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The Role of Geopolitics in the Energy Transition of Saudi Arabia and Iran: a literature review

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THE ROLE OF GEOPOLITICS IN THE ENERGY TRANSITION OF SAUDI ARABIA AND IRAN: A LITERATURE REVIEW

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Dissertation

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This dissertation is a personal achievement to me by being able to write academically about topics that are close to my heart.
First, I would like to thank Professor Susana Silva for her guidance and patience throughout the whole elaboration of this dissertation.
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This is just the beginning.

Resumo

Desde a assinatura do Acordo de Paris, em 2015, (na COP21), a transição energética tornou-se um dos temas mais importantes a nível mundial. Esta tese visa preencher uma lacuna na literatura científica, analisando os fatores geopolíticos que impactam a transição energética de dois Estados membros da OPEP: Arábia Saudita e Irão.

A metodologia adotada é uma Revisão Sistemática da Literatura extensa, onde é realizada uma pesquisa em 4 base de dados (SciVerse Scopus; Clarivate Web of Science; Elsevier Science Direct; b-on) e uma seleção das publicações relevantes, resultando em 32 documentos considerados para discussão.

De seguida, descrevem-se todos os fatores geopolíticos encontrados na literatura pertinente, ordenados por temas (Energias Não Renováveis; Energias Renováveis; Iniciativas; Estado; Acordos; Internacional). Os 27 fatores são: Energia Nuclear; Gás Natural; Energias Renováveis; Energia Solar; Hidrogénio; *National Transformation Program; Saudi Arabia's Vision 2030; Belt and Road Initiative; Desertec Industrial Initiative; The Line; Grid Politics; Public Investment Fund*; Conflitos Internos nos Estados Produtores; Estado Rentável; Autoritarismo; Reformas da Energia; Alterações de Regime; COP21; *Nationally Determined Contribution; JCPOA; Non-Proliferation of Nuclear Weapons*; Conflitos dos Estados Produtores com outros Estados; Imposição de Sanções; Dependência do Dólar Americano; Relação China-Irão; Administração dos EUA e COVID-19.

Posteriormente, são retiradas conclusões a partir da informação reportada anteriormente nos vários fatores para responder a três questões de síntese: O que condiciona politicamente a transição energética destes países? Qual o nível de progresso da transição energética na Arábia Saudita e no Irão? Quais os programas e acordos atualmente em vigor e para o futuro?

Palavras-chave: Geopolítica; Transição Energética; Arábia Saudita; Irão.

Abstract

Since the signing of the Paris Agreement in 2015 (in COP21), the energy transition has become one of the most important topics worldwide. This thesis aims to fill a gap in the scientific literature by analysing the geopolitical factors which affect the energy transition of two OPEC member states: Saudi Arabia and Iran.

The methodology adopted is an extensive Systematic Literature Review, where a search through 4 data sources (SciVerse Scopus; Clarivate Web of Science; Elsevier Science Direct; b-on) and a selection of the relevant publications is conducted, resulting in 32 documents being considered for discussion.

Subsequently, all the geopolitical factors found in the fitting literature are described, being ordered by themes (Non-Renewable Energy; Renewable Energy; Initiatives; State; Agreements; International). The 27 factors are Nuclear Energy; Natural Gas; Renewable Energy; Solar Energy; Hydrogen; National Transformation Program; Saudi Arabia's Vision 2030; Belt and Road Initiative; Desertec Industrial Initiative; The Line; Grid Politics; Public Investment Fund; Conflicts in Producing States Internally; Rentier State; Authoritarianism; Energy Reforms; Regime Changes; COP21; Nationally Determined Contribution; JCPOA; Non-Proliferation of Nuclear Weapons; Conflicts in Producing States with Other States; Imposition of Sanctions; US dollars Dependency; China-Iran Relation; USA's Administration and COVID-19.

Afterwards, conclusions are drawn from the information reported previously in the several factors to answer three summarising questions: What mainly conditions these countries' energy transition politically? What is the level of progress of the energy transition in Saudi Arabia and Iran? Which programs and accords are currently in force and for the future?

Keywords: Geopolitics; Energy Transition; Saudi Arabia; Iran.

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List of Abbreviations

b-on – Biblioteca do Conhecimento Online

BRI - Belt and Road Initiative

COP – Conference of the Parties

COVID-19 - Coronavirus Disease 2019

CPEC - China–Pakistan Economic Corridor

DII - Desertec Industrial Initiative

EU – European Union

FEP – Faculdade de Economia da Universidade do Porto

FIT - Feed-in-Tariff

GCC – Gulf Cooperation Council

GCCIA - GCC Interconnection Authority

GDP – Gross Domestic Product

GECF – Gas Exporting Countries Forum

GHG – Greenhouse Gas

IAEA - International Atomic Energy Agency

IPCC - Intergovernmental Panel on Climate Change

IRENA - International Renewable Energy Agency

JCR - Journal Citation Reports

JIF – Journal Impact Factor

JCPOA - Joint Comprehensive Plan of Actions

LNG – Liquified Natural Gas

MENA – Middle East and North Africa

NDC - Nationally Determined Contribution

NGO – Non-Governmental Organisation

NPT - Non-Proliferation of Nuclear Weapons

NTP - National Transformation Program

OPEC - Organization of Petroleum Exporting Countries

PIF - Public Investment Fund

Scopus – SciVerse Scopus

SD – Elsevier Science Direct

SDG – Sustainable Development Goals

SJR – Scimago Journal Ranking

SLR – Systematic Literature Review

UAE – United Arab Emirates

UN – United Nations

US – United States

USA – United States of America

VAT – Value-Added Tax

VPN – Virtual Private Network

WoS – Clarivate Web of Science

1. Introduction

This thesis aims to analyse the role that geopolitics plays when it comes to the energy transition of Saudi Arabia and Iran. The objective is to understand which political factors determine how these two countries are in their energy transition, both globally and between them.

Since the signing of the Paris Agreement in 2015, the energy transition has become one of the most important topics, not only among the scientific community but also among the general population. After COP21 and to date, there have been 5 other United Nations Conferences on Climate Change, 3 IPCC reports and several manifestations not only of the population but also of government initiatives to address the issue of the energy transition.

Currently, after the COVID-19 pandemic and given the Ukraine-Russia War, with oil and natural gas price shocks, it has been suffering from pressure and the cost of living and a forecast of imminent global economic recession/crisis, debater on the fuel topic fossils versus renewable energies is quite relevant.

In this way, it is opportune to look at the countries that most economically depend on fossil fuels, such as OPEC which concentrates on itself the countries with the greatest amount of petroleum resources and whose income from six countries still provides, from oil exports. In addition to the economic factor, the political factor is also decisive for the energy transition of this group of payments.

Within the distortion, it should be noted that Saudi Arabia is the OPEC country that has the greatest potential, whether at an economic, or political level (at the level of state power and diplomatic relations with Western countries) as well as strategies for energy transition. Iran, within OPEC too, due to its political crises and wars, is not at the same level as the first country mentioned.

There are, however, some gaps in the scientific literature concerning particularly correlating the political factors and the energy transition of these countries, and, therefore, this dissertation is relevant to contribute to the debate referred to above.

Starting with a theoretical literature review, in section 2, about the energy transition in OPEC, where these countries are inserted, and starting from a historical and political context since the 20th century, which was decisive for the conditions existing today and the medium-long term.

In section 3, the methodology adopted for this study is explained, – an extensive Systematic Literature Review - where after a search through 4 data sources and a selection of the relevant publications, 32 results were considered. The methodology itself consists of two phases, where the first one is a bibliometric description and the second one is a thorough analysis of the several factors found in the literature.

In section 5, an analysis of all the topics covered in the literature will provide an idea of how geopolitics are influencing the energy transition in both countries and how much this point has been studied so far.

In the end, it is intended to conclude what mainly conditions the progress of energy transition in Saudi Arabia and Iran politically; the level of progress of the energy transition in these countries and which programs and accords are currently in force and for the future (renewable energies and which ones, zero carbon emissions, nuclear energy, equipment and infrastructure changes, among others).

2. Literature Review

Considering that the methodology of this dissertation is an extensive Systematic Literature Review, in this section, instead of enumerating the literature written about the theme of this study, there will be a brief description of what the scientific community is publishing about related relevant concepts, such as geopolitics, energy transition, Gulf countries, Saudi Arabia and Iran.

2.1 Geopolitics

Overland et al. (2019) comment on the fact that energy transition transformed the way literature investigated geopolitics. For example, post-World War II publications were focused on oil-resources competition and now, it is on which countries will win or lose in the energy transition dynamic. For oil-exporting countries, the loss of fossil fuels as their main source of revenue will destabilise their states internally, therefore, becoming more vulnerable to international conflicts.

Alsagr & van Hemmen (2021) characterise geopolitical risks as risks regarding armed fights, terrorism, and state conflicts, which cause international affairs and create uncertainty and instability. These risks have consequences when it comes to the countries' economy since they modify the capital markets and reduce the decision-making action of investors (disincentives companies to invest in the conflicted countries). With this causation in mind, it is possible to assume that geopolitical risks affect the growth of renewable energy as well. Since it is still an expensive form of energy and investors pull out if they know a certain region/country is undergoing violence, they will look out for developed and politically stable regions/countries where they can invest their capital safely.

Pflugmann, & De Blasio (2020) state that even if the countries wanted to implement in their energy mix renewable hydrogen, there are several obstacles, such as cost of production, infrastructure, market regulation and geopolitical. This last factor is regarding the implication that renewable energy is viewed as a way for the energy market sector to be democratised, by ending the hegemonies of fossil fuels-rich states.

2.2 Conflicts

Razek & McQuinn (2021) refer to various events involving Saudi Arabia and Iran, such as the first Gulf War in 1990 (where Saudi Arabia gained market share); the Iraq sanctions Act of 1990 (where Saudi Arabia earned 24 billion USD from their instability); Operation Desert Storm in 1991; closure and loss of Kuwait's refining capacity; the 11th of September of 2001 attacks; Saudi Arabia's intervention in Yemen; Riyadh and oil infrastructure missile attacks and Iran imposed sanctions by the USA.

Rajmil et al. (2021) focus on the 1979 revolution in Iran against the monarchy, which affected the country not only on a political level but also economic, religious, and cultural. Iran went from a tradition-breaking, economic growth and neutral reputation in the West Country to one known for its theocracy, economic decline and fundamentalism and isolation.

2.3 Energy transition

Bradshaw et al. (2019) explain that if governments do not recognise the geopolitical repercussions of the energy transition, especially in economies dependent on fossil fuels exports, there will be a rise in conflicts. This might retrieve attention from implementing strategies for a smooth energy transition to strategies to overcome war affairs.

Alsagr & van Hemmen (2021) connect the dot between the political governance in emerging countries with their renewable energy usage targets. For the energy transition process to be successful, world leaders need to improve their renewable energy infrastructures, which requires not only financial decisions but also consideration of the geopolitical risks.

Tagliapietra (2019) mentions the importance of the Paris Agreement regarding the mitigation of climate change. For a change, governments in developed and developing countries compromised to adopt policies that will keep the global average temperature below 2ºC.

Griffiths (2019) writes about how geopolitics is at the centre of the energy transition. For example, there will be a shift in energy power relations between producers and consumers and a need to consider sustainability the number one priority in terms of governance.

Elavarasan et al. (2021) centre their attention on the influence of COVID-19 on the energy transition. Due to lockdown measures, the energy demand decreased, which resulted in the signature of the OPEC+ agreement, where the oil producers cut their production.

Overall, COVID-19 affected the energy-dependent states consonant with how much they are politically stable. On another hand, according to IRENA, when it comes to employment cost-benefit analysis, the percentage coming from energy transition job opportunities surpasses the fossil fuel job losses.

2.4 Gulf countries

Al-Saidi & Haghirian (2020) refer to the importance the sharing of the Persian Gulf has on Saudi Arabia and Iran since it is where international trade, infrastructure for oil and gas production, desalinated water and marine food production happen. In addition, the geopolitical factor weighs in as Saudi Arabia is the most powerful country of the group and has a history of rivalry with Iran, thus influencing all the other regions' relations. Regarding energy transition, some of the Gulf states have implemented reforms like the King Abdullah City for Atomic and Renewable Energy in Saudi Arabia and the commitment to having 20% of energy usage coming from nuclear power in the next decade in Saudi Arabia as well. In terms of renewable energy, the Gulf countries hold an advantage in solar given their geographical location.

Griffiths (2017) studies how geopolitics influences the implementation of strategies related to universal access to reliable and affordable energy and the development of the economy of the Gulf states. Moreover, the instability and conflict that are known of these countries impact their social contracts and regional cooperation. These contracts usually include state-provided jobs, free healthcare, and education. However, these regions are dependent on the rentier state and the resource wealth to achieve the two points mentioned above.

Griffiths (2019) reinforces that the Gulf countries, dependent on oil export revenues, need to have a strong bilateral relationship to help them secure energy demand and economic opportunities that might develop the energy transition.

2.5 Saudi Arabia

Razek & McQuinn (2021) report that Saudi Arabia has the lowest extraction costs and the largest crude oil surplus production capacity out of all OPEC members, making it an influential state among the others regarding any energy market decision.

Bradshaw et al. (2019) state that Saudi Arabia has had rapid economic growth since 1990, consequently, has had an increase in carbon emissions. Given the country's power in

the energy market, in 2016, Mohammed Bin Salman revealed two plans for the region: offering up to 5% of Saudi Aramco and executing Saudi Arabia's Vision 2030.

