

Renewable Energies as a strategic option for achieving development and environmental sustainability in Algeria

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Received: 20/10/2025

Accepted: 24/01/2026

Published: 05 /04/ 2026

Summary :

The importance of the study is highlighted by the growing interest in the renewable energy sector because it represents one of the most important main sources of global energy outside traditional energy, in addition to being clean and non-polluting energy to the environment, and this is what increases its value and gives it great importance. This is why Algeria - over the past decades - has paid great attention to the renewable energy sector due to the position it occupies in economic and social development. It also strives to devote the principle of environmental preservation and sustainable development to advance its economy in the future, by opening Promising prospects for investment in this field, and it has been able to achieve significant achievements in establishing and developing the structure of this sector through many incentive programmes, plans and laws.

Keywords : renewable energies, environment, sustainable development, pollution, green energy.

Introduction:

Since non-renewable energy is traditional energy that is vulnerable to depletion on the one hand, in addition to being harmful to the environment on the other hand, and in view of the decline in oil prices that are still not stable to this day, it is necessary for all countries of the world - especially those that have great potential for renewable energy - to make the necessary efforts to invest in the field of renewable energy.

Algeria is considered among the countries that have paid great attention to investment in this field, so this study aims to highlight the importance of turning to renewable energies and the technology accompanying them in Algeria as a positive and necessary aspect of the post-hydrocarbons era.

On this basis, the problem of this study revolves around: **To what extent does green energy contribute to achieving development and environmental sustainability in Algeria?**

In response to the problem raised, we decided to follow the descriptive approach in addition to employing the analytical method in order to present and analyze the economic components and indicators of renewable energy sources in Algeria, as well as presenting the various mechanisms adopted within the framework of promoting investment in renewable energy in Algeria.

To answer the problem raised, we will divide this study as follows:

The first section: The conceptual framework of the study

Many countries have turned to preparing studies and research in the field of exploiting renewable energies, due to the latter's positive effects on the economy and the environment to achieve sustainable development at the local and international levels. Based on that, we will try to cover the basic concepts of this study by clarifying the concept of each of renewable energy, the environment, and sustainable development.

The first requirement: the concept of renewable energies and the environment

Renewable energy is expressed by several names, as it is termed: alternative energy to traditional energy, clean energy, safe energy in order to distinguish it from traditional energy that pollutes the environment, and also sustainable energy as an expression of its natural renewal. The term green energy is also used as an alternative to the term renewable energies and this refers to energy produced from sources that do not create negative effects on the environment¹.

Based on this, we will clarify the concept of renewable energies and the environment through the following:

The first section: The concept of renewable energies

Renewable energy constitutes an important future source of energy, and through the following we will try to clarify the concept of renewable energy by defining it and explaining its characteristics.

First: Definition of renewable energy

The Algerian legislator defined renewable energy within Article 2 of Executive Decree No. 04/92 relating to the costs of diversifying electricity production² Which states: "It is defined as renewable energies, all energies derived from water sources, solar heat, wind, geothermal heat, and sunlight, as well as energies resulting from joint production and waste valorization".

It is also defined in Article 3 of Law 04/09 relating to the promotion of renewable energies within the framework of sustainable development³ Which states: 'Renewable energy is defined in the meaning of this law as follows:

Forms of electrical, kinetic, thermal, or gaseous energy obtained from the conversion of solar radiation, ground wind power, organic waste, water energy, and techniques for using biomass.

-The totality of methods that allow for significant energy savings by resorting to bioclimatic engineering techniques in the construction process'.

By extrapolating the above definitions, it can be said that the Algerian legislator did not provide a clear and specific definition of renewable energy, but rather enumerated its types, sources, and methods of obtaining it.

Through the above, renewable energy can be defined as: **“those natural sources that are not depleted and available in nature, whether limited or unlimited, but they are renewable and clean, and their use does not result in environmental pollution⁴”**.

Second: Characteristics of renewable energy

Renewable energy is characterized by several characteristics, making it an important and distinctive source of energy. Below we explain its characteristics:

1/ Clean resources (environmentally friendly): Renewable energy sources are considered clean sources that do not affect the environment, as they help mitigate the damage of gaseous and thermal emissions, prevent harmful acid rain, limit the accumulation of waste in all its forms (solid, gaseous, and liquid), and also clear crops of chemical pollutants and protect species, especially those that are threatened with extinction, in addition to protecting groundwater, seawater, and fish wealth⁵.

