RESEARCH ARTICLE

The issue of energy investment in Algeria between traditional sources and renewable alternatives.

Bouzid Boumediene Chouaib
Researcher
University Hassiba Ben Bouali
Laboratory for Reform of Arab Policies within the Framework of Globalization
Algeria
Email Id: b.bouzid@univ-chlef.dz

Belkhira Mohamed
Researcher
University Hassiba Ben Bouali
Algeria
Email Id- m.belkhira@univ-chlef.dz

Doi Serial https://doi.org/10.56334/sei/8.8.30

Keywords traditional energy, renewable energy, energy policy, energy investment in Algeria

Abstract
This study aims to highlight the importance of transitioning to renewable energy as an alternative to traditional energy, and to shed light on the efforts and policies adopted by Algeria in this area. The study seeks to clarify the main points related to renewable energy and energy investment, as well as what has been achieved so far. It employs an inductive approach to explore the means that contribute to the development of the energy sector, focusing on energy policies and renewable energies. Additionally, it highlights Algeria's direction towards investment in this sector
JEL classification: Q41 ;Q42 ;Q48 ;Q13

Citation
Bouzid B. Ch., Belkhira M. (2025). The issue of energy investment in Algeria between traditional sources and renewable alternatives. *Science, Education and Innovations in the Context of Modern Problems*, 8(8), 321-330; doi:10.56352/sei/8.8.30. https://imcra-az.org/archive/375-science-education-and-innovations-in-the-context-of-modern-problems-issue-8-vol-8-2025.html

Received: 04.12.2024 | Accepted: 02.03.2025 | Published: 28.06.2025 (available online)

Introduction

In the modern era, societies and states are witnessing an increasing need to secure permanent and safe energy sources that meet their economic requirements and the needs of their citizens. Therefore, energy plays a vital role in sustaining life and advancing it on all levels. However, global energy markets are currently experiencing a significant dominance of traditional energy sources such as oil, gas, and coal, which remain the most widely used resources for providing energy. Yet, these sources are considered finite and are heading toward depletion, which increases the need to search for more sustainable energy alternatives.

Algeria, like many other countries, faces major challenges due to its reliance on traditional energy sources. The continuous increase in energy demand caused by population growth and economic development has led to

international competition to secure energy resources that meet countries' needs. Nevertheless, dependence on traditional energy sources raises widespread concerns due to their negative environmental impacts.

In this regard, renewable energies such as solar, hydro, and wind power are considered promising options to enhance Algeria's energy security. These alternative sources represent a major opportunity to reduce reliance on traditional energy sources and to mitigate their negative environmental impacts. Therefore, policymakers must inject significant investments into developing renewable energy infrastructure and provide suitable incentives to attract further investments.*

Research Problem

Algeria faces major challenges in the field of energy, as it relies heavily on traditional sources such as oil and gas, while there is an increasing need to secure sustainable energy sources that can meet the country's economic and social development needs. Accordingly, this issue raises the following central question:

How can Algeria achieve a balance between relying on traditional energy sources and transitioning toward effective investment in renewable energies?

From this main problem, the following sub-questions emerge:

- What are the most important traditional energy sources in Algeria?
- What are the possible strategies to reduce dependence on traditional sources in Algeria?
- What is Algeria's energy policy?
- What are Algeria's orientations toward energy investment?
- What are Algeria's potentials in renewable energy alternatives?
- What is the current reality of renewable energies in Algeria, and what are the available opportunities?

Research Hypotheses

Based on the main research problem and in order to answer the sub-questions, a set of hypotheses has been developed to help us reach the study's results, as follows:

- The contribution of traditional energy sources to the national economy is evident through their share in total exports, as well as the size of energy supplies provided to domestic and foreign markets.
- The weakness of energy supplies from renewable sources compared to the production of traditional sources is the main reason for not achieving the targets of the national renewable energy program and the future energy strategy of Algeria.
- Achieving a sustainable and secure energy transition by replacing traditional energy sources with renewable energies depends on the availability of energy resources to cover the deficit caused by high levels of domestic energy consumption while fulfilling export commitments.
- Algeria can create an effective energy mix that guarantees sustainability by optimally exploiting both traditional and renewable sources, and benefiting from all available energy resources.

