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The Impact of Brexit on Green Energy Sustainability of the European Union

Gyakari Ntim

Faculty of Business and Law, University of Roehampton, London, UK

Email address:
ntimgyakari91@gmail.com

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Abstract: The Great Britain exiting the European Union in 2020 through a referendum made significant impressions on geopolitical integration and partnerships. Brexit fueled heated discussions over the future of both the remaining Union members and the United Kingdom as well; the question of energy sustainability remains unsettled. The focus of common market policies have shifted from the shared economic advantages of open trade policies to geopolitical considerations, which represents the numerous influences of Brexit. An essential part of the study is the external environment influencing corporate operations between the United Kingdom and the European Union under the new geopolitical environment. Few studies, however, have focused on an in depth research on Brexit, considering both the internal and external energy sustainability of the European Union. The data gathered revealed the tremendous influences of geopolitical frictions after Brexit on numerous areas of green energy co-operations. The paper identified key areas which have suffered significant impact from Brexit and is a great concern for policy and decision makers. The study revealed events and some trends that needed fundamental inter-connectedness between the UK and the EU for mutual economic progress and stability.

Keywords: Brexit, Green Energy, Eurozone, Green Investment, Europeanization

1. Introduction

1.1. Overview

This chapter's goal is to provide background information on the European Union (EU) and discuss the effects of Britain's leave on the EU's capacity to sustain its use of Green energy. Investigating and comprehending the direction the EU is taking in light of its clean and Green energy programmes following Brexit is crucial. The UK's action will have a wide range of effects on EU aspirations.

The objective is to examine the EU's interests in environmentally friendly policy and the viability of sustainable Green energy sources. Although many European nations are interested in joining the EU, the UK's choice to leave raises serious questions about whether the EU is indeed advantageous to its member states.

1.2. History of EU

The ultimate goal of pursing a common regional policies and environmental goals led Europe to create a Common Market which the United Kingdom joined in 1973. The Union has made efforts to liberalise trading and co-operation through common regulatory and legal frameworks.

The European Union is formed on three thematic pillars as stated in TEU;

1) Common European Community including common coal, steel and energy community
2) Common Foreign and Security Policies
3) Cooperation in justice and Home Affairs

The European Union is committed to create "a robust Energy Union with a forward-looking climate policy" and has begun implementing changes to integrate international energy markets and hasten the transition to a system that is effective, low-carbon, and heavily reliant on renewable energy sources. The UK's vote to exit the EU does not alter the fundamental justification for Europe's energy and climate transition, but it does make it more difficult to advance the Energy Union [67]. The physical networks, markets, and energy policies of the EU are intricately linked to the UK. It will be difficult to deal with the UK's exit from the EU from a political and practical standpoint.

Since the Single European Act of 1987, the EU has been granted the power to legislate for environmental protection. The 2009 Treaty of Lisbon revised the goals of the EU's environmental policy to mandate that environmental considerations be included into all EU programmes and added a specific reference to addressing climate change. The Treaty on the Functioning of the European Union outlines the EU's legislative authority with regard to the environment and climate change. EU environmental and climate change policy plans are outlined in the 7th Environment Action Plan for the period of 2020. It has three main goals:

1) Make the EU a resource-efficient, environmentally friendly,
2) Competitive low-carbon economy; safeguard, conserve,
3) Improve the EU's natural capital [123].

Taking an introspective view to dealing with environmental and Green energy sustainability is very uncertain for both the European Union and the United Kingdom. An official document produced by the House Commons' Environmental Audit Committee in 2016 stated "There are significant unanswered questions about what relationship a UK outside the EU would have with it and with the rest of the world, just as there are unanswered questions as to how our relationship with the EU might develop" [77].

1.3. Why Brexit

The United Kingdom voted to leave the EU after being an active member since 1973 [9]. Brexit was the common named coined for ''Britain's Exit'' from the European Union, which took place in 2020, following a referendum in 2016. The United Kingdom's decisions to leave the European Union has had several impact on the Union and the UK as well. The step brought a transition period in the European Union and the United Kingdom's economy as well [58]. Brexit has been hitting the headlines and has become the talk of all regional institutions contributing to the climate fight, its impact on business decisions and Green energy sustainability of the European Union is critical to the survival of businesses [63].

By examining the developments of the United Kingdom's participation in the European Union, it can be argued that the referendum's outcome was mostly the result of a 20-year campaign against EU membership that began after 1992 saw the Maastricht Treaty and 1993 saw the creation of the single market. Additionally, some political experts argued that the UK's sovereignty would be restricted by sharing political power with the EU. Additionally, there was a difference of opinion regarding the free movement of workers throughout the entire Union's territory, and the UK was unwilling to entirely open its borders. Another issue was the Court of Justice of the European Union's jurisdiction, which indicated a waiver of national judicial authority [113]. The justifications listed imply that there a real source to exiting the EU to achieve national sovereignty.

The ability to pursue international trade policies, adopt protectionist measures, as well as independently create anti-dumping measures on controlling the flow of goods, is one of the key reasons favouring disintegration [73]. On the one hand, the autonomous implementation of these policies safeguards the home economy and allows domestic producers that support the adoption of national regulations that encourage disintegration a greater opportunity. On the other side, integration mandates that a nation adhere to global norms in these areas, which are frequently in conflict with the requirements of the local population and may result in a reduction in their standard of living and overall economic development.

1.4. Research Problem

The main objectives of the EU were centered on promoting common and unified market where member states could transact at fair and equitable rates, the strength of the EU to uphold its thematic goals is strengthened by her membership [96]. The United Kingdom's decision to exit the EU has brought numerous changes and has made the future uncertain for both the UK and the EU on Green energy and sustainability on many fronts. The macroeconomic and global implications of Brexit is obvious and the future of Brexit remains an economic mystery for both UK, the EU and the rest of the world. It is important to note that the EU member states have shared rules on trading, financing, co-operation and various economic modules [55]. An exit of a member states implies that common rules do no longer hold between member states and the exited economy, and between the EU as an economic body, this raises the urgent need to assess the possible implication of the exit on energy sustainability of the European Union.

The UK is one of the nations that contribute a greater percentage of the EU budget, compared to other EU economies, the costs it incurs and the benefits it derives from EU common resources [96]. The amount of money the UK received from the EU budget in 2016 was 7 billion euros, whereas the country's contribution in the same year was 13.46 billion euros [50]. This information supports those who oppose integration by highlighting the drawbacks of the United Kingdom's membership and providing quantifiable evidence in favour of the restoration of the UK's full sovereignty, which would be rendered impossible by EU membership. Brexit means that the UK will no longer make significant net contributions to the EU budget, which is one of the justifications for leaving the EU [83].

The United Kingdom occupies a significant position in the EU, and as such her withdrawal from the union has significant impacts that need adequate study. The economic effect of Brexit is more consequential, hence the need to provide frameworks to guide the EU to fulfil its sustainable goals. These insights into probable ramifications point to the fact that Brexit will require the UK to strike a balance between leaving the EU while adhering to predetermined "red lines" and preserving as many membership perks as possible [126] The economic implications of Brexit can be understood through independent research studies, highlighting the necessity for further study into the

environmental implications of Britain's withdrawal from the EU and it is in this vein that this study seeks to examine the impacts of the disintegration on the European Union.

Despite the UK-EU trade agreements after Brexit, the level of co-operation does not fully integrate economic activities and policies regarding environmental and green energy sustainability as the United Kingdom pursues its individual energy policies outside of the EU. The Supremacy of EU laws as agreed by member states makes domestic laws and policies subordinating, which has an impact on how trade and commerce are internally decided. For a very long period, the specialists drafting the withdrawal agreement struggled with these issues as they considered how Brexit might affect them [14].

The entire globe is waiting to see how Brexit will fundamentally alter the dynamics in both the UK and all of Europe especially. There could be a variety of issues with the UK's energy industry and energy policy, especially with relation to the country's "low-carbon future," Additionally, the EU's Renewable Energy Directive institutionalised the growth of renewable energy sources across the EU, inspiring the UK to quickly increase its use of renewable energy sources including wind and solar farms. Will Britain stay in compliance with EU energy rules or will they break free and enact its own energy laws? This is a special concern because the EU finances a lot of energy projects in the UK [31].

In light of the causes behind the goal for Brexit and the validity of the disintegration in specific situations, we can accept the viewpoints expressed by Hobolt and De Vries [76], by taking a look at three criteria that assess the acceptance of economic integration:

1) the evaluation of the integration's effectiveness,
2) its identity, and the information made available to voters,
3) economic study of the costs and advantages.

The specific outcomes of Brexit cannot be determined with certainty, further studies into the disintegration can help bring relevant findings to academia and researchers. This dissertation has created a conceptual framework for identifying policy changes brought on by Brexit in the absence of any theory of EU-exit. As a result, this study aims to address the issue of the paucity of information and research on the implications of Brexit on Green Energy Sustainability of the EU.

1.5. Significance of the Study

It is important Brexit receives the various scholarships for further study and analysis as the decision has and will influence the global economy in diverse ways. The central focus of this research paper is to take an in-depth look and study into the impact of Brexit on Green energy sustainability of the European Union. Not much study has gone into the future challenges that may surface to fight the European Union and the United Kingdom on many fronts, most importantly on her green energy sustainability goals and targets [80].

It is for the purpose of the long term impacts of Brexit that this research is conducted, and for the purpose of objectivity shall be conducted with relevant underpinning information. This research shall resort to factual documents published with credible sources as to the outcome of Brexit on the Green energy sustainability of the European Union. To give this study general usage and relevance, no politically induced documents shall be consulted, the focus shall be directed to unbiased published works that seeks to provide genuine insight into the area of study.

It is expected that the results of the research shall provide recommendations and guidelines for both the UK and EU on how to implement energy sustainability projects in the future for the mutual good of both bodies. There have been several publication on the impact of Brexit on the European Union, this documents provides research based evidences to green energy sustainability. This research contributes to the findings of other similar studies on the topic, and how the EU and the United Kingdom can streamline Green energy policies towards a greater efficiency and results. In the EU, low-carbon footprints depend on infrastructure, and the union is very conscious of the environment and the planet, thus the union has an immediate edge in that regard. The adaptive nature of the EU results from the unified commitment of members to comply with environmental policies pursued as a body and advocate that some Green policies required lifestyle changes involving habits adjustments [111].

