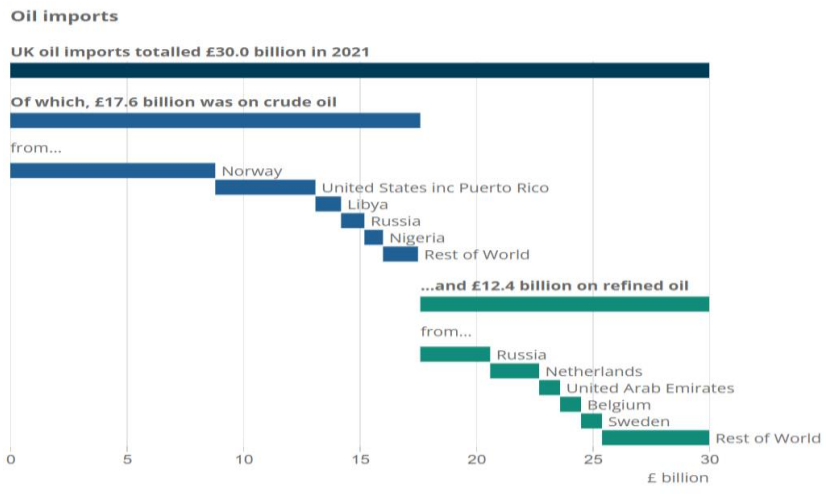
3.2.3 Fossil Fuels Accessibility

In 200 years of using fossil fuels, people are sharing sources in the name of business, economics, and mutual benefits. But, since fossil fuels are a global commodity, many countries produce more and some others produce less, which means that some territories have a significant abundance of fossil fuels and some others have more renewable energy. They have more giving some of their sources and fossil fuels products towards the less by trading, this is a basic economic principle when the market fits with the product.

In a simple term, there is a huge difference in the accessibility of fossil fuels due to the nature of where the fossil fuel can be found. In many cases, Middle Eastern countries are blessed with abundant levels of liquid fossil fuels or petroleum, this petroleum will be distilled and used in many cases, especially for transportation fuels. For instance, Saudi Arabia itself became the largest oil producer from 1992 to 2017 providing roughly 15% of oil global output, this country produces in daily basis roughly about 11 million barrels of oil per day. From the private sector perspective, Saudi Arabia's oil and gas industry is controlled by an oil company called Saudi Aramco which is a state-owned company controlled by Saudi Arabia's Ministry of Petroleum and Mineral Resources and the Supreme Council for Petroleum and Minerals (Carpenter, W. 2024).

In the upper west or within the western hemisphere, the United States became the largest oil producer among them. In 2018, the United

States became the largest oil producer in the whole wide world, this country ranked first after Saudi Arabia fell to second place due to surging oil production in the United States (Carpenter, W. 2024). Although the United States became the global top producer of oil or crude oil, the top exporter of oil in 2022 is still held by Saudi Arabia with roughly 236 billion USD in numbers of exports of petroleum to the whole wide world (OEC, 2022). In 2022, the United States is no better by giving total exports of about 9.52 million barrels per day. In business view, the Compounded Annual Growth Rate (CAGR) for this fossil fuels business still growing over time with about 46.1% Export Growth in 2021-2022 (OEC, 2022).



Graph 3.6 Oil Imports by the United Kingdom in 2021

(The Office of National Statistics of the United Kingdom, 2021)

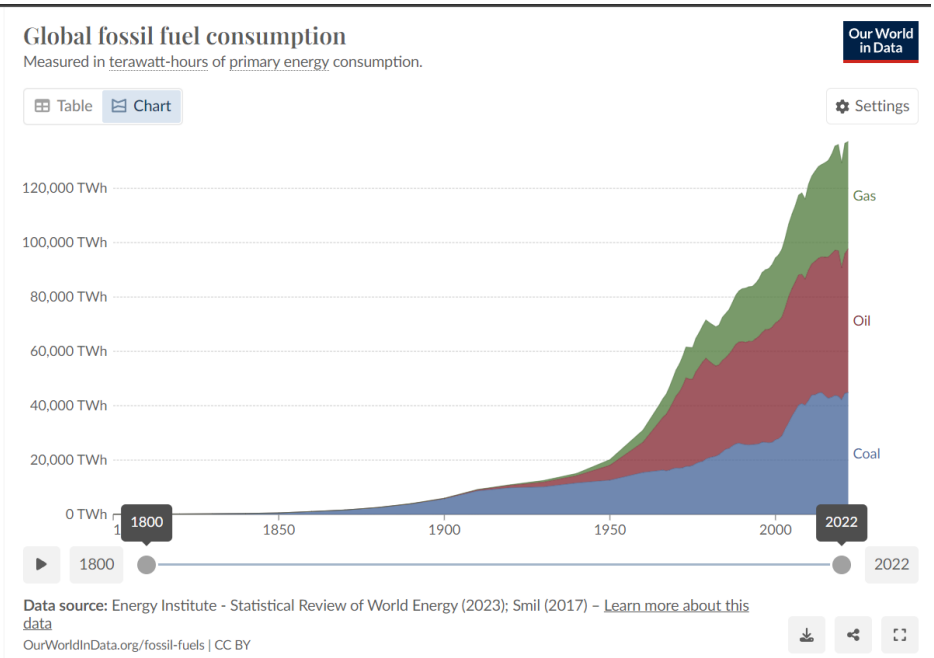
Those countries that have an abundance level of petroleum help the rest of the world fulfill their growing demand for fossil fuels daily by giving exports to all of those countries. From the United Kingdom's perspective, the whole country imported at least roughly about 30 billion GBP of oil in 2021 which consisted of 12.4 billion GBP in refined oil and 17.6 billion GBP in crude oil (Office for National Statistics, 2021). This huge number of imports shows the United Kingdom's reliance on fossil fuels through its import mechanism, the main United Kingdom crude oil supplier in 2021 would be Norway which accounted for 49.9% or about 8.8 billion GBP, and refined oil accounted for 24.1% or 2.9 billion GBP solely from Russia (Office for National Statistics, 2021).

3.2.4 Fossil Fuels Acceptability

For the past 200 years, people have relied heavily on fossil fuels energy. Human lives, it seems like fossil fuels will never be detached from human lives, numerous services benefit human lives from transportation, energy services, electricity, and many others. It is indeed a blatant fact that fossil fuels have been fundamental to our lives on a daily basis.

For a couple of decades, oil companies drilling the surface of the earth in many places, from the ocean floor or offshore to the oil that is trapped inside the land territory (National Geographic, 2024). It is so widely accepted by the whole wide world that oil companies can extract petroleum 24 hours a day without any vacations in 365 days. The reason behind fossil fuels especially oil is providing thousands of conveniences in the form of

gasoline, that is so central towards the human lives up until now even the demand always increasing overtime (Rosado, P. & Ritchie, H., 2022).