Importance of the Study

The importance of this research lies in the fact that energy represents one of the most crucial pillars of the national economy, serving as the primary financier of other economic activities through the revenues it provides to the state budget and its significant contribution to GDP. Therefore, it is essential to study the extent of Algeria's economic dependence on fossil fuel revenues, as this will allow us to understand the degree of risk that threatens this economy in the event of a collapse in hydrocarbon markets. Experts also stress the need to examine the available options for alternative energies that are more sustainable and less harmful to the environment.

The growing global interest in renewable energies is evident through the significant rise in clean electricity production, which indicates a major shift in global energy production and consumption patterns. Moreover, incidents such as Fukushima have proven the risks associated with using nuclear energy, pushing toward adopting renewable energy as a fundamental pillar of development.

Study Objectives

The objectives we seek to achieve through this research are as follows:

- To evaluate Algeria's energy policies by highlighting the importance and motivations of energy investment in Algeria;
- To study the possibility of avoiding the risk of strong dependence on traditional energies through supporting and developing alternative and renewable energy sources;
- To establish ambitious strategies for investing in renewable energies, such as solar energy, wind energy, peaceful nuclear energy, and hydrogen energy.

Reasons for Choosing the Study Topic

There are multiple objective and personal reasons that motivated us to research this topic, the most important of which are:

- Since independence, energy has been a fundamental pillar for growth and for supporting various sectors in Algeria.
- Awareness of the risks of hydrocarbon depletion, which represents a significant threat to the economic side and calls for finding alternative sources of income.
- The topic is directly related to my academic specialization in political economy, which makes me more interested and prepared to study it.

1. Traditional Energy in Algeria

In this section, we will attempt to explore the basic concepts in this field, then present the most important types and components of traditional energy, in addition to addressing the natural and economic characteristics of each type of these energies.

1.1 The Concept of Traditional Energy

The concepts of traditional energy vary according to energy classifications and types. These definitions can be summarized as follows:

Traditional energy refers to energy that exists in large quantities in nature, but its amount does not increase; rather, it gradually decreases as a result of its exploitation and extraction from underground. The depletion of these reserves depends on the annual production and extraction rates, and increases as new sources are discovered (Saadoun, Al-Shammar, & Al-Kurani, 2016, p. 30).

Traditional energy is defined as the resources that have met the majority of the energy needs of modern industrial societies, such as coal, oil, and natural gas. These sources are considered exhaustible resources, meaning that they will run out with continued use and exploitation in nature (Al-Saadi, 1983, pp. 49–50).

Traditional energy is also known as non-renewable energy, which is the energy resulting from natural sources that are depleted and consumed with use, making them limited in lifespan and non-renewable. This energy is extracted from concentrated temporal storage underground (Ghania, 2016).

Based on these previous definitions, we can say that traditional energy is energy derived from natural sources and resources that are perishable over time due to increased use and urgent need for them. For a resource to be considered traditional energy, it must have two characteristics:

- It is a non-producible commodity, as extraction is not considered production;
- It is depleted through its use in the production process.

1.2 The Basic Functions of Traditional Energy

Traditional energy has several basic functions, the most prominent of which are (Hindi, 2023):

- **The energy function**: Petroleum and gas are among the most important energy sources, as they contribute significantly to the production of primary energy worldwide.
- **The commercial function**: This is reflected in international trade exchanges, as industrial countries import crude oil and convert it into goods and products.
- **The financial function**: Financial revenues from oil and gas return to the producing countries, representing an important source for the general state budget.
- **The production function**: Traditional energy enters as a raw material in the production of most goods, increasing their economic value.

In short, traditional energy is one of the essential elements of the global economy, and it is necessary to think of effective strategies to use it sustainably.

2. Energy Policy in Algeria

Energy represents a fundamental element in the equation of progress and economic prosperity, playing a pivotal role in sustaining development that aims to achieve the highest levels of growth and welfare.