Al-Saidi & Haghirian (2020) compare nuclear energy versus natural gas versus renewable energy in Saudi Arabia. The state's geographic location is favourable to the production of renewable solar energy, making it cheaper than nuclear power – independently of the cost of production, nuclear energy has an excessive cost in terms of waste disposal and management that neither natural gas nor renewable energy has.

2.6 Iran

Makhdoum & Pouransari (2022) consider Iran to have a vital position in the natural gas market: its reserves are close to different borders and so it does not have a distribution obstacle. Also, there has been an increase in the usage of nuclear energy, which might continue developing depending on the imposition of sanctions. Therefore, it is an important nation for the planning of a reliable energy policy.

Al-Saidi & Haghirian (2020) focus on nuclear energy, mentioning that the state started using it before the Islamic Revolution in 1979 with the Iranian Nuclear Program. This was supported not only by the USA but also globally due to the oil crisis in 1973, during the Arab Israeli war. However, until nowadays there have been some barriers to nuclear energy development in Iran: the 1979 revolution; the Tehran Declaration in 2003; the imposition of sanctions in 2005 by the USA, EU and United Nations Security Council and the signature of the Nuclear Non-Proliferation Treaty. Only in 2015, did Iran manage to reach an agreement with China, France, Russia, the United Kingdom, the USA, and Germany to continue with the Iran Nuclear Program in exchange for the removal of nuclear energy-related sanctions. Nonetheless, when the JCPOA was signed, it created resistance across the Gulf countries, especially Saudi Arabia and Israel, which consider Iran their rivalry. This geopolitical tension intensified during the administration of Donald Trump in the USA, as he again imposed sanctions against Iran and withdrew from the JCPOA in 2018 – the conflicts among Gulf states increased significantly.

Griffiths (2017) recognises that the future of energy policy in Iran is dependent on the outcome of international sanctions. Nevertheless, even if the country is clear, it still has a long way to go in terms of diplomatic relations with the West and the other Gulf states and, because of the sanctions, years of underinvestment across all market sectors.

3. Methodology

3.1 Methodological option contextualization and aim of the study

In this study, an extensive Systematic Literature Review is being conducted on the topic of the role of geopolitics in the energy transition of Saudi Arabia and Iran. At the time that this research began, there were no studies published about this specific topic, demonstrating the relevance of analysing all the geopolitical factors, instead of focusing on only a selected number of them.

(Kraus et al., 2020, p. 1024) stated that the SLR is a methodology that helps organise the literature under review. The main advantages he pointed out were the *"transparency in data collection and synthesis, which result in a higher level of objectivity and reproducibility"*.

(Knopf, 2006; Okoli, 2015) affirm that an SLR approach can be useful in three types of situations, such as:

"1) A standalone review of the literature for a specific topic.

2) An introduction to an empirical paper and foundation for a hypothesis.

3) The first stage of a bigger research project."

(Kraus et al., 2020, p. 1027) compared the SLR and the Traditional Literature Review contemplating seven characteristics, as per below:

"1) Identification for the need for a review article.

2) Development of a review protocol.

3) Identification of research (structured, replicable, and transparent process).

4) Evaluating studies (a transparent protocol of eliminated studies, objective process of elimination).

5) Conducting data synthesis (concept driven).

6) Reasons for an SLR (it´s a standalone paper that creates evidence and answers a research question).

7) Very time-consuming."

According to Knopf (2006) and Okoli (2015), the aim of this study fills in their first situation. As for the aspects referred to by Kraus (2020), they will be further explained in this chapter.

3.2 Criteria

For the creation of the database, there was no time publication restriction, but there were several criteria points maintained for all data sources, which were the following:

1- The keywords selected for the search were "GEOPOLITICS" + "ENERGY TRANSITION" + "SAUDI ARABIA" + "IRAN". The words were chosen in capital letters for a matter of consistency and to eliminate an influence when it came to the appearance of results.

2- Only publications in English were accepted.

3- Book reviews, citations, working papers, data papers, preview papers, editorials, notes, abstract papers, thesis, dissertations, reports, studies, conference reviews and undefined documents were the types of literature not accepted.

4- Articles, journal articles, book chapters, conference papers, review papers, books and short surveys were the type of literature accepted.

5- For the organisation of the data collected, the documents were read twice: first by the abstract, granting a partial selection and, afterwards, by the full-text creation, and then, by the final selection of the information.

For the abstract criteria exclusion and acceptability, if it did not mention any of the keywords, it was excluded. For instance, if it referred to at least one of the following words: "Middle East", "OPEC", "Organization of the Petroleum Exporting Countries", "MENA", "Arab Gulf", "Gulf", "Persian Gulf", "Arabian Peninsula", "Middle East and North Africa" or just one of the two countries, "Saudi Arabia" or "Iran", plus either "energy transition" or "geopolitics", it was accepted. If the content of the abstract was relevant to the analysis of the thesis, it was accepted.

3.3 Categorization of Literature

For the first interpretation, the relevant literature was classified as "Used" and the non-relevant as "Not Used". To allow a better understanding of the reason behind excluded literature, the documents "Not Used" were divided into five categories (see Table 1).

Table 1

Classification of Not Used Publications. Source: Own elaboration

Classification of Not Used Publications	Justification
Repeated	Documents repeated either inside the same source or from one source to a posterior one.
Not Relevant	Documents not relevant to the investigative question of the thesis.
Not in English	Accordingly, to criteria point number 2.
No Access	Documents that, by reading the Abstract seem relevant to the study, but cannot be opened - even using FEP's VPN, there is the possibility that information may be inaccessible.
Excluded	Accordingly, to criteria point number 3.

3.4 Data source selection

For this database, four data sources were considered, which were chosen given FEP's institution accessibility through the faculty's VPN and thus its recognition as trustful sources on its website in the Bibliographic Databases tab.

Scopus and WoS have selective journal-based policies turning them into precise sources (Balstad and Berg, 2019). Yet, they lack literature when it comes to the topic of social sciences (Martín-Martín et al., 2018).

SD is considered *"one of the most popular publications that provide subscription-based access to large databases"* (Charoenthammachoke et al., 2020, p.547).

The data source b-on is an online library that publishes full texts of journal articles and e-books from international researchers (Biblioteca do Conhecimento Online, 2022).

Even though none of the above sources is flawless, they were all scanned for the investigation of this thesis to analyse as many perspectives of written scientific and bibliographical data as possible and, simultaneously, that was available at the time of the information collection.

The literature was collected in September 2022. Thus, for the relevance of the classification of the "Repeated" documents, the search was made in the following order: Scopus, WoS, SD and b-on.

3.5 Scopus research

When the keywords were put in and the option for "Article, Abstract, Keywords" was selected in the search, it showed up with 0 results.

On that occasion, a second search was made, but this time for the countries individually. The rationale for this was that since Scopus is a more accurate source, there could have been publications for one country but not the other and that could influence the total results. Then, by adding "GEOPOLITICS" + "ENERGY TRANSITION" + "IRAN", there were 0 results and by adding "GEOPOLITICS" + "ENERGY TRANSITION" + "SAUDI ARABIA", there were 3 results.

To have a full perspective of the data source, a third search was carried out this time for the option "All Fields", which resulted in 0 results for the criteria keywords, 0 results for "GEOPOLITICS" + "ENERGY TRANSITION" + "IRAN" and the same 3 results for "GEOPOLITICS" + "ENERGY TRANSITION" + "SAUDI ARABIA" (see Tables 2 and 3).

Table 2

Scopus research: Classification of Publications. Source: Own elaboration

Classification of Publications	Number of Results
Used	2
Not used	1

Table 3

Scopus research: Sub-Classification of Not Used Publications. Source: Own elaboration

Sub-Classification of Not Used Publications	Number of Results
Repeated	0
Not Relevant	1
Not in English	0
No Access	0
Excluded	0

3.6 WoS research

The keywords were put in the "Basic Search" field and the option for "Topic" was selected. Alike Scopus, 0 results came up and since they are similar databases in their nature, the same strategy was applied.

When conducting the second search by putting "GEOPOLITICS" + "ENERGY TRANSITION" + "IRAN", 0 results came up and by putting "GEOPOLITICS" + "ENERGY TRANSITION" + "SAUDI ARABIA", 3 results came up.

When managing the third search with the option for "All Fields," it resulted in 49 results for the criteria keywords (see Tables 5 and 6).

Table 4

WoS research: Classification of Publications. Source: Own elaboration

Classification of Publications	Number of Results
Used	11
Not used	38

Table 5

WoS research: Sub-Classification of Not Used Publications. Source: Own elaboration

Sub-Classification of Not Used Publications	Number of Results
Repeated	2
Not Relevant	27
Not in English	0
No Access	9
Excluded	0

3.7 SD research

By inserting the criteria keywords in the "Keywords" field and searching without any other filter, this resulted in 49 papers (see Tables 6 and 7).

Table 6

SD research: Classification of Publications. Source: Own elaboration

Classification of Publications	Number of Results
Used	6
Not used	43

Table 7

SD research: Sub-Classification of Not Used Publications. Source: Own elaboration

Sub-Classification of Not Used Publications	Number of Results
Repeated	5
Not Relevant	27
Not in English	0
No Access	2
Excluded	9

3.8 b-on research

By putting the keywords in the search bar, 1,279 documents appeared. However, only 1,231 were available for viewing (see Tables 8 and 9).

Table 8

b-on research: Classification of Publications. Source: Own elaboration

Classification of Publications	Number of Results
Used	54
Not used	1,177

Table 9

b-on research: Sub-Classification of Not Used Publications. Source: Own elaboration

Sub-Classification of Not Used Publications	Number of Results
Repeated	68
Not Relevant	973
Not in English	12
No Access	105
Excluded	19

3.9 Partial selection analysis

Summarising the four data sources considered for the database of this study, the partial selection is constituted of 1,332 results (see Tables 10 and 11).

Table 10

Partial selection analysis: Classification of Publications. Source: Own elaboration

Classification of Publications	Number of Results
Used	73
Not used	1,259

Table 11

Partial selection analysis: Sub-Classification of Not Used Publications. Source: Own elaboration

Sub-Classification of Not Used Publications	Number of Results
Repeated	75
Not Relevant	1,028
Not in English	12
No Access	116
Excluded	28

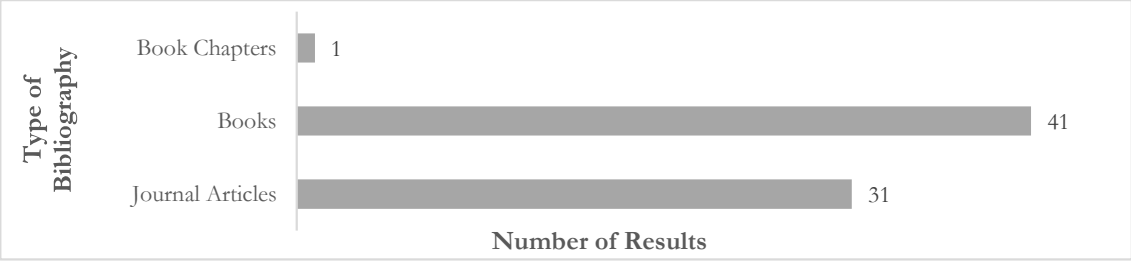
Focusing on the multidisciplinary variety of the literature selected, the 73 results were split into several systematic classes, as described in the next sections.

3.9.1 Type of bibliography

Approximately, 42.5% were Journal Articles, 56.2% were Books and 1.3% were Book Chapters (see Figure 1).

Figure 1

Type of bibliography. Source: Own elaboration



3.9.2 Type of bibliography per data source

For Scopus, 100% of the documents considered relevant were Journal Articles.

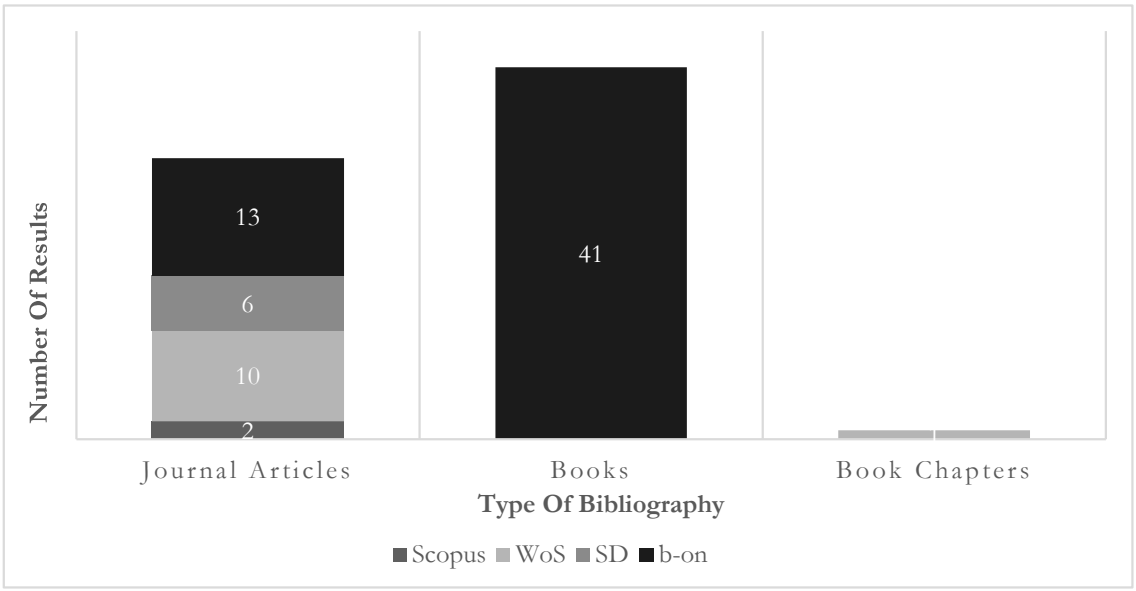
Regarding WoS, approximately, 90.9% were Journal Articles and 9.1% were Book Chapters.