Graph 3.7 Global Fossil Fuel Consumptions

(Energy Institute - Statistical Review of World Energy 2023; Smil 2017)

It is indeed a blatant fact that fossil fuel has been burned more in some places than others, however, it also needs to take into account many reasons and external factors from production, intensity of trades, etc. In 2022, the United States became the country in which people consumed fossil fuel derived from coal in greater numbers than the rest of the world at the level of 63,836 kWh per capita. This number was followed by Australia in the second place at 54,286 kWh and Germany at 31,225 kWh which became the number one country in the entire Europe which heavily relied

on energy derived from coal at 31,225 kWh. From the United Kingdom stand standpoint, it is no better than the rest of Europe just below the People's Republic of China (PRC) at the level of 22,509 kWh of fossil fuel consumption per capita that is derived from coal (Energy Institute, 2023).

In addition to that, other non-renewable energy sources such as nuclear energy and biomass energy could potentially help to reduce the use of other means of conventional non-renewable energy. Nuclear energy harvests the most powerful energy in the nucleus or core of an atom, this energy is harvested through a process called *"nuclear fission*" where the nucleus of an atom splits and at the end produces electricity (National Geography, 2023). However, this energy has a very potential threat which there is not a lot of government is ready to implement this kind of energy due to its dangerous nature of *nuclear fission* and it requires the element uranium, this type of nuclear power plant usually uses a very unusual and quite rare type of Uranium called the U-235 Uranium which a non-renewable source. This type of uranium is not available in many places and can be depleted over time (National Geography, 2023).

3.3. *Au Revoir* for Fossil Fuels

There is a saying "*Every encounter has its goodbye*", it seems like humans will put their reliance on fossil fuels to an end. For these past 200 years, the discovery of fossil fuels has made a significant difference in human lives, we created something useful that become fundamental in everyday human lives. But, this introduction to fossil fuel is at a decline state and we need to be prepared to

move towards energy with substantially more availability, especially when the substances that we have been using are depleted sooner than later. According to the calculation research conducted in 2015 showed that Natural Gas and Oil will have vanished from the face of the earth in only 51 to 53 years. Not to mention, coal which produces the most *Carbon Dioxide* (CO2) will vanish from the earth for roughly 114 years (MET Group, 2021).

From this point of view, there is no reason for a human to still rely solely only with fossil fuels. Every piece of evidence shows that humans can no longer rely on fossil fuels for energy security since the availability, accessibility, acceptability, and affordability of such energy will no longer be at an acceptable level for everyone to use. Human needs to find other means or sources which help them survive in this whole world. This is the time for people to look towards the advancement of Renewable and Sustainable Energy since the depletion process of fossil fuels can no longer be stopped or slowed. The true state of security is when humans can rely on something that will never vanish or be depleted by the trend of increasing consumption of humans who always need energy to fulfill their lives.

In line with this, the United Kingdom is in no better state than the rest of the world, the same problem is been inside the United Kingdom, especially in the midst of current world and political conditions. In the interview made with Mr. Fahrurrozi Zaini President Director of INEOS Aromatics Indonesia mentioned:

"*If we are talking about the UK (United Kingdom) ... if you look at the situation today, it's kind of a bit chaos because of the Ukraine war and so on…the EU (European Union) itself*"

He later added:

"*If you look at the example of the UK (United Kingdom), they are so much dependent on fossil fuel. Whenever the supply of fossil fuel gets less, the government…. Having difficulties to support the energy required for the UK people*"

Ultimately, he also mentioned how the dependency on something that becomes depleted overtime could potentially go wrong:

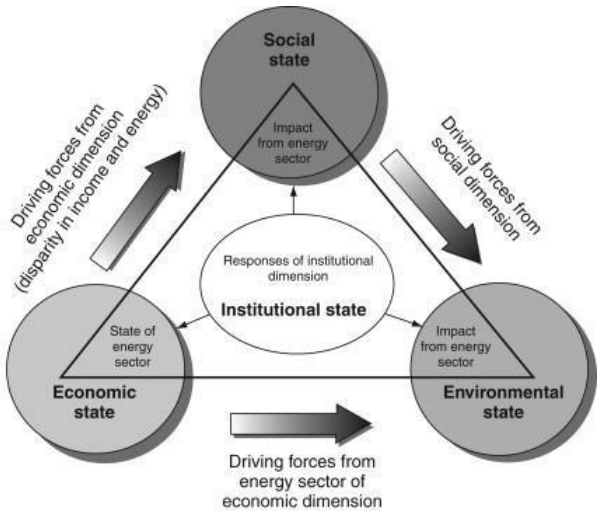
"*This also shows that when a country or one economic zone is pretty much actually dependent on fossil energy… it is very sensitive. That means it is also showing the need to move from dependency on fossil fuels to renewables is becoming much more crucial"*

This is an eye-opening fact for the United Kingdom and the rest of the world regarding their view on fossil fuel, the need for transformation towards renewable energy become more crucial.

3.4. Sustainable Energy Development

This is the time when humans need to rely on their natural behavior to survive by being adaptive to the current world conditions which shows signs that fossil fuels will be depleted over time.

The new concept of Sustainable Energy Development (SED) is currently growing over time due to the fossil fuels nature, the International Atomic Energy Agency (IEA) defined what called Sustainable Energy Development (SED) as "*the provision of adequate energy services as affordable cost in a secure and environmentally benign manner, in conformity with social and economic development needs*" (Davidsottir, B. 2012). In a simple term, sustainable energy development helps us to define and seek energy services that are still quite affordable but also sensitive to their impact on social, economic, and environmental conditions that are currently happening. Later, the IEA defined Sustainable Energy Development with the inclusion of a business point of view as "*development that lasts and that is supported by an economically profitable, socially responsive and environmentally responsible energy sector with a global, long-term vision*" (Davidsottir, B. 2012). The term *"global, long-term vision*" is crucial in that it illustrates the potential collaboration between the governments of the world and its private sectors as the executors to fulfill this mission.



Graph 3.8 Three dimensions of sustainability in the energy sector

Source: International Energy Agency (IEA)

In the discourse of Sustainable Energy Development (SED), there are at least four central goals in which everything has a serious potential to achieve energy security, these goals help the future of human lives meet the energy demand and secure the state of energy security in the future. Those goals are as follows:

1. **Reduce environmental impact:** Reducing the production of fossil fuels and substances that potentially become a threat to the earth's conditions, ensuring the reduction of waste that comes from the process of fossil energy.
2. **Improving energy efficiency:** Moving towards Sustainable Energy Development (SED) not only enhances the technical efficiency aspect of energy production but also economic efficiency which effectively enhances energy supply.