Algeria possesses a rich array of energy resources, including both renewable and non-renewable sources, and aims to develop and enhance these resources in line with local and global economic transformations. To achieve this vision, it is necessary to establish a comprehensive framework for energy policy that supports the country's economic and social development efforts. Accordingly, this section will address the concept of energy policy, its development, its dimensions, and its objectives.

2.1 The Concept of Energy Policy

There are numerous definitions related to the concept of energy policy. One of the most prominent definitions states that it refers to the measures taken by governments to influence energy demand and supply. These measures include ways of dealing with energy supply disruptions, in addition to efforts aimed at influencing energy consumption and promoting economic growth (Bakhoush, 2021, p. 109).

Through this definition, it is clear that energy policy represents the approach adopted by a particular governmental authority to address issues of energy development, such as its production and distribution. The features of energy policy include legislation, international treaties, investment incentives, energy conservation guidelines, taxes, as well as other public policy tools.

2.2 The Dimensions of Energy Policy in Algeria

Energy policy consists of several main dimensions that shape its features, which can be explained as follows (Si Nacer, 2013, pp. 80–81):

- **Preservation of resource bases**: Energy policy seeks to achieve a balance between meeting societal needs and maintaining the sustainability of energy resources. This balance becomes increasingly important with the rise in

consumption and the depletion of traditional resources such as oil and gas, especially in developed countries that aim to maintain their standards of living.

- **The environmental dimension**: Environmental issues are closely intertwined with energy policies, as many environmental problems are linked to energy production and consumption. This necessitates effective international actions, such as encouraging the use of renewable energy and clean technologies, to meet the growing energy demand while preserving the environment.
- **The economic dimension**: Economic development relies heavily on energy sources. Therefore, economic considerations play an important role in formulating energy policies. This dimension also includes efforts to rationalize resource consumption and improve the efficiency of production processes to reduce energy intensity.
- **The geopolitical dimension**: Controlling energy resources, especially oil, is a crucial factor in international relations. This control reflects geopolitical dynamics and influences the global distribution of resources. Energy also plays a pivotal role in the political and economic development of countries, which increases tensions among producing and consuming countries. Hence, energy policy has become a key variable in international relations and a fundamental element of global political and economic concerns.

3. Energy Investment in Algeria

Energy investment in Algeria is considered an urgent necessity to achieve economic development that relies on renewable energy sources. This investment is based on several central strategies aimed at achieving a balance between the use of traditional and renewable energies.

3.1 Energy Investment Strategies

Energy investment strategies in Algeria can be summarized in several points (Ben Fliss & Harouri, 2023, p. 811):

- **Transition from traditional energy**: Algeria relies on traditional energy by approximately 95%, which necessitates a shift toward renewable energy sources to reduce dependence on these traditional sources.
- **Technical and human capabilities**: Algeria needs to develop its technical and human capabilities to ensure the success of the energy investment strategy, which requires investments in education and training.
- **The National Renewable Energy Program**: This program includes ambitious goals to produce 22,000 megawatts by 2030, with a focus on solar and wind energy.
- **Developing energy efficiency**: The program also includes enhancing energy use efficiency as part of the country's general policy, contributing to reducing waste and improving energy performance.
- **Supporting local industries**: Algeria aims to develop its industrial capacities related to renewable energy by building factories to manufacture necessary components, such as solar panels, which supports the local economy.
- **Research and innovation**: The government encourages the development of scientific and technological research in the field of renewable energy, which helps achieve the necessary innovations to support this sector.
- **The legal and regulatory framework**: Energy investment requires an appropriate legal framework that supports investments and enhances the stability of energy policies.

Figure (01): The Energy Investment Plan in Algeria

	First Phase (2015–2020)	Second Phase (2021–2030)	Total
Solar PV	3,000	10,575	(...)
Wind	1,010	4,000	5,010
Solar Thermal	–	2,000	2,000
Hybrid Generation	190	250	440
Biomass	360	640	1000
Geothermal Energy	05	10	15
Total	4525	17475	22000

Source: Al Jazeera Center for Studies. https://studies.aljazeera.net/ar/article/4683

2.3 Challenges of Energy Investment in Algeria and Ways to Address Them

Algeria is among the countries rich in energy resources, as it possesses large reserves of oil and natural gas. However, investment in the energy sector faces many challenges that may hinder the development of this vital sector. These challenges range from global economic changes, fluctuations in oil prices, to changes in the legislative environment. Confronting these challenges requires comprehensive strategies that include improving the investment climate, enhancing international cooperation, and developing renewable energy sources. Algeria must also seek to achieve diversity in energy sources and reduce dependence on fossil fuels in order to ensure a sustainable energy future.