2/ Safe resources: The distributed system of renewable energy generation remains safe from any attack, meaning that it will not likely constitute military targets, and even if it did, the result would be minimal environmental damage. In contrast, nuclear and fossil fuel power plants pose important problems with regard to national security⁶.

3/ Reliable resources: The distributed system of generating energy from a variety of renewable sources provides an energy system that is more durable or less susceptible to interruptions in the energy supply compared to central systems. If one system fails, the entire city - and sometimes the country as a whole - will not experience a state of emergency⁷.

4/ Economic resources: The use of renewable energy resources would lead to the diversification of energy sources and thus achieve an abundance of traditional energy sources, thus protecting local economies from shocks resulting from price fluctuations of basic commodities in global markets.

5/ Permanent resources: Renewable energy sources are characterized by their permanence, as they are renewable energy without interruption or cessation and there is no fear of running out⁸.

Section Two: The concept of the environment

To clarify the relationship between renewable energies and the environment, we will define the environment and then show the renewable energy sources that contribute to protecting the environment

First: Definition of the environment

The environment is considered one of the commonly used terms, as its meaning is linked to the pattern of the relationship between it and its users (political environment, social environment, economic environment, agricultural environment, administrative environment...etc.) and in light of these diverse perceptions of aspects of the environment, every concept has a relationship with the environment. Through this element, we will attempt to address a set of definitions of this term, whether at the legal or jurisprudential level.

1/ The Algerian legislator's definition of the environment:

The Algerian legislator defined the environment through Article 04 of Law 03/10 relating to environmental protection within the framework of sustainable development ⁹. **'The environment: consists of abiotic and biotic natural resources such as air, water, land, subsoil, plants and animals, including the genetic heritage and forms of interaction between these resources as well as places, views and natural landmarks.'**

What is noted from this definition is that the Algerian legislator narrowed the meaning of the environment, so that it included it in its natural, biotic and abiotic components.

2/ Jurisprudential definition of the environment:

The environment is defined as: 'the environment in which humans live and carry out their productive and social activities. It is a reservoir of renewable natural resources, such as agricultural fields and fisheries, and non-renewable natural resources such as metal mines and oil wells¹⁰'.

From the above, it can be said that the environment was viewed in the past from its physical and biological aspects, but today it is viewed from its social, human, economic and cultural aspects. If the biological and physical aspects constitute the natural basis of the human environment, then its social and cultural aspects are what determine the guidance that humans need to understand and use natural resources¹¹.

Second: Renewable energy sources that preserve the environment

The most important sources of renewable energy that protect the environment are the following:

1/ Solar energy: Solar energy is characterized by being clean, non-polluting energy with no harmful production waste resulting from it. It is currently used in many fields through two methods: either solar thermal energy, which is used to heat water and swimming pools, and heat and cool buildings through special technical designs, or solar thermal energy, which is the process of converting sunlight into electrical energy through electronic structures called solar cells (photovoltaic panels) ¹². Solar energy is available in all countries of the Arab region at rates higher than most other regions of the world, and Algeria is considered one of these countries, as it benefits through its

geographical location in large quantities of solar brightness, which makes it an important mine of renewable energy.

2/ Wind energy (wind energy): It is the energy derived from the movement of air and wind by converting the movement of the wind into another form of energy, which is electrical energy¹³. This is done using windmills, and their importance lies in their constant flow and there is no fear of their depletion, as well as their being clean and not polluting the environment.¹⁴ Algeria is considered among the countries interested in advancing this clean energy, as its sources of wind energy vary greatly from one region to another, and this difference is due to topographical and climatic diversity. Algeria is characterized by wind blowing that carries with it a lot of humid marine air and large amounts of continental and desert air. Adrar is considered one of the most important areas with high winds in the southwest and In Amenas in the southeast.

3/ Geothermal energy: It means the heat stored under the surface of the Earth, which increases with increasing depth and emerges from the Earth's interior through contact and heat transfer, hot springs and erupting volcanoes¹⁵. This energy is used to generate electricity, and it can also be used in other fields such as central heating, agricultural and industrial uses, and medical purposes. Hot springs in Algeria are used for medical and tourist purposes¹⁶.

