



Algeria's Energy Security A Study of the Ingredients, Challenges, and Future Prospects

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Abstract:

The study aims to highlight the strategy adopted by Algeria to achieve the energy transition through the National Renewable Energy Program (NRP) from 2011 to 2030 with the aim of achieving electricity generation in @ renewable energies. However, Algeria's continuation of its energy transition program inevitably faces certain obstacles and challenges so that it can move forward with the energy transition and adopt alternative energies mainly in its energy mix in the face of current situation, which calls for an end to oil dependence and economic diversification.

The study found that, although Algeria has huge potential for renewable energy, especially solar and wind energy. He has set an ambitious 2030 Renewable Energy Development Agenda, but that is until his experience in this area remains in its infancy. The success of the program for the development of these energies in the future holds hostage to find the appropriate financial structure by opening up to the private and external sector and focusing on the human and technological factor as the basis of any growth. Many efforts are needed to ensure the achievement of the objectives of its national energy transition program to renewable energies, in addition to supporting technology and scientific research, in particular in the field of scientific research on energy alternatives and the development of renewable energies, the activation of laws and legislation to encourage the use of renewable and clean energies, and the rationalization of the use of petroleum energy.

Keywords: renewable energies, energy security, energy

Introduction:

Energy is one of the most important topics that attracts the attention of researchers and has received their attention from the past, because of the variety and diversity of areas of use. It is a key pillar of economic and social development. The world is currently experiencing a strategic shift in energy from traditional

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sources to renewable energies. Many developed and developing countries have made strides in preparing possible alternatives for the post-oil period. Interest in studying renewable energies at the end of the twenty-first century has increased due to their great need on the one hand, and to the fact that traditional energy is not permanent on the other, and the damage it causes on nature, such as pollution on the other. In this context, Algeria is one of the most important States concerned with renewable energies because of its enormous potential in this area, particularly solar energy, as well as because of the energy sector's general centrality in the economic and political structure of the Algerian State. Energy transition is no longer optional for Algeria. Internal variables related to the decline in national oil and gas reserves and increased domestic demand for energy, as well as external variables, especially the global shift towards renewable energies, are putting pressure on Algerian decision makers to respond to these variables. The Algerian economy is known to belong to the rent-based pattern of the burning sector. As a result, Algeria's general State budget still depends mainly on the oil revenues employed by the political system in the administration of State affairs and in its relationship with society. It also possesses vast land of various kinds and sources of energy. Its subsoil stores petroleum or natural gas. Its surface receives solar radiation. Resources also occupy a privileged position in Algeria's economy because of their positive material and social effects. Algeria's economic development and growth have been linked to the exploitation of vital resources. Algeria has developed.

01 The importance of the study:

Energy is the vital nerve of any nation in today's world and an important element in achieving development. which justifies these States' endeavours to possess and develop technologies that enable them to achieve their energy security and to reinforce and embrace ambitious and effective energy policies by shaping effective programmes and working to control energy sources and sources, In contrast, the exploitation of traditional energies has a serious negative impact on the integrity of the environment, which is the only vital incubator for the continuation of human life. s sustainable development ", highlighting the urgent need to leverage clean, environmentally friendly energies known as renewable energies, which are important for sustainable and sustainable access to energy while ensuring that environmental integrity is maintained and ensures the achievement of what is known as sustainable development.

- The importance of the study stems from addressing the variables that have driven Algeria towards renewable energies, including solar, wind and underground energy, as well as nuclear energy, which is regarded as alternative and renewable energy resources.



- Renewable energies are alternative energy to traditional energy and their role in preserving the property of future generations with sources that do not cause loss of nature and the environment.

02- Objectives of the study:

This study seeks to achieve a number of objectives that can be limited to:

- Attempt to understand the justification and motivations of the trend towards the exploitation of renewable energy in Algeria.
- Trying to learn about the realities of renewable energy in Algeria and the orientation and exploitation of these sources.
- Highlighting energy alternatives that can be used in foreign trade and this is to diversify the energy mix on which to process a well in the export process.
- Understand the obstacles and challenges of energy security and the most important programs to develop these energies.

03_ problematic study:

Algeria has taken the initiative to experience renewable energy as an alternative to depleted fossil energy towards achieving development, safeguarding the right of future generations to natural wealth and stimulating development inventions, making it a bet on how to make the most effective use of renewable energy sources in Algeria. From this point of view, this problem can be elaborated in the following key question: How successful is Algerian to exploit renewable energies and achieve energy transition? - What are the ingredients for achieving energy security in Algeria and what are Algeria's energy security strategies. ؟. _ What are the obstacles and challenges to achieving robust security in Algeria. ؟. What are the future bets for achieving energy security in Algeria?

04- Study Methodology:

Based on a case study approach, the nature of the research relates to a single case study, Algeria's Alternative Energy Strategy, by describing the possibilities available to it and demonstrating the legal and institutional arsenal to support the energy transition process, as well as Algeria's planned National Energy Transition Strategy Programme, the 2030 horizon.