As for SD, 100% were Journal Articles.

Lastly, for b-on, approximately, 24.1% were Journal Articles and 75.9% were Books (see Figure 2).

Figure 2

Type of bibliography per data source. Source: Own elaboration

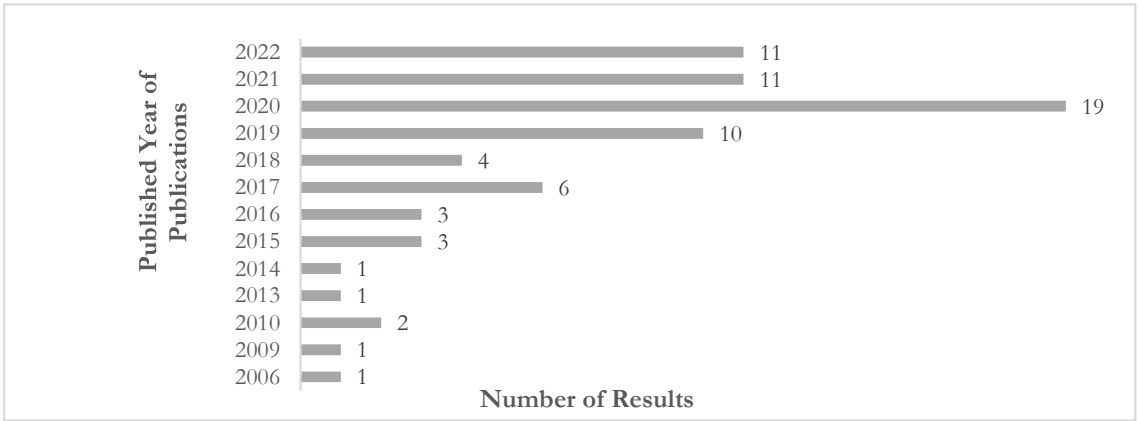


3.9.3 Published year of publications

Approximately, 1.4% of the literature was published in 2006; 1.4% was in 2009; 2.7% was in 2010; 1.4% was in 2013; 1.4% was in 2014; 4.1% was in 2015; 4.1% was in 2016; 8.2% was in 2017; 5.5% was in 2018; 13.6% was in 2019; 26% was in 2020; 15.1% was in 2021 and 15.1% was in 2022 (see Figure 3).

Figure 3

The published year of publications. Source: Own elaboration



3.9.4 Published year of publications per data source

For Scopus, 50% of the documents considered relevant were published in 2019 and 50% were in 2021.

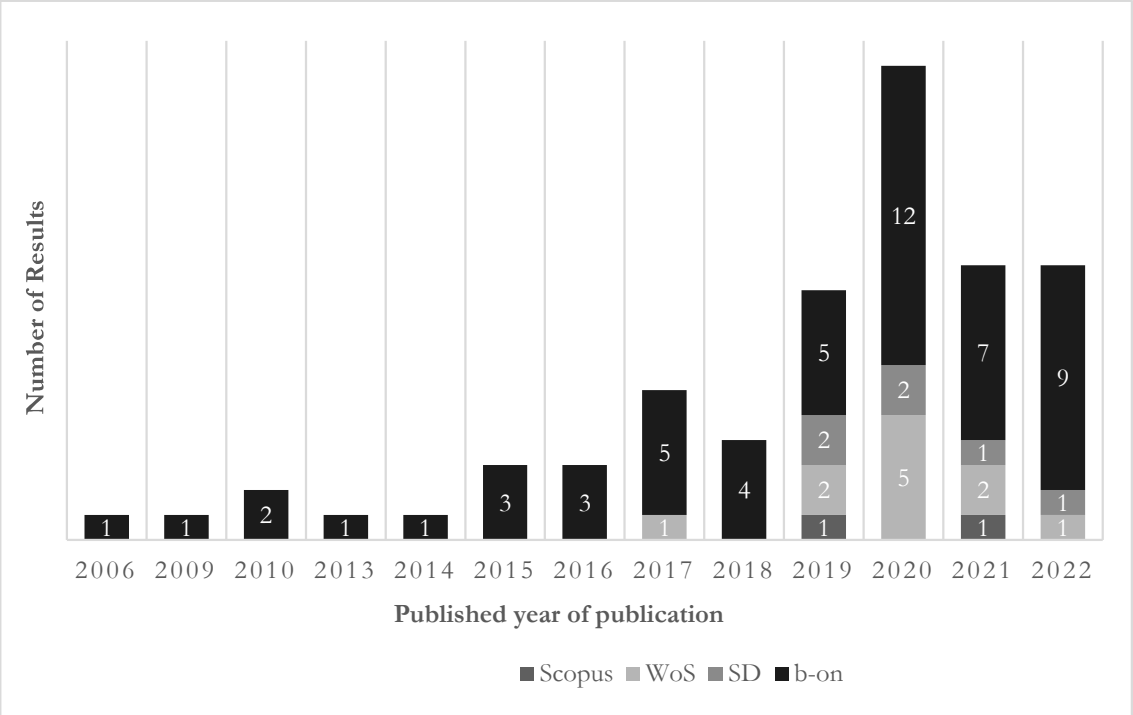
Regarding WoS, approximately, 9.1% were published in 2017, 18.2% were in 2019, 45.5% were in 2020, 18.2% were in 2021 and 9.1% were in 2022.

As for SD, approximately, 33.3% were published in 2019, 33.3% were in 2020, 16.7% were in 2021 and 16.7% were in 2022.

Lastly, for b-on, approximately, 1.9% were published in 2006, 1.9% were in 2009, 3.6% were in 2010, 1.9% were in 2013, 1.9% in 2014, 5.5% in 2015, 5.5% in 2016, 9.3% in 2017, 7.3% in 2018, 9.3% in 2019, 22.2% in 2020, 13% in 2021 and 16.7% in 2022 (see Figure 4).

Figure 4

The published year of publications per data source. Source: Own elaboration



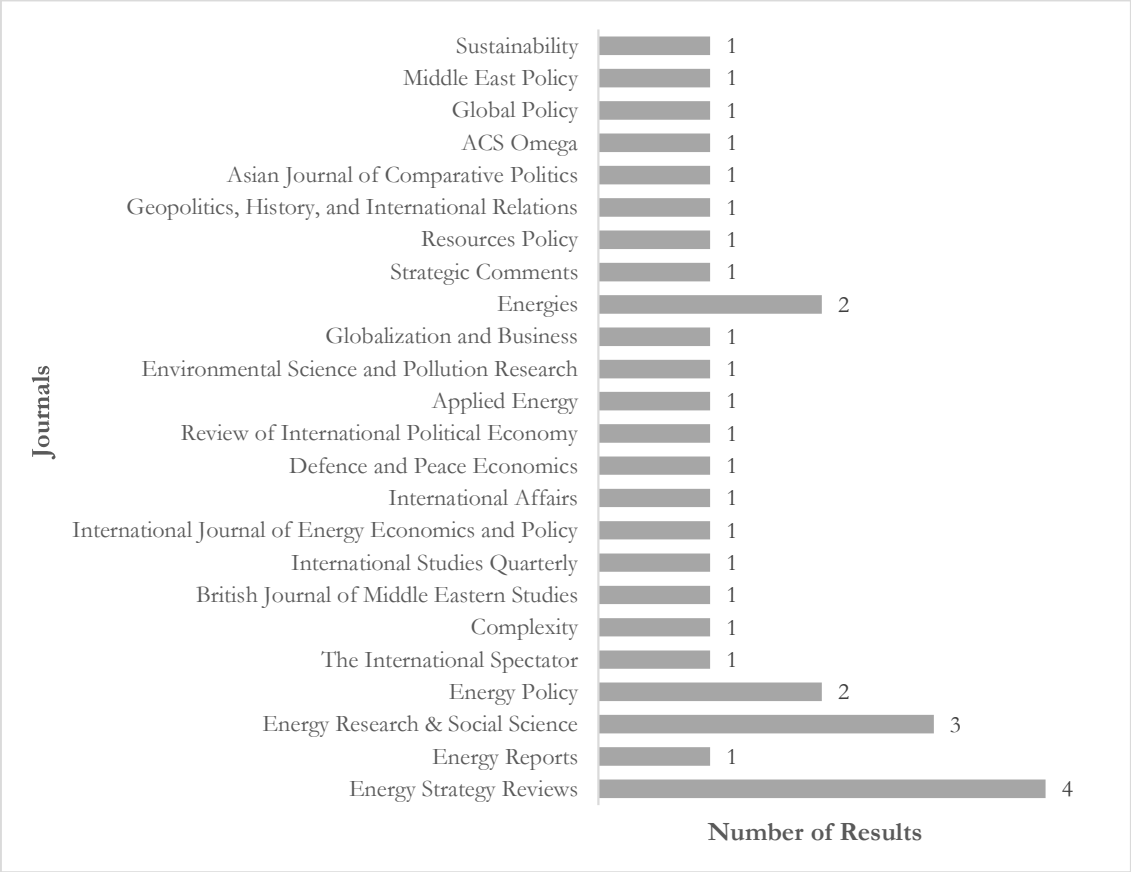
3.9.5 Journals

Approximately, 3.2% of the literature was published in Sustainability, 3.2% was in Middle East Policy, 3.2% was in Global Policy, 3.2% was in ACS Omega, 3.2% was in Asian Journal of Comparative Politics, 3.2% was in Geopolitics, History, and International Relations, 3.2% was in Resources Policy; 3.2% was in Strategic Comments; 6.6% was in Energies; 3.2% was in Globalization and Business; 3.2% was in Environmental Science and

Pollution Research; 3.2% was in Applied Energy; 3.2% was in Review of International Political Economy; 3.2% was in Defence and Peace Economics; 3.2% was in International Affairs; 3.2% was in International Journal of Energy Economics and Policy; 3.2% was in International Studies Quarterly; 3.2% was in British Journal of Middle Eastern Studies; 3.2% was in Complexity; 3.2% was in The International Spectator; 6.6% was in Energy Policy; 9.8% was in Energy Research & Social Science; 3.2% was in Energy Reports and 13% was in Energy Strategy Reviews (see Figure 5).

Figure 5

Journals. Source: Own elaboration



3.9.6 Journals per data source

For Scopus, 50% of the articles considered relevant were published in Resources Policy and 50% were in Energy Strategy Reviews.

Regarding WoS, approximately, 10% were published in the International Journal of Energy Economics and Policy, 10% were in International Studies Quarterly, 10% were in Environmental Science and Pollution Research, 20% were in Energy Research & Science,

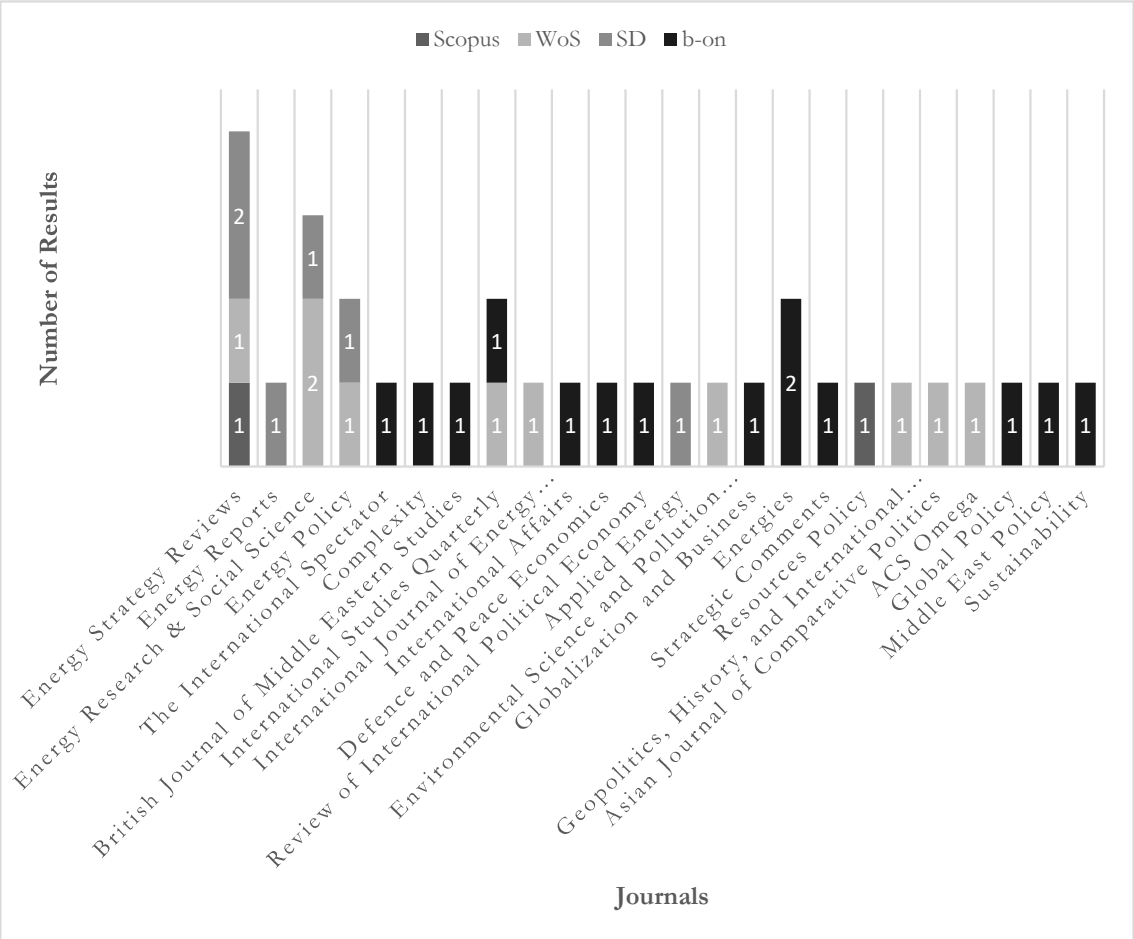
10% were in Energy Strategy Reviews, 10% were in Energy Policy, 10% were in Geopolitics, History, and International Relations, 10% were in Asian Journal of Comparative Politics and 10% were in ACS Omega.

