

Algeria's Potential in Renewable Energies: Feasibility Analysis of the Project and its Challenges from 2014 to 2023



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Abstract:

As part of the global effort to achieve a sustainable energy transition, Algeria launched the National Renewable Energy Program in 2011 with the goal of promoting investments in renewable energy sources, ensuring energy security, and reducing dependence on fossil fuels.

This study aims to assess Algeria's progress in achieving the program's objectives and identify the obstacles it faces by analyzing the latest statistics on renewable energy production rates for 2023. The results indicate that, despite Algeria's significant potential in this field, financial, technical, and regulatory challenges remain major barriers. In this context, the study highlights the necessity of developing renewable energy infrastructure and enhancing both local and international investments to ensure the success of renewable energy projects and achieve sustainable development.

Keywords: Renewable Energy; Algeria; Energy Security; Solar Energy; Sustainable Development.

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Introduction:

The topic of renewable energy has garnered significant attention from numerous countries and governments, due to their commitments to reducing carbon emissions and its vital importance in the energy sector, in addition to its pivotal role in achieving sustainable development. With the global transformations witnessed by most nations toward energy transition and the implementation of energy projects, Algeria emerges as one of the countries that has invested in this field. It is considered a nation rich in natural resources and endowed with vast potential that qualifies it to become a leader in the field of renewable energy. Algeria leverages its distinctive geographical location, diverse terrains, and climate, enabling it to efficiently harness solar and wind energy.

In 2011, Algeria launched the National Renewable Energy Program, taking serious steps toward utilizing these clean resources. Several goals were outlined to be implemented in successive phases, with each phase aiming to achieve tangible levels of energy production and enhance the country's energy security. To ensure the success of this project on the ground, a substantial budget was allocated for the development of appropriate infrastructure and the support of energy-related projects.

Nevertheless, the implementation of this program faced numerous challenges and obstacles that negatively impacted the achievement of its set objectives. These challenges were reflected in issues related to funding, the lack of technology and digitalization, weak infrastructure, in addition to limited management capabilities and insufficient political will. These factors contributed to slowing down the pace of progress and hindering the realization of the desired outcomes.

Based on the above, this study aims to highlight the natural potential that Algeria possesses, making it well-positioned to become a leading nation in the field of renewable energy. It will also delve into the National Renewable Energy Program, examining its primary goals and stages of implementation. The study will conclude by analyzing energy production and generation statistics to assess the success of the project in achieving its ambitious objectives.

Research problem:

To study this topic, the following research problem is posed:

Has Algeria been able to achieve the objectives of the National Renewable Energy Program given the available resources and the challenges it faces?

Research Questions:

The following sub-questions fall under this main issue:

- What are the natural resources that have helped Algeria in its energy transition?
- What are the objectives of the National Renewable Energy Program, and has Algeria been able to achieve them?
- What are the challenges hindering Algeria in its renewable energy projects?

Research hypotheses:

To answer the research problem, we propose the following research hypothesis:

Despite Algeria's significant renewable energy potential, it has faced financial, technical, and regulatory challenges. However, with strategic investment in technology and infrastructure, Algeria can achieve its renewable energy goals in the future.

Study Methodology:

To address the research problem, **the statistical method** was employed, allowing us to analyze the data provided by the International Renewable Energy Agency (IRENA) for the year 2024. These statistics represent the renewable energy production rates in Algeria during the period from 2014 to 2023.

Additionally, **the comparative method** was utilized, enabling us to compare and analyze the rates across different time periods. This approach aimed to evaluate Algeria's success in implementing the stages of the National Renewable Energy Program.

Objectives of the study:

This study aims to achieve the following objectives:

- To explore the various resources that qualify Algeria to be a leader in the field of renewable energy.
- To understand the objectives of the National Renewable Energy Program and the stages of its implementation.
- To examine the extent of Algeria's success in achieving the objectives of the renewable energy program through the available statistics for 2024.
- To address the various challenges hindering the implementation of the National Renewable Energy Program.

Study Plan:

To cover all aspects of the topic, the study was divided into the following sections:

1. Algerian renewable energy potential

2. Feasibility of the National Renewable Energy Program: An Analysis of the Statistics

3. Challenges and Opportunities of Renewable Energy in Algeria

1. Algerian renewable energy potential:

This section includes the definition and content of renewable energies, in addition to reviewing Algeria's key potentials in this field, which qualify it to achieve a sustainable energy transition.