The United Kingdom has not fully recovered from the economic damages of the COVID-19 pandemic, adding the decision to exit the European Union brings the EU and the United Kingdom to the limelight of academic researches and study. The unpredictable times have thrown challenges to put the future of European Union’s green energy sustainability into great question of uncertainty calling for relevant analysis and consideration into the subject.

1.6. Research Aims and Objectives

The fundamental goal of the study is to examine how Brexit has affected the European Union's sustainability of Green energy, which is based on the research question that is stated in the section below.

The following goals must be completed in order to attain this goal since many theories make diverse assumptions about the ramifications of the Union's collapse. This research offers insights to better analyse these implications.

1) Critically analyse the EU’s pursued policies on Green energy sustainability before and after Brexit.
2) Investigate the impact of Brexit on the remaining member states of the EU with their common and individual pursuit of sustainability targets.
3) Conduct a risk assessment model to help analyse the institutional efforts both bodies are putting in place regarding Green energy and climate sustainability.

1.7. Research Questions

The purpose of this research is to answer the following research questions;

1) Does the argument for disintegration shape Green energy sustainability of the European Union for a positive energy future?
2) To what extent will Brexit influence Green energy sustainability of the European Union?
3) What plausible recommendations could help deal with climate and environmental sustainability of the EU?

1.8. Scope of Study

The study looks into how much psychology there is surrounding Brexit. There are some opinions that claim the UK leaving the EU will be considerably better for Britain than if the UK stays in the EU.

On the other hand, there are also opinions that the UK's departure from the EU will have an impact on the EU's budget financing, which will ultimately have an impact on international trade and the union's financial viability in a time when clean energy and climate action are developing into major areas of concern.

Therefore, this study focuses on analysing how Brexit may affect Green energy sustainability of the European Union.

1.9. Limitations of the Study

Due to time constraints, it was not possible to travel to gather field data and check some allegations of what actually caused British citizens to vote in favour of Brexit and to assess the implications of the decision on energy sustainability on the bloc as far as greening is concerned.

It is crucial to remember that Brexit was adopted approximately two years ago, suggesting that there has been little research on the subject, which could have an impact on the standard of the information available about the economic effects. Additionally, many Brexit academics generalised the consequences, which prevented them from taking a close look at the economic effects [99].

As a result, the evaluation and analysis of the data were dependent primarily on secondary sources, with very little material also coming from public statements made by senior British diplomats or government officials during the time period under examination. Because of this, the results of this study might not entirely represent an accurate picture of the situation, but they may provide insight for meaningful actions to be done by the EU, the UK, and international organisations like the UN.

1.10. Summary of Research Methodology

The diverse sources used in conducting the research will be based on published work and secondary sources from academia, credible publications and governmental reports. Materials such as news articles, research reports, international journals, papers prepared on the subject, and other research carried out by institutions that are operating within the union and the UK will help in constructing a well-balanced observation on the effects it will impose on the EU's Green energy and sustainability [74]. The topic of Brexit is new, and a wide variety of sources will help in developing an opinion on those effects. Academic insights from De-Europeanisation, Brexit policy studies, and political economy of Brexit literatures are worthy sources of relevant information for this dissertation [32].

To determine what perspectives the writers of the acquired data adopted, an analysis of the data will be done. In addition, how are the ties between the EU and the UK discussed in their writings, and how will that information be relevant in performing my own study and drawing conclusions about the sustainability of EU Green energy? It is expected by applying the various theories and concepts, and by consulting independent articles and documents, a well analysed document t can be produced for economic and institutional consumption. This research is aimed at identifying, and critically analyzing the impact of Brexit on Green energy sustainability of the European Union. The research work will make use of common EU Policies on environmental sustainability and climate safety, national policies of the UK on Green energy and climate factors and other independent credible articles and reports on the research area.

2. Literature Review

The EU has a universal environmental plan for member states towards safe energy production and sustainability on the continent. The impact of the environment is a regional challenge that needs collective efforts of a union and not individualized fights can make any great impact. The collective agreement to trade among member states arms the union with unified strength to deal with Green Energy sustainability better than could be handled individually. The collective agreement evidenced by the common trade agreements the Union has with some economies the U.S., China, Africa, and other nations gives a united front strong enough to bargain on fair deals and trade for the continent [126]. Brexit has significant implications on the operations and future of the EU, as an exit of the United Kingdom, a key contributor of the EU creates an economically bigger vacuum that needs further and continuous study and assessment to help develop researched evidences to dealing environmental issues in the region. With the Brexit, the Union lost a sizable portion of its population, which decreased the consumption of products and services within the Union. Regional trade blocs use the domestic market as a means of stability in the trade and commerce. The prices of goods and services across the EU were impacted by the withdrawal of Britain from the EU, and the effect of Post-Brexit on financial markets have been inconsistent with rational asset pricing models and as such affected investment in Green energy sustainability and other sustainable investment portfolios [79].

2.1. Eurozone

The European Union is a platform that gives governments an organised place to meet and discuss these trans-boundary issues concerning business and cross border issues in the European zones. Through trade agreements and other arrangements, the EU handles trade relations with other

nations. The EU and its trading partners have committed to one another through these agreements and arrangements, which are intended to improve trading possibilities and remove related obstacles. For firms, trading under an agreement has real advantages including reduced tariffs, better market access, and fewer red tape [46]. Fabbrini [55], asserts that the withdrawal of the United Kingdom has weakened the common European currency, mainly as a result of the changes in demand and supply of the currency. This is because most European economies and other international trading partners held the view of no deal Brexit anticipation. Trading partners held the proposition that they could not transact in Euro with the UK after Brexit, this affected the purchase of the Euro leading to its fall. This choice has macroeconomic ramifications that are already being felt, not the least of which are in emerging and developing nations. A $2 trillion loss has been suffered by the world's stock markets, and risk aversion has taken hold, leaving developing markets vulnerable to volatility with little liquidity to cushion the blow. Countries whose economies rely heavily on Britain are already experiencing a decline in their currencies or an increase in borrowing rates [122]. All developing economies who had significant trading relationships with the UK were now shifting from the use of Euro leading a standstill of the Eurozone. In addition, Lannoo [87] explains this results from the premise that the UK was the second-largest contributor to the EU budget, the demand for the euro as a shared currency decreased as a result of its leaving, transactions between EU member states were conducted in euros, an exit of the UK means a great decline in the demand for and usage of the currency, as most EU countries experienced economic recessions as a result of Brexit and this has affected the strength of the Euro.

In another document published by Fabbrini [55], Brexit has declined FDI of UK nationals in the EU member states, it means that fewer businesses or investors from the UK are buying shares of the companies in the Union and that the EU is under environmental policy strain as the ECT is not in line with the Union's investment regulations. Other researchers have differing views on the current state of the European Union as far as unionisatioon is concerned. Some researchers like Gravey and Jordan [68], believe that the EU is in a period of disintegration and dismantling exemplified by UK's firm decision not to remain in the European Union, however Brauch [19], holds an opposing view to this, according to him, the Union currently negotiates investment agreements that, despite their flaws, still offer substantive rights with language that promotes reforms and amendments. These suggestions ought to be more comprehensive, and they would in any case have to be supplemented with changes to other clauses. They might then contribute to lessening the risk that the ECT offers to a fair low-carbon energy transition, but the issue for the EU will be to win over its fossil fuel-dependent negotiating allies, who are probably not going to be keen or prepared to consent to a phase-out of protections for investments in fossil fuels.

This means that from a critical analysis of the opposing views, Europe and the rest of the globe stand a critical point of green and climate friendly future, and UK's exit is not a sign of deterioration of the EU. The globe is under existential threat from climate change and environmental deterioration even though the European Green Deal promises the EU into a resource-efficient, innovative and competitive economy to address these issues, ensuring that;

1) no net emissions of greenhouse gases by 2050
2) economic growth decoupled from resource use
3) no person and no place left behind

The European Green Deal will be funded in part by the €1.8 trillion investments from the NextGenerationEU Recovery Plan and the EU's seven-year budget. In order to make certain sensitive sectors in the EU's like climate, energy production and consumption, and taxation policies suitable for decreasing net greenhouse gas emissions by at least 55% by 2030, relative to 1990 levels, the European Commission has adopted a set of green policies. The commitment by the remaining 27 member states to turn the EU into the first climate neutral continent by 2050 poses a sense of direction and focus for the region [42]. But according to Butler [26], the strategy adopted by the European Green Deal is more centralised and focused on the application of regulations than on innovation and research. A reminder of why Europe is not dominating in producing more of the big new enterprises of the globe over the past 50 years is the lack of attention given to innovation. This means that the European Union Green Deal has a weak commitment to innovation, without which it would be challenging to meet these environmental goals. The UK was a great contributor the EU's fund, research and innovations, losing such significant member in financial terms reduces the union's financial capabilities to achieve the policies in the green energy deal [78].

One can therefore argue that UK's exit has revealed in the European Union's low commitment to innovation, research and development as outlined in the Green Deal.

2.2. Review of Related Research

In order to fairly assess the various dimension of Brexit and better analyse the implications for both now and the future, an extensive analysis of related research is a great addition. Many researchers have delved deeper on the same topic and their unbiased opinions are a good source of critiquing this research work. The House of Commons [77], stated that the UK and EU are in a Political Declaration (PD), an agreement which set out their mutual commitment to an ambitious and broad economic partnership. The PD stated that "equal playing fields" will be maintained to promote "open and fair" competition, however it is unclear what exactly these obligations entail and the level of commitment of both parties is debatable as they both are pursuing different set of regional or economic policies. One of the primary points of contention in the negotiations between the European Union and the UK regarding their future collaboration is the concept of a "fair playing field," which includes regulations on state assistance, labour and

environmental standards, and climate change. The current friction with the Northern Ireland Protocol has created trading complexities for the EU and the UK, several publications and meetings have yielded no results, this is weighing a great toll on the energy trading initiatives of the Union [95]. Upon these back and forth in the agreement plan, is there any trading agreement effective for UK-EU other than being in a common market? [15]). The trade and collaboration deal has done the exact opposite of what was intended, which was to foster goodwill and a better working relationship and for this reason Menon and Portes [100], stated that no deal is better than a bad deal and this emphasizes the state of the United Kingdom's energy deals with other countries. This speaks of the frailty of trading agreements after the exit. The issue of environment and green sustainability for both the European Union and the UK barely featured in the consideration to leave the Union, and fresh doubts about the United Kingdom's green credentials are piling up on successive governments [24].