2.3.1 Challenges

The various challenges of energy investment can be summarized as follows:

- **Dependence on traditional energy**: Algeria relies on traditional energy sources by approximately 95%, which hinders investments in the renewable energy sector and makes it vulnerable to risks from global energy price fluctuations.
- **Lack of awareness and understanding**: Public awareness is weak regarding the importance of renewable energies in achieving sustainable development, which affects the trend toward their effective use.
- **Political and economic challenges**: Algeria faces a set of political and economic challenges that impede investment in renewable energies, including instability of public policies and a weak legal framework.
- **Infrastructure**: There is an urgent need to improve the infrastructure required to support renewable energy projects, as Algeria lacks sufficient renewable energy projects to meet market needs.
- **Difficulty accessing financing**: Renewable energy projects suffer from difficulty obtaining the necessary financing due to the economic and financial crises the country is experiencing (Ben Lakhdar & Youssef, 2020, p. 226).

2.3.2 Ways to Address the Challenges

To face these challenges, a set of strategies can be adopted (Ben Fliss & Harouri, 2023, p. 818):

- **Enhancing public awareness**: Efforts should be made to implement awareness programs to explain the benefits of renewable energies and their positive impact on the environment and the economy.
- **Developing public policies**: It is necessary to improve public policies and the legal framework to support investment in renewable energies through clear legislation and simplified procedures for investors.
- **Improving infrastructure**: More investment should be directed to developing renewable energy infrastructure, including building new plants and improving electrical grids.
- **Encouraging partnerships**: The state can encourage partnerships between the public and private sectors to provide the necessary funding and exchange technical expertise.
- **Providing incentives for investors**: Tax and financial incentives should be offered to investors in the renewable energy sector to attract the required investments.
- **Implementing training programs**: It is important to develop training programs to qualify the human resources necessary to work in the renewable energy sector.

Through these measures, Algeria can confront the challenges hindering energy investment and promote the growth of the renewable energy sector.

4. Moving Toward Renewable Energy

Renewable energies are among the essential solutions for facing the environmental and economic challenges the world is experiencing today. With the growing demand for energy and rising pollution levels resulting from dependence on fossil fuels, it has become necessary to shift toward clean energy sources such as solar, wind, and hydropower. The following section will review the concept of renewable energy, the motivations for investing in it, and the available potentials in Algeria.

4.1 The Concept of Renewable Energy and Motivations for Investing in It

Renewable energies are permanent and inexhaustible natural sources, constantly available in nature, and are characterized by being clean and not producing environmental harm (Hiroshi & Safir, 2016, p. 184).

Renewable energies are energies obtained through naturally recurring and periodic energy flows, in contrast to non-renewable energies that are usually stored in fixed deposits underground and can only be used after human intervention to extract them (Zawawia, 2014, p. 122).

According to the United Nations Environment Program (UNEP), renewable energy is energy whose source is not a fixed and limited stock in nature, but rather it is replenished faster than its consumption rate. It includes five forms: biomass, solar radiation, wind, hydropower, and geothermal energy.

2.4 Algeria's Potentials in Renewable Energy

2.4.1 Solar Energy

Algeria possesses enormous solar energy resources due to its geographical location, with sunshine duration in some regions exceeding 3,000 hours annually, making it among the countries most qualified to harness solar energy. Estimates indicate that the available daily solar energy reaches 5.5 kilowatt-hours in desert areas, while it is around 2.5 kilowatt-hours in northern regions. This makes Algeria well-suited to effectively exploit solar energy, especially since approximately 80% of its territory consists of desert with high temperatures, which further enhances this potential (Al-Zouka, 2001, p. 287).