As for SD, approximately, 16.7% were published in Energy Reports, 16.7% were in Energy Policy, 33.2% were in Energy Strategy Reviews, 16.7% were in Applied Energy and 16.7% were in Energy Research & Social Science.

Lastly, for b-on, approximately, 7.7% were published in The International Spectator, 7.7% were in Complexity, 7.7% were in British Journal of Middle Eastern Studies, 7.7% were in International Affairs, 7.7% were in Defence and Peace Economics, 7.7% were in Review of International Political Economy, 7.7% were in International Studies Quarterly, 7.7% were in Globalization and Business, 15.3% were in Energies, 7.7% were in Strategic Comments, 7.7% were in Global Policy, 7.7% were in Middle East Policy, and 7.7% were in Sustainability (see Figure 6).

Figure 6

Journals per data source. Source: Own elaboration



3.9.7 Scimago Journal & Country Rank

Scopus has an element, Scimago Journal & Country Rank, which contains various indicators that analyse its scientific domains and compare the journals in the data source.

For this study, only the SJR will be analysed as it measures the *"scientific influence of journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where such citations come from."* (Scimago Journal & Country Rank, 2022, https://www.scimagojr.com/journalsearch.php?q=110031&tip=sid&clean=0). The higher the value of SJR, the more prestige that journal has.

Of the journal articles considered from Scopus, the results were retrieved from 2021, the latest year with information about (see Table 12).

Table 12

Scimago Journal & Country Rank. Source: Own elaboration

Journal	Cite Score
Resources Policy	1.461
Energy Strategy Reviews	2.254
International Journal of Energy Economics and Policy	0.380
International Studies Quarterly	1.615
Environmental Science and Pollution Research	0.831
Energy Research & Social Science	2.551
Energy Policy	2.126
Geopolitics, History, and International Relations	0.412
Asian Journal of Comparative Politics	0.192
ACS Omega	0.708

3.9.8 Journal Impact Reports

WoS has a component, Journal Citation Reports, which provides objective and transparent data. The reports are useful for publishers, editors, librarians, and researchers to recognise if a journal is influential within the data source.

There are several indicators in JCR, but for this study, Journal Impact Factor will be the only one analysed. JIF's calculation for 2021 is the ratio between "*Citations in 2021 to items published in 2019 + 2020*" and "*Number of citable items in 2019 + 2020"* (Journal Citation Reports, 2022, https://jcr.help.clarivate.com/Content/jcr3-glossary.htm).

Of the journal articles selected from WoS, 3 did not have any results in JCR and for the other 7, the results were gathered for 2021, which was the latest year there was

information about. Thus, the one with the highest JIF was Energy Strategy Reviews and the one with the lowest was International Studies Quarterly (see Table 13).

Table 13

Journal Impact Reports. Source: Own elaboration

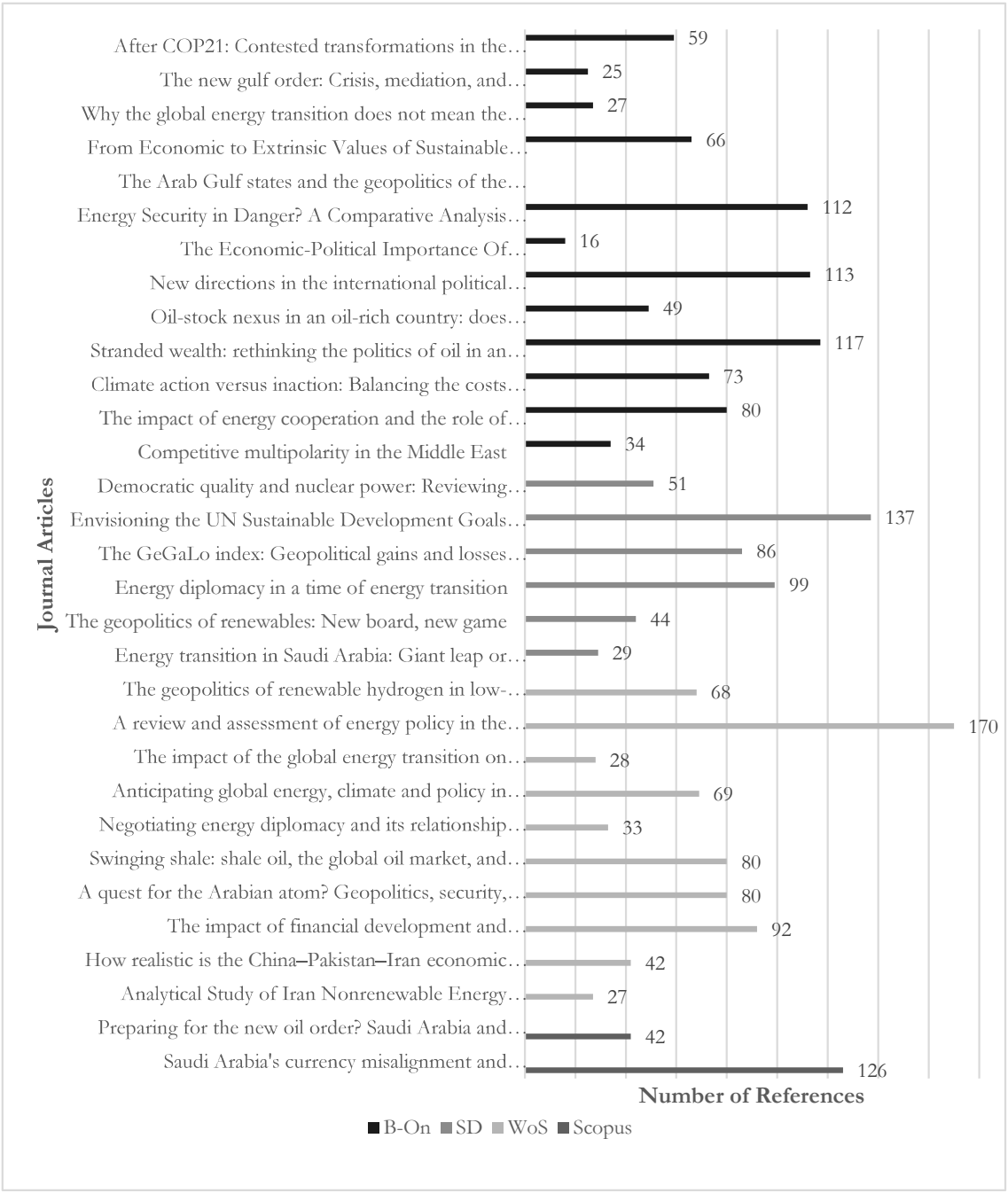
Journal	JIF
International Journal of Energy Economics and Policy	No results were found
International Studies Quarterly	2.799
Environmental Science and Pollution Research	5.190
Energy Research & Social Science	8.514
Energy Strategy Reviews	10.010
Energy Policy	7.576
Geopolitics, History, and International Relations	No results were found
Asian Journal of Comparative Politics	No results were found
ACS Omega	4.132
Resources Policy	8.222

3.9.9 References per article per data source

For this classification, only the bibliography of Journal Articles was examined because 1) for Books, even though there was access, it was not for the full text, so it would not be a precise number of references and 2) for Book Chapters, since it was sole a chapter, it would not give a full view of the whole book's references (see Figure 7).

Figure 7

References per article per data source. Source: Own elaboration

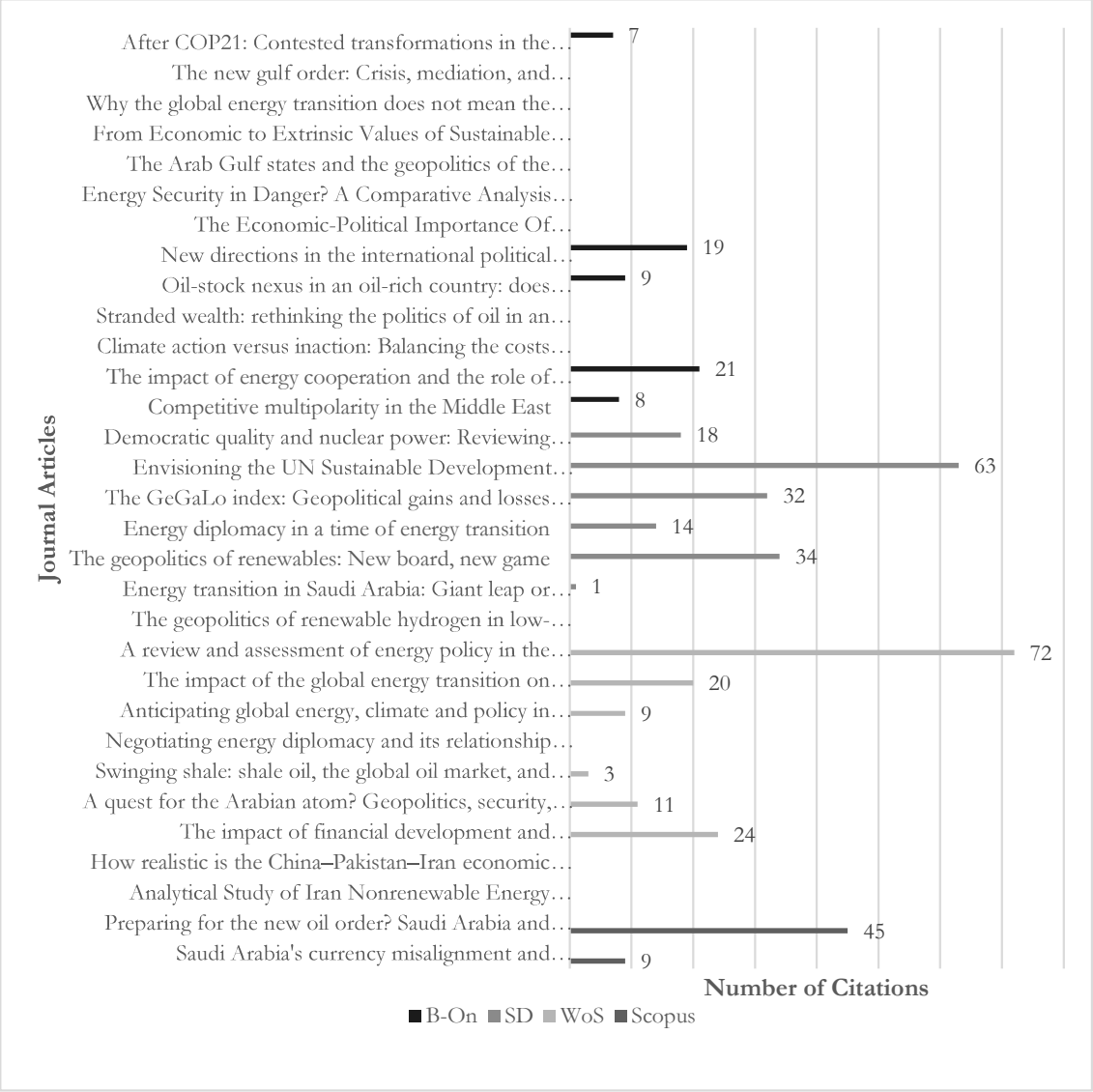


3.9.10 Citations in other publications per data source

The same approach was applied in this section as it was in section 3.9.9. The articles that have 0 citations do not fully mean they were not cited in other publications, however, when looking up the document in the data source, no details regarding citations appeared (see Figure 8).

Figure 8

Citations in other publications per data source. Source: Own elaboration



3.9.11 Publications and Citations per author

When searching for the documents published by each author in the data source corresponding to the relevant publication and the total citations for the authors as well, two obstacles came up: 1) b-on did not have information about the authors (uniquely appeared about their affiliated university); 2) SD, even though it had some details, it was taken from Scopus. In the end, the data regarding how many documents an author published was pulled from Scopus and Web of Science.

For two authors Mohammad Al-Saidi and Steven Griffiths, when searching the journal articles, it was possible to find results from both Scopus and WoS (see Tables 14 and 15).