Definitions of renewable energy vary between governmental and non-governmental organizations, The International Agency for Renewable Energy (IAEA) defines it as: "Sources such as sunlight and wind that renew faster than they are consumed". The United Nations Environment Program (UNEP) extends the definition to include biomass, wind, hydroelectric power and geothermal energy (Halali, et al, 2024, p. 2).

So renewable energy is considered a permanent and clean source that does not cause environmental pollution. It serves as a vital and important alternative to non-renewable resources such as oil and natural gas, which are gradually depleted over time and cause significant environmental damage. Renewable energy sources are naturally and continuously replenished, making them a sustainable option to meet both current and future energy demands.

It comes from a wide variety of sources, including solar energy that relies on sunlight, wind energy generated by the movement of air, and biomass derived from organic materials. It also includes geothermal energy obtained from the heat of the Earth's interior, as well as hydropower generated by the movement of water.

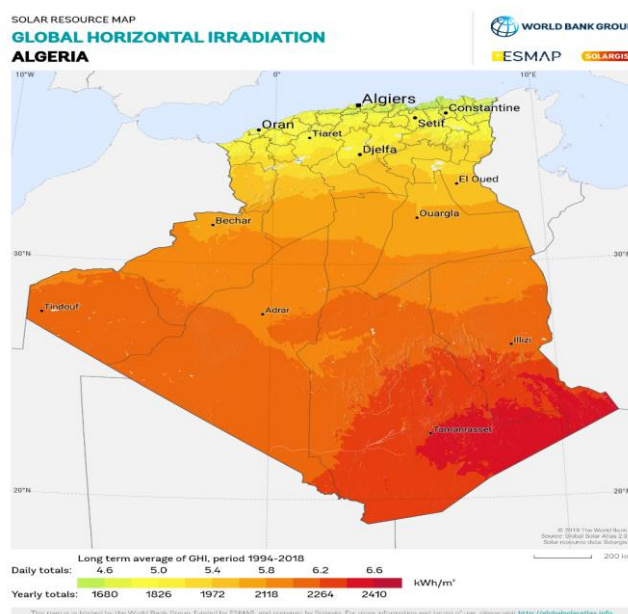
Among the countries that have shown interest in this field, Algeria stands out as one of the nation's rich in natural potential, qualifying it to be a pioneer in renewable energy. This advantage has facilitated its energy transition from traditional energy sources, primarily hydrocarbons (the main energy source in Algeria), to alternative energy. Algeria also benefits from its distinguished geographical location and diverse resources, with enormous potential in solar energy, especially in desert areas. Additionally, its wind energy resources, concentrated in the southern regions and high plateaus, enable the generation of renewable energy and contribute to achieving sustainable economic development. This form of energy is not only environmentally friendly but also helps mitigate climate change and its associated threats. The following are the most prominent aspects of Algeria's potential in the field of renewable energy:

1.1. Solar energy:

Algeria began its journey into solar energy in 1988 with the launch of the Southern Project, marking the start of its shift towards renewable energy sources. Subsequently, it extended its initiatives by installing the required infrastructure in larger cities like Skikda and Oran to optimize the use of solar power (Khenfri, et al, 2018, p. 7). Due to its favorable geographic location, Algeria is endowed with one of the world's highest solar potentials, estimated at 13.9 TWh annually (Haddoum, et al, 2024, p. 51). As Carlo Rubbia, the Nobel Prize-winning physicist, remarked, "In the Sahara, it rains every year the equivalent of one barrel of oil per square meter in solar form". Additionally, Algeria holds a substantial solar resource with a theoretical volume of 37,000 trillion cubic meters, which is eight times greater than its natural gas reserves (Ait Bara & Baar, 2024, p. 8).

The duration of insolation is around 2,000 to 3,900 hours annually, with horizontal surface radiation of around 3 to 5 kWh/m² (Zahraoui M, et al, 2021, p. 8). Daily solar energy potential varies from 4.66 kWh/m² in the north to 7.26 kWh/m² in the south (Haddoum, et al, 2024, p. 51), as shown in Figure 01.

figure (01): The solar irradiation in Algeria kW/m².