The Prime Minister, Rishi Sunak has said [14], "The UK will not pursue any post-Brexit relationship with the EU that relies on alignment with EU laws", this means that trade on green energy policies poses commercial uncertainties for energy companies transacting between the bloc and the UK, this affects the ability of the union to access the impacts of green energy companies on the continent and to determine fairer taxation for revenue purpose. Certain studies on Brexit reveals that the UK membership of the EU has provided the United Kingdom with policy capacities to look into its Green Energy Policies for the future but a gap of arguments remains unsettled as the UK's discontinuity of the EU shall be a gap to offer sustainable policy capacities for the future climate concerns [115].

Available literature indicates that as the UK no longer belongs to the EU, designing policies to dealing with external economies shall be an economic burden of Britain alone, as the EU has begun to be a part of the UK's external environment following the transition. The UK serves as a transit country for electricity and gas between Ireland and the rest of the 26 Union members, an exit indicates more complexities on energy trading and regulations. It therefore puts the sustainability and security of EU energy at risk [50]. The UK can chooses to comply with EU energy and climate targets, it might be required to participate in the new Energy Union governance structure which will still limits its autonomy and nationalization. That will mean the United Kingdom will have to give timely reports on renewables, energy investments and greenhouse emissions to show that it is complying with the EU policy goals [86].

2.3. Evaluating Concepts, Theories and Regional Impact

2.3.1. Regional Co-operation

The various geo-political rules limiting co-operation and trading among the European countries have a long term impact on the efforts to achieving European Union's climate goals [12] Green Alliance and sustainability partnerships between EU economies and environmental sustainability institutions in the European Union have been affected by Brexit, as changes in rules and regulations have changed agreements and negotiations of the EU [72].

Leaving the European Union could mean the instant loss of access to a world-leading database and common information relevant to the pursuit of the union on climate safety and sustainability, it has been suggested that even though the United Kingdom can set its own Green energy policies and regimes, this will be very expensive and affect its national income. Even with backup plans in place, the loss of any or all of the tools will result in slower, less visible intelligence systems that will make collaborative working with European partners more challenging, and a collaboration with holds less relevance to security for the Union and the United Kingdom [39]. Moreover, as the UK loses access to EU funding and networks, particularly Horizon Europe, it could make the EU less attractive collaborator for other research partners due to the significance of the UK in research and innovation and the EU loses the research competence and advanced technology of the United Kingdom in the pursuit of green energy production and sustainability. Although Brexit could also encourage various international partnerships with scientists outside of the EU, such may be subject to frequent uncertainties and unplanned changes [82]. With the exit of the United Kingdom, a significant contributor of the Union both financially and technologically, the EU continues to struggle to support the ECT which defends fossil fuel investments and investors, with its commitment to becoming carbon neutral by 2050 represented in both the European Green Deal and Climate Law. [49].

Similarly, Nera [105], explained that utilizing renewable energy sources that are appropriate due to concerns about supply security, employment, or regional or local advantages could help reduce GHG emissions. Brexit has got much influence on the EU's common pursuit of a greener and more sustainable Europe in terms of co-operation, and the vision to turn the EU into resources efficient and competitive low-carbon economy. Stankeviciute & Criqui [119], argued extensively that Brexit has reduced the strong linkages and interactions between member states of the union that occurred in terms of emission reductions as well as the costs of policy implementations chosen to achieve Green energy sustainability goals. The use of different quota systems and external trade barriers between member states and the Great Britain affects the EU efforts to achieving a green energy production and consumption by 2050.

On the other hand, The United Kingdom's Department for Environment holds the optimistic premise that Brexit with the macroeconomic decisions can enhance our natural environment and create awareness for those who care deeply about the environment. The UK's participation in the EU corresponded with both an increase in environmental awareness and better protections for the environment, thus many people believed that leaving the EU would jeopardise those gains or, at the very least, cast doubt on the possibility of further advancement [40].

This not to frown absolutely on Brexit neither to hail in praises, despite the dividing conclusions, Brexit has revealed the strengths and weaknesses as far as co-operation is concerned. The EU now has to strengthen its co-operation with other countries for which it previously relied on the UK, and this adds up to continue to increase its co-operation with the rest of world in various spheres.

2.3.2. Green Investment

Investments in clean and green energy and low carbon technologies is central for the development of Europe as an economic body and commitment of over 72 billion Euros towards this end is a clear indication of how important energy sustainability is [47]. Before the UK left the EU, analyses of how Brexit will affect energy and climate policy offered some more implications enough for study; Brexit might allow for more voluntarism in UK energy policy, as Brexit will make UK energy emission reduction targets difficult to meet and reduce climate commitments of the EU towards member states. A bigger burden falls on the financial stability of the Union to fund innovations and technologies towards greening the region and investment co-operation with the rest of the world [56]. Breinlich et al [20], holds the preview that many businesses and investments in the European Union were transferred from the EU to escape harsh conditions, the relocation of businesses and withdrawal of investment from the EU impacted employment and doing business in Europe, again, a lot of EU businesses with branches in the UK were required to undergo fresh registration under different set of regulations, and this discouraged investment after Brexit because the new mode of registration came at extra cost to companies. It is therefore argued from this research that as the UK claims its exits is a means to opportunities and business investments in the energy sector, the European Union may experience the opposite. From a research point of view, even though the UK has some benefits and opportunities in the future, its enormous privileges under the union concerning environmental and climate investment cannot be overlooked. Again, the competitiveness of EU companies in the energy sector on a global perspective stands a serious organizational justification.

Prior to Brexit, the UK was obligated to abide by the EU's requirements for domestic energy management and climate change, particularly its green energy policy. Therefore, Brexit might hinder the UK's move toward a low-carbon future. Based on decisions made in Brussels, the EU's Renewable Energy Directives implemented the liberalisation of the energy sector in EU member countries. As a result, Brexit transfers authority from Brussels to London because the UK may end up deciding its own energy policies.

The agreement between the UK and the EU on energy matters is presently composed of the following after the implementation period has ended:

i. The EU-UK Agreement on Trade and Cooperation (TCA).
ii. A nuclear cooperation agreement between the UK and Euratom (an agreement for cooperation on the safe and peaceful uses of nuclear energy)
iii. The updated Withdrawal Agreement, which was released on October 19, 2019

In actuality, the energy policies of the other EU members were influenced by the UK's energy policy. As a result, Brexit might mean that other EU members are put under more stress, the UK-EU have not reached concrete agreements on all aspects of their energy relationships and this leave the two countries in uncertainty with their future energy policies and implementations [70]. Studies show that the policy of the EU to tax energy emission companies as a means to reducing emissions is worsened by the exit of the United Kingdom as companies operating across the region have to adopt different accounting presentations and regulations to determine their incomes and assessing overall performance as a body corporate becomes a problem, likewise the carbon border tax introduced by the Union [33].

Other arguments from accounting perspective raises the impression that Brexit has brought changes in accounting presentations like Value Added Tax, Rules of Origin, Distance Selling, Postponed Accounting and other relevant accounting concepts which affects the operations of accounting firms auditing companies on the bloc. Even though the AAT sees the challenges associated with these changes, some of the developments have positive prospects for businesses. Accountants have begun to incorporate climate awareness into presentations and this has made the emergence of green accounting very necessary, UK's exit implicates the ability to fairly determine an entity's compliance to green energy consumption and production as different set of rules and reporting requirements operate [31].

The EU Biodiversity Strategy for 2030 outlines the focus of implementation from creating the EU policy frameworks to putting those policies into practice to accomplish effective protection, rehabilitation, and integration on the ground. Integration is a crucial touchstones for the success of the bloc towards this end [45]. This means exiting the EU at this time in global energy crises has critical energy implications on the EU, the import of Brexit is that the UK chooses to comply with the Union's environmental policies. This difficult political balancing act between differing goals of both the EU and the UK is very crucial given that the UK is not on track to meet legally binding de-carbonization agreements.

2.3.3. Europeanization and De-Europeanisation

Burns et al [25], specifically includes findings from Europeanization research to pinpoint the environmental policy areas most vulnerable to change. In fact, as implied by Copeland [36], establishing the initial level of Europeanization in a policy area is the starting point for research on de-Europeanization. The advocates for Brexit did not specifically mention energy or climate policies as reasons to leave. This is partially due to the fact that the UK and EU have historically shared goals about climate change and similar market-liberal outlooks on the energy sector. Due to the UK and EU's close vicinity, institutions and

infrastructures have gradually incorporated coordination in energy commerce, how to accomplish de-carbonization, and energy security. The challenge of how to depart while keeping as much collaboration in sustainable energy as is possible is made more urgent by this close-knit and interconnected energy relationship. Research insights from Europeanization pinpoints environmental policy sectors most susceptible to change after the UK exits the EU [24]. The concept of Europeanisation seeks to give much clearer insight into Brexit but fails to buttress the move with enough evidences as far as green energy sustainability of the region is concerned. As defined by Evan and Bains [54], Internationalisation focuses on the interconnectivity between countries, the frequency with which foreign nationals migrate into an economy, the collective effort to globalize the world has improved economies into strengthening internationalization policies and safety of foreigners. The great concern falls on Europeanization than it does on internationalization, Europeanisation as defined as the process whereby a country's membership of the EU influences and transforms national sovereignty and policies. Earlier studies have shown that the influence do not occur rapidly as supposed and individual economies have the choices of domestic policies and implementations [36]. It is an all-important area of study as the United Kingdom felt disintegration as the best means to de-europeanise, policy implementation rigidities have been major areas of concern for the United Kingdom but key areas of corporation needed the UK to reconsider the decision to exit the EU, Environmental Policy formulation, green target setting, environmental policy regimes and instruments and Policy Capacity are major thematic areas that needs regional integration and collective cooperation to win as a Union [85]. Another dimension notable to mention is to further adjust environmental policies of the Union to better account for specific targets and standards, such as EU renewable energy goals, and distinct policy regimes, like the EU Emissions Trading Scheme (EU ETS), which have become significant elements of UK sustainability focus. The challenge here stems from the fact that a future adjustment to EU's sustainable and Green energy targets requiring strict compliance may prove dicey as Britain pursues its localized environmental policies as a nation [91].