Table 14

Publications per author. Source: Own elaboration

Author	Publications from Scopus	Publications from WoS
Razek, Noha H.A.	2	-
McQuinn, Brian	11	-
Bradshaw, Michael	101	-
Van de Graaf, Thijs	46	-
Connolly, Richard	25	-
Makhdoum, Hasti	-	1
Pouransari, Zeinab	-	3
Rajmil, Daniel	-	3
Morales, Lucia	-	30
Andreosso-O'Callaghan, Bernadette	-	32
Alsagr, Naif	-	3
van Hemmen, Stefan	-	13
Al-Saidi, Mohammad	47	47
Haghirian, Mehran	-	3
Kim, Inwook	-	3
Bovan, Ana	-	1
Ansari, Dawud	-	7
Holz, Franziska	-	35
Tagliapietra, Simone	-	33
Griffiths, Steven	41	78
Pflugmann, Fridolin	-	1
De Blasio, Nicola	-	9
Mills, Robin	-	4
Scholten, Daniel	22	-
Bazilian, Morgan	184	-
Overland, Indra	73	-
Westphal, Kirsten	39	-
Ilimbek Uulu, Talgat	1	-
Vakulchuk, Roman	16	-
Neumann, Anne	24	-
Sorge, Lars	3	-
Von Hirschhausen, Christian R.	99	-
Wealer, Bem	6	-

Table 15

Citations per author. Source: Own elaboration

Author	Citations from Scopus	Citations from WoS
Razek, Noha H.A.	20	-
McQuinn, Brian	522	-
Bradshaw, Michael	2467	-
Van de Graaf, Thijs	1595	-
Connolly, Richard	332	-
Makhdoum, Hasti	-	-
Pouransari, Zeinab	-	10
Rajmil, Daniel	-	-
Morales, Lucia	-	168
Andreosso-O'Callaghan, Bernadette	-	89
Alsagr, Naif	-	36
van Hemmen, Stefan	-	223
Al-Saidi, Mohammad	614	614
Haghirian, Mehran	-	12
Kim, Inwook	-	7
Bovan, Ana	-	-
Ansari, Dawud	-	75
Holz, Franziska	-	451
Tagliapietra, Simone	-	195
Griffiths, Steven	1029	876
Pflugmann, Fridolin	-	22
De Blasio, Nicola	-	122
Mills, Robin	-	38
Scholten, Daniel	676	-
Bazilian, Morgan	8291	-
Overland, Indra	1122	-
Westphal, Kirsten	731	-
Ilimbek Uulu, Talgat	31	-
Vakulchuk, Roman	229	-
Neumann, Anne	443	-
Sorge, Lars	20	-
Von Hirschhausen, Christian R.	1927	-
Wealer, Bem	44	-

3.9.12 Author's Affiliation Country

The first author of each journal article selected was analysed to understand its affiliation university's country. Out of 17 countries, the United Kingdom and the USA were the ones which appeared the most, five and four times, specifically (see Figure 9).

Figure 9

Author's Affiliation Country. Source: Own elaboration

3.10 Final Selection Analysis

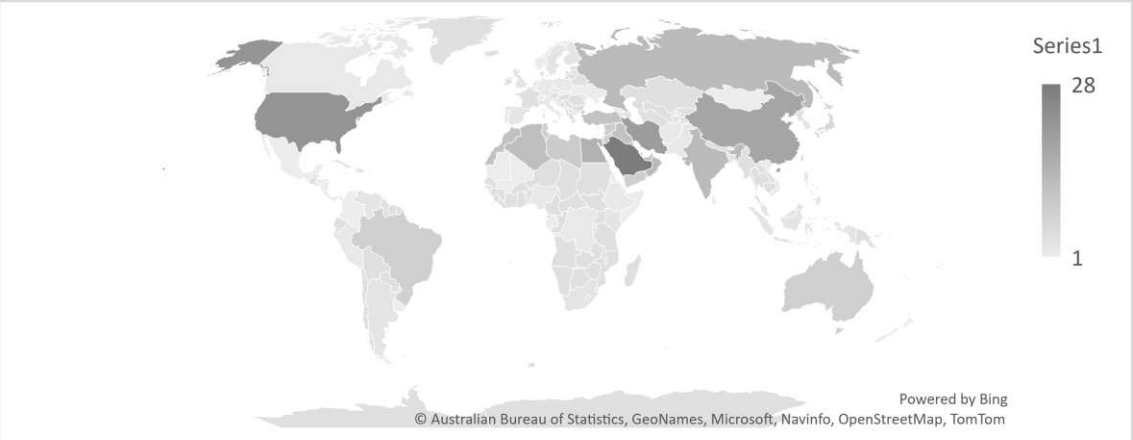
After reading the book's type of literature from the b-on database, the 40 documents were not considered for the analysis of this thesis as the access to its contents was limited (not all the book pages were freely available) and the information that was accessible was considered not relevant for the aim of this study. In the end, 32 documents were considered for the analysis.

3.10.1 Countries analysed in the literature

Among all 95 countries, Saudi Arabia, the United States of America, and Iran were the ones which appeared the most, 28, 22 and 20 times, specifically (see Figure 10).

Figure 10

Countries analysed in the literature. Source: Own elaboration

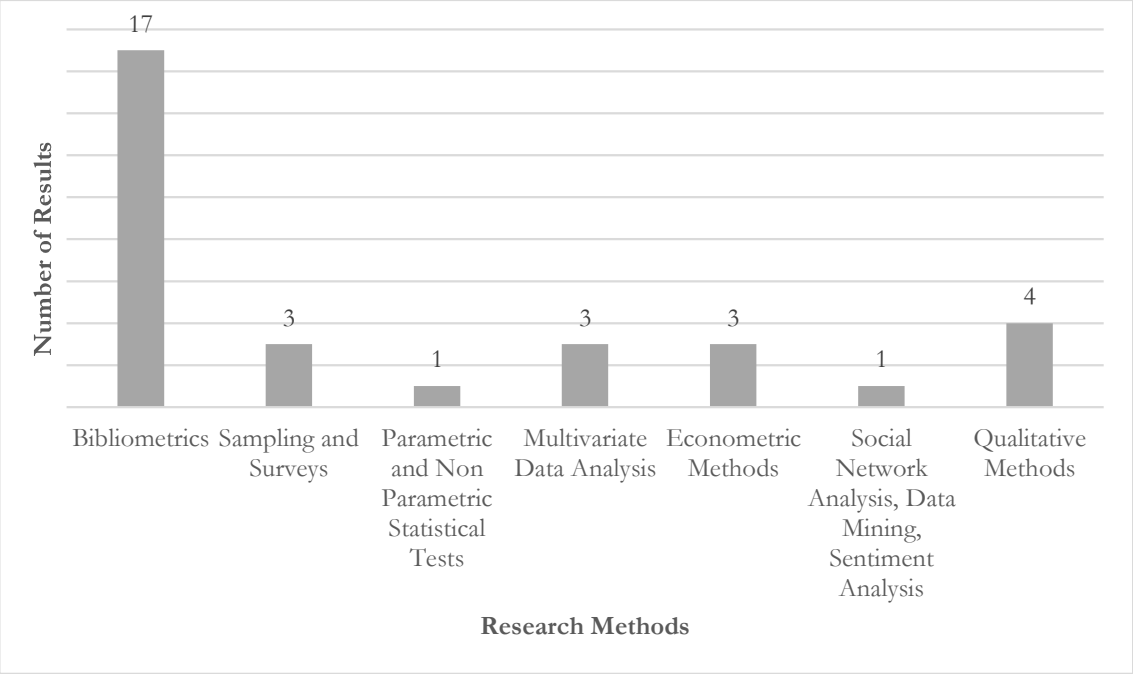


3.10.2 The methodology adopted in the literature

To gather a better sense of the information collected, each document was divided by types of methodologies as available in FEP's research methods training unit. Out of 32 documents, bibliometrics is the most adopted method (see Figure 11).

Figure 11

The methodology adopted in the literature. Source: Own elaboration



3.11 Timeframe

For the writing of the methodology, the time duration was divided into sections, as shown in Table 16:

Table 16

Timeframe. Source: Own elaboration

Section	Duration
3.1	4 weeks
3.2	
3.3	
3.4	
3.5	
3.6	
3.7	
3.8	
3.9	2 weeks
3.10	6 weeks

4. Discussion

In this section, all political factors found in the literature regarding the energy transition in Saudi Arabia and Iran will be described. Firstly, through systematic tables and, secondly, through a justification for each reference (see Tables 17, 18, 19, 20, 21 and 22).

Table 17

Topic Theme: Non-Renewable Energy. Source: Own elaboration

Topic Theme: Non-Renewable Energy	Publication Reference
1.1 Nuclear Energy	Griffiths (2017)
	Al-Saidi & Haghirian (2020)
	Al-Saidi (2020)
	Neumann et al. (2020)
	Rajmil et al. (2021)
	Al-Saidi (2022)
	Krane (2020)
1.2 Natural Gas	Griffiths (2017)
	Hao et al. (2020)
	Griffiths (2019)
	Mills (2020)
	Makhdoum & Pouransari (2022)
	Krane (2020)
	Tabagari (2020)

Table 18

Topic Theme: Renewable Energy. Source: Own elaboration

Topic Theme: Renewable Energy	Publication Reference
2.1 Renewable Energy	Alsagr & van Hemmen (2021)
	Scholten et al. (2020)
	Al-Saidi (2020)
	Krane (2020)
	Kuzemko et al. (2019)
2.2 Solar Energy	Al-Saidi & Haghirian (2020)
	Griffiths (2017)
2.3 Hydrogen	Pflugmann & De Blasio (2020)

Table 19

Topic Theme: Initiatives. Source: Own elaboration

Topic Theme: Initiatives	Publication Reference
3.1 National Transformation Program (NTP)	Bradshaw et al. (2019)
3.2 Saudi Arabia's Vision 2030	Razek & McQuinn (2019)
	Fraioli (2022)
	Mills (2020)
	Al-Saidi (2022)
3.3 Belt and Road Initiative (BRI)	Rajmil et al. (2021)
3.4 Desertec Industrial Initiative (DII)	Griffiths (2017)
3.5 The Line	Al-Saidi (2022)
3.6 Grid politics	Scholten et al. (2020)
3.7 Public Investment Fund (PIF)	Tagliapietra (2019)

Table 20

Topic Theme: State. Source: Own elaboration

Topic Theme: State	Publication Reference
4.1 Conflicts in producing states internally	Ansari & Holz (2019)
	Razek & McQuinn (2019)
	Kim (2020)
	Kausch (2015)
	Makhdoum & Pouransari (2022)
	Aloui & Hamida (2021)
4.2 Rentier State	Ansari & Holz (2019)
	Al-Saidi (2020)
	Bradshaw et al. (2019)
	Fraioli (2022)
	Tagliapietra (2019)
	Al-Saidi & Haghirian (2020)
4.3 Authoritarianism	Bradshaw et al. (2019)
	Al-Saidi & Haghirian (2020)
	Goldthau & Westphal (2019)
	Neumann et al. (2020)
	Scholten et al. (2020)
	Rajmil et al. (2021)
	Krane (2020)
4.4 Energy Reforms	Griffiths (2017)
	Al-Saidi (2022)
	Marsden & Rucinska (2019)
	Al-Saidi (2020)
	Krane (2020)
4.5 Regime Changes	Al-Saidi (2022)
	Overland et al. (2019)

Table 21

Topic Theme: Agreements. Source: Own elaboration

Topic Theme: Agreements	Publication Reference
5.1 COP21 (Paris Agreement)	Griffiths (2017)
	Ansari & Holz (2019)
	Bradshaw et al. (2019)
	Tagliapietra (2019)
	Elavarasan et al. (2021)
	Makhdoum & Pouransari (2022)
	Van de Graaf & Bradshaw (2018)
5.2 Nationally Determined Contribution (NDC)	Bradshaw et al. (2019)
	Mills (2020)
5.3 JCPOA (Joint Comprehensive Plan of Action)	Al-Saidi & Haghirian (2020)
	Rajmil et al. (2021)
	Makhdoum & Pouransari (2022)
5.4 Non-Proliferation of Nuclear Weapons (NPT)	Al-Saidi & Haghirian (2020)

Table 22

Topic Theme: International. Source: Own elaboration

Topic Theme: International	Publication Reference
6.1 Conflicts in producing states with other states	Ansari & Holz (2019)
	Bradshaw et al. (2019)
	Razek & McQuinn (2019)
	Kausch (2015)
	Makhdoum & Pouransari (2022)
	Aloui & Hamida (2021)
6.2 Imposition of sanctions	Bradshaw et al. (2019)
	Al-Saidi & Haghirian (2020)
	Kim (2020)
	Rajmil et al. (2021)
	Mróz (2022)
	Makhdoum & Pouransari (2022)
6.3 US dollars Dependency	Hao et al. (2020)
	Bradshaw et al. (2019)
6.4 China-Iran Relation	Rajmil et al. (2021)
6.5 USA's administration	Ansari & Holz (2019)
	Al-Saidi & Haghirian (2020)
	Al-Ansari ET AL. (2021)
	Kim (2020)
	Rajmil et al. (2021)
	Competitive Multipolarity in the Middle East
6.6 COVID-19	Elavarasan et al. (2021)

4.1 Non-Renewable Energy

4.1.1 Nuclear Energy

Griffiths (2017), Al-Saidi & Haghirian (2020) and Neumann et al. (2020) debate the advantages and disadvantages of nuclear energy in the MENA region. On the one hand, authoritarian countries are more likely to use nuclear power in their energy mix than democratic ones and countries with at least one nuclear warhead are also more likely than the ones without one, as concluded by Neumann et al. (2020). The reason for this is that in states where political and public debate is decreased, it is easier for the government to implement programmes that might be contrary to the public interest, resulting in an overpowering and controlling of democracy. On the other hand, Griffiths (2017) and Al-Saidi & Haghirian (2020) illustrate how the political instability of the region not only puts the project at risk of attacks by non-state actors or rogue groups, cyberattacks and terrorism but also makes the military want to use the nuclear programme for themselves instead of civilian purposes – this last issue is what happened with the Iranian nuclear programme.