4/ Hydropower: It is the energy generated as a result of rainfall and the flow of water at high speed in rivers. It is used to generate electrical energy by establishing power generation stations on riverbeds and building artificial dams to provide large quantities of water to ensure the permanent operation of these stations¹⁷. One of the advantages of this energy is that it is safe, cheap, sustainable, and pollution-free. The Arab countries are considered to have limited capabilities in terms of exploiting hydroelectric energy. However, this does not negate Algeria's move towards increasing the production of hydroelectric energy within the framework of an energy policy that works to develop renewable energy sources.

5/ Biomass energy: This means what is collected from plant and animal waste, where the rotting process of these biowastes is exploited and their impact on the atmosphere is suppressed by using them as alternative energy¹⁸. The sources of this energy include: wood, plant and animal waste, household waste...etc. The fuel that results from exploiting this type of energy is ethanol, biofuel, and methane gas¹⁹.

From the above, we can say that renewable energies have a significant role in protecting the environment, as preserving the environment from pollution through the use of renewable energies is considered one of the most important challenges of the current era.

The second requirement: the concept of sustainable development

Sustainable development is one of the most important modern scientific concepts. Its importance lies in achieving economic growth for societies, improving social

conditions, and preserving natural resources and the environment. We will try to highlight the concept of sustainable development as follows:

Section One: Definition of sustainable development and its dimensions

First: Definition of development

The World Bank defined sustainable development: 'Sustainable development is concerned with achieving continuous equality that ensures the availability of the same current opportunities for future generations, by ensuring the stability of overall capital or its fruitful increase over time.'

The Algerian legislator defined it in Article 04 of Law 03/10 relating to environmental protection within the framework of sustainable development as: a concept that means reconciling sustainable social and economic development with environmental protection, that is, including the environmental dimension within a development framework that ensures meeting the needs of present and future generations.'

From the above, it is clear to us that the perspective of sustainable development lies in creating development that meets the needs of current societies while preserving the environment and natural resources for future generations.

Second: Dimensions of sustainable development:

Through the previous definitions, three basic dimensions can be identified that form the pillars on which the sustainable development process is based.

First: the economic dimension:

The economic dimension of development is concerned with achieving sustainable growth through the continuous production of goods and services that maintains a certain level of economic balance between public output and debt and prevents the occurrence of social imbalances resulting from economic policies²⁰. Therefore, sustainable growth is growth that works to achieve economic efficiency within a framework of justice between generations and within each generation²¹.

Second: The social dimension:

The social dimension of sustainable development is concerned with providing the material and qualitative conditions for individuals' lives, that is, it is concerned with building individual capabilities through increasing interest in health and education, reducing poverty and poor distribution of income, in addition to providing job and employment opportunities, expanding the scope of basic freedoms, participation, and so on²².

Third: The environmental dimension:

The philosophy of sustainable development is based on the important fact that the depletion of natural environmental resources, which are considered necessary for any economic activity, will have harmful effects on development and the economy in general. This dimension explains many environmental goals, such as the rational use of non-renewable resources, taking into account the limited ability of the environment to absorb waste, and precisely determining the quantity that should be used from each

depleted resource. Therefore, the ideal goal of sustainable development is to reconcile economic development with environmental preservation, while taking into account the rights of future generations to natural resources²³.

From the above, it can be said that the concept of sustainable development is a general development model for integration between environmental considerations and economic considerations in addition to social considerations.

Section Two: The role of renewable energy in achieving the dimensions of sustainable development:

Renewable energy plays an important role in achieving sustainable development, as the use of this type of energies reflects positively on the three dimensions that make up sustainable development. We will show through what follows the extent to which the use of renewable energies reflects the achievement of this development.

First: The role of renewable energy in achieving the environmental dimension:

The use of renewable energy has a well-known effect in protecting the environment as a result of the reduction in emissions of these gases, including environmental pollution. Therefore, to achieve sustainable development in its ecological nature, renewable energy is resorted to.

Second: The role of renewable energy in achieving the economic dimension:

Renewable energies contribute to economic diversification through establishing the renewable energies sector and paying attention to developing these technologies locally and creating broad export opportunities that will contribute to the development of a sustainable economy²⁴.