De-Europeanization and dismantling are emerging as crucial analytical terms for comprehending the present and anticipated future trajectory of EU environmental policies [68]. And for the years ahead, many policies proposed by member states may seem Europeanised for some member states who feel opting out a choice. The UK which has made certain provisions with the EU can choose to tag certain green policies as Europeanised and may decide not to comply with them, and the remaining EU states may object certain provisions suggested by the UK before the exit as de-europenised and this may weaken the Union's legislative and implementation powers. On the other hand, innovations and projects led by the UK may also be seen ad de-europeanised policies and the EU members may also feel unwilling to participate or comply irrespective of the possible climate benefits.

2.3.4. Foreign Trade and Relations

The balance of foreign relations now falls on the UK and the EU to re-draft foreign polices with the rest of the world as an exit of the UK means so much to Pre-Brexit policies pursued. Foreign Green Energy and Sustainability Policy implementations is a key area that can re-shape the Union's fight for Green Energy Sustainability [65]. Armstrong [2], in his opinion believes that it is crucial to take into account a lower level of intention to diverge in less contentious policy areas since it suggests a more complex spectrum of Brexit policy implications and provides one explanation for the differing levels of intention. But Fidler [58], holds an opposing view and that the UK will continue to have the highest level of energy security in the EU, this means an exit leaves the remaining EU energy security in an unstable position. But figures from the central Electricity Generating Board proved the opposite, the margins of spare capacity, which have been significantly lower than during the previous Central Electricity Generating Board, were brought up when the energy secretary was questioned. He said that because of government, National Grid, and Ofgem actions, this winter's supply levels would be "comfortably above our dependability criteria [6]. This was when the UK was part of the EU, and it can be argued form this point of view that the UK was utilizing the competitiveness of the EU and the energy competence of the Union to sustain its energy supply. What the disintegration now means is that UK is now going to fall on its local resources and supply for its energy, this has adverse impact on the union as the United Kingdom's inability to comply with energy emission targets has adverse consequences on the Unions strength to discharge and ensure carbon free region.

As defined by Porter [102], declustering which describes the loss of national advantage happens to be a perfect case for the United Kingdom as it loses its national advantages for exiting the EU. As the EU continues the pursuit of Green energy policy implementation, The separatist Britain may be pursuing boundary policies that might be incorporated into the practices of actors working in the diverse energy fields, even to the extent that those individual polices may be described as 'social infrastructure which may mar the outcome of the EU as a common union.

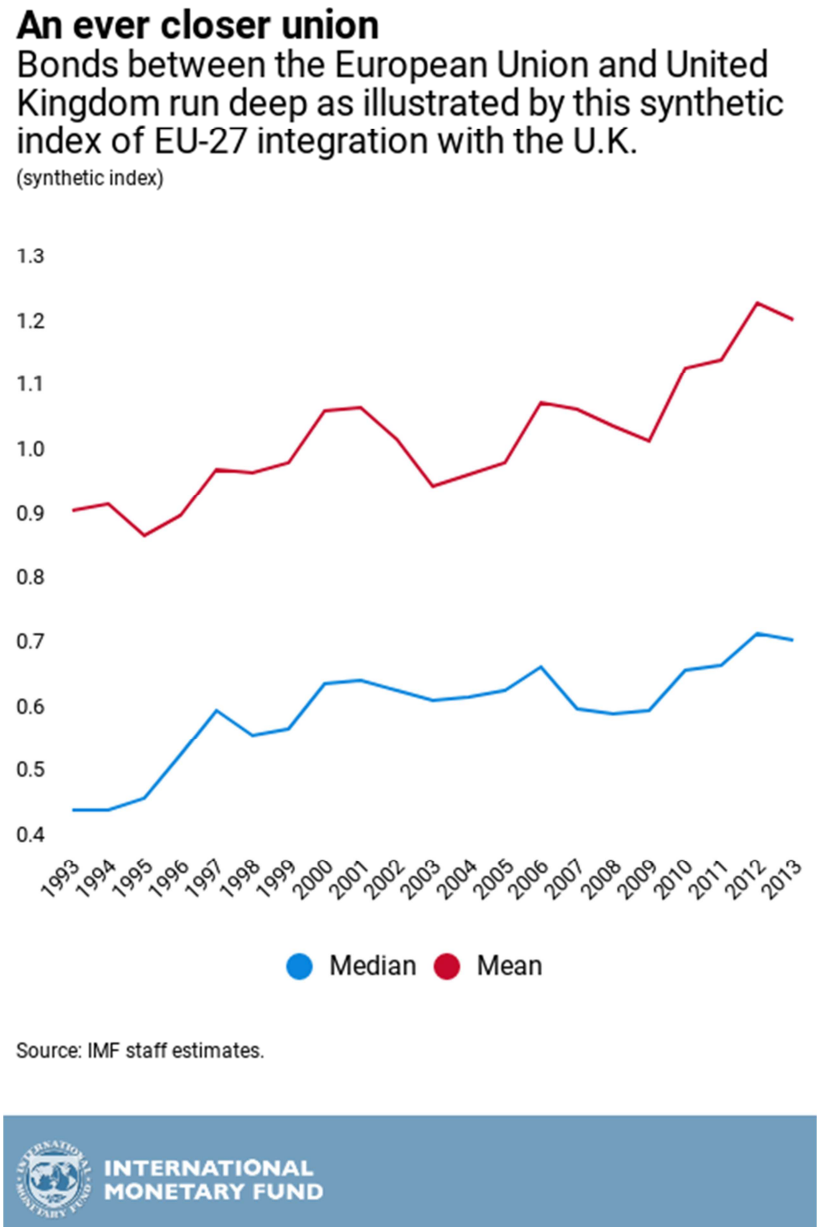


Figure 1. *EU-UK Integration Index.*

Trade and Bond between remaining 27 member states run deep [81].

The IMF in an official document confirmed that the incidence of trade protectionism, capital flows, and labor mobility will affect productivity and job creation in both the UK and the EU member states due to friction economic relationships, there will be unavoidable costs on both sides. As shown in the diagram, trade begun to sunk and that brings into the picture a more fragile trading relationships in the future. All these emanates from the complex provisions in the Trade and Co-operation Agreement (TCA) between the EU- and the UK, the agreement has a narrow scope of definition of investor and also requires all investors to engage in substantive business operations. The agreements exclude range of sectors such as air transport and subsidiary services, maritime and waterway transportation and this threatens trading confidence for the region. The TCA also does not highlight so much on public procurements, grants and subsidies, including government-supported funding, guarantees and insurance from its application [114].

Euronews 2021, in its findings, revealed that extra EU trade with the UK fell by significant numbers, Germany for instant reduced imports by 56%, while exports were down by a third. This has put the EU-UK trading relationships into complexities as bureaucratic demands go beyond control. One notable case is the case of the EU taking legal actions against the UK after the British government unilaterally extended a grace period on some food checks. It is noteworthy that reasserting greater trade ties with its Commonwealth nations served as a focal point of the Brexit campaign. Nevertheless, even if the UK can prioritise these discussions, the UK will not be able to secure terms that are more favourable than those of the EU because of an EPA clause that mandates the EPA countries to also share any

favourable terms awarded by other accords with the EU [60]. All these leave the EU in a tangled trading relationship with the UK, and this may have significant impact among union members and trade with the rest of the world, this is because failure to negotiate favourable terms on climate innovation and green investments means zero climate achievement for the bloc.

Post Brexit Energy Trading

Energy trading between the UK and the EU faces a different phase of negotiations and co-operations, Brexit has created gaps for EU to re-draft its energy agreements and trading terms with the UK and this will affect energy consumption and product. Green Alliances agreed that variable renewable energy needs more dispatch area. Brexit has introduced commercial uncertainties as the joint ventures between companies of respective EU countries need the support of governments to combat energy crises and ensure Green Energy production and consumption. Green management needs the Union's effort to ensure absolute compliance, an exit of the UK weakens the fronts of the Union to setting green target and subsequently achieving them. The uncertainty accompanied with Brexit affects interconnector developments and infrastructure of the EU, this threatens the Green Energy security of the bloc and future [124]. The EU committed £1.3bn to fund Scotland-Norway Energy agreement to enhance energy supply and sustainability. The Project was important to achieving the strategic goals of green energy sustainable development by integrating renewable energy sources across the European Union. Trading electricity between the UK and the EU is very helpful for promoting the production of renewable electricity. Electricity will be the cornerstone of the UK's future commercial relationship because through cross-border commerce, the variable renewable energy generation needed to decarbonize the electrical networks in the EU and UK can be more effectively achieved through a unified trading agreements which Brexit has marred. Even though UK exited the EU, pipelines and wires that connect the UK and other EU economies are still in place, so even if the UK may be leaving the EU politically, it still has a physical connection with the EU. The UK-EU interconnectors provide energy supply and demand security for the European Union, this implies that Brexit has several energy implications for the union as the UK may adopt different set of energy trading pacts with the Union [75].

A notable Brexit effect is the complications of the energy agreement which is funded by the EU; as the Union cannot continue to fund a project which it has less control. The far reaching implication is that, the green energy sustainability goals of the Union faces lots of uncertainties making them extremely difficult to reach in the stipulated period. The project is estimated to bring double benefits to the EU, ensuring security of energy supply and eliminating expensive fossil fuel power stations. The EU has to re-consider this already funded project as a separation of the UK affects the reliability of whatever agreement that was made under the old order, and the future of EU's green energy sustainability stands a test [8].

2.3.5. Budget Financing and Globalisation

In November 2020, the UK government announced reduction in budgetary allocations to ODA, this implied that the governments assistance to research was reduced and that meant the nation needed the research complement of the European Union in order to leverage the benefits of research and development. Exiting the EU, cutting down budgetary allocations to research and development and the dying implications of COVID-19 puts the EU in a daring state to increase research and development spending towards environmental sustainability. Non-Governmental Organizations who relied on this funding to carry out green energy initiatives on the bloc could not facilitate their projects hence the European Union felt the grievous impact [12]. The UK has also been very instrumental in influencing some EU climate and green policy choices. It was a significant member of the group that pushed the EU to adopt more market oriented emission trading schemes (ETS) in relation to the rules-based system [98].

Like other nationalist themes, the environment has fast become a powerful new political flashpoint in the EU, the populists' preferred message structure of "the people versus the elites" is perfectly suited for the attack on climate policy. They also run the risk of undermining the objectives of a continent that has historically attempted to lead the world in addressing climate change as it works to determine its emissions reduction and renewable energy targets for the coming decades and the far right parties make sustainable policies difficult to achieve [66].