3. **Improving energy security:** This ensures the condition of "availability" for the energy to meet the demand for energy in all forms, at affordable prices, and in sufficient quantities. This improves energy security in various ways such as shifting towards more reliable energy sources that can be found within every country's territory. Therefore, the possibility of a clash of nations in searching for energy derived from sources that suffered from scarcity can be reduced, and the war for energy could be less likely to happen.
4. **Improving the condition of access, affordability, and availability:** This ensures reliable access to energy security with a high quality of energy at an affordable price can be done by every country. Renewable energy and sustainable energy could potentially play a good role in the stability of energy prices, and the access, and also availability of energy (Davidsottir, B. 2012)

By implementing Sustainable Energy Development, energy security can be achieved by using sustainable energy to meet the needs for energy security without sacrificing the social, economic, and environmental conditions for future generations. To achieve a true state of energy security, we also need to consider the way to achieve that, in the sensitivity of the future generation.

3.5 The Potential Cooperation Between the HM Government and British Private Sectors

In the past decade, several concerns forced governments around the world to make some changes both domestically and *vis-à-vis* internationally. This is because the current conditions of the earth require a vital pivot in the human lives way of life, especially in the environmental, economic, and social conditions. Governments and private sectors around the world *vis-à-vis* begun to make some changes in their laws, regulations, and actions. Several actions by the government include their pledges toward international communities by ratifying international agreements to achieve a greater good for humanity and to achieve a common goal for a better future.

3.5.1 British Government Stance

From the United Kingdom's perspective, His Majesty's Government has a very firm stance and active participation in the international community, especially in the environmental, social, and economic aspects of human lives. The United Kingdom's stance demonstrated firmly in its action and leadership to tackle climate change by hosting the 26th United Nations Climate Change Conference of the Parties (COP26) in the city of Glasgow, Scotland (Climate & Clean Air Coalition, n.d). COP 26 President and Business and Energy Secretary Alok Sharma mentioned to the public as follows:

"*Tackling climate change is one of the most urgent shared endeavors of our lifetimes…As a country, we (the United Kingdom) have*

demonstrated we can both rapidly cut carbon emissions while creating new jobs, new technologies, and future-proof industries that will generate economic growth for decades to come".

In 2020, the United Kingdom released a policy paper which quite progressive called "The Ten Point Plan for a Green Industrial Revolution" which includes ten plans:

1. Advancing offshore wind;
2. Driving the growth of low-carbon hydrogen;
3. Delivering new and advanced nuclear power
4. Accelerating the shift to zero-emission vehicles;
5. Green public transport, cycling, and walking
6. Jet zero and green ships;
7. Greener buildings
8. Investing in carbon capture, usage, and storage;
9. Protecting our natural environment;
10. Green finance and innovation;

The United Kingdom has set the most ambitious target to reduce emissions made by carbon in 20230 by 68%. Those above are also supported by the firm decision and statement made by the Prime Minister of the United Kingdom at that time The Rt Hon Mr. Boris Johnson MP:

"*The UK was the first major economy to embrace a legal obligation to achieve net zero carbon emissions by 2050. I will establish Task Force Net Zero to take forward this national priority, and through next year's COP26 Summit, we will urge countries and companies around the world to join us in delivering net zero globally*"

(Prime Minister's Office, 10 Downing Street, 2020).

This ambitious plan has been carried to the newest prime minister who released a statement for the United Kingdom to recommit its position to achieve Net Zero Prime Minister Rishi Sunak Mentioned:

"*This country is proud to be a world leader in reaching Net Zero by 2050. But we simply won't achieve it unless we change*"

"*We'll now have a more pragmatic, proportionate, and realistic approach that eases the burdens on families*"

"*All while doubling down on the new green industries of the future. In a democracy, that's the only realistic path to Net Zero*"

(Prime Minister's Office, 10 Downing Street, 2023).

The above examples of the official statement from the office of Prime Minister in 10 Downing Street act as the basis of the United Kingdom's stance towards the social, environmental, and economic requirements that have been set higher in this wide world due to the shifting global current conditions.

In 2023, there is also a new Energy Act 2023 which addresses the state of energy security by utilizing sustainably with the transition to net Zero Emissions in the loop. This act supports Innovation and Technology which also implies the support from the government to encourage investment in Clean Technologies such as carbon capture and storage (CCS) and support for emerging sectors such as hydrogen energy and advanced nuclear technologies in part 2 “Carbon Dioxide Capture, Storage, etc and Hydrogen Production, Transport and Storage” and part 4 “New Technology”, especially in chapter 2 “Hydrogen Grid Conversion Trials” of this energy act. The latest revised version of the Energy Act 2023, has 14 parts which are stated as follows (Legislation.gov.uk, 2023):

UK Energy Act 2023

Part 1 Licensing of Carbon Dioxide Transport and Storage

Part 2 Carbon Dioxide Capture, Storage, etc, and Hydrogen Production, Transport and Storage

Part 3 Licensing of Hydrogen Pipeline Projects

Part 4 New Technology

Part 5 Independent System Operator and Planner

Part 6 Governance of Gas and Electricity Industry Codes

Part 7 Market Reform and Consumer Protection

Part 8 Heat Networks

Part 9 Energy Smart Appliances and Load Control

Part 10 Energy Performance of Premisise

Part 11 Energy Savings Opportunity Schemes

Part 12 Core Fuel Sector Resilience

Part 13 Offshore Wind Electricity Generation, Oil and Gas

Part 14 Civil Nuclear Sector

Part 15 General

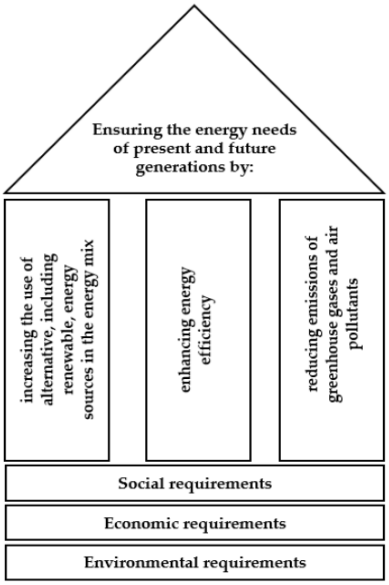
Moreover, In the international world, the United Kingdom has also pledged and stood in the position that is in favour of the current shift or new demand of social, economic, and environmental conditions. In the paper presented to the British Parliament by the Secretary of State for Business, Energy and Industrial Strategy by Command of His Majesty's with the title

of “United Kingdom of Great Britain and Northern Ireland’s Nationally Determined Contribution”, mentioning the whole country stance towards the Paris Agreement which provided the international community to maintain the increase in global average temperature below 2 degrees Celsius (Secretary of State for Business, Energy, and Industrial Strategy. 2022). In December 2020, the Nationally Determined Contribution (NDC) was made in order to respond to the United Nations Framework Convention on Climate Change (UNFCCC) by the United Kingdom of Great Britain and Northern Ireland, this strong move consists of a commitment to the United Kingdom to reduce nation-wide greenhouse gas emission to the point or under 68% in 2030. Such movement is actually in accordance with Article 4 of the Paris Agreement, this movement showed the strong contribution of the United Kingdom especially in the target sectors of Energy, Industrial Processes and Product Use, Land-Use Change and Forestry, Agriculture, and Waste Management (State for Business, Energy, and Industrial Strategy. 2022).