Source: Solar resource maps of Algeria. (2021). consulted on: (03/12/2024), from: <http://bit.ly/4kWqRKG>

To tap into this immense potential, Algeria has initiated several major solar projects, such as the Hassi R'Mel and Ghardaïa solar plants, which are key contributors to the country's electricity generation (Ait Bara & Baar, 2024, p. 8). These plants are not just pilot projects, but part of a national plan for sustainable

electricity generation, which means that Algeria is aiming to increase the share of renewable energy in its energy mix and enhance its energy independence.

1.2. Wind energy:

In Algeria, the winds are a mix of humid marine air and dry desert continental air, with an average speed of 7 m/s, especially along the coast. This results in an estimated annual energy generation potential of 673 million watts, which is sufficient to power 1,008 households. The southern regions of the country experience higher wind speeds, particularly from the southwest, with speeds exceeding 4 m/s and reaching up to 5 m/s in the Adrar area (Ziani Bey & Zerouat, 2022, p. 1075).

Algeria also boasts considerable potential for wind energy in regions such as M'Sila, Bou Chekif, Djelfa, and Mecheria. These areas experience steady winds year-round, with speeds ranging between 6 to 7 m/s. However, the geographical challenges and the lack of an electrical grid make these locations unsuitable for wind energy projects. Additionally, the extreme temperatures, reaching as high as 50°C, hinder the viability of such installations in the southern desert regions (Zahraoui M, et al, 2021, p. 11).

Although Algeria has considerable potential for renewable energy, the contribution of renewable energy production (especially solar and wind power) remains relatively small in the country's overall energy generation. Despite having 23 solar and wind power plants across the nation, the total installed capacity is only about 500 MW. Several obstacles persist, limiting the growth and expansion of renewable energy projects (Haddoum, et al, 2024, p. 51).

1.3. Bioenergy potential:

Algeria holds considerable potential for biomass energy, with its forests contributing approximately 37 million tons of oil equivalent. Furthermore, agricultural waste, including byproducts from olives and dates, serves as an important biomass energy source (Aidouni & Aiouadj, 2023, p. 67). The unused urban and agricultural waste is estimated to have a potential of around 5 million tons of oil equivalent (Ziani Bey & Zerouat, 2022, p. 1077).

1.4. Geothermal Energy:

Geothermal energy presents a promising opportunity to enhance the use of renewable energy in Algeria, thanks to the abundance of natural hot springs across the country. Over 240 hot springs are spread throughout Algeria, from the eastern to the western regions, primarily located at moderate elevations in mountainous areas. The highest recorded temperature reaches 98°C in the east, 68°C in the west, and 80°C in the central part of the country. In contrast, the southern region has an average temperature of 50°C (Zahraoui M, et al, 2021, p. 11).

1.5. Hydropower:

The volume of rainfall in Algeria is significant, totaling approximately 65 billion cubic meters per year. However, only about 5% of this water is utilized, and hydropower contributes a mere 1% to the country's electricity production, equating to 286 megawatts, of this 100 megawatts come from the Zeyama, Mansuriyah, and Jijel dams. The limited utilization of water resources is primarily due to a lack of sufficient dams and inefficient use of available resources, in addition to irregular rainfall patterns that are unevenly spread across different regions of the country (Ziani Bey & Zerouat, 2022, p. 1076).

From the above and the statistics provided on renewable energy sources in Algeria, it is evident that:

- Algeria relies heavily on solar energy and, to a much lesser extent, on other sources. This is due to the natural abundance of this resource and the infrastructure projects that facilitate its exploitation.
- On the other hand, the utilization of other renewable energy sources remains limited. This is primarily due to the challenges associated with managing and operating them, as they require specific geological and water conditions. Additionally, the lack of investment and the underdevelopment of technological and digital tools -essential for improving production efficiency and reducing costs- further hinder their exploitation. These aspects will be discussed in greater detail in the remainder of the article.