2.4.2 Wind Energy

Algeria has begun investing in its wind energy resources, with experts expecting that this investment could generate annual profits exceeding three billion euros, in addition to creating numerous job opportunities. After limited use of this energy source, Algeria has developed an ambitious program to expand this sector. Local wind energy units will be supported, with a focus on identifying suitable locations for establishing wind farms, aiming to achieve a 5% share of electricity production from wind energy by 2030 (Cheikhi & Al-Absi, 2018, p. 196).

2.4.3 Hydropower

Although significant rainfall quantities are available, Algeria exploits only a small percentage of these waters for hydroelectric power production. Renewable water resources are estimated at around 25 billion cubic meters, but only 3% of this amount is currently used. Meanwhile, surface water sources are noticeably decreasing in the south, which leads to weak exploitation of this energy (Talem & Kafi, 2019, p. 179).

2.4.4 Geothermal Energy

Geothermal energy is known as the energy stored deep within the Earth, appearing in the form of hot water, steam, and thermal rocks. While exploiting energy from hot rocks is still under research and development, the current focus is on using hot water and steam. This energy is mainly used to generate electricity, in addition to other applications such as home heating, swimming pools, tourist resorts, crop drying, as well as agricultural and industrial uses. Geothermal energy resources are present in about 95 countries, of which around 60 use this energy for electricity generation. It is worth noting that other uses of geothermal energy exist in a larger number of countries compared to those that rely on it for electricity generation. The total installed geothermal power globally at the beginning of 2023 reached about 15 gigawatts, indicating that discovered geothermal resources account for approximately 0.2% of total global energy resources (Talbi & Sahel, 2008, p. 204).

2.4.5 Motivations for Algeria's Shift Toward Renewable Energy

These motivations can be summarized in several key points (Ben Fliss & Harouri, 2023, p. 806):

- **Reducing dependence on traditional energy**: Algeria aims to reduce its reliance on traditional energy sources, which represent about 90% of its energy mix, thereby minimizing risks related to price and supply fluctuations.
- **Exploiting natural resources**: Algeria enjoys great potential in solar energy and is considered one of the leading countries in the Mediterranean basin in this field, making investment in renewable energy an important economic option.
- **Moving toward environmental sustainability**: The increasing awareness of the negative impacts of fossil fuel use, such as greenhouse gas emissions and environmental pollution, is pushing Algeria to adopt more sustainable energy policies.
- **Global targets**: Algeria's efforts align with global trends to combat climate change, which strengthens its position in the international community and makes it part of global solutions.
- **Economic development**: Investment in renewable energies opens new opportunities for employment and economic growth, helping Algeria achieve sustainable development.
- **Government strategies**: Policies and legislation are being developed to support this direction, facilitating the attraction of local and foreign investments in renewable energy.

In this way, renewable energies represent a strategic option for Algeria to address both energy and environmental challenges.