Through the above study can be divided into:

First axis:

The reality and potential of renewable energies in Algeria.

Second: Challenges to Algeria's energy security.

Axis III: Prospects for Algeria's energy transition

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The realities and potential of renewable energies in Algeria Second theme: Challenges to Algeria's energy security Axis III: Prospects for Algeria's energy transition

The realities and potential of renewable energies in Algeria.



- Algeria has sought alternative ways of exploiting energy beyond oil. It has also paved the way for the green energy dynamic by launching a strategic plan for the development of renewable energies and energy effectiveness by relying on renewable energy resources. Algeria possesses important possibilities and qualifications in the field of renewable energies that qualify it for the world's first ranks in this area, owing to its vast area and strategic geographical location, as well as adequate climatic conditions. These possibilities will be highlighted in the following:ⁱ

First: Solar Energy:

Solar energy is the world's best clean and inexhaustible energy source. Interest in it originated in the early 1950s. The costs of this source were high compared to fossil energy sources. Interest in this source increased further after the 1960s when electricity generated from sunlight emerged, especially in high-solar countries.

Algeria has an estimated area of more than 2.3 million square kilometers, of which the Sahara represents 80.0%. They have an enormous stock of this energy, and this is what the Department of Renewable Energies and Energy Effectiveness announced in December 2020, Algeria has one of the world's largest solar fields. with a period of more than 2,000 hours per year on almost the entire national territory, Solar radiation production can reach 5,5 kW/h (approximately 1860 kW/h per square metre in the north) and 6.6 kW/h (approximately 2410 kW/h per year per square metre in the large ⁱⁱ south, so solar energy occupies an important place in the new energy programme that aims to provide 22,000 megawatts of generating electricity through the use of solar power during the period 2011-2030.ⁱⁱⁱ

Second: Wind Energy:

Wind energy is expressed by air movement in the atmosphere and is the transformative process of kinetic energy of air into regular rotary turbine power using wind turbines which are used in ancient water lifting and grinding and are currently used in generating electric power.

Algeria's wind resource changes from region to region as a result of terrain and climate diversity in which Algeria is divided into two main geographical areas, namely, the Mediterranean-bordered North, where wind speed is generally moderate, The region of the south, characterized by more wind speed than the north, possesses rich wind-speed areas averaging 5m/s in the Tindouf region, Tiart and Oran, with a maximum of more than 6 m/s in the Adrar, Timimon and Ayn Saleh, which are suitable fields for the establishment of wind farms for the production of electric power And it can be said that the wind speed in Algeria is moderate and ranges from 2 to 6 m/s, which is energy. is suitable for water pumping, especially in high plains, but the high cost of achieving wind energy



platforms is one of the main reasons for obstructing their realization on the ground.^{iv}

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Third: Underground Energy:

It can be argued that the geothermal energy is the heat stored beneath the Earth's surface, and this type of heat is embodied in hot water, wet and dry steam, hot rock, compressed heat in depth, emerging from the Earth's hollow by connection, thermal transport, hot springs and revolving volcanoes.

Algeria has more than 200 sources in the north of the country Two thirds of these sources are above 45 degrees Celsius, and the sedimentary basin beneath the desert contains important hot water reserves that have not been exploited and are one of the most important untapped natural riches. Besides generating electricity, underground energy can contribute to the upgrading of our country's agricultural sector, especially in the southern regions. and thermal energy flowing from the Earth's underground provides great opportunities for sustainable food production, As well as other sources up to 118 in Biskara and 1994 in Ain and Lman, which calls for the establishment of power plants.

It can be said that Algeria has an aquifer of hot water consisting of thousands of square kilometres, known as the "alpine aquifer" or "large boat", bordered north by Biskara province, south by Ayn Saleh, west by Adrar and east by the Tunisian border, where the average temperature is estimated at 57.^v

IV. Hydropower:

Energy generated from watersheds is the cheapest energy resource but their use requires special natural conditions relating to watercourse, water quantity, prevailing climate, terrain, etc., along with economic conditions related to the proximity of these resources to the market, lack of competition from other energy resources, and other factors.^{vi}

Hydropower is a limited source of energy in Algeria for limited water and rivers. This is despite the large amount of rainfall, most of which are not used as a result of poor mobilization capacity, In addition to other factors such as the concentration of precipitation in certain areas of the home² While the amount of water falling on the national territory is estimated at 68 billion cubic metres, most of it is not exploited and headed for the sea, Renewable resources are currently estimated at 25 billion m³ of which about 02/03 water/surface resources ", there are currently 103 dams, of which 50 are in service.^{vii}

V. Biomass energy

Organic energy can be said to be those that can be extracted from plant and animal materials and waste after being converted into liquid and gas by chemical



or thermal degradation methods. It can also not be utilized by directly burning them and using the resulting heat in heating water or producing steam by which turbines can be operated and generating electric power.^{viii}