2.3.6. Post Brexit Energy Transition

Brexit reduces the EU's globalization prospects on Green Energy macro-level policy negotiation and implementations. The direct and indirect contribution of globalization on the European energy market have all been impacted by the exit of a significant share of the EU energy market-the UK. This increases the exposure to risks associated with globalization and how political economies might alter their external policies agreements knowing of the weakness of the EU. Global competition as explained by Margalit [93], shapes protectionist trade theories. It can therefore be viewed that the EU is going to encounter new trading partnerships with strict rules and challenges regarding trading on energy sustainability.

The European Union faces institutional complexities with global trade and agreements in periods after Britain's exit. The economic effect of Brexit is huge and still unfolding, the duration for businesses and governments to adapt to the new change cannot be predicted with certainty [35]. This reveals Post Brexit business transactions are categrised into three serious traps when it comes to planning for Brexit:

1. They are taking a wait-and-see mode until they are satisfied that they have adequate knowledge on Brexit
2. They are setting trade targets using data which are unavailable or irrelevant; and
3. Businesses are failing to accommodate the Brexit

spillover effects (for example, on currencies, regulations, and cost increases) that will impact different parts of their businesses.

This indicates therefore that waiting for the perfect timing and information can be very risky for global trade since sufficient information may not be available in the transition period. Quick fixes that deal with short term operational deficiencies may not be beneficial enough for the EU in the transition period [99]. Organizational disruptions in trading relationships and how trade adapts in the long term is much unknown and uncertain [95]. The European Union therefore needs a comprehensive Energy Policy and trading agreements that will harness local strengths with international partnerships to make up for the gap left by the United Kingdom.

3. Methodology

3.1. Methodology Overview

This chapter's goal is to review the body of knowledge in the field of study. It will look at the significant effects of Brexit on the sustainability of the EU's green energy system. It will also look at the various ideas that have been established in the past and present to explain Brexit and its many effects on commerce and global sustainability.

3.2. Qualitative Approach

The purpose of a research is beneficial to decide on the study's goal and the metrics by which one hopes to judge its success. The type of design and research methodology to use depend on the types of hypotheses or questions the researcher attempts to investigate. According to Marshall and Rossman [94], figuring out a research assignment's aim can frequently be a reasonable first step in figuring out which research approach is ideal for a given subject. The research information for this study will be gathered from a variety of sources, including books, credible websites (mostly government websites), journals, and libraries. The EU maintains a website where important details about its policies, studies, and conclusions are posted on numerous problems. Experts and academics who have studied the impacts of Brexit on the EU and the UK have written peer-reviewed articles about their findings. Their papers will be extremely helpful to the research. Additionally, books about the Brexit have been written, covering a variety of topics, including Green Energy and Sustainability impacts. All of this information will be evaluated in order to assess how the Brexit would affect the EU' Green Energy Sustainability.

The official EU and other credible source materials consulted for this research satisfy a variety of analytical needs. They are a source of information on the one hand [121]. In reality, information from the official documents allowed for the reconstruction of the sequence of events that ultimately resulted in the Withdrawal Agreement and the retracing of important process milestones. Observational and oral data can be cultivated by using fresh information or contextualising existing data in the context of the document.

The researcher will analyse current literature on the topic, 'The impact of Brexit on the Green Energy Sustainability of the European Union'', as part of a systematic literature review, which is the research methodology. Methodology helps the researcher to reduce errors pertaining to an area of study [59]. The research will examine many works of literature on the subject, ranging from books, peer-reviewed articles, journal articles, and reliable websites. Because of the abundance of literature materials available and the demand for in-depth study, qualitative content analysis was chosen [84]. Qualitative research uses qualitative techniques and as such uses quantitative data, as they have already been adopted by other researchers writing conducting similar researches. There is a lot of emphasis on the advantages of one way over another, but it is contended that instead of seeing qualitative as either/or, we should see it as both/and since doing so would assist secure the optimal conclusion [62]. This does not only concern the methodological aspect of research but more importantly, data selection. A major critique of qualitative research is the inability to meet established duality criteria of reliability and validity. Due to the complex nature of Brexit and the EU relations on Green energy sustainability, it is essential to take a qualitative method to examine Brexit-EU energy ties in order to effectively comprehend the intricacy. Beuving and De Vries [16] point out that, "Qualitative analysis is sometimes frowned upon as an art more than a craft. The procedures seem opaque to some, and the outcome therefore difficult to replicate".

3.3. Reliability and Validity

Reliability and validity are very key to qualitative research, they reveal how better materials and methods explain best the concepts and topics discussed. Validity explains accuracy of data used as reliability concerns more of consistency of the methods adopted under similar conditions [112]. The main reason for the adoption of secondary data as methods of conducting this dissertation is because of Brexit's recent occurrence, and the paucity of information regarding its effects on the EU's greening and energy sustainability, not much has been experienced on the impact of Brexit on the EU's energy or vice versa and so conducting a secondary data dissertation is justifiable [32]. As a matter of fact, the study needs a comprehensive inclusion of expert opinions as far as Brexit and EU energy is concerned, and due to the accuracy of the material provided, this academic paper will be very valid [74].

For the purpose of objectivity, this dissertation resorts to qualitative secondary data in order to assess the quality of information available to public consumption, what really are the impacts of Brexit on the green energy sustainability of the European Union after Britain exiting the Union? For this reason adopting independent data sources is the most logical. As mentioned by Leeds, [89] thick description is very essential to qualitative research; Thick description, "refers to a detailed description of actual behavior, typically resulting from ethnography, sufficient to permit the reader to see below surface appearances by offering an understanding of

underlying patterns and context that give the information meaning". A lot of independent researchers have used thick description to assess the authenticity of genuine documents. Understanding the extent to which Brexit influences the green energy sustainability of the European Union requires the use of dense descriptions in themed news textual analysis.

Due to the controversies of the topic, a lot of trustworthy data sources provides convincing evidences to delve into the topical area to bring relevant findings and outcomes. The impacts of Brexit on the EU, most especially in the case of Green energy has high academic standing, and as a result there are reliable sources of information. For instance, using books and journal articles allows the author to find more helpful references by looking at the findings of earlier researchers [116]. The data sources consulted are going to be current as Brexit occurred in 2016, this reduces the use of obsolete and unreliable data sources. Other advantages of employing secondary data is the absence of ethical concerns regarding the materials acquired because they are publicly accessible through the internet, journals, and books [38]. Since confidentiality and anonymity are not a concern while using this method, there are fewer ethical considerations to contend with when acquiring secondary data. Similarly, secondary sources do not require the safekeeping of participant data from third party compromises and data misuse [69]. Despite the argument that primary research on its own is inadequate as the researcher can make up their findings, thus there is no supporting evidence to corroborate what they are speaking about [108]. Yet, secondary research is advantageous since knowledge can be supported by a variety of sources, all of which connect to one another. Comparatively speaking, secondary research is less expensive than primary research because it is more expensive to use qualitative methods on a wide scale, such as creating 1,000 questionnaires [128]. As a result, numerous pieces of secondary data that are already in existence and relate to the dissertation topic chosen have been gathered, allowing the researcher to examine bigger sample sizes that can be analysed quickly [109]. This has allowed the impact of Brexit on the Green energy sustainability of the EU on a larger scale than a smaller sample size, this is a logical research because the impact of Brexit on Green energy sustainability of the EU affects millions of inhabitants and so resorting to data collected from a small sample size cannot bring the relevant outcomes of the disintegration and the study. Guthrie [71], emphasised that small sample sizes affects the outcome of a research and hence the usefulness of the study. This secondary source has allowed the researcher to accumulate genuine data from government sources which could have been very difficult to assess in person and therefore the credibility of the research is improved [23].

3.4. Research Problems Encountered Through the Implementation of Secondary Data and the Weaknesses of Secondary Research

While conducting this study, the researcher ran into a number of issues, including difficulty getting access to some data sets that required payment methods to download. This trait, which is frequently connected with conducting secondary research, led to the analysis of incomplete data because these sources only provided previews of the information [61]. Additionally, many written works included a wealth of knowledge but were not scholarly in nature, making them unreliable as sources. This is a well-known drawback of secondary research because it is often to come into a lack of data quality when looking for existing information [125]. Moreover, focusing on this specific topic about Brexit presented critical issues as detailed researched based information on the impacts of Brexit on Green energy initiatives of the EU is relatively scarce in comparison to other dissertation themes, and this means it is harder to find credible data useful for academic purposes. Selectivity was necessary during the research period to focus searches on energy sustainability of the EU and Brexit due to the abundance of material on irrelevant subtopics. At the early stages of this dissertation, the author looked at a variety of facts on the impacts of Brexit on Green energy sustainability of the European Union. These numbers showed differences since different sources produced different results; nevertheless, this problem was resolved by further investigation, which permitted the correlation of data from several references. It has been argued that secondary data also has the drawback of being less suited to the needs of the researcher because they are unable to select, expand, and customise the research instruments to fulfil the goals of their study [107]. Some unrelated material was discovered, which presented a minor problem for the researcher, but this issue was quickly resolved with continuous reading and research.

3.5. Strengths of Mixed Method

Due to the fact that an aspect of Brexit implications of the EU's Green energy and sustainability can be examined numerically, the researcher adopted both qualitative and quantitative approach which explain the figures that relate to the impacts on the EU. In order to evaluate the potential impact that Brexit may have on energy sustainability of the EU, experts' opinions will also be examined. Research triangulation would be carried out as a result, and it has been found that this will boost the accuracy of the dissertation because of the supporting evidence [101]. Additionally, it has been found that study triangulation, as opposed to evaluating only one viewpoint, results in the generation of greater knowledge through the observation of other perspectives [37]. Mixed method is advantageous to research as limitations of each method: qualitative and quantitative are minimized by the combining effect of both [104]. The mixed method research framework involves methodological relevance, where the researcher selects and then combines the best research methodologies in order to address the research issues, the mixed method reveals the key issues that broadens the understanding of the researcher and users as well [103].