However, there is a slight concern for the British government. In order for them to achieve the statements and fulfill their pledges, the government needs to also consider the other roles which are equally important which is the private sector as the plan executor. Without the proper executor, no plans can be carried out, hence there will be no stances and pledges towards the domestic and international community that can be

fulfilled by the British Government. It is such a waste of time when there is a comprehensive plan without a reliable executor at the other end of the line.

3.5.2 How Private Sectors Role in Energy Security by Advancing Renewable Energy?



Graph 3.9 Energy Security Components

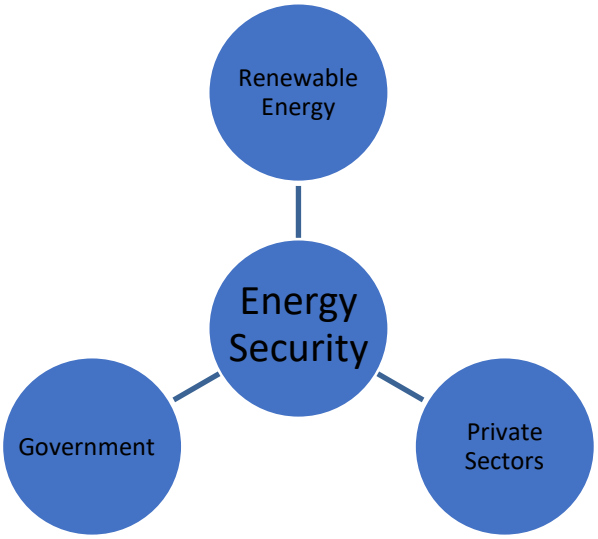
(Lukasiewicz, K et.al, 2022)

Graph 3.9 above according to Lukasiewicz shows how social, economic, and environmental requirements become the foundational basis to achieve the energy security. The acknowledgement of newer and fast changing global conditions are needed to tailor the efforts to achieve energy security in more relevant ways. In the energy sectors and within the perspective of energy security, the role of the private sector very much

depends on how the government acts towards issues because the government itself needs to provide a sense of conformation, security, and confidence towards the private sector as the main executors. the government needs to recognize and react swiftly to the changing conditions that demand better social, economic, and environmental requirements. It is indeed very important for countries recognize the shift in social, economic, and environmental requirements, especially when some changes are needed to ensure human lives continuation in this world. However, to fulfill those changes, pledges, and stances by the government, the world also needs to take into account the role of the private sector as the executor of the plan. The private sector acts as the bridge between policymakers and the public masses because, in the end, they are the one that helps the government unleash public policy by complying with them.

Quoting the graph 3.9 private sectors act as the media or the bridge between the government acts, pledges, and policy with the future energy security for the people in the British territory. At least there are three ways of private sector vital role to the government

a. **Increasing the use of alternatives, including renewable energy sources and energy transitions.**
b. **Enhancing energy efficiency**
c. **Reducing emissions of greenhouse gasses and air pollutants.**



Graph 3.10 The relationship between Government, Private Sectors and Renewable Energy

Source: Researcher Owned

Graph 3.10 shows the relations between government and private sector to achieve energy security, and the relations shown in Graph 3.10 need to be enhanced by ensuring the private sector takes the leading role in energy transformation, this helps to release the burden of government. According to Lukasiewicz and Kevin Baumert, by acknowledging higher requirements standards, private sectors can help to increase the use of alternatives, increase energy efficiency, and reducing pollutions. This is also backed by opinion made by Melanie Kenderdine and Ernest Moniz which acknowledge the role of technological advancement to harness renewable energy (Lukasiewicz, 2022; Kalicki & Goldwyn, 2005).

It is indeed a generous help for the British government if the private sectors begin its invention of renewable energy, this will help as the pillar towards energy security by increasing the use of alternative fuels.

3.5.2.1 Private Sectors Role to Increase Alternatives, Familiarity, and Energy Transitions.

It is indeed a blatant fact that the government's role is vital to those above, but for the pledges to be completed, it needs the hands of the private sector, especially as the leading role in energy transitions.

Quoting from the President Director of INEOS Aromatics Indonesia Mr. Fahrurrozi Zaini:

"*of course, It is indeed there will be a lot of things that private sectors can do to make sure that they can drive the energy transitions from fossil fuels to renewables…if companies can transform their energy towards the renewables*"

"*They need to invent themselves, every company needs to transfer their energy requirements, by doing this they can slowly transfer themselves from fossil fuel dependents to the renewable*"

"*And then when a lot of private sectors can transfer themselves to the renewables, that can also help the government to release their burden, and helps the stability of energy supply become more stabilized*"

The United Kingdom as a whole country is so dependent on fossil fuels, that the increased use of alternative fuels such as sustainable and renewable energy by the private sector helps the market domestically and internationally to be familiar with such alternatives. Therefore, the familiarity and the increased usage of renewable and sustainable energy helps the United Kingdom government to support the energy required for the United Kingdom people. The one that will bring the change and the one that will sell this type of energy to the market will be the private sector, this helps the United Kingdom people to be familiar with the changes towards renewable. This will release the burden of the government by helping them distribute the energy evenly.

This is aligned with the statement made by the President Director,

"*If you look at the example of the UK (United Kingdom), they are so much dependent on fossil fuel. Whenever the supply of*

fossil fuel gets less, the government…. Having difficulties to support the energy required for the UK people"

"*If a lot of companies already transfer the energy into renewable, basically the amount of energy for public use becomes more available, and its easier for the UK government to control*"

Faster renewable and sustainable energy transformation also means more stability in the supply side of energy. Although the demand for that kind of energy is still limited, there will be a time when a full shift is required by human lives. By the time a full shift is required, the United Kingdom government has all the supply they need to meet the requirements of energy security which are from the point of view of availability, accessibility, affordability, and acceptability. This familiarity is also helpful in enhancing energy efficiency by increasing its availability, accessibility, affordability, and acceptability for the people of the United Kingdom and Northern Ireland.