Algeria's bioenergy resources consist mainly of forest resources (forest wealth), particularly tropical forests in the north of the country, accounting for 10% of the country's total area, and the remainder of the area is a desert area. The total capacity of this resource represents 37 megatons, with a recovery capacity of 3.7 megatons, a rate of 10%. On the other hand, bioenergy consists of agricultural and urban waste resources, estimated at 5 million, which represent a field capable of absorbing 1.33 million tons annually.^{ix}

Sixth _ Nuclear Power:

Nuclear energy is energy that can be exported from the corn nucleus and here are two ways to produce this energy either by fission or fusion, and it is commonly used to produce nuclear energy uranium material.^x

Nuclear power is exploited in nuclear power plants, to heat water and produce steam for use in electricity production. Atomic energy is also called nuclear energy. It is the most effective type of energy and is divided into two types: nuclear fission and nuclear fusion. Nuclear energy is used in some submarines and ships where a hot reactor is generated sufficient to create vapour that drives the circle. The most important types of reactors are:

- _ Rapid refrigeration reactorLead used in Russian submarines.
- _ Thorium-powered salt reactor.
- _ Progressive gas cooling reactor, powered by natural or enriched uranium.
- _ Heavy water reactor pressed with natural uranium.^{xi}

Seventh _ Hydrogen Energy:

Hydrogen is one of the most present elements in the universe, on Garalengumi, and the Sun has a high hydrogen content in space. Amavi Earth has hydrogen as a separate element, being in the air in small proportions, while being highly available and united with oxygen in the liquid picture in the form of ocean water, seas and rivers. ideal fuel in terms of technical, economic and environmental impacts, A kilogram of hydrogen provides three times as much petroleum as a kilogram. Hydrogen can be provided through the electrical degradation of water or thermal degradation through direct heating, or through The effect of solar radiation directly or through the process resembling the photosynthesis process of plants, hydrogen represents 75% of the mass

of the universe and 90% of the molecules in its composition.^{xii}



Second theme: Challenges to Algeria's energy security

The concept of Algerian energy security reflects the new set of indicators of the evolution of the concept and dimensions of security. Algeria's energy security is the security of the constant demand for energy resources, at competitive prices that ensure the reimbursement of investment costs and financial profits. It also includes the security of the sustainability of adequate and durable extraction of energy sources and of environmental damage and hazards.

I. Internal challenges to Algeria's energy security

Algeria's energy security faces many obstacles to its achievement, on the one hand, and ways to develop and upgrade it, on the other. These challenges can be presented as follows: Security situation:

This reflects the impact of the country's security situation on energy security, which has caused significant material and human losses. The Algerian security forces' firm engagement with the incident illustrates the importance of energy security for the Algerian State, and how terrorist attacks and the security situation can affect energy security by fearing that terrorist organizations may control sources of energy supplies.

The seizure of merchant ships by means of weapons reinforces the requirements for the protection of sea lanes and maritime navigation. The 2009 hijacking of the Sreus Star oil tanker and the Ma 'ren Santoros tanker on Somali coasts was the biggest evidence of the impact of piracy on energy security and the resulting damage to the global and domestic energy security of ship-owning States.^{xiii}

Nearly two-thirds of crude oil and the source product are trending daily through oil tankers, which are divided into two parts between what is meant for transoceanic crude oil and refined petroleum offshore. Of the 48 million barrels of crude petroleum transported daily, more than 35 million are transported through the Straits and are considered potential targets of terrorist movements and organizations or pirates.^{xiv}

In 1869, the world's first tanker transported oil from the United States of America to Europe. And sea tankers have been doubling from that time to the present day. Each year, about 62% of the world's oil production is transported via offshore oil tankers. While the remaining 38% is transported via oil pipes, trains and trucks for short distances, the oil market currently has 4,042 offshore tankers in service.

The world's maritime corridors are undoubtedly full of sea straits. There are about 200 locations of straits, canals and heads in the world. Most of the straits and canals are located in relatively unstable areas of strategic importance and include the geopolitical distribution of oil in the world through 6 maritime choke points in



the world: the Strait of Hormuz, Malacca, Bab al-Mandab, Bosphore, Suez Canal and Panama.^{xv}

03- Investment Challenges:

Alternative energies at the end of the last century did not receive much attention under public data. global inventories in the field, It has been known to increase somewhat, as reflected in the proliferation of solar cells and wind turbines in various regions of the world, According to the International Renewable Energy Agency's report, there remains a recorded preference for proven technologies. Such as solar photovoltaic and wind power production technology, compared with fossil energy, there is a great preference for investing in fossil energy, A range of conditions and factors affect.^{xvi}

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1-Country-specific conditions such as availability of resources, financing costs, land and labour.

2 - The confidence reflected in investors.

3. Other policies related to renewable energy such as: grid policies, distribution priority, content rules local.