Third: The role of renewable energy in achieving the social dimension: Social issues related to energy use include alleviating poverty by providing sustainable living conditions for residents in poor places, relying on sustainable management of available resources while providing appropriate job opportunities and conducive health and educational conditions to enhance economic growth²⁵. The use of solar energy in remote areas for heating, generating electricity with steam, or drying crops also contributes to breaking the isolation of remote areas and acquiring many skills and experiences, thus contributing to achieving local development²⁶.

The second topic: Mechanisms for implementing the transition to exploiting renewable energy in Algeria and its effects

In an effort to activate the role of renewable energies in protecting the environment and preserving the natural environment in order to achieve sustainable development, Algeria has adopted a number of strategies in order to achieve this, through the following mechanisms:

The first requirement: Mechanisms for implementing the transition to exploiting renewable energy in Algeria

We first address the legal mechanisms, then the regulatory and institutional mechanisms, as follows:

The first section: Legal mechanisms

Aware of the growing importance of renewable energies and energy efficiency, Algeria has integrated their development into its energy policy by adopting a legal framework and by enacting a set of legislative and regulatory texts.

First: Legislative texts

The Algerian legislator developed a number of legislative texts that reflect the interest in transitioning to the use of renewable energies, among which we mention:

- **Law No. 98/11 of August 22, 1998, containing the directive law and the five-year program on scientific research and technological development 1998-2002** ²⁷:It is considered the first actual legislative interest that embodies the state's interest in renewable energies.
- **Law No. 99/09 of July 28, 1999 relating to energy control** ²⁸:Which aims to determine the conditions of the national energy control policy and the means of framing it and putting it into effect.
- **Law No. 02/01 of 02/05/2002 relating to electricity and gas distribution via canals** ²⁹:It is considered the first legislative framework to address the marketing of electrical energy resulting from renewable sources.
- **Law No. 03/10 of July 9, 2003 relating to environmental protection within the framework of sustainable development**: which came to define the basic principles and rules for managing the environment to prevent all pollution problems by ensuring the preservation of its components and repairing the affected areas.
- **Law No. 04/09 of August 14, 2004 relating to the promotion of renewable energies within the framework of sustainable development**³⁰.

Second: Regulatory texts

Among the regulatory texts in this field we mention:

- **Executive Decree No. 04/92 of March 25, 2004 relating to the costs of diversifying electricity production** ³¹:This decree - which came in implementation of the provisions of Law No. 02/01 mentioned above - aims to determine the costs of diversifying electricity produced from renewable energies.
- **Executive Decree No. 17/364 of December 25, 2017 defining the powers of the Minister of Environment and Renewable Energies.**

From the above, we notice the richness of the legal system regulating the renewable energies sector in Algeria. However, this legal arsenal is not sufficient - alone - to develop renewable energies, as a country replete with enormous wealth of renewable energies cannot compete with the global economy with these laws alone. Therefore, to cover this deficiency, the government has established an institutional base for the development of renewable energies, which we will discuss in what follows:

Section Two: Regulatory and Institutional Mechanisms:

In addition to the legal framework related to renewable energies, this sector has been supported by an institutional framework to serve and develop the renewable energies sector. Among the most important of these institutions are³²:

- **National Agency for Energy Development and Rationalization (A P R U):** It was created by Decree 85/235 of August 25, 1985, which included the establishment of an agency for energy development and rationalization .
³³In Algiers, under the supervision of the Ministry of Energy and Mines, and in line with the development in the field of renewable energies, Decree No. 85/235 was amended with the aim of adding many tasks to the agency, in accordance with Decree No. 04/314 of September 25, 2004³⁴.
- **Center for the Development of Renewable Energies (C D E R):** Established on March 28, 1988 by Decree 88/06 in Bouzareah, it is a center charged with preparing and implementing scientific and technological research and development programs, developing energy systems for exploiting renewable energy, and formulating the research work necessary to develop the production and use of renewable energies, in addition to formulating standards for the renewable energy industry and its use³⁵.
- **Solar Equipment Development Unit (U D E S):** Established on January 9, 1988 by the government, it is responsible for developing solar equipment and electrical, thermal, and mechanical equipment and systems that are involved in the development of solar equipment and the use of solar energy.
- **Applied Research Unit in Renewable Energy:** It was established in 1999 and is affiliated with the Renewable Energy Development Center and aims to cooperate with universities and other research centers for research and training in the field of renewable energy.
- **The National Observatory for Renewable Energies:** Established pursuant to Article 17 of Law 04/09, which stipulates: 'A national body shall be established to promote and develop the use of renewable energies, called the National Observatory for the Promotion of Renewable Energies'.
- **The Algerian Institute for Renewable Energies: was created pursuant to Executive Decree No. 11/33 of January 27, 2011**It was dissolved ³⁶. pursuant to Executive Decree No. 16/70 of February 22, 2016 ³⁷ without providing any explanations for this.