2. Feasibility of the National Renewable Energy Program: An Analysis of the Statistics:

In this section, the National Renewable Energy Program in Algeria will be discussed, along with its key objectives, which were defined over two phases. In each phase, specific projects are implemented, and medium- and long-term strategies are set to achieve significant renewable energy production rates. To assess the effectiveness of this project, the statistics provided by the International Renewable Energy Agency from 2014 to 2023 have been analyzed.

2.1. The National Renewable Energy Program:

Given Algeria's vast potential in the field of renewable energy, the government began adopting a renewable energy strategy in 2011. This initiative is part of its broader plan to achieve sustainable development and safeguard hydrocarbons from depletion. The government has worked to establish the necessary infrastructure to open up various opportunities in this sector. The project has gone through several phases, which will be discussed below, along with an evaluation of the extent to which national efforts have succeeded in achieving its key objectives.

The program places significant emphasis on solar energy, with photovoltaic systems being a central component. By 2030, solar power is projected to contribute more than 37% of the country's total electricity generation. While wind energy has a relatively modest potential, it remains an important aspect of the program and is considered the second primary area of development. Wind energy is expected to account for about 3% of electricity production by 2030. Additionally, Algeria plans to launch pilot projects to explore a range of renewable energy technologies, including biomass, geothermal energy, and brackish water desalination (Khenfri, et al, 2018, p. 13).

The initiative involves the establishment of 60 solar photovoltaic and solar thermal power plants, wind farms, and a variety of other stations. The execution of renewable energy projects aimed at generating electricity for the domestic market is structured in two stages:

- a. **First Phase (2015-2020):** The objective of this phase is to generate 4,000 megawatts of power from solar and wind energy, along with 500 megawatts from biomass, co-generation, and geothermal sources.
- b. **Second Phase (2021-2030):** Work is ongoing to strengthen the connection between the northern regions and the Sahara, especially in the Adrar area. Significant renewable energy facilities have been set up in locations such as Ain Saleh, Adrar, Timimoun, and Bashar, facilitating their integration into the national power grid (Ziani Bey & Zerouat, 2022, p. 1078).

The following table clearly illustrates the stages and objectives of the National Renewable Energy Program:

Figure (02): The updated National Renewable Energy and Energy Efficiency Program 2015-2030.

	Phase One 2015-2020 (MW)	Phase Two 2021-2030 (MW)	Total (MW)
Photovoltaic Solar	3000	10575	13575
Wind	1010	4000	5010
Solar thermal	-	2000	2000
Cogeneration	190	250	440
Biomass	360	640	1000
Geothermal	05	10	15
Total	4525	17475	22000

Source: Boubekour Mohammed, & Argillos Amal. (2023). Intégration des sources d'énergie renouvelables en Algérie, Réalisation et perspective. Modern Economic and Sustainable Development, 6 (1), p. 76-77.

The National Renewable Energy Development Program aims for renewable energy (RE) to account for 30% of the country's energy supply by 2035. However, by 2022, RE's share in primary energy consumption remains minimal, standing at just 0.26%, with total renewable capacity barely reaching 599 MW (Chabouni, et al, 2024, pp. 300-301).

2.2. Analysis of the statistics provided in the International Renewable Energy Agency report 2014-2023:

Based on the goals set by Algeria in its program, can it be said that Algeria has truly achieved what was outlined? To answer this question, and to conduct a feasibility study of this project and assess its achievement of the set objectives, official statistics provided by the International Renewable Energy Agency for the year 2024 were referred to, as follows:

2.2.1. The total renewable energy in Algeria:

Figure (03): The total renewable energy in Algeria (MW) during the period between 2014 and 2023.



Source: The figure is designed by the researcher based on the statistics provided in: The International Renewable Energy Agency (IRENA). (2024). Renewable Capacity Statistics 2024. Abu Dhabi.

According to the statistics provided by the International Renewable Energy Agency (IRENA), it is evident that:

a. From 2014 to 2019:

Investment in renewable energy in Algeria saw significant growth, reaching 604 MW, which remained stable in 2018 and 2019. This can be attributed to the infrastructure that supported the implementation of renewable energy projects, as well as the political will for the energy transition in the sector.

b. From 2019 to 2021:

There was a decline in renewable energy investment, from 604 MW to 505 MW in 2021. This was primarily due to the impact of the COVID-19 pandemic, which caused delays in many renewable energy projects and programs, particularly solar energy. Additionally, there were difficulties in importing raw materials and essential components for the projects, as well as the effects of lockdowns on the shortage of labor and staff.