2.4.6 Algeria's Renewable Energy Strategy (2011–2030)

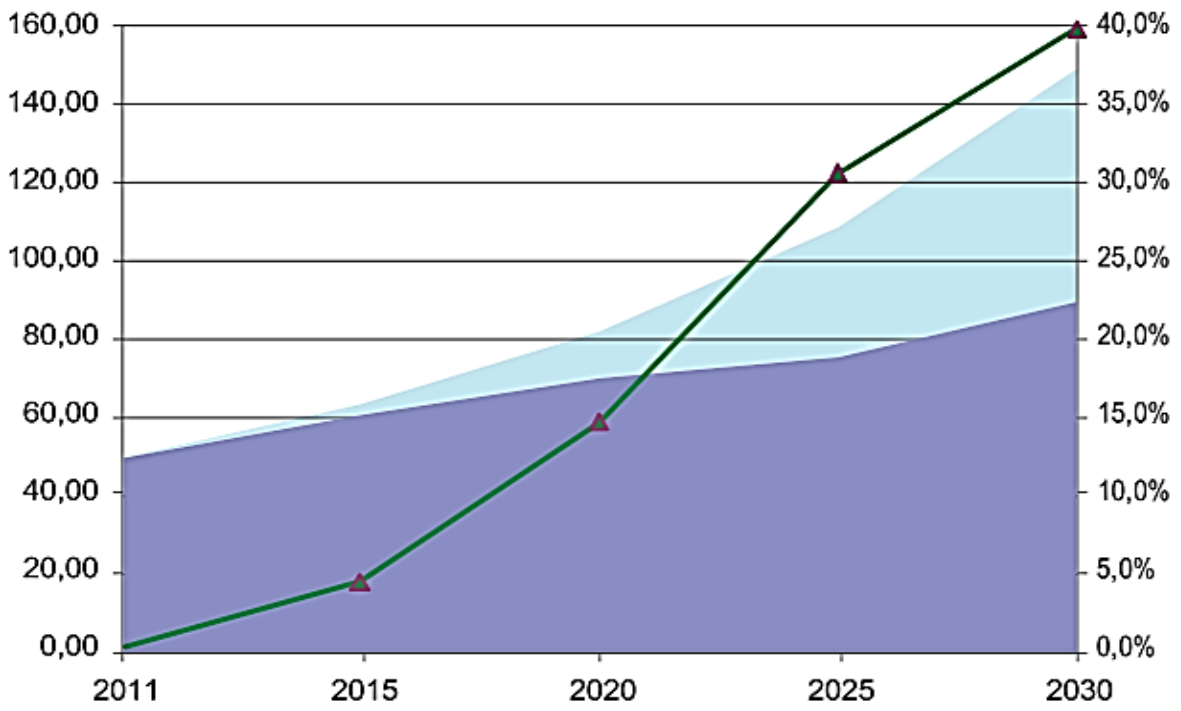
The renewable energy strategy in Algeria is considered an essential part of the country's energy investment policy, especially in light of environmental and economic challenges. This direction came in response to the decline in hydrocarbon prices in recent years, prompting consideration of alternative options consistent with sustainable development requirements.

In 2015, Algeria confirmed its commitment under the climate agreement to reduce greenhouse gas emissions by between 7% and 22% by 2030. The **"National Program for Renewable Energies and Energy Efficiency 2015–2030"** was adopted with the goal of expanding the use of renewable energies in electricity generation, thereby reducing reliance on natural gas as the main source of energy (Blatash, 2021, p. 122).

Conclusion

Algeria's renewable energy strategy represents an effective step toward achieving sustainable development, diversifying energy sources, and enhancing energy independence. Through cooperation between the public and private sectors, and investment in modern technologies, Algeria seeks to achieve its climate and environmental goals in the coming years. In addition, it aims to achieve energy security, considering that it is a hydrocarbon-producing country on the one hand, and enjoys vast geographical features and a large area on the other hand, which will make Algeria, in the near future, an economic power not to be underestimated – especially as we are living today in an era of economic competition, conflict, and wars. The energy crisis in the European Union, for instance, is a reflection of the Russian-Ukrainian war, in addition to instability in maritime straits such as Bab al-Mandab following the war in Gaza and interventions in Lebanon, which cause fluctuations in energy shipments and rising prices. Therefore, today, Algerian decision-makers must adopt an energy policy that balances investments between traditional sources and renewable alternatives, while gradually transitioning toward renewable energy in the near term.

Figure (02): Algeria's Renewable Energy Trends During the Period (2011–2030)



Source: Al Jazeera Center for Studies. https://studies.aljazeera.net/ar/article/4683

This study has reached several conclusions, the most important of which are:

- Strengthening economic capacity through the development of new energy sources.
- Preserving oil and gas reserves for future generations.
- Moving toward renewable energy sources to reduce dependence on oil and gas.

Based on these results, several important recommendations can be drawn:

- Strengthening research efforts in renewable energy fields by providing the necessary support.
- Stimulating renewable energy technologies by attracting foreign investment.
- It is essential to train and educate the workforce and to support research and experimentation laboratories related to renewable energy.
- Encouraging cooperation with foreign countries and companies, especially in training and capacity building, and establishing specialized institutes, universities, and research centers with continuous development.
- Working to provide various incentives, both financial and tax-related, to support investment in renewable energy fields, with the involvement of the private sector.
- Promoting awareness of the importance of new and renewable energy uses among all segments of society (governments, individuals, investors, business owners, and civil society organizations), highlighting the positive impact of this culture on environmental protection and meeting energy needs.