-Creation of the Ministry of Environment and Renewable Energies: Pursuant to Presidential Decree 17/23 of August 17, 2017, which includes the appointment of members of the government, a ministry concerned with environmental affairs and renewable energies was created, as a serious and courageous attempt to give this sector more attention by upgrading the field of renewable energies from a directorate affiliated with several ministries to an independent ministry.

From the above, it can be said that Algeria's creation of these bodies and institutions authorized to develop renewable energies embodies its commitment to international agreements on environmental protection and climate change and strengthens its trend towards achieving sustainable development.

The second requirement: Areas of contribution of renewable energy to achieving sustainable development in Algeria:

Renewable energy in Algeria can impact the following³⁸:

- **Achieving sustainable development by delivering energy to all the population of Algeria:** In light of the new energy strategy that Algeria has adopted in recent years, this strategy does not depend only on fossil energy, but rather takes into its dimensions the issue of renewable energy, based on Law 02/01 related to electricity and gas distribution by channels. Renewable energy remains one of the most important concerns of the sector, and what was achieved during the period 2002/2004 with regard to developing the use of renewable energy falls within the framework of what serves sustainable development, and was taken into account. This goal is the responsibility of the energy interests of the inhabitants of isolated places in the greater south of Algeria and deprived rural areas.
- **Achieving sustainable development through diversifying energy sources in Algeria:** Algeria began adopting an energy strategy based on two basic dimensions to achieve it. The first relates to the priorities of responding to internal requirements and achieving a living framework that serves sustainable development. The second dimension was to increase Algeria's reserve capabilities inside and outside the national territory by supporting international partnership and attracting foreign capital and modern technologies.
- **Achieving sustainable development of renewable energy by improving the standard of living in Algeria:** The trend towards achieving an effective contribution of renewable energy sources in providing the energy supplies necessary for the development of rural and remote areas would contribute to combating poverty in these areas through its role in providing opportunities for local employment in the fields of manufacturing, installing and maintaining renewable energy equipment.

Conclusion:

At the conclusion of this study, it can be said that Algeria attaches great importance to the renewable energy sector due to the position it occupies in economic and social development. It also strives to devote the principle of environmental preservation and sustainable development to advance its economy in the future, by opening promising horizons for investment and development in this field, including achieving sustainable development. It has been able to achieve significant achievements in establishing and developing

the structure of this sector through many stimulating programmes, plans and laws.

Through this study we were able to come up with the following results:

-There is a close connection between energy and achieving sustainable development, which requires attention to protecting the environment in order to achieve it.

Renewable energy plays an important role in achieving dimensions of sustainable development by achieving economic gains, improving social conditions, and preserving the environment for future generations.

-Algeria has abundant sources of renewable energy due to its natural and climatic characteristics, especially solar energy and wind energy, which qualifies it to occupy an important position in global markets.

The increasing importance of renewable energies and the great capabilities that Algeria has in this field have prompted it to enact a number of laws and establish specialized structures in order to promote this field.

Based on the results obtained, the following suggestions can be made:

-The necessity of creating partnerships with countries that have experience in the field of renewable energies in order to benefit from their expertise in this field.

-Encouraging investment in the field of renewable energies and encouraging work between the government and the private sector in this field.

-Activating laws and legislation to encourage the use of renewable energy and rationalize the exploitation of fossil energies.

-Developing mechanisms and scientific research processes related to the field of renewable energy.

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³⁵ Nasima, *previous reference, p. 533.*

³⁶ *Algerian Official Gazette, No. 08 dated February 6, 2011*

³⁷ *Algerian Official Gazette, No. 10 dated February 22, 2016.*

³⁸ *Takwasht Emad, former reference, p226.*