For example conducting only a quantitative research will only expose the knowledge of academia at the neglect of the large European population who cannot express the impact in figures

but feel the impact in their daily lives. The mixed methods incorporates both previous empirical studies from academia and the views of the public who are the direct recipients of these implications. Conducting a mixed research is advantageous since it helps to realise that various research issues call for distinct and divergent techniques. As a result, the mixed method methodology evaluates the applicability of applied procedures against methodological criteria [27]. Mixed method helps the researcher to examine multiple viewpoints on the study questions and issues, the researcher accepts the merging of deductive and inductive reasoning. The benefits of deductive and inductive reasoning helps the researcher to make justifiable and accurate findings from the study [34]. Because of this, pragmatic approaches are applied which improves the quality of research; also, mixed-methods studies like this one are simple to reproduce, eradicating research dogma in the process. Research dogma occurs when a researcher agrees to findings without empirical testing and analysis, this subsequently leads to research bias. The mixed method reduces the incidence of research biases through the evaluation of data from multiple date sources [88]. Fetters and Freshwater [57], propose that mixed method increases the strength of the research outcomes due to the combined findings from both qualitative and quantitative sources, it produces findings that are more reliable than their individual methods, and they suggest that the mixed method leverages the benefits of the study.

3.6. Limitations of Mixed Method

The difficulty of combining both methods—it is frequently advised that a researcher use only one way or the other—and the considerable time required to review data and complete work are some drawbacks of the mixed method approach [88]. Also, it has been stated that many researchers lack considerable experience in particular issues since they have not received adequate training in both qualitative and quantitative approaches [18]. As a result, considerable effort was made to identify and evaluate potential data sources.

3.7. Data Analysis

This dissertation uses a deductive approach, which aims to test a hypothesis to see whether it is accurate [38]. The hypothesis has clearly been outlined in the introduction, and by providing evidenced-based answers to the research questions, further grounds are provided as to the implications of Brexit on the Green energy sustainability of the European Union. A major view of deductive approach is to provide a theoretical understanding of the context, people and the perspective of their views. A significant aim of the research is to provide a basis of understanding the aim, context and ideas of the subjects concerned [22]. In this regard, it is very necessary an understanding of why people voted out of the EU will further enlighten the topic of research and further expatiate the green energy implications on the EU.

Furthermore, both exploratory and predictive analysis are used to analyse the data throughout this study; this is crucial since exploratory research helps in studying new concerns that have either not been explored before or that have very little starting information [104]. So, the topic at hand is relevant because the variable (in this case, energy sustainability) will be connected with the Brexit event in order to determine how EU energy policies would alter following the events of leaving the European Union and the potential trade deals welcomed later. It has been claimed that this method is useful for seeing new patterns and trends in the data, which has helped to show the variations in EU trade policies before and after the Brexit vote [98].

The researcher has been able to assess the European Union's work on sustainable green energy in the future thanks to the combination of exploratory and predictive analysis. Using statistical analysis of secondary charts and numerical data, important details about how Brexit will affect the sustainability of green energy in the European Union were extracted. It has been discovered that exploratory analysis can help future academics by saving them time and effort when reviewing extensive datasets, such as the effects that Brexit is anticipated to have on the United Kingdom [18]. This has made it possible to conduct predictive analysis through the examination and analysis of current statistics, which will help to identify the most likely consequences of Brexit on commerce based on available information and the opinions of experts.

4. Findings & Discussion

4.1. Summary

As indicated in earlier chapters, Brexit has effects on the European Union, the UK, and the entire world. This chapter explains the findings established from the research, and provides research based evidences on the implications of Brexit on the green energy sustainability of the European Union. The chapter analyses the effects Brexit will have on the EU's ability to sustain green energy. These repercussions, which could be economic, political, cultural, environmental, security, and diplomatic, could be both beneficial and harmful. The chapter also evaluates the EU's trade alternatives following Brexit.

4.2. Research Discussions

Access to Data and Information sharing is declining, the EU is restricting information access which will affect the security and sustainability of businesses in the region**.** Current legal arrangements rely on continuous UK access to various shared commercial platforms created at the EU level, such as the definition of interconnector points between EU member states. Brexit is a clear indication of the rise of climate science scepticism in Europe. Key security databases will no longer be automatically accessible to the UK, but it should still be possible to do so upon request. Despite perhaps having a representative at Europol's headquarters, the UK will not be a member of the EU’s law enforcement agencies because the UK is no longer required to adhere to EU data protection laws [11].

On the topic of the environment, it is obvious that climate change is a complex issue that demands intellectual understanding and a global response, making it the ideal nemesis for nationalists who are skilled at emotionally charged discourse.

Brexit, for Europe, might mean a weakening of the continent's quest for more renewable energy as well as a lowering of emissions-reduction targets. In effect, the issue of green energy sustainability is extremely important, not least because of how quickly the EU is making bold, innovative decisions about sustainable energy, but because of its proximity to one another, its physical links, and the ongoing cost of renegotiations of energy trading. A recent agreement between the EU and the US to trade liquefied natural gas (LNG) is a prime illustration of how UK is absence from the union is affecting important international energy policy decisions [86].

All three thematic areas of renewable energy supply, namely transportation, heating and cooling, and electricity, saw an increase in the proportion of renewable supply in the EU. In 2020, electrical generation had the highest share of renewable energy at 37.5%, followed by heating and cooling at 23.1% and transportation at 10.2% [51]. Even though the UK had exited the EU, the union managed to make considerable achievements on its Green, Clean and Renewable energy production targets. In other views, EU has re-structured its internal operations to grow as a common market despite the UK leaving [5].

The UK is a market driven by innovation and production sophistications, its innovation drive promotes investments in goods, labour markets, financial market growth, and education and training markets results in efficiency advantages for the EU, an economic disintegration has innovative consequences on the EU strength to achieve its Green Energy Deal or target [117].

The research revealed that Brexit's effect on private agreements may also be felt. A contract may be terminated for good cause if the UK is no longer an EU member state. The specific effects depend, naturally, on the regulations that apply. Under the doctrine of frustration, both parties may be completely released from their contractual duties under English law. However, the circumstances are imagined very narrowly: It only applies in cases when a supervening event either makes a duty impossible to execute or renders it completely uninteresting to both parties. Many long term investment contracts contains force majeure clauses, which may affect the subsequent discharge of such [110]. However, Brexit would encourage judges in EU/EEA nations to create a hardship doctrine outside of their civil laws and apply it retroactively to agreements made before the 23 June 2016 referendum. In doing so, these courts could be referencing the instances of Germany, Spain, or other nations that have embraced the concept devoid of a strong legal foundation [120]. Article 7 of ENER lays the groundwork for ongoing collaboration in the pursuit of identifying and combating insider trading and market manipulation, as well as for information sharing, especially about market surveillance and enforcement efforts. In effect, this lays the groundwork for ongoing collaboration with regard to the regime against market abuse set up by the EU Regulation on wholesale energy market integrity and transparency (REMIT). However, no new agreements have been reached regarding these TCA regimes [106]. Brexit will therefore mean that the UK can choose to forgo these provisions since it is operating under a different set of energy provisions and administration now, making implementation on the bloc very difficult for the Union to enforce. Issues including the expiration of long-term pipeline supply contracts, the failure to re-contract interconnected capacity on a long-term basis, and limitations on selling capacity on such a basis in the future are of increased importance. The question is, will the EU or the UK be ready to enter into new contracts with differing laws and rules? The change in legal contractual provisions makes the future of energy contracts of the union very blur and green energy sustainability is threatened.

Business and trading relationships have been marred by Brexit, as transactions and conditions of agreements have been overly complex in post-Brexit than before. The CETA EU trade deal has been one of the trading options for the EU after Brexit, even though the agreement is not yet in full force, it is towards a positive reach and the comprehensive agreement when in force will contribute the EU's trade development and sustainability [7]. Business merger, Cross-border mergers involving UK-based businesses will not be able to make use of the Directive's provisions or, more generally, the EU freedom of establishment system. It might be possible to use the Pre-Centros Strategy once more. Authorities monitoring the formation and legalities of mergers could raise objections, since publications would have to conform to the national regime. Also, the rule that a merger once effective could not be terminated on EU law no longer holds. This creates some sort of contractual unfairness and complexities for companies with subsidiaries in the EU and vice versa. EU companies transacting business in the UK will have to comply with different set of regulations to their disfavor and the private involvement in Green Energy Sustainability of the Union may decline. Privatization is a thematic area of economic growth and development, a major goal of the EU is to create sustainable jobs for the private sector, and if UK laws permit termination of contracts despite the contractual commitment and EU does not permit this, EU companies are going to face stricter contractual laws which influences the private sector investment and commitment to Green Energy Sustainability of the bloc [90].

While the media would need to adhere to the national regime104, authorities overseeing the merger's completion and legality could oppose. On the basis of EU law, the provision that the merger could not be declared void once it became effective would also no longer be applicable and the provisions of the Directive and, more broadly, the EU freedom of establishment framework will not be available to cross-border mergers involving UK firms. The Pre-Centros Strategy would start to make sense once more. National Authorities in charge of overseeing the merger's completion and legalities may object,

and the publications would have to adhere to the national regime. Additionally, under EU law, it would no longer be possible to declare the merger invalid and unlawful after it had been operational. This means most contracts are going to be frustrated by Brexit which in turn influences the efforts on sustainability and the environment. Contracts entered into by the union's agencies like the European Banking Authority (EBA), and the European Investment Bank (EIB) are going to be difficult to execute since Brexit has created new financial and investment regulations for its local business environment so contracts concerning Green energy investment would have to suffer undue stoppages, generating lots of uncertainties for the future of Environmental sustainability for the Union. [64]. English law served as a counter model for drafting rules on private and investment laws on the region, a disintegration might mean a change of laws from the English. An inferences can be drawn from the work of Alfaro et al [1], who estimate the effect of changes in FDI on growth rates of countries. They find that increases in FDI have a large positive impact on GDP growth rate, this then means a reducing FDI as experienced on the bloc has adverse effect on the growth of member states.

The United Kingdom lost its license to perform intra-EU flights, this is an indication of the different rules that are going to apply to the two regions. That means the UK might be pursuing its own net zero targets and different eco-environmental flight policies which may endanger the many instruments of the Union. As member states of the Union seek to harmonize the eco-friendly policies towards net zero emissions, common intra-EU flight climate safety protocols have been laid out of compliance, Brexit therefore means that the UK does not need to comply with these common legal provisions which then impedes on its implementation and assessment [28]. The EU will be very limited in funds to secure digital intelligence to contribute the development of green technology, when it comes to information gathering and processing speed, digital intelligent systems outperform human brain effort, and their negative effects on the environment are very minor [21]. The natural gas storage in Europe is diminishing greatly after Brexit since the union suffers weak import capacity. As a result, the gas shortage will still be a problem. European energy industry faces idle capacity due to a decrease in demand, and rising input costs which renders it uncompetitive. The big UK market for the union energy supply is undergoing different set of trading and negotiation hence affecting the union energy strength and supply. If this continues for a while, it could push supply chains away from Europe and the long-term effects of high energy costs include increased debt loads, business failures, and undue adjustments to the green transition [41]. The EU Industrial Emissions Directive 2010 (IED) mandates that owners and operators of specific industrial and combustion facilities possess environmental permits that are granted subject to requirements aimed at limiting and gradually reducing waste production and emissions/discharges into the environment. The IED establishes severe emission limit values that must be met (via permit conditions) in the energy sector. This may necessitate investing in pollution abatement equipment, or where it is decided that this is not cost-effective, the plants will be forced to close.