Notable names in the energy industry such as INEOS Group, Royal Shell, and British Petroleum have shown direct intervention in their daily operations system in which lies plans to increase the utilization of alternative fuels including but not limited to sustainable and renewable fuels. For instance, Royal Shell and

British Petroleum have shown significant plans to reduce greenhouse gasses by deploying renewable electricity, minimizing flaring, and performing transformation in their downstream business to rely more on renewables and low-carbon solutions (Royal Shell, 2023) (British Petroleum, 2023). As for British Petroleum, the usage of renewables increased significantly as showed by the increasing supply volumes of their Biogas under the company BP Pulse, it grows significantly at the level of 80% growth per year (British Petroleum, 2023)

As for the INEOS Group, they have been planning out the specific roadmap to achieving Net Zero emissions by 2050 in accordance with the Paris Agreement which was ratified by the United Kingdom of England and Northern Ireland in 2019. The target of this roadmap is to reduce the emissions emitted by the activity of the company by 33% in 2030, this plant initiated with a total investment of over 6 billion EUR in the effort of including but not limited to:

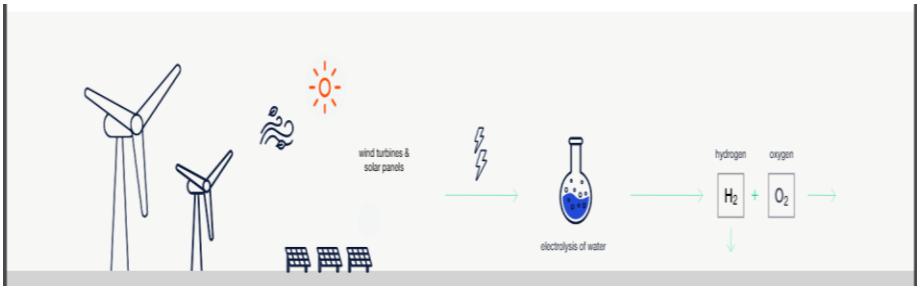
a. developing a new hydrogen business
b. purchasing green power to run daily company's activities
c. producing recycled plastics and materials
d. utilising bio-based feedstocks which included renewable instead of fossil-based resources;

e. conducting electrification and low-carbon technologies

f. conducting continuous optimization process

g. Creating sustainable and long-term partnerships to achieve a reduction in value chain emissions as well as investing in brand new assets to step up the game of renewable energy. (INEOS, n.d)

A notable and significant move has been made by the INEOS Group for the company to push its business towards renewable low carbon emission energy, a global scale of investment made by the INEOS group as a direct commitment towards Net Zero by 2045 and also to become the leader in a clean hydrogen revolution (INEOS, 2022).



Graph 3.11 Hydrogen energy revolution

(INEOS Group, 2023)

Quoting Mr. Stuart Collings, the CEO of INEOS O&P in the United Kingdom:

"*We are progressing at pace with our commitment to deliver our Net Zero plans. This will see the displacement of hydrocarbon fuels used at Grangemouth, like natural gas, with clean, low carbon hydrogen to power our processes and manufacture vital materials used across a wide range of sectors.*"

In addition to that, quoting Andrew Gardner, the Chairman and CEO of Grangemouth Plant:

"*We are determined to reduce our emissions to Net Zero by 2045, create products that will help others reduce their emissions, and play a leading role in a clean hydrogen revolution*"

This is aligned with the recent investment of INEOS Group of over 500 million GBP to build the newest energy plant which will drive down emissions of over 140.000 tons of CO2 per annum, this power plant later will be converted to run on hydrogen (INEOS, 2022)

3.5.2.2 Enhancing Energy Efficiency

For the United Kingdom to achieve more efficiency in the energy sector, the key is in the innovation that will be made by the private sectors in energy sectors. This innovation can vary such as

in technology, production, business, new sources discoveries, supply chain, and many others. As Mr. Fahrurrozi Zaini mentioned:

"*What private sectors can do now is to keep pursuing to have the better and latest technology and more efficient technology, make sure that the renewables in whatever form can be battery technology, can be a solar cell, can be hydrogen fuel…that should be economical…this is the key*"

The discovery of sustainable and renewable sources is only a discovery of information if one's country cannot translate and transform those sources into usable energy for daily use. In this case, the role of research and development (R&D) can be helpful not only in the hands of the government but also in the hands of private sectors, this freedom can ease the burden of government by not thinking about the process of research and development (R&D) themselves but to the private sectors.

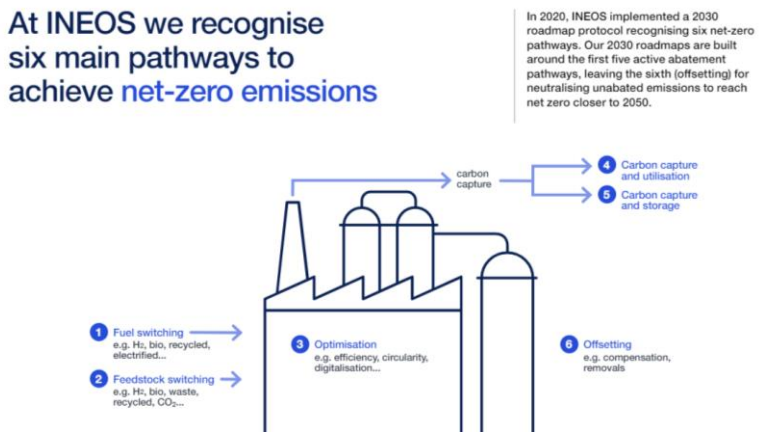
Energy efficiency can be achieved with advanced mechanisms and technology, especially technology and processes to transform and translate renewables into daily uses. However, the latest and greatest technology does not ensure the process of transformation of energy will be more efficient. The role of the private sector also needs to be guided by the United Kingdom's

government so the latest technology can be applied thoroughly in accordance with the laws and public policy. The seamless coordination between the fastest and latest innovations needs to be developed around a better bureaucracy system to have better efficiency in energy transformation and usage.

Mr Fahrurrozi Zaini mentioned:

"*The government need to walk together and work together with the private sector…so that the private sector can have a very clear goal and at the same time private sector can help the government*"

As for the innovation towards enhancing energy security, many of British Energy's private sectors rely heavily on technological innovation which has provided significance in increasing efficiency. For instance, for British Petroleum to decrease the amount of flaring, they made specific software that helps the efficiency of flaring which will help predict the emissions monitoring process (British Petroleum, 2023).