In recent years, Algeria has faced significant economic and financial challenges, including the decline in oil and gas prices, which affected the funding allocated for renewable energy projects.

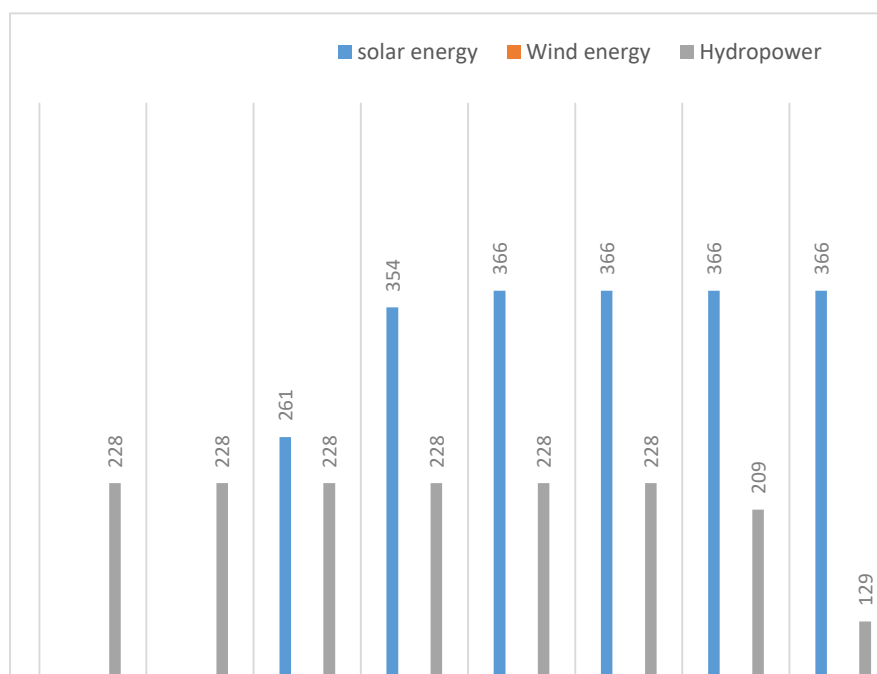
Thus, it is clear that any reduction in investment in renewable energy is met with an increase in reliance on traditional energy sources, including gas and oil, due to the quick economic benefits these sources provide.

c. Since 2022:

Since 2022 renewable energy production in Algeria has increased again, reaching 590 MW in 2023, after the end of the COVID-19 pandemic and its negative impacts on the sector.

2.2.2. The production of solar energy, wind energy, and hydropower in Algeria:

Figure (04): The production of solar energy, wind energy, and hydropower in Algeria (MW) during the period between 2014 and 2023.



Source: The figure is designed by the researcher based on the statistics provided in: The International Renewable Energy Agency (IRENA). (2024). Renewable Capacity Statistics 2024. Abu Dhabi.

From the statistics presented in the bar charts, it is evident that:

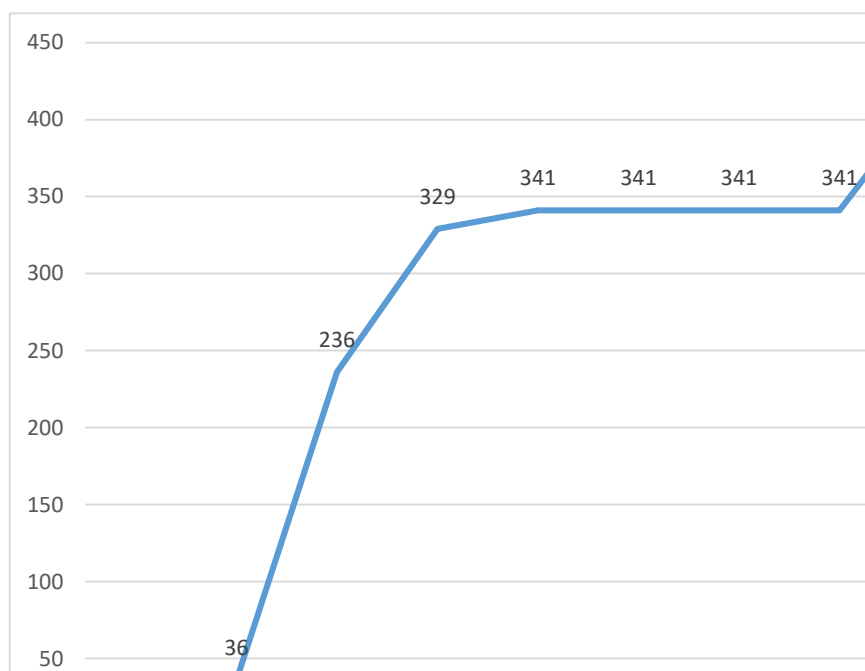
- Algeria ranks fourth in Africa in terms of solar energy production and primarily relies on it for several reasons. While the country invests slightly less in hydropower, wind energy remains very weak due to several factors related to geography, infrastructure, and policies.
- Solar energy production in Algeria increased significantly, from 28 MW in 2014 to 451 MW in 2024, demonstrating the relative success of the Algerian government in this sector.
- Although hydropower production was several times greater than solar energy in 2014 and 2015 (228 MW), it remained stable at the same level until 2019. However, it then experienced a decline, reaching 129 MW in 2023.
- Wind energy remains very weak and constant throughout the years (10 MW).
- As previously mentioned, Algeria is one of the countries with the highest exposure to sunlight globally, especially in the Sahara region,

making it a key candidate for renewable energy programs and enabling it to benefit significantly compared to other energy sources.

- The lack of funding for wind energy and other renewable energy projects, particularly given the high costs of their establishment and operation, contrasts with the availability of mechanisms and infrastructure for solar energy projects.
- Hydropower production is limited due to the drought waves that Algeria has experienced in recent years, with water resources being allocated more for consumption than for energy production.
- Despite Algeria setting clear and ambitious goals in the two phases of the project to achieve 4,000 megawatts of solar energy by the end of the first phase (2015–2020), it failed to meet this target, according to the statistics shown in the figure.
- Finally, according to the statistics provided by the International Renewable Energy Agency, there is a noticeable absence of other renewable energy types, such as bioenergy and geothermal energy, in Algeria. This is due to the scarcity of projects in these two sectors, despite the fact that Algeria possesses significant potential in both, which could enable it to produce substantial amounts of energy.

2.2.3. Solar photovoltaic energy production rates in Algeria:

Figure (05): Solar photovoltaic in Algeria (MW) between 2014 and 2023.



Source: The figure is designed by the researcher based on the statistics provided in: The International Renewable Energy Agency (IRENA). (2024). Renewable Capacity Statistics 2024. Abu Dhabi.

From the graph, we notice a significant increase in the percentages of photovoltaic solar energy in Algeria, indicating its investment in this field. However, it has not reached the target set in the 2011 renewable energy program.

3. Challenges and Opportunities of Renewable Energy in Algeria:

According to the statistics that were analyzed, it was found that the strategic objectives set by Algeria in its national program have not been achieved, especially concerning the production of solar energy and wind energy. This is due to the presence of several obstacles that require addressing and encouraging investment in this field.

3.1. The challenges facing Algeria in the field of renewable energy:

Similar to many developing nations, Algeria has faced numerous challenges in the adoption of renewable energy. Some of these challenges include:

a. Expenses and Pricing: Numerous stakeholders argue that renewable energy sources are more expensive than conventional energy options, leading to decisions and policies that tend to avoid the adoption of renewables due to cost

considerations. The assessment of actual costs and setting of appropriate prices face several challenges, including:

- Subsidies for initial investment costs.
- Challenges in evaluating the risks associated with fuel price fluctuations.
- Disadvantageous electricity pricing regulations.
- High transaction costs.
- Environmental externalities (Allaoui & Cherbi, 2017, p. 70).

b. Legal and Regulatory Issues: The lack of clear legislation and regulatory frameworks hinders investment in renewable energy sources. Specifically:

- There is an absence of a legal structure for independent electricity producers.
- There are limitations regarding site selection and other constraints.
- Requirements for interconnection with utilities are restrictive.
- Mandatory liability insurance is a challenge (Allaoui & Cherbi, 2017, p. 71).

c. Market Performance Issues: The renewable energy market is still emerging and complex, involving multiple stakeholders, which leads to several obstacles, including:

- Limited access to credit.
- Perceived uncertainties and risks concerning the performance of renewable energy technologies.
- Insufficient technical or commercial expertise and information (Allaoui & Cherbi, 2017, p. 71).