Krane (2020) and Al-Saidi (2020) elaborate on the potential of clean and renewable energies in the GCC states. Al-Saidi (2020) affirms that even though renewables are a cost advantage in the region, they would not provide a political advantage, so the states discard it. For example, electricity generated from solar power is cheaper than from nuclear power in Saudi Arabia. Nevertheless, Krane (2020) believes that clean energy technologies will undermine fuel demand. For example, in the power sector, coal is starting to be replaced by lower-emission natural gas, while gas competes with nuclear power and renewables.

Al-Saidi (2020), Al-Saidi & Haghirian (2020) and Al-Saidi (2022) discuss the nuclear program in Saudi Arabia. The country started to incorporate nuclear energy into their energy mix and secretly construct programs in cooperation with China. According to Al-Saidi (2022), the reason for the energy mix modification is the prestige and modernity associated with the development of renewable energy and nuclear power projects. Regarding the nuclear program itself, Al-Saidi (2020) and Al-Saidi & Haghirian (2020) state that the rationale behind is the geopolitical rivalry with Iran after Donald Trump won the Presidential election of the USA, to maintain the protective economic relationship of the USA.

Al-Saidi & Haghirian (2020) and Rajmil et al. (2021) focus on the Iranian nuclear programme. Its project gives the state prestige, boosts regional influence, maintains domestic legitimacy, and is used to try to regain leadership in the Middle East, as identified by Rajmil

et al. (2021). Thus, Al-Saidi & Haghirian (2020) refer that it is a way of turning the country into a regional power as well as among the East and the West.

4.1.2 Natural Gas

Tabagari (2020) believes that gas consumption will take a bigger place in the GCC countries' energy consumption than renewable energy resources. Similarly, Griffiths (2019) asserts that these states are now developing their natural gas resources as well as clean energy, such as nuclear and renewables, to achieve domestic energy security at the cheapest possible cost.

As claimed by Griffiths (2017), for this energy source to succeed, the country would have to share access to large-scale nuclear power generation plants and integrate the growing shares of intermittent renewable energy sources. The author also affirmed, Griffiths (2019), will need cooperation between the GCC countries to share foreign engagement for access to specialised skills and technologies.

Griffiths (2017) and Makhdoum & Pouransari (2022) enumerate the advantages and disadvantages of natural gas energy in Iran. The first author states that political disputes and unattractive regulated gas prices plus limited investment plans disincentive the country into developing an intra-regional pipeline gas trade. On the contrary, the second authors reiterate how, in recent years, the state uses natural gas as one of the main fuels in power plants and for residential usage. Iran could have a promising investment in natural gas exportation in the LNG form and increase its production rate by a significant amount if it is not internationally sanctioned for natural gas exportation.

Hao et al. (2020) and Mills (2020) explain why, despite Iran having the second-largest natural gas reserve in the world, it failed to be a significant natural gas exporter. Hao et al. (2020) argue that it is only due to international sanctions and unattractive investment, while Mills (2020) affirms that it is also due to political disputes and high domestic use.

4.2 Renewable Energy

4.2.1 Renewable Energy

Kuzemko et al. (2019) and Al-Saidi (2020) elucidate why renewable energy is growing within the GCC states. Kuzemko et al. (2019) say this has resulted from policies of national and local governments as public research and development budgets have shifted to

renewables, storage, and energy efficiency. Nonetheless, Al-Saidi (2020) linked the use of renewable energy and interventions in the economic environment to low-carbon policies - they can reduce environmental costs and damage while engaging in economic diversification.

Scholten et al. (2020) and Alsagr & van Hemmen (2021) connect the pros and cons of renewables in the MENA and OPEC states, respectively. The first authors affirm that these countries consider two factors when shifting to renewables: ensuring that investments in fuels will remain profitable and benefiting from a political leadership position within broader climate-oriented institutions. In the short term, renewables soften oil and gas-related geopolitical tensions. While in the medium term, due to increasing global energy demand, the simultaneous use of fossil fuels and renewable energy requires industrial infrastructure and technology. The latter will evaluate their social contract; their ability to ensure economic development and political stability and, consequently, the speed of the transition. The second authors declare that OPEC states have higher political instability and need to make regular investments to prevent their pipelines and oil wells from terrorist attacks. Yet, they are shifting towards increased generation and consumption of renewable energy to ensure energy security and development.

4.2.2 Solar Energy

Griffiths (2017) resumes the IRENA's REMap 2030 assessment, which concludes that, by 2030, it is unlikely that renewable energy will contribute to most of the transportation sector's energy mix. Despite this, MENA countries are moving towards the adoption of renewable energy in their power sectors, but for it to be successful, a structured approach must be adopted to policy development. For instance, Iran has the ambition and potential for solar power, but its geopolitical context acts as a major hindrance. As for Saudi Arabia, Al-Saidi & Haghirian (2020) indicate that solar-based desalination is increasing, as they are building the Al Kafji solar-powered desalination plant.

4.2.3 Hydrogen

Pflugmann & De Blasio (2020) describe the requirements for Saudi Arabia to produce hydrogen as equal to 15% of its annual oil production: 26 million tons of renewable hydrogen yearly and 230 million m^3 of fresh water and a high capital investment. To generate the necessary latter, the state would have to add at least five new large-scale desalination plants to its existing ones, which is unlikely as water is a scarce resource. To become a large-scale

exporter of renewable hydrogen, the country would also need to increase its solar power capacity from currently below 1 gigawatt to approximately 213 gigawatts. Besides, resource abundance creates geopolitical influence, while a lack of resources reveals vulnerability. Consequently, unequal access to resources catalyses international conflict. The Middle East would then play a less prominent role in renewable hydrogen markets than it occupies in oil markets and considering that fossil fuels exports are a vital source of government revenue, shrinking economic relevance could destabilise the region. Nonetheless, geopolitical defensive strategies aimed at protecting a nation's energy security could favour renewable hydrogen, such as fuel-switching, forced load shedding for industrial customers, and building strategic reserves. The latter could keep a country from running dry even during longer supply interruptions. However, strategic hydrogen storage would present safety and environmental concerns and supply diversification would be needed to reduce the risk of politically driven supply disruptions and to increase a country's energy security.

4.3 Initiatives

4.3.1 National Transformation Program (NTP)

Bradshaw et al. (2019) describe Saudi Arabia's NTP purpose as to reorient the country's economic dependence away from oil revenues by 2020 and towards a new private sector. The government outlined several initiatives to be implemented by ministries consistent with Saudi Arabia's Vision 2030: increasing efficiency, diversifying the economy, cutting public spending, reducing subsidies, increasing the role of the private sector, and privatising public assets.

4.3.2 Saudi Arabia's Vision 2030

Fraioli (2022) refers that in 2016, Saudi Arabia launched Saudi Vision 2030, an investment programme to diversify and modernise the economy. The plan gives form to Saudi Arabia's intention to achieve net-zero carbon emissions by 2060 and has also served as a tool to reassure the country's citizens and its foreign investors that it will be able to manage the energy transition. Mills (2020) affirms the project's goals are to maintain oil production capacity at 12.5 million barrels per day by 2020, increase gas production, increase domestic refining capacity, and phase out energy subsidies by 2025. Furthermore, Al-Saidi (2022) states that within this, the government announced two initiatives: Green Saudi Arabia

and Green Middle East, which include a program to plant 50 billion trees and eliminate 130 million tons of carbon emissions.

Despite that, investments have been put on hold due to the oil sector's decreasing returns and, simultaneously, increasing political and environmental issues. This caused an oil price drop, which created a setback in Saudi Arabia's economy and, consequently, in the realisation of Vision 2030, as stated by Razek & McQuinn (2019).

4.3.3 Belt and Road Initiative (BRI)

Rajmil et al. (2021) express how Iran's current political economy and international relations have led the country to enter the BRI. Following this project, the gas pipeline between Pakistan and Iran, as part of the CPEC, will be constructed, which is an indication of the country taking a step towards using natural gas as a source of revenue, therefore, depending less on oil.

4.3.4 Desertec Industrial Initiative (DII)

Griffiths (2017) describes the DII as a scheme for the integration of inter-regional electricity systems, whose progress is impacted by factors such as energy subsidy differences across borders, administrative barriers, lack of availability of local value chains and difficult conditions for renewable energy project financing. As a result, the GCCIA was established to support electricity trade among all GCC member states, indicating that a GCC electricity market could create economic benefits by 2038 via a reduction in fuel, operation and maintenance costs and provide additional savings in power generation capacity along with abatement of tons of regional carbon dioxide emissions.

4.3.5 The Line

Al-Saidi (2022) describes Saudi Arabia's futuristic city The Line as part of the Neom project. This initiative is constituted by having no cars, an underground clean transport system and zero carbon emissions. Thus, it is funded through renewables spending, public-private partnerships, megaprojects, and regulatory reforms. The approach to sustainable energy development is made by using FITs, distributed energy systems and energy communities. The reasons for this project are political and economic, namely maintaining state control, providing public jobs, and maintaining the rentier state mentality.

4.3.6 Grid Politics

Scholten et al. (2020) elucidate Grid politics as a way of ensuring service continuity and availability for countries to compete for ownership of assets, operations, and markets. Grid communities experience differences in economic wealth and political power among their participating countries: power relations become less underpinned by access to and availability of energy sources and asymmetric trade and infrastructure interdependencies. Energy security concerns shift from a strategic emphasis on energy sources to a focus on distribution and international energy relations become more symmetrical and stable.

4.3.7 Public Investment Fund (PIF)

Tagliapietra (2019) outlines PIF as a strategy for Saudi Arabia to diversify its economy, which was elaborated due to the risk of oil market volatility, uncertainty regarding the speed of the global energy transition and therefore the long-term sustainability of the hydrocarbons rent, and the pressing need to create jobs opportunities for the population. These arguments might be applied to other MENA hydrocarbon producers as they are starting to implement their respective economic diversification strategies as they consider the energy transition an unavoidable pathway.

4.4 State

4.4.1 Conflicts in Producing States Internally

Ansari & Holz (2019) gathers that as both Saudi Arabia and Iran normalise their relationship, oil-producing countries are reaching an effective and long-term agreement on withholding production. However, this has limited influence on oil and gas prices as consumption in net importing countries is decreasing due to a shift to alternative renewable energy sources.

Kausch (2015), Razek & McQuinn (2019), Kim (2020) and Aloui & Hamida (2021) describe Saudi Arabia's several internal conflicts throughout the years. In general, Aloui & Hamida (2021) indicate that the country has seen its energy infrastructure continuously attacked, shaking the core of its biggest company. Saudi Aramco generates over half of the Saudi Arabian GDP per year, unveiling the country's necessity to diversify its portfolio outside of petrol. Specifically, Kausch (2015) writes about how the 2011 Arab uprisings led to a temporary rise in funds and initially weakened authoritarian regimes, but eventually left

most transition states in turmoil while reassuring authoritarian strongholds. Regarding the attacks on September 2019: Razek & McQuinn (2019) argue that after the attacks against the state's oil infrastructure, the government acquired missile defence shields to reduce the impact on the currency, affecting the oil prices and therefore, increasing Saudi Arabia's interest in oil revenues; Kim (2020) mentions that this event could have been an opportunity for the government to diversify its energy portfolio for a more stable economy, but it only reflected the country's high sensitivity to oil prices and spare capacity disruption.

Makhdoum & Pouransari (2022) focus on Iran and how the 1978 Islamic Revolution influenced the state's political situation until now. They consider that these circumstances will promote a better energy plan for the future: Iran's high rank in crude oil and natural gas reserves of the world; the specific political situation in selling and exporting; OPEC and GECF membership and its effects on political energy decisions; the neighbourhood of the primary production and selling rivals; and the amount of crude oil selling instead of products from refinery and other downstream industries

4.4.2 Rentier State

Ansari & Holz (2019) state that extreme climate events can sway public opinion towards decarbonisation, but it can be outweighed by conflicts of interest within the population. For a successful energy transition, governments will need to influence investments, policies, and the social perception of climate targets through decision-makers.

Tagliapietra (2019) describes the drop in oil prices in 2014 paved the way for MENA governments to diversify their economies by developing their non-hydrocarbon sectors. Nonetheless, the balance of employment across the private and public sectors is shaped by the higher pay in the public one, contributing to lower labour productivity. This low level is one of the major barriers to economic diversification in hydrocarbon producers.

Al-Saidi (2020), Al-Saidi & Haghirian (2020) and Fraioli (2022) write about how GCC countries are rentier and autocratic states with the potential for low-cost renewable energy projects and little expertise. Al-Saidi (2020) elaborates that new rent distribution mechanisms in the energy sector might jeopardise economic diversification and market-based reforms. Some of the most urgent environmental problems (for example, risks to coastal supply infrastructure and water security) require regional cooperation beyond the current state of dispute and interstate competition. Al-Saidi & Haghirian (2020) underline that under energy policy reforms, the oil sector extends control through subsidies and power purchase

agreements over service providers of clean energy while maintaining the state's dominance and rentier characteristics. Currently, some of the GCC countries are choosing nuclear power as an alternative source in their energy mix due to the compatibility of this type of production with their governance systems. Fraioli (2022) explains how a mismanaged transition to a world without oil can threaten the viability of the political model and the international standing of the Gulf states. If they adopt more diverse economic systems, they will need to replace lost revenue, which they have begun to do so by raising corporate taxes, but this could lead businesspeople to demand more transparent decision-making by the government.