Graph 3.12 INEOS Optimisation for Net Zero Emissions

(INEOS Group, 2023)

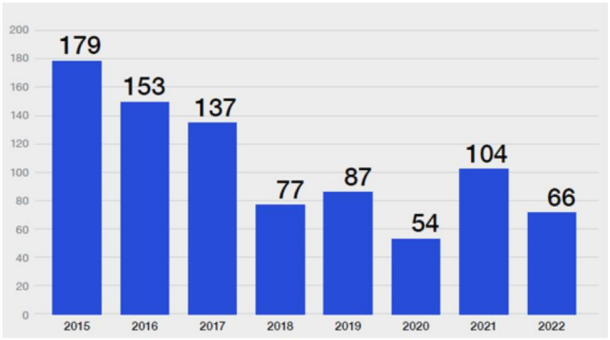
As for INEOS Group, they continuously perform improvement in many operating sectors which helps to increase efficiency, this will help to achieve the reduction of carbon emission. Innovative solutions have been implemented which help to reduce the emissions from the production process of zero-carbon energy. In addition to that, technology has been influential for the INEOS Group to help the advancement of efficiency in producing, distributing, and saving renewable energy. INEOS claimed to become the largest operator of electrolysis technology which can become the buffer of the intermittency of sustainable and renewable energy (INEOS, 2024)

3.5.2.3 Reducing emissions of greenhouse gasses and air pollutants

In order to reduce emissions significantly, there need to be multiple parties involved by giving the best effort they can potentially give to reduce emissions. The government of the United Kingdom has done a significant amount of alignment inside the government to reduce the emission of greenhouse gasses and air pollutants. However, plans and policies are only mere words when the executors will not comply with them. The continuation of fossil usage will potentially have further consequences in hurting the current plans and policies for the future.

As the executors, by encouraging private sectors to move from fossil fuels to renewable, this will easily help to decrease the carbon released by the process of combustion made by burning fossil fuels into the air or water due to the nature of sustainable and renewable energy that are less harmful than the energy derived from the fossil fuels. As for now, the United Kingdom still heavily relies on fossil fuels, especially the ones that emit greenhouse gasses the most, in this case, coal. Moving towards renewable energy allows the United Kingdom to retain its stance as a country that pledges to maintain world temperature well under 2 degrees Celsius, this is the consequence made by the government from the ratification decision of the Paris Agreement in 2015. Energy transformation made by the

private sector also helps the United Kingdom government to be a world-leading government to achieve 2050 Net Zero.



Graph 3.13 INEOS Group progress in reducing emissions

Source: (INEOS, 2022)

To achieve the standards, set by the Paris Agreement, the British private sector has been making substantial leaps to achieve those standards. For instance, there is an operation conducted by the private sector called the "*carbon capture storage & use*". As for the INEOS group, they have been capturing emissions from their plants in Tavaux, French Lavera, Belgium Antwerp, and Germany Cologne which accounted for the removal of over 300.000 tonnes of CO2 per annum (INEOS, 2022). As for the Royal Shell and British Petroleum, they followed the same pattern. Earlier, it supports the 2050 net-zero emission target by reducing direct greenhouse gas emissions and indirect gas emissions in its operations and investments. Later, it has been actively controlled and reduced the

emission to the air by reducing non-methane hydrocarbon emissions by 5% (British Petroleum, 2023).

Reducing emissions is not an overnight process, there is a long process of finding the right technology and the right renewable sources to begin the process of reducing emissions. The government of the United Kingdom needs to work *vis-à-vis* with the executors to have the same goals and expectations, all the plans and policies need to be discussed with the British energy private sector to ensure capability of everyone to be onboarded towards the same idea and goal of reducing emission. As for now, the government has already implemented some limitations, however, this needs to be followed by a series of mutual efforts to make it economical for the private sector to move from fossil fuels to renewable energy and to help the government reduce the level of carbon emission below the appropriate target.

From the INEOS Group point of view, quoting the Sustainability Director at INEOS Grangemouth Mr. Colin Pritchard:

"*We welcome the UK Government's commitment .... This is essential to delivering reductions of more than one million tonnes of carbon dioxide emissions each year at Grangemouth*"

3.7 The Impact Private Sector Role in Energy Security

The sustainable energy development effort or the advancement of sustainable energy made by the British energy private sectors will help the government of the United Kingdom to achieve long-term energy security, especially not only in a world full of higher social, economic, and environmental requirements but also the worrying state of faster depletion of fossil fuels. When the private sector has been conducting its role in sustainable energy development including but not limited to:

1. **Increase the usage of alternatives including but not limited to biofuels, renewables, and sustainable energy;**
2. **Increase efficiency;**
3. **Reducing emissions of greenhouse gasses and air pollutants.**

It will have a tremendous impact in helping the government to ease the burden of achieving future energy security for the United Kingdom's masses. Especially when the parameter of energy security is applied to see the bigger picture of what are they trying to achieve for the mass's future. **The 4 A's of energy security are as follows:**

1. **Availability**: In the worrying state of faster fossil fuel depletion, availability will be an issue that can be tackled with the utilization of renewable and sustainable energy. The advancement and the increase of renewable and sustainable energy utilization by the private sector will potentially lead to more discovery of renewable and sustainable energy sources. For instance,

INEOS Group has been developing clean hydrogen as fuel. They produce at least 400 thousand tonnes of hydrogen to fuel 300 million miles of heavy goods vehicles equivalent to more than 11.000 trucks navigating the world (INEOS, 2022). INEOS Group sees the potential in the future of energy with clean hydrogen for the British masses, the company has been seen to invest further in this type of energy in the United Kingdom, and the initial action will be to incorporate this type of energy at INEOS plant in Grangemouth to reduce at least 1 million tonnes of emission in 2030 (INEOS, 2023)

2. **Affordability**: Every new energy needs new technology for it to be affordable. With the expansion made by the private sector, the cost of energy can be lowered due to the nature of renewable and sustainable energy which are easier to be controlled and acquired. In comparison with fossil fuels, renewable and sustainable energy are never volatile in terms of their prices, this stability will help the government to become more economical. Although there is a potential cost of converting crude energy into practical energy to be used by the public masses, however, if the energy has been produced enough, it will surely become cheaper due to the market law of supply and demand. In simple terms, the law of supply states that the more scarce a commodity the price will increase, on the other hand, the more abundance a commodity will make the price decrease. Certain efforts have been made by the British private sector to increase the supply of renewable energy. For instance, INEOS Group INEOS has been developing

electrolysis projects across Europe with a total investment of 2 billion Euros in November 2020 (INEOS, 2020).

3. **Accessibility**: Due to the nature of renewable and sustainable energy it can be found anytime and anywhere in any country. As for the resources, it will reduce the intensity of competing to get the scarcity of energy sources. Although it is easier to find, for the masses to also become the beneficiary, it needs the role of the private sector to make it accessible to the public.

Graph 3.14 INEOS Design of Circular Economy

(INEOS Group, 2023)

As for INEOS Group, to increase accessibility INEOS Group and many other British energy private sectors have been implementing circular economy design to incorporate renewable to the end product of users.