3.2. Factors for Accelerating the Energy Transition:

In contrast, there are many opportunities and factors that can help Algeria accelerate the energy transition and implement the goals of the national renewable energy program. Below are the most prominent ones:

a. Regulatory Structure: A strong and comprehensive regulatory framework is essential to support the development of renewable energy. This framework should encourage investment and innovation in clean energy technologies, while also establishing clear policies and standards that promote long-term sustainability. It should include mechanisms for implementing energy efficiency measures, incentivizing the adoption of renewable energy systems, and ensuring compliance with environmental standards. Additionally, the regulatory system must actively contribute to the reduction of carbon emissions by setting achievable targets,

monitoring progress, and holding stakeholders accountable (Allaoui & Cherbi, 2017, p. 71). Creating a stable and transparent legal environment will attract both local and international stakeholders and drive significant progress towards a greener, more sustainable energy future.

b. Global Collaboration: Algeria has significant potential to benefit from global partnerships, especially through technical support, knowledge exchange, and access to international markets for renewable energy technologies. To successfully transition to renewable energy, the country will need a well-rounded strategy that includes strong policies, substantial investments, and efforts to increase public awareness about the importance and benefits of renewable energy. These combined efforts will be crucial in ensuring Algeria can effectively harness renewable energy resources while promoting sustainable development and reducing its environmental impact (Allaoui & Cherbi, 2017, p. 71).

c. Investment: Algeria will have to allocate funds towards the development of renewable energy infrastructure, encompassing wind, solar, and hydropower systems. This financial commitment will necessitate investments from both government and private sector sources (Aidouni & Aiouadj, 2023, p. 68), therefore, the government must support the private sector in order to attract significant investments for the program and allocate a budget for it, as the profits generated by this sector in the long term will contribute to accelerating the energy transition process.

d. Political Commitment: The political will indicates seriousness in implementing the project and attention to its strategies. It reflects the government's commitment to establishing legislative and regulatory laws that facilitate and support the energy transition. It is considered the cornerstone for the launch of the renewable energy program in Algeria.

e. Technological Advancement: Algeria must pay significant attention to the role of digitalization and technological advancement in supporting the national renewable energy program, benefiting from the enormous progress in artificial intelligence. Efforts should be made to integrate its technologies into energy generation, storage, and production, as it will enhance efficiency, reduce costs, and attract both local and international investors and companies.

f. Fostering Renewable Energy Culture in Society: Civil society actors, political parties, and other tools of education and political development must play an important role in raising awareness among individuals about the importance of renewable energy in reducing carbon emissions and achieving sustainable development.

Conclusion:

After analyzing the various aspects of the topic, it can be concluded that Algeria is endowed with substantial natural resources in the field of renewable

energy, especially in solar and wind power, which provides it with significant potential to achieve a sustainable energy transition. However, the achievement of the objectives of the National Renewable Energy Program has faced several challenges, leading to delays and obstacles in its implementation. Based on this, the following conclusions were drawn:

- Algeria possesses immense potential in the field of renewable energy, particularly in solar and wind power, making it one of the countries that could play a leading role in this sector.
- The National Renewable Energy Program, through its ambitious projects, aims to diversify energy sources in Algeria and increase the generation of clean energy to achieve energy security.
- Although Algeria has made some progress in renewable energy projects, challenges related to poor management, financial constraints, and technological barriers have prevented the full realization of its objectives by 2023, as evidenced by the analyzed statistics.
- To ensure the success of energy transition projects, Algeria must focus on developing its infrastructure in this sector, allocate a significant budget, and ensure strong political will to implement the projects and achieve their objectives.