As revealed by Eurostat, [51] primary energy production fell by 7.1% and gross available energy fell by 8.1% in 2020 as compared to 2019. The drops in 2020 were figures that could affect energy efficiency of the union. This results can be attributed to Brexit which reduced household and industrial energy consumption. Selected green initiatives have suffered their share of investment target volatilities.

A decision in favour of nationalism as against globalization. The study identified that the Brits voted against globalization for fear of losing their sovereignty and nationalism. According to Lutkevich, [92] globalisation is criticised "for undermining national policies and cultures" as a result of the increased elimination of barriers between countries.

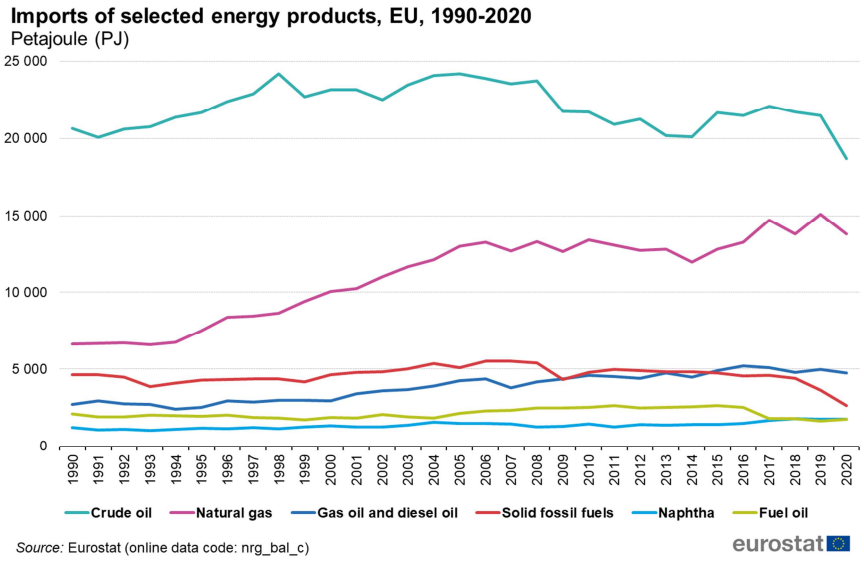


Figure 2. *Imports of EU Energy Products. Eurostat (2022).*

As showed above, the fluctuations in the production of renewable energy in the European Union was as a result of efficiency gaps, brought about by the decrease in human innovative capital [118].

Energy funding and investment have received their fair share of the disintegration, an official document produced by World Economic Forum [127], reiterated that ‘’the world will not reach net-zero emissions by 2050 without an unprecedented level of new technology and business innovation. Thankfully, this innovation is taking place and a global system of climate innovators has emerged in recent years to respond to the global need. However, a common challenge facing many of these innovators is the lack of funding to support both early stage innovation and scaling up the opportunities identified. This systemic issue remains one of the critical barriers to successful action on the climate change agenda’’. This means energy funding is very critical to the green energy deals of the EU and an exit of a significant contributor if the EU budget has energy implications on the union. Since the UK played a crucial role in financing EU’s energy budget and energy innovations, its leaving would likely result in budget deficits hence the EU’s inability to secure funding for sustainable green energy projects and initiatives [126]. The disintegration means that the European Union needs to transform current business models and processes or replace them entirely from the original models drafted when the UK was part of the union, leading to a double expenditure of the same policies without any benefits to the bloc. The application of digital technologies to change the traditional business logics of the bloc and its value dimension is reflected in promoting industrial cross-border integration and reconfiguring the competitive model of industrial organizations, but the current issue of Brexit throws this initiative into a ditch creating organizational dilemma towards business and the environment. Economic policies, industrial conditions, and other factors have a direct impact on sustainability, the break-away leaves the union in frustration over common economic and industrial policies for a sustainable future. The study reveals that the confidence of the union in pursing the common interest of member states is weakened and as such the strength to handle Green Energy at the highest level suffers many doubts [17]. The EU stated in an official publication, [42].

“Five years after agreeing on the Security of Supply Regulation, only 6 bilateral solidarity agreements between Member States have been signed, out of the 40 possible ones. This is too slow.”

The United Kingdom was one of the country taking a chunk of EU revenue despite the significant contribution, an exit will save the Union extra funds to commit to its energy sustainable developments and innovations. By comparison, Baier et al [4] estimate that EU membership create trading relations with other EU members states as compared to EFTA membership, hence increasing the flow of goods and services amongst member states, this is to say that UK exiting the union broke the trade relations with the rest of the union members. In 2020, renewable energy will replace fossil fuels as the primary source of electricity in the EU for the first time. This is a significant start towards changing how power is produced in Europe, but it pales in comparison to the continent's intended targets of 55% greenhouse gas reductions by 2030 and climate neutrality by 2050.

Transporting renewable energies from their sources of production to their points of consumption will need significant infrastructure expenditures on the part of the EU countries. The pricing and taxation of energies (as well as greenhouse gas emissions) must also be coordinated in order to restructure European electricity generation in a way that keeps the EU competitive and creates strong incentives [29].

The decision to exit the European Union came with all sort of uncertainties and unknown steps for the future, the voters who voted the decision to leave the EU did not consider the future of leaving the EU. This stands to reason that exiting the European Union could lead the United Kingdom to backslide on most of the sustainability targets it is set to achieve over the years. The move impacts the global economy and the rest of the European Union risk sustainability and green energy goals.

5. Recommendations and Conclusion

A critical reflection on the impacts of Brexit on the Green Energy Sustainability of the EU are not yet fully appreciated, several articles and credible documents have complemented the various reasons and concepts behind the decision to break away from the EU. The research identified the policy related changes after Brexit, and trading renegotiations of the EU with the rest of the world and trading partners.

However, EU’s policy formulations and implementations after the Brexit have been uncertain and the research could exhaust fully the available data to perfectly predict the future of the Unions Energy Sustainability. With a new 55% emissions reduction target for 2030, the new "Fit for 55" policy is its largest-ever legislative package. The package deals with long term Energy strategies not just mere changes to the EU’s ETS and social climate funding which essential steps to a greening future. In reaction to Russia's invasion of the Ukraine, the EU has also unveiled a more comprehensive sustainable energy policy, which includes an EU-wide natural gas, LNG, and hydrogen purchasing programme from which the UK is excluded. This policy harmonises the economic strength and innovations of the member states for mutual energy security and gains.

The Porter's Five Forces is a good approach to assess and comprehend trades, as well as their repercussions. Another important factor influencing how the EU will trade with the rest of the world is product substitution and market branding. In terms of trade discussions, the UK, which is now a distinct market, competes with the EU. Trades will still occur due to the demand for specific services or products, but the private sector will likely look more different. However, if the market branding is not too strong among union members, product substitution will be simpler. According to predictions, demand will tend to decline as a result of subpar product

branding. The estimation is that demand will tend to move away due to poor product branding, long transit times and extra associated costs. However, if the market brand is strong enough, the union will grow in trade with the rest of the world and be able to generate revenue from trade to finance its green energy initiatives and innovations. It has been established through comparative examination of a large number of academic research that Brexit will have a detrimental effect on the European economy's ability to accomplish green energy sustainability goals.

Future researches could focus on how the EU's Greene Energy Sustainability pursuit could have progressed if the UK were on board as the union seems struggling with energy policies and operations. Even though this study delved deeper into the implications of the disintegration on the union, and in this case, the energy sector. The decision to step out of the Union weakened it's strive for energy targets and using this a basis of analysis, the EU has committed more resources towards green energy production and consumption but the sustainability of these greening projects remains unstable. The research revealed that UK's membership increased the innovativeness and gave the union trading advantages looking at Britain's position across the globe, the union is now left with efforts to achieve those complex targets with its limited funding and partnerships. The UK has so far maintained a similar approach in its new policies, and its overarching goals in connection to climate change are still those of the EU. This might help allay worries that the Brexit might be used to scale down climate commitments.

Moreover, the research revealed that new policy regimes may not be very instrumental towards achieving net zero target due to the disintegration and policy misapplications due to influences and alliances. Huge financial committals needs consideration by the Union in order to ensure compliance with policy operation and implementations since its clear the UK may miss its energy emission targets and this will have adverse consequences on the strength of the EU. The conceptual framework of Europeanisation and disintegrations are applicable in others studies albeit changes to accommodate the area of study. Fundamental challenges concerning whether fair research collaborations are viable under the current systems of research governance in the EU are raised by the funding cuts and their implications. The budget cuts demonstrate how such partnerships not only continue to be unfair, but also how the major players involved in establishing and maintaining research partnerships on the bloc have little influence over choices that could effectively weaken and derail their initiative and this could lead to green energy projects disruptions and lowering aspirations to fit budgets.

In addressing conceptual gaps and shortcomings, the UK needs renegotiation to join the EU, not to stabilize the British economy but on a large note for mutual benefits as far as climate and environment issues are concerned. The analysis explains why there may be less inclination to diverge in some sectors by demonstrating how helpful EU membership has been in sustainable energy and how, in the dimension of policy ideas, Europeanization had been a two-way process [2018]. The uncertainty of the green future of the EU lends itself for further research as issues and the future unfolds.

The UK's exit from EURATOM as well as the EU requires clear arrangements on issues such as equipment safeguards and radioactive waste. The European Union has safeguard obligations to ensure the safety of member states as far as energy production is concerned. Since the UK now purses sole energy policies, non-compliance with international energy treaties will have adverse consequences on neighbouring countries who are members of the Union, the Union therefore has the responsibility to ensure energy security and safety of member states. The European Union needs to recognise the need to set out clear arrangements on issues like special fissile materials, equipment safeguards and radioactive waste in the Withdrawal scheme.