4. **Acceptability**: Acceptability has been a significant burden to the government, with the private sector's help, the acceptability of new energy to the masses will be achieved faster. For instance, the impact made by the

INEOS Group with the investment of 2 billion EUR in 2020 will give a world-scale low-carbon hydrogen plant at its plant in Grangemouth (INEOS Group, 2022). This will help the advancement of hydrogen as the new type of renewable energy for the masses which has been used by many high-load vehicles in this whole wide world (INEOS Group). Not to mention, INEOS Group direct impact in helping the acceptability of new renewable energy towards the United Kingdom masses by producing charging wall boxes for e-mobility made with sustainable styrenics. According to INEOS Styrolution Key Account Manager, this will help towards the advancement of e-mobility (INEOS Group, 2023)

Picture 3.1 Charging Wall box for e-mobility using sustainable materials

Source: (INEOS, 2023)

3.8 Potential Cause of Divorce

3.8.1 Different Expectations Between the Government and the British Private Sector

In the most beautiful way that the government of the United Kingdom can cooperate with the private sector, some differences might be found along the way in this relationship. For the government of the United Kingdom to work *vis-à-vis* with the British private sector, some alignment is needed to help unite different mindsets into the same vision.

The differences might be fundamental, especially about the drive behind every action that is quite contrary between each private sector and the government. Every private sector will be driven to take several actions by economic aspects, to help them achieve or to act for something, it also needs to consider the economic aspects of the action in order not to harm the company's financial structure. However, governments think differently in how they drive their action, much more towards the masses and the people than about the economy. Sometimes, the government put aside economical aspects to achieve what their people wanted or needed.

A common ground is needed to achieve the same mission and the same goal of energy security without harming one or more parties, the common ground lies within each other ability to understand each other point of view, especially on what drives their actions. Mr Fahrurrozi Zaini mentioned:

"*For you (government) to push the private sector…when they (private sectors) see that the economic is not viable…whatever the effort of the government try to pursue will not work*"

In simple terms, for the government of the United Kingdom to push the agenda by utilizing private sectors, therefore it also needs to be reminded of the limitation of private sectors in terms of capital and the ability to do something out of economic reason. In other words, the government needs to be sensitive on how they also can provide ways for the private sector to push forward for energy security without harming their profitability or company cash reserve.

3.8.2 Potential Greenwashing by the Private Sector

As stated in part 3.8.1, the private sector always be driven by economic aspects in which it also needs to be profitable enough to run the operations and distribute its product. INEOS largest facility in Grangemouth Scotland emitted more than 3.2 Million Tonnes of annual carbon dioxide in 2019. The commitment made by the company has been faced with critiques especially when they are still expanding their chain of pollution in their manufacturing site, especially in Antwerp Belgium. In addition to that, since 2015 INEOS group has been expanding its subsidiary to fortify its positions in the UK, USA, Denmark, and Norway in the oil and gas business. Recently, they have invested 250 Million USD in the Forties Pipeline which transports of accounted to 40% UK's oil production. Not to mention, the continuous fracking exploration which holds exploration licenses in northern England, this process of fracking has been done also by other major energy companies such as Schlumberger, Baker Hughes, Halliburton, ConocoPhillips, Chevron, and ExxonMobil (BlackRidgeResearch, 2024)

3.8.2 How fast is the Energy Transformation?

The fundamental differences that have to be taken into consideration are how the energy transformation target is different between each British energy private sector and the government of the United Kingdom. The United Kingdom has given some limitations on several things, but limitations need to also be taken into account, especially with the ability of private sectors to move forward with their current conditions. The technology to transfer and translate renewable or sustainable energy can be really expensive, and the research and development (R&D) can be costly for the private sector. However, if innovation is successfully made by the private sector, it will change the game of how they serve the market. In other words, it is opening various new ways of doing business in this particular market, hence their profitability will not be harmed.

Mr Fahrurrozi Zaini mentioned:

"*The government (United Kingdom) as the regulator needs to realize how fast the technology can cater…for you to push the private sector to transitions…*"

Sometimes governments in the world come up with way too extreme measures to tackle and to align with what the social, economic, and environmental needs right now, however, they are not taking into account the process of research and development (R&D) of private sectors and the economic ability of private sector to move from fossil fuels towards renewables.

3.9 Realistic Government and Private Sector Relations

To achieve real energy security which gives the needs of the public masses in the United Kingdom but also economically viable for private sectors, there are several things that both parties can do to make this relationship work for them.

3.9.1 Common Ground, Economic Opportunities & Future Stability

However, the major energy companies would not turn themselves towards sustainability with their profitability margin nature. However, the current trend will reflect the future trends of energy trading which will affect the profitability of companies worldwide. A recent IEA report in 2023, mentioned that the global investment in clean energy has been rising to the level of USD 1.7 Trillion in 2023 which includes investment towards renewables, clean technologies, EVs, storage, low-emission fuels, efficiency improvements, heat pumps, and nuclear power (IEA, 2023, General; Rijsberman, 2019).

Mentioned by the IEA Executive Director Fatih Birol:

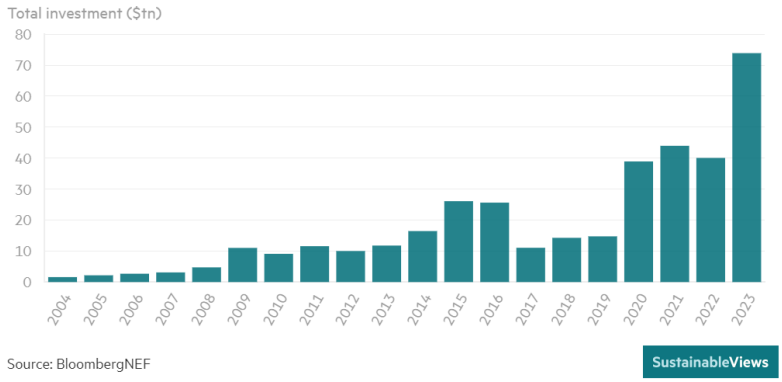
"*For every dollar invested in fossil fuels, about 1.7 dollars are now going into clean energy*"

He later mentioned:

"*Five years ago, this ratio was one to one…Which is set to overtake the amount of investment going into oil production for the first time*"

(IEA, 2023)

Although there has been quite a report that major oil companies have been investing heavily in upstream oil and gas in 2023 which goes back to the level of 2019, it has been reported those companies have profited more than 100 Billion USD combined (Evans, 2023). However, many fossil fuel producers' profit cash flow has gone to share buybacks, debt repayment, and dividends rather than back into increasing supply (IEA, 2023). In addition to that, the research made by T.A. Hansen has simulated the impact of cumulative forgone profits from fossil fuels each year as the scenarios of climate stabilization still going, within the year 2020 to 2025 nearly 1.6 to 2.3 trillion profit will decrease worldwide for energy companies which also translated to further 4.7 to 6.5 trillion USD profit loses from 2020 to 2030 (Hansen, 2022).