Bradshaw et al. (2019) correlate the rentier state and oil revenues in Saudi Arabia. The first authors relate that the state is reliant on oil exports to generate revenue, as it is the sector employing the growing workforce. Although there are domestic gas reserves, they are mostly used in the domestic power sector and are not yet developed enough to keep up with the demand growth in the power sector.

4.4.3 Authoritarianism

Al-Saidi & Haghirian (2020), Krane (2020), Neumann et al. (2020) and Scholten et al. (2020) write about authoritarianism in a broad sense. Firstly, Al-Saidi & Haghirian (2020) show that authoritarian states are more likely to introduce nuclear power programs to obtain power within the MENA region. Secondly, Krane (2020) refers that the Gulf monarchies need global climate action to succeed in reducing fossil fuel combustion. Yet, a solution that suppresses fossil fuel demand would demolish their oil-export-dominated economies and political systems. Thirdly, Neumann et al. (2020) mention that authoritarianism impacts its regulators and overpowers deliberative forums and public engagement to foster energy policy, retroceding the energy transition of the countries. Lastly, Scholten et al. (2020) affirm that fossil fuels influence the authoritarian nature of petrostates, affecting and setting the pace of their international political relations.

Respecting both Iran and Saudi Arabia, Goldthau & Westphal (2019) explain that these countries face strong population growth, perpetuating expenditure structures related to oil and hardwiring them into state budgets, as they ensure the stability of authoritarian regimes – resulting in not considering energy reforms a priority.

Concerning the regime in Saudi Arabia, Bradshaw et al. (2019) debate the effect on the state's authoritarian model of rule with the project Saudi Arabia Vision 2030. If the population can no longer rely on subsidised services, they will hold the government

accountable to find other sources of legitimacy, which could either create a bigger public involvement in decision-making or an intensified authoritarian mandate.

In respect of Iran's state, Rajmil et al. (2021) write about how after the win of the 2021 Presidential Iranian elections of the conservative Ebrahim Raisi, an obstacle to achieving the political and economic goals of the BRI project was created.

4.4.4 Energy Reforms

Griffiths (2017), Marsden & Rucinska (2019), Al-Saidi (2020) and Al-Saidi (2022) describe the type of energy reforms in the MENA region. Griffiths (2017) and Al-Saidi (2020) explain that the rising fiscal burdens and falling global oil and gas prices have stimulated energy subsidy reforms. They have covered natural gas, transport fuels, electricity, and water across residential, commercial, and industrial sectors. Moreover, both authors affirm that energy subsidy reforms in the GCC states allow for more competition in the energy-intensive industries market while introducing an economic incentive for consumers to save energy and reflect on consumption, serving as well as a means of redistributing natural resource wealth to citizens. Marsden & Rucinska (2019) mention that the oil industry assumes that energy demands will not subside soon, thus investing can continue irrespective of policies. The oil industry also assumes that governments will continue to delay policy instruments such as heavy taxing and tax breaks for renewable energy. Still, Griffiths (2017) and Al-Saidi (2022), affirm energy subsidy reforms have covered fuel, electricity tariffs and water tariffs. These countries have instrumented energy certifications for buildings, district cooling systems and the construction of low-carbon megaprojects The rising domestic demands, regional instability, low oil prices and international pressures have enabled these key reforms.

Regarding Saudi Arabia and Iran, Krane (2020) enumerates international moments that these states take into account in their energy transition framework: the 2015 Paris Agreement; increasing public pressure on governments to impose policy prescriptions; carbon taxes and restrictions or 'caps' on emissions are proliferating; restrictions on single-use plastics made from fossil fuel feedstocks; emissions being subject to requirements to 'offset' or mitigate carbon emissions; investor pressure from multilateral institutions, shareholders, insurers, and lenders that have reduced investment in carbon-intensive developments; a decrease in the number of suppliers of cobalt, lithium, rare earth metals,

and other minerals used in batteries and renewable power, rendering clean energy less able to compete with fossil fuels.

For Iran, Griffiths (2017) exemplifies how the energy reforms began in 2010 but have had difficulties due to removing price controls completely, inflation, currency depreciation, and institutional challenges in achieving targeted and cost-effective compensation measures for citizens. Nonetheless, the Iranian government has sustained its initiatives and continued with a further price adjustment in 2014.

Concerning Saudi Arabia, Al-Saidi (2022) demonstrates how the energy reforms have led to significant tax savings and a much lower subsidisation rate.

4.4.5 Regime Changes

Al-Saidi (2022) attributes the energy and economic reforms in Saudi Arabia to the rise in power of the Saudi Crown Prince Mohammed Bin Salman. Overland et al. (2019) justify the first author's affirmation: Saudi Arabia's current regime is not buoyed by its fossil fuel reserves but by its fossil fuel production and exports. By being a key player in the Gulf region and a US ally, energy transition is seen as a driver for a geopolitical decline by weakening its energy-related political positions.

4.5 Agreements

4.5.1 COP21 (Paris Agreement)

Ansari & Holz (2019) and Tagliapietra (2019) address the effects of the Paris Agreement broadly. The first authors see a change in thinking happening by turning the national economies interconnected, with better-integrated energy systems and greater international cooperation regarding climate mitigation measures. Additionally, the Agreement contributes to the dismantlement of fossil fuel subsidy programmes, expansion of emission trading schemes, increased climate policy ambition and reduced cost of emission mitigation. The authors preview that in the 2030s, the global electricity mix will be coal-free and dominated by renewables, which have been the focus of public and private investment. The second author asserts that it will result in lower oil demand for hydrocarbon producers due to more rigorous policies on fuel switching and efficiency, which can lead to a loss in revenue for oil and gas producers, inciting them to expand their energy income portfolio.

Elavarasan et al. (2021) take into consideration the importance of G20 economies complying with the Paris Agreement. To reach the objectives, countries need to cooperate with technologically more advanced partners, increasing their dependency on other states. Nonetheless, the GCC countries have not made GHG emissions reduction commitments, and no MENA country has implemented a climate policy related to carbon taxes or emissions trading, despite the Paris Agreement, as written by Griffiths (2017).

Bradshaw et al. (2019) consider that a fast energy transition is difficult to happen in the Middle East due to geopolitical instability, despite what was agreed on at COP21. Preparing both Saudi Arabia and Iran's economies for lower demand for oil and gas, and hence lower prices, will have geopolitical consequences, both internally, socially, and politically cohesion and externally, foreign policy and international relations.

Makhdoum & Pouransari (2022) explain that given the Paris Agreement guarantee of a carbon dioxide production reduction, the oil production rate will be affected and eventually decrease. For this matter, Iran has agreed to implement a reduction strategy for their carbon dioxide emissions. However, this is only valid if the country is not sanctioned.

4.5.2 Nationally Determined Contribution (NDC)

Bradshaw et al. (2019) and Mills (2020) describe Saudi Arabia's NDC. The first author explains that although the NGO Action Climate Tracker has assessed it as Critically Insufficient compared to the Paris Agreement, the objective is to avoid 130 million tons of carbon dioxide equivalent by 2030. The second author enumerates what is included in Saudi Arabia's NDC: improvements in energy efficiency in generation and use; gains in renewable and nuclear energy; fuel substitution; boosting public transport; reducing gas flaring and leakage; changing land use and reduction in greenhouse gas emissions.

4.5.3 JCPOA (Joint Comprehensive Plan of Action)

Al-Saidi & Haghirian (2020) emphasises that since the withdrawal of the USA from the JCPOA in Donald Trump's administration, the political tensions regarding nuclear power have increased in the Middle East region, specifically, Saudi Arabia versus Iran.

Rajmil et al. (2021) and Makhdoum & Pouransari (2022) correlate the JCPOA and its effects in Iran. This agreement relieved the country of sanctions until the USA's withdrawal in May 2019, when they reappeared, restricting Iranian trade, limiting foreign investment, weakening the national coin value, and increasing levels of inflation. Rajmil et al. (2021) also

explicitly how the sanctions made the Iranian economy vulnerable to oil price fluctuations and affected its already weakened economy. Regarding this last issue, Makhdoum & Pouransari (2022) interpret the plausible reason behind Iran's decrease in oil production after the USA's withdrawal from the JCPOA: due to developments in the energy sector and the necessity to use renewable energies as per the Paris Agreement, oil customers decreased and, consequently, oil prices dropped. This could be seen as an incentive for the Iranian government to expand its revenue portfolio with other energy sources. Nevertheless, with the support of China, Iran was able to pass a bill to force the USA to return to the JCPOA, resulting in the end of IAEA inspections, increasing Iran's enrichment of uranium and revitalising the Fordow uranium plant, as mentioned by Rajmil et al. (2021).

4.5.4 Non-Proliferation of Nuclear Weapons (NPT)

Al-Saidi & Haghirian (2020) observe how even though Saudi Arabia ratified the Treaty on the NPT in 1988 and concluded a Comprehensive Safeguards Agreement with the IAEA in 2009, has not yet signed the additional protocol, which allows for stricter inspections, nor has signed the Comprehensive Nuclear Test Ban Treaty. Since the beginning of Trump's administration, there has been concern among US Congress members in conceding nuclear capabilities to Saudi Arabia due to the murder of Jamal Khashoggi and the war in Yemen. In contrast, the Saudi Kingdom is threatening to abandon its NPT obligations in response to a possible nuclear breakout in Iran, which would give the Iranian government political power. On the one hand, nuclear power is a stable option in the region, but the least desirable one from an environmental perspective, especially when GCC countries as well as Iran have the potential for renewable energies such as solar, wind, and tidal power.

4.6 International

4.6.1 Conflicts in Producing States with Other States

Ansari & Holz (2019) characterise the disaggregation of the GCC, as caused by political struggles and which lead to a climate of tension. There were several consequences, such as military confrontation, with an expansion of the conflict to the wider MENA, tensions on domestic fronts and instability in the oil policy of exporters. Therefore, until stability was achieved, energy transition policies were not considered a priority. Similarly, Makhdoum & Pouransari (2022) exemplifies one of the periods of oil production fluctuation in Iran with

the 1980-1988 Iran-Iraq war, concluding that whenever events like this happen, governments do not input the effort to implement energy reforms.

Bradshaw et al. (2019) and Razek & McQuinn (2019) acknowledge the repercussions of Saudi Arabia's war with other states. The first authors focus on Saudi Arabia's reputation after the war in Yemen, the Carlton Ritz crackdown, and the murder of Jamal Khashoggi. These events scared off foreign investors, decreasing the inflow of foreign direct investments. To mitigate this, the government plans to boost growth by cutting oil dependence. But this decision requires sustained political support from the country's decision-makers and falling oil prices or public discontent could stall or even reverse the reforms. To avoid economic hardship and political instability, the government must amplify efforts to decarbonise their domestic energy systems, as a means of maintaining an exportable surplus to finance clean investment and energy access. The second authors centre on the war in Yemen, where the Saudi Arabian government was focused on allocating its funding to the Ministry of Defence because it was either taking an anticipatory or reactive approach to external threats. This demonstrates Saudi Arabia's strategic planning. As for energy transition, to succeed, it will have to endogenize economic growth, diversify its energy mix and acquire new skills beyond the oil sector to be able to develop new competitive advantages and increase international competitiveness.

4.6.2 Imposition of Sanctions

Kim (2020), Al-Saidi & Haghirian (2020), Rajmil et al. (2021) and Mróz (2022) approach the imposition of sanctions in Iran. Firstly, Kim (2020) affirms that the state ceased production in oil fields due to sanctions, war, and civil unrest. Secondly, Rajmil et al. (2021) state that the economic sanctions towards oil as a way of weakening the state's power, contributed to Iran's increase in investment in nuclear energy, as it is not sanctioned. Thirdly, Mróz (2022) elaborates on how the supply security of the crude oil market is influenced by not only OPEC but also by political and economic turmoil, such as the sanctions on Iranian oil. Lastly, Al-Saidi & Haghirian (2020) consider that despite the economic and political sanctions since 1979, the country is engaged in the SDGs agenda and the Paris Agreement, having created subsidy reforms to bridge the sanctions range.

Bradshaw et al. (2019) and Makhdoum & Pouransari (2022) centre their analysis on the 2011-2012 years of sanctions in Iran. The second authors express the importance of 2011 for the state, as it was the beginning of their oil sanctions. This caused a decrease in the

general production rate for two years that only started rising after the Iranian nuclear process began implementation again. Considering the current sanctions applied to Iran, the country is trying to decrease its economic dependence on oil. If the Iranian natural gas exportation also becomes under sanctions, the country's focus on nuclear energy could be a substitute alternative. Yet the first authors point out that until 2012, the country was always able to regain almost 100% of its original market share. However, after sanctions were intensified, Iran had to reach an agreement with OPEC+ to cut production from January 2017 until March 2018.

4.6.3 US dollars Dependency

Bradshaw et al. (2019) write about Saudi Arabia's dilemma of abandoning the peg or re-pegging at a lower value. But this could damage investors' confidence and be offset by an increase in import prices. By sticking to the dollar peg within lower oil prices, the government has less need for public spending and more room for transparency and private initiative. For instance, in January 2018, the country introduced a new VAT of 5% on the consumption of most goods and services, including energy and food, to increase non-oil revenue and diversify its economy.