For a sustainable energy security for the European Union, channels for investment in sustainable energy infrastructure by institutional investors needs to be identified and mobilized for energy investment and infrastructural development. The EU regional government must consolidate policy levers and risk mitigants to facilitate green energy security and supply. Emerging channels such as green bonds hold significant promise for scaling up institutional investment and as such should be tapped for regional energy synergy.

In conclusion, there are many available measures that the European Union can embrace regarding green energy sustainability on the bloc. In order to achieve climate neutrality, greenhouse gas emissions, particularly carbon dioxide, must be as low as possible and any residual emissions must be made up for. This equilibrium is known as net-zero emission. Net-zero refers to all greenhouse gases and goes beyond just reducing carbon emissions, hence, moving in the direction of climate neutrality.

Businesses must cut their carbon emissions in order to become climate-neutral, as well as to satisfy stakeholder expectations and adhere to sustainability laws. Moreover, carbon emissions are prevalent all along the supply chain. By enhancing supply chain transparency, employing artificial intelligence for optimization, or developing a plan based on user carbon profiling, open data and analytics can play a significant part in lowering emissions. AI has the ability to significantly reduce carbon emissions by providing more accurate predictions and enhancing supply chain procedures. AI can help with the creation of renewable energy. But, it's crucial to remember that because AI needs energy and technology, it itself emits carbon. As a result, even if AI can contribute to the goal of net-zero emissions, its carbon footprint must be considered.

Transparency of carbon emissions in the supply chain can also be improved by open data.

Open data can assist businesses in making more informed decisions and locating the most ecologically friendly suppliers by revealing information about the carbon emissions of various providers. This data is necessary to determine a product's carbon footprint and develop its carbon profile. In the end, carbon profiling, open data, and analytics can help companies create carbon reduction plans that are

more precise.

List of Abbreviations

TEU: Treaty on European Union
ECT: Energy Charter Treaty
ODA: Official Development Assistance
EU: European Union
UK: United Kingdom
BBC: British Broadcasting Corporation
FDI: Foreign Direct Investment
ETS: Emission Trading Scheme
CNN: Cable News Network
Ofgem: Office of Gas and Electricity Markets
CETA: Comprehensive Economic and Trade Agreement
IfG: Institute for Government

Appendix

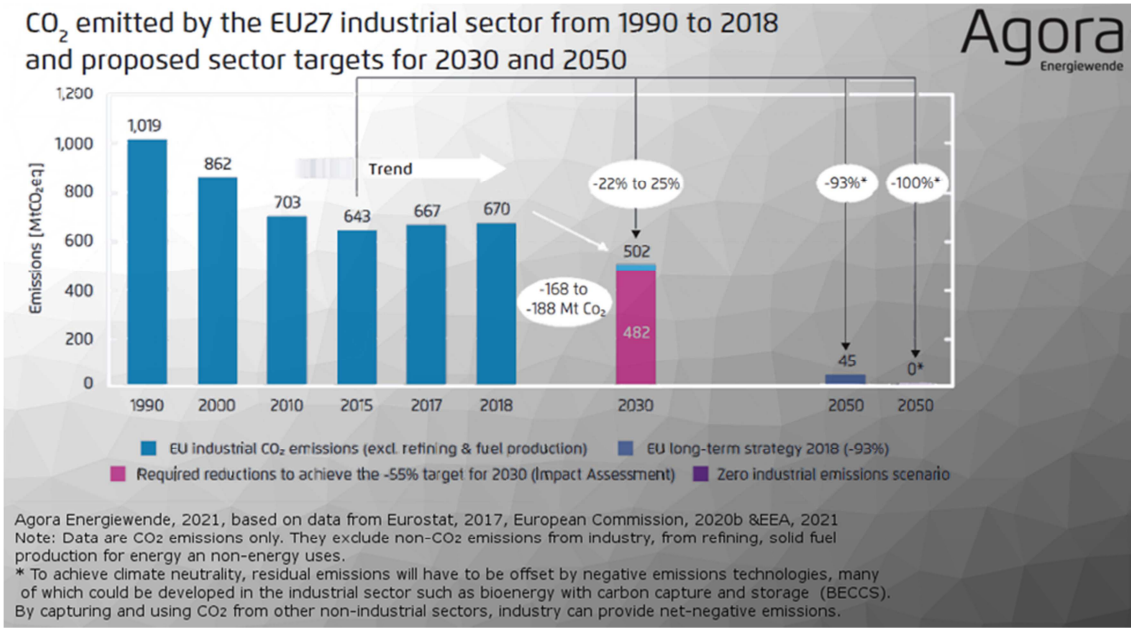
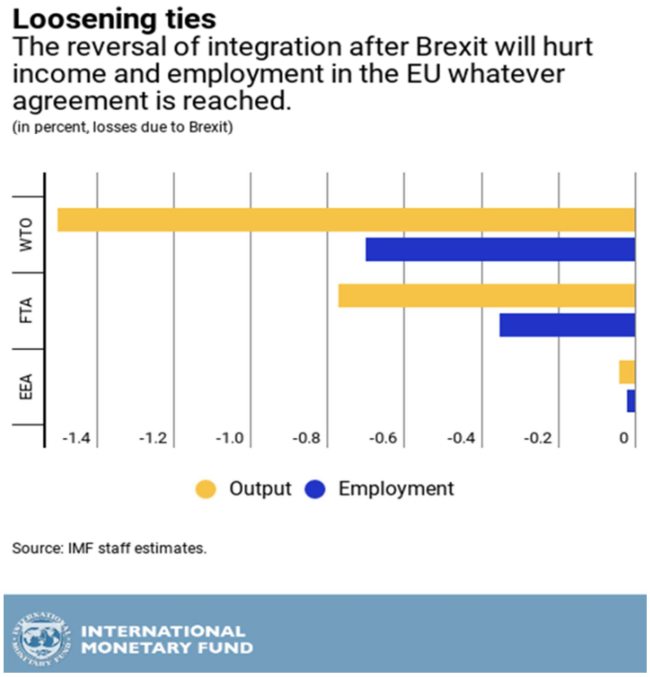
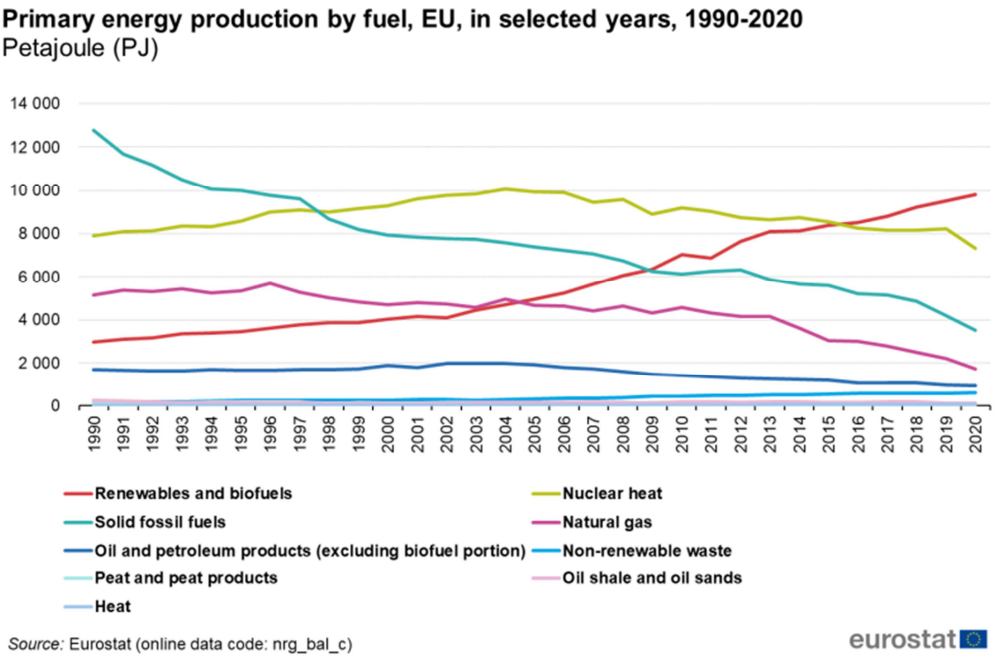


Figure A1. *Carbon Dioxide emission Performance Target of the EU.*



IMF, (no date)

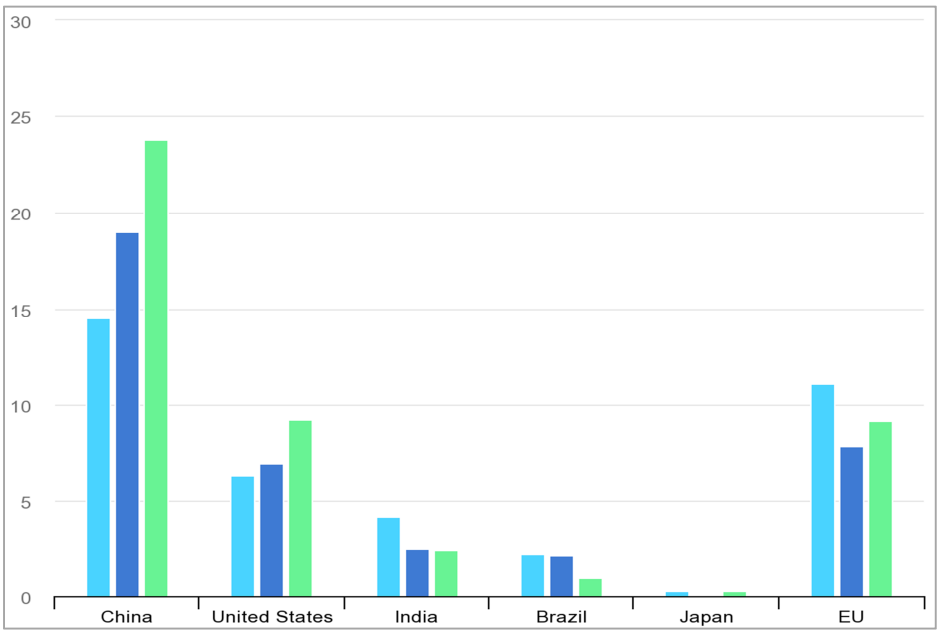
Figure A2. *Impacts of Brexit on Income and Employment of the EU.*



Eurostat, 2021

Figure A3. *Primary Energy Production Targets of the EU.*

Onshore Wind Global Capacity Additions



IEA, 2020

Figure A4. *Onshore Global Capacity Additions.*

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