Graph 3.15 Total Investment in clean energy in the UK

(Bloomberg NEF, 2023)

Despite the ongoing investment in clean energy surging, the companies still make a profit on fossil fuels, and seems like the profitability is increasing. However, in the long-term perspective, Stanford Professor Engell stated that fossil fuels are no longer decent investments. A phenomenon called '*Divestment*' which is a condition when the investor moves away from a certain investment object is currently happening across the fossil fuels industry. In addition to that, the 2015 Goldman Sach's commodities research team mentioned that coal which is currently the biggest fossil fuel supporter is at its so-called "retirement age". Moreover, the Senior Attorney of the Climate & Energy Program from the Center for International Environmental Law Ms. Muriel Moody Korol in her report stated that 1000 USD invested in the coal industry in her case Arch Coal in March 2011 would now be only worth 32.78 USD due to the decrease price of share from 35.99 in 2011 to worth only 1.18 USD in 2015 (Korol, 2015). Imagine the loss with the amount of money invested from 2011 to this year 2024, surely an economical perspective it is no longer a viable aspect for long-term investment. Due to the complexity of fossil fuels as an upstream commodity traded object, the margin in this business has been decreasing over time which also reflected in INEOS Group Holdings' operating and financial review and prospects, the profitability has been decreased in 2023 as a result of lower margins and lower sales volumes (INEOS Group Holdings, 2023)

As for the INEOS and the United Kingdom, through the recent UK Energy Act 2023, they (INEOS) can find major support to move into a new clean energy economy, especially with its pledges to be a leader in the clean hydrogen business. The Energy Act 2023, regulates and states the government's unwavering support, For instance in Part 2 "*Carbon dioxide capture, storage, etc and hydrogen production transport and storage*", Part 3 "*Licensing of Hydrogen Pipeline Projects*", Part 4 "*New Technology*" in which in chapter 2 of this part talks about "*Hydrogen Grid Conversion Trials*". The United Kingdom government and the INEOS have the same common ground in which they prioritize the clean hydrogen business opportunity to increase the advancement of renewable energy and to create energy security. Since INEOS, has made significant investments and plans for the clean hydrogen business, this energy act will help to accelerate the advancement of the clean hydrogen business.

3.9.2 Government as the Goal Setter and Penal Giver

The government's role is quite the opposite of the private sector, they act as the regulator the role is to give and point directions towards goals that will be beneficial for the public masses. Not to mention, by giving directions they also need to give way towards checkpoints or objectives by providing legislation that will give confidence to the executors and the public. His Majesty's government needs to be appreciated for how its swift response to the fast-changing circumstances of social, economic, and environmental demand for human lives, such pressure must

be difficult for the country which is famously known for its economy and industrial revolutions.

There are several options that the government can take to improve its position as the regulator whose role is to give confidence to the public and the executors. From the point of view of INEOS, Mr. Fahrurrozi Zaini mentioned:

"*The role of government is very important here, there are two major things"*

"Number one, they need to have the Goals, Rewards & Punishments"

"*And also, they should be realistic enough on how fast the technology is moving"*

The government's role here is not only by giving stances and making countless pledges towards the local and international community, but also they need the tools to move forward all parties per the social, economic, and environmental changes that they have recognized earlier. For example, the government needs to have a reward and punishment mechanism for the private sector. This will help the private sector to have more motivation and an easier way to cooperate with appropriate rewards, but also, they will get punished when they fail to meet the government expectations or limitations that have been set earlier.

However, every government move needs to be discussed with all of the parties involved. The government needs to have more understanding of the realistic vision and goals by taking into account the ability and the limitations of private

sectors and the technology. Transitioning towards renewable energy can be a very huge gamble for lots of private sectors. Government needs to communicate clearly with the private sector so that they can have clearer goals, common visions, and common grounds.

Later He added:

"*The government (needs to) have an open discussion and continuous communication with all the stakeholders, then we can have common goals"*

"Today government have set the limitations…provide carbon banks…that all the instrument to help the company become more focus to achieve Net Zero"

"*So, then the government needs to work together with the private sector so then we can have a realistic target, milestone. So, then the private sector can have a very clear goal. And at the same time, the government can also help the private sector*"

Understanding everyone's ability and limitations can be determined by creating great communication with all the stakeholders, for instance in this case private sectors, public masses, non-governmental organizations, etc.

3.9.3 Private Sectors as R&D Spearhead

For the government to achieve energy security, they can no longer rely solely on fossil fuels which no government and parties can control its prices and

sources. There is a huge need for transitions towards better energy sources, and that is when the government needs the private sector as the executors. The plans, limitations, pledges, and statements made by the government will only become mere words if there are no executors who will comply with their rules and messages.

The private sector acts as the executor in the energy sector, it has a very vital role which helping to create the pillar of energy security and helping to achieve the appropriate level of acceptability, affordability, availability, and accessibility of energy. They have the leading role in the energy transition from fossil fuels to renewable energy, their role will help to ease the burden on the government by providing a good research & development process to create efficiency for renewable energy. Its presence will help to increase the use of alternatives, and hence will help to create a good supply side. Due to the nature of renewable energy, the more companies use this type of energy, it will gradually reduce the emissions emitted from carbon fossil fuels.

The private sector's vital role is also in line with the advice of the President Director of INEOS Aromatics Indonesia, Mr. Fahrurrozi Zaini:

"*What private sectors can do now is to keep pursuing to have the better and latest technology and more efficient technology, make sure that the renewables in whatever form can be battery technology, can be a solar cell, can be hydrogen fuel…that should be economical…this is the key*"

Private sectors also need to begin their transitions and dependents from fossil fuels to renewable energy as soon as possible. As a key British energy sector owned by the United Kingdom's richest individual, several key movements have been carried out by INEOS to begin its transitions towards renewable energy and to align themselves with the 2050 Net Zero mission.

Later He mentioned:

"*I think it's slightly more advanced compared to the country in Asia, for example. So they already determined the target for carbon net zero by 2050, whereas most of, we are talking about the UK, most of the UK companies set the same*"

"*For INEOS, we started to do a lot of things… then we are directly saving the percent of CO2 emission per ton of we produce. So that's quite a significant milestone*"

"*Our logistic lead. By the usage of biodiesel, for example, this is also our effort for us to move into. We also try to control and also try to implement the solar cell for our plant utilization and several other*"

From the perspective of energy security and energy transition as a global effort, the British private sectors have a leading role in creating a process or business that will help the technology transfer between the northern part and the southern part of the world. The countries that show significant progress towards

innovation in energy transfer will help other countries through their private sectors, when British private sectors making business with the outside world, it helps to create a multiple relationship between government to government, government to private sectors, and private sectors to private sectors in a global scale.

Later he mentioned:

"*So the joint effort of every country in this world is very crucial. As you know, the United Nations is also promoting the Carbon Net Zero initiative. And then a lot of, you know, potential cooperation between country to country or company to company to elaborate and also to push the technology and also the implementation of the whole system, the whole economic system*"

Given the limitations that the private sector is having, it is indeed still efficient enough to help this joint effort of every country in this world. Private sectors will help Britain to secure energy by actively contributing towards international trade of knowledge, energy, and technology for energy transformation.