4.6.4 China-Iran Relation

Rajmil et al. (2021) delineate China's relevance to Iran's economy, as the first is one of the few countries to overlook the USA sanctions, continuing to import oil from Iran. Hence, their relationship is not only in the economic field but also in terms of security and energy aspects.

4.6.5 USA's Administration

Al-Saidi & Haghirian (2020) and Al-Ansari et al. (2021) refer to the US administration's influence on Saudi Arabia's and Iran's political framework. As for Iran, Al-Saidi & Haghirian (2020) correlate the Trump administration's decision to withdraw the USA from the JCPOA and Iran's redevelopment of nuclear energy activities, which in turn intensified the geopolitical competition between Iran and Saudi Arabia. Regarding Saudi Arabia, Al-Ansari et al. (2021) mention that the ending of the diplomatic rift was seen as a move to reshape the image of Mohammed bin Salman as a more suitable partner to USA interests, including the crown prince's project: to build an environmentally sustainable city.

On the other hand, Kausch (2015), Ansari & Holz (2019), Al-Saidi & Haghirian (2020), Kim (2020) and Rajmil et al. (2021) approach specific moments. Respectively, Kausch (2015) writes about how the USA stood with Saudi Arabia during the 2011 Arab uprisings as a way of containing Iran and maintaining the political status quo. Kim (2020) states that per Trump's request in 2018, Saudi Arabia increased its oil production, contributing to the fall of the oil price. However, as the USA allowed major consumers to continue importing oil from Iran, in December 2018, Saudi Arabia joined an OPEC effort and cut oil production, since it is committed to maintaining its role as a swing producer and the power that it entails. Ansari & Holz (2019) write about how, in 2020, the USA reduced their military presence in the Middle East, leading to the disaggregation of alliances and turning the Gulf States' economies and political stability more vulnerable. Rajmil et al. (2021) analyse the impact of Trump's administration on isolating Iran's economy, foreign relations, and regional influence. This is due to Iran's signing of a 25-year cooperation programme deal with China in March 2021 as this agreement will put the country in a position of political power within the Middle East and Central Asia.

4.6.7 COVID-19

Elavarasan et al. (2021) use the Saudi-Russian oil price war as an example of political players taking advantage of international turbulence to strengthen their position versus their rivals. The coronavirus and low oil prices have had a powerful impact on Iran's economy, which was already affected by the USA's imposition of sanctions. Several crucial energy markets players, like governments and energy companies from the private sector, see fossil fuel-powered economic development as a key in their strategic planning for recovery. The vast majority of COVID-19 stimulus around the world has been rolled out to finance high-carbon industries, therefore, global fossil fuel consumption may not decrease but instead continue to grow, being a threat to sustainable development and achieving the UN SDG 7.

5. Conclusion

This study aims to understand how geopolitics influences the energy transition framework of Saudi Arabia and Iran. The main questions this thesis answers are: What mainly conditions their energy transition politically? What is the level of progress of the energy transition in Saudi Arabia and Iran? Which programs are currently in force and for the future?

To respond to these, an extensive Systematic Literature Review was applied. Concretely, a database was created, whose intent was to gather English literature available until September 2022. By searching the keywords "GEOPOLITICS + ENERGY TRANSITION + SAUDI ARABIA + IRAN" throughout four data sources - Sciverse Scopus; World of Science; Science Direct and b-on – 1,332 results appeared.

After analysing several criteria points, 32 documents were considered relevant for this thesis. Out of 27 geopolitical factors encountered, the most common 9 were: Nuclear Energy; Natural Gas; Conflicts in producing states internally; Rentier State; Authoritarianism; COP21 (Paris Agreement); Conflicts in producing states with other states; Imposition of sanctions and USA's Administration.

In this section, the information from the factors described in Section 4 will be highlighted, considering the research's questions from Section 1.

5.1 What mainly conditions their energy transition politically?

For oil export-dominated economies and political systems, authoritarianism sets the pace of their international political relations, consequently, impacting their energy transition timeframe. In both Saudi Arabia and Iran, maintaining or gaining power relations is a priority when framing their energy transition path. For example, nuclear energy provides a political advantage in the MENA region that renewable energy does not. Nevertheless, if both countries can benefit from a political leadership position within climate-oriented institutions, then they will want to take part in it. Another factor impacting their approach to renewables is their high political instability and need for regular investments to protect infrastructure from terrorist attacks. Looking at natural gas, both countries could develop their investments in it, but this type of energy requires cooperation within the MENA region for expertise and technology, which given the rivalry among them, is unlikely to occur. Overall, for a successful energy transition, governments will need to influence investment and policies towards cleaner energy markets. For this hypothesis to happen, governments will need to find an

equilibrium between diversifying their economic portfolio and maintaining the state's dominance and rentier characteristics.

Looking at Saudi Arabia, there are various common factors influencing the country's energy transition. For once, its rivalry with Iran and its wish of maintaining a good relationship with the USA impulses the country to develop its nuclear energy sector. Another example is the exploitation of hydrogen as a cleaner energy source, where for it to generate a high turnover, the state will have to construct more large-scale desalination plants in addition to the existing ones, however, water is a scarce resource in Saudi Arabia. Moreover, the political perception of energy transition in the country is that it will be a driver for a geopolitical decline by weakening its geopolitical leadership in both the MENA region and OPEC. Lastly, the state's relationship with the US is a high factor in its energy transition framework. For instance, North American support was fragilized when Saudi Arabia launched an idealistic sustainable city, as they would start focusing on non-oil revenues, resulting in less exportation. This provoked a setback reaction in the Saudi Arabian government, as they want to maintain their partnership with the USA.

About Iran, nuclear energy gives the state prestige, and domestic legitimacy and can help the country regain leadership in the MENA region. If the USA and the UN continue to sanction Iranian oil, it will impel the country to finance cleaner energy sources. Another natural resource present in their energy mix is natural gas, which if it is not sanctioned, they can invest in as they have the second largest reserve in the world. Thus, Iran has the potential for producing electricity from solar power, although, given the country's geopolitical context, it creates a costly security risk to develop. Nonetheless, there are three types of relations influencing Iran's energy transition: firstly, due to the state's membership in OPEC and GECF, the energy policies decided for Iran can make it decentralise its attention to oil revenues and more to cleaner energies; secondly, as China continues to import oil from Iran, the country keeps investing in this fossil fuel as an energy revenue source; thirdly, when the USA retrieved from the JCPOA, it made Iran fund its nuclear energy infrastructure.

5.2 What is the level of progress of the energy transition in Saudi Arabia and Iran?

Rising fiscal burdens plus falling oil and gas prices after COVID-19 have stimulated energy subsidy reforms in natural gas, transport fuels, commercial and industrial sectors, electricity tariffs and water tariffs. Public research and development budgets have also shifted

to renewables and energy efficiency, consisting of policies of national and local governments turned towards sustainability. These countries are moving towards the adoption of renewable and cleaner energy in their power sectors. For instance, coal is starting to be replaced by lower-emission natural gas. Both Saudi Arabia and Iran have created initiatives and signed agreements to achieve a smoother energy transition (these will be described more in detail in section 5.3).

In Saudi Arabia, its nuclear program is incorporated into the energy mix and the country has also been involved in construction programs in cooperation with China. Saudi Arabia's solar energy-powered electricity is increasing, as they are building the Al Kafji solar-powered desalination plant. Nonetheless, their energy reforms have led to significant tax savings and lower subsidisation rates.

Iran's energy reforms began in 2010 and despite obstacles, the country has sustained its initiatives, subscribing to the Paris Agreement, and considering the SDGs Agenda. For example, its nuclear program has existed for several years and continues to be an energy resource in which the government deeply invests. Natural gas could also play a significant role in the country's energy mix, as it uses this resource as the main fuel in power plants and for the residential sector. Thus, Iran has the ambition and potential for solar energy-powered electricity.

5.3 Which programs and accords are currently in force and for the future?

In both countries, there is the Desertec Industrial Initiative that intends to integrate inter-regional electricity systems. The plan is that this type of electricity market could create economic benefits by 2038 via a reduction in fuel costs, savings in power generation capacity and abatement of regional carbon dioxide emissions. Another initiative happening in the region is Grid politics. Grid communities can be successful as the power relations of the countries involved will become less underpinned: energy resources and infrastructure will be more available for improvement. Nonetheless, considering the Paris Agreement guarantee of a carbon dioxide production reduction, oil production will eventually decrease.

As for Saudi Arabia, the National Transformation Program's objective is to decrease the country's dependence on oil revenues. Thus, Saudi Arabia's Vision 2030 intention is to achieve net zero carbon emissions by 2060 and increase gas production and domestic refining capacity. This initiative created two others: Green Saudi Arabia and the Green Middle East,

which plan to plant 50 billion trees and eliminate 130 million tons of carbon emissions. Another one is The Line, which is part of the Neom project. The idea is that constructing an idealist city will pave the way for the country's energy transition: by not having cars; a clean transport system and zero carbon emissions. There is also the Public Investment Fund, whose strategy is to diversify the country's economic portfolio by creating job opportunities in cleaner energy markets. Lastly, the Nationally Determined Contribution's goal is to avoid 130 million tons of carbon dioxide equivalent by 2030. They want to do so by improving energy efficiency and nuclear energy, boosting public transport, and reducing greenhouse gas emissions.

Regarding Iran, the Belt and Road Initiative is constructing a gas pipeline between Pakistan and Iran, indicating the latter country's investment in using natural gas as a revenue source. Moreover, the Joint Comprehensive Plan of Action made Iran decrease its oil production and expand cleaner energy sectors.

6. Limitations and Future Studies

6.1 Limitations

This study, by considering only the literature freely available in the four data sources, ends up not gathering conclusions based on all the information academically available. Within the 1,332 results found from the selected keywords, 116 were automatically excluded due to lack of access. Afterwards, 40 other pieces of literature, although there was access to some pages, were not relevant, and these books were also excluded from the study. Yet, the hypothesis remains that, with full access to the 156 documents, they could contain relevant information for the systematic review of an extensive literature.

The objective of this thesis is to analyse the factors that are influencing the energy transition of two OPEC member states, Saudi Arabia, and Iran. As the timeline of factors considered relevant to the study are present and future (with some exceptions for important moments that occurred after the 2010s), historical political factors were not considered for the discussion section.

For example, in Saudi Arabia, the 1945 agreement with the USA regarding the supply of oil, in addition to bringing economic benefits to the country, also brought the US military and political protection, which remains until today. This resulted in Saudi Arabia not suffering so many reprisals during the wars that took place in the MENA region (for example with Yemen and Iraq, among others). Consequently, the country had the opportunity to begin outlining its energy transition plans earlier by investing in environmentally efficient infrastructure; expanding to new energy sources beyond oil; creating initiatives considered more sustainable, among other aspects.

On the other hand, Iran has been imposed sanctions since November 1979, at the time of its Islamic Revolution, making the country vulnerable not only economically, but also in matters of primary necessity (sanitary water, food for the entire population, infrastructure, among other aspects). Moreover, it has been involved in several wars, some of which remain today (with Yemen, Bahrain, and Eastern Kurdish-inhabited areas, among others). This created a precedent where the country cannot prioritise the energy transition and the investment needed to do so.

6.2 Future Studies

Endorsing the same methodology of this thesis, an extensive systematic review, two themes of studies can be conceived. The first within the OPEC region and the second in the Latin America one.

It would be relevant to compare the geopolitical factors influencing the energy transition in the United Arab Emirates versus Iraq and Venezuela. The UAE has similarities with Saudi Arabia: its economy is the second largest in the OPEC (after Saudi Arabia); the country has had a beneficial relationship with the USA for several decades; its involvement in wars (for example, Gulf War; Lebanese Civil War; Libyan Civil War; Yemen) has mainly resulted in victories and most of the UAE's revenue comes from the oil sector. On the contrary, Iraq has been imposed sanctions since 1990 and suffered war implications throughout the years (for example, Gulf War and Iraq War with the USA), making it an appropriate state to compare the evolution of the energy transition with. As for Venezuela, the state has had sanctions imposed since 2014 and an economic recession that started also in 2014 and remains until today. Nonetheless, Venezuela is part of the Latin America field, which is a vulnerable region when it comes to climate change, making it a relevant country to study its energy transition framework related to geopolitics.

In Latin America, nine countries of this region are embraced by the Amazon forest (Brazil, Bolivia, Peru, Ecuador, Colombia, Venezuela, Guyana, Suriname and French Guiana). Given the forest's importance not only for food, water and the Indigenous population, it is also a stabilising condition for climate change. Taking this into consideration, it would be material research to investigate the role of geopolitical factors in the energy transition of countries in this part that have diverse political characteristics, such as Brazil and Colombia versus Venezuela. The first state is one of the largest oil producers in the world, while at the same having controversial governments. For example, President Jair Bolsonaro during his administration did not prioritise energy transition in his policies and enhanced agreements with the USA and Saudi Arabia for oil trade, whereas the actual President, Luís Lula da Silva included in his government planned, an energy transition framework. Colombia also has had oil as a central revenue source for various years. However, in 2022, the country's elections were won by Gustavo Pedro, who indicated he would take steps to implement measures that favour the energy transition. Lastly, Venezuela has the OPEC conditions mentioned above, but it also considers being part of Latin America, a region with a higher probability of suffering climate change consequences.

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