Study recommendations:

- Integrating Artificial Intelligence Technologies into Renewable Energy Projects, where decision-makers must recognize the immense advancements brought about by the artificial intelligence revolution in the renewable energy sector and work towards integrating its systems and technologies into energy projects. This includes utilizing machine learning and neural networks to improve weather forecasting and predict energy production, especially in the fields of solar panels and wind farms.
- Enhancing Government Support for Renewable Energy by:
 - Encouraging investment in renewable energy projects.
 - Upgrading and improving the performance and efficiency of existing energy plants.
 - Providing household solar energy systems, particularly in remote areas suffering from electricity shortages.
- Exploiting High Solar Irradiation Potential in Desert Regions by increasing the number of solar power plants in these areas, which have high solar irradiation rates, with a clear target to increase production by at

least 50%. Additionally, supporting the local manufacturing of solar panels is necessary to reduce import costs and stimulate domestic industry.

- Utilizing the Potential of Bioenergy, as the study shows that Algeria has significant bioenergy potential, but energy production in this field is almost non-existent according to statistics. It is therefore essential to benefit from the experiences of leading countries, such as Malaysia, and replicate their successful techniques in bioenergy production, including the use of agricultural and industrial waste.
- Increasing Hydropower Production, as Algeria has achieved relative success in utilizing hydropower thanks to its natural resources. The study recommends supporting the construction of additional dams, sustainably managing water resources, and improving the efficiency of hydropower turbines by locally manufacturing advanced models and adopting cutting-edge technologies.

Bibliography:

1. Aidouni, L., & Aiouadj, M. (2023). Algeria and the transition to renewable energy: the path to achieving energy security. *Journal of Finance. Investment and Sustainable Development*, 8 (1), 67-68.
2. Ait Bara, H., & Baar, A. (2024). Energy Transition and Sustainable Development in Algeria: The Challenges of Green Economy. *Finance and Business Economics Review*, 8 (1), 8.
3. Allaoui, M. E., & Cherbi, M. L. (2017). Renewable Energies: Challenges and Prospects in Algerian Economic. *Revue des Sciences Humaines*, (46), 70-71.
4. Boubekeur, M., & Argillos, A. (2023). Intégration des sources d'énergie renouvelables en Algérie, Réalisation et perspective. *Modern Economic and Sustainable Development*, 6 (1), 76-77.
5. Chabouni, N., Barnet, Ch., Assoumou, E., Maïzi, N., & Sandrine, S. (2024). Align Algeria's Energy Diversification Strategies with Energy and Climate Sustainable Development Goals. in: *Aligning the Energy Transition with the Sustainable Development Goals*. Maryse, L., et al (eds). Lecture Notes in Energy 101.
6. Haddoum, S., Bennour, H., & Toudert, A. Z. (2024). Renewables in the Energy Mix of Algeria, a pledge for food security. *ENP Engineering Science Journal*, 4 (1), 51. <https://doi.org/10.53907/enpesj.v4i1.195>.
7. Halali, A., Khirdja, H., Khelassi, A., Bellal, B., Benkaddour, A., & Ayad, L. (July 2024). The Future of Investment in Renewable Energies and Its Role in Achieving the Dimensions of Sustainable Development in

- Algeria. Conference about the Future of Investment in Renewable Energies and Its Role in Achieving the Dimensions of Sustainable Development in Algeria. Adrar university, Algeria.
8. Khenfri, Kh., Grinat, M., & Bournissa, M. (2018). renewable energy in Algeria reality and perspective. *Journal of Information System and Technology Management*, 3. 7-13.
 9. Solar resource maps of Algeria. (2021). consulted on: (03/12/2024), from: <http://bit.ly/4kWqRKG>
 10. The International Renewable Energy Agency (IRENA). (2024). Renewable Capacity Statistics 2024. Abu Dhabi.
 11. Zahraoui, Y., Basir Khan, M, R., AlHamrouni, I., Mekhilef, S., & Mahrous, A. (2021). Current Status, Scenario, and Prospective of Renewable Energy in Algeria: A Review. *Energies*, 14 (2354), 8-11. <http://doi.org/10.3390/en14092354>.
 12. Ziani Bey, S., & Zerouat, F, Z. (2022). Prospects for Developing the Renewable Energy Sector in Algeria: A Prospective Study Using the MICMAC Structural Analysis Technique. *Al-Basha'er Economic Journal*, 3 (2), 1075- 1078.