6. References:

1. Ahlam Zawawia. (2014). The Role of Renewable Energy Economics in Achieving Sustainable Economic Development in Maghreb Countries. Alexandria, Egypt: El-Wafaa Legal Library.

2. Ahmed Mohamed Mandouz, & Ahmed Ramadan Neamatallah. (1995). The Economic Problems of Environmental Resources. Egypt: Department of Economics, Faculty of Commerce, Alexandria University.
3. Al-Saadi, A. (1983). Energy Sources (OPEC Papers 3). Kuwait.
4. Anissa Ben Ramadan. (2014). A Study on the Problematic Use of Exhaustible Natural Resources and Its Impact on Economic Growth. Algeria: Houma Publishing.
5. Bilal Cheikhi, & Ali Al-Absi. (2018). Renewable Energy as a Strategic Alternative to Traditional Energy. Journal of Economic and Financial Studies, University of Martyr Hamma Lakhdar El Oued, 11(01), 193–209.
6. Hasiba Blatash. (2021). Energy Policy and Its Impact on Sustainable Development. Algerian Journal of Security and Development, 10(01), 14–28.
7. Sarah Bakhoush. (2021). Energy Policy in Algeria: A Reading of Its Foundations and Challenges. Algerian Journal of Security and Development, 10(03), 108–120.
8. Achour Hiroshi, & Mohamed Safir. (2016). Renewable Energies: The Way to Achieve Development Away from Hydrocarbons. Algerian Journal of Economics and Finance, 03(01), 179–202.
9. Abdel Samad Saadoun, Abdullah Al-Shammar, & Ziyad Abdul Rahman Al-Kurani. (2016). Pulsating Energy and Regional Conflicts: A Geo-Strategic Study Toward Reengineering the East (First edition). Iraq: Dar Al-Dajla.
10. Ali Talem, & Farida Kafi. (2019). Renewable Energies: The Way to Achieve Sustainable Dimensions and Strengthen a Sustainable Energy Future. Journal of Scientific Research in Environmental Legislation, 06(01), 172–199.
11. Issa Ben Lakhdar, & Iftikhar Youssef. (2020). The Reality and Future Prospects of Renewable Energies in Algeria: An Evaluative Study. Journal of Contemporary Business and Economic Studies, 03(02), 218–235.
12. Karim Hindi. (2023). The Energy Economy in Algeria Between Exhaustible and Renewable Energies. Doctoral Dissertation in Economic Sciences, specializing in Economic Analysis. University of Algiers 3.
13. Mohamed Ehab Salah El-Din. (n.d.). Energy and Future Challenges. Egypt: Cairo Academic Library.
14. Mohamed Khamees Al-Zouka. (2001). Energy Geography. Alexandria: University Knowledge House.
15. Mohamed Talbi, & Mohamed Sahel. (2008). The Importance of Renewable Energy in Environmental Protection for Sustainable Development: The German Experience. Al-Bahith Journal, 06(06), 201–211.
16. Najoud Ben Fliss, & Siham Harouri. (2023). Investment in Renewable Energies in Algeria and Ways to Develop It. Algerian Journal of Human Security, 08(01), 798–803.
17. Nadhir Ghania. (2016). Optimal Energy Management Strategy for Sustainable Development: A Case Study of Selected Economies. Doctoral Thesis in Management Sciences (unpublished). Faculty of Economic, Commercial and Management Sciences, Kasdi Merbah University, Ouargla.
18. Hajar Si Nacer. (2013). The Role of Energy Policies and Modern Technology in Securing Energy Supplies Within Sustainable Development Requirements: A Comparative Study Between the USA and China. Master's Thesis in Economic Sciences, Faculty of Economic, Commercial and Management Sciences, University of Setif 1.
19. UNEP. (n.d.). Retrieved from g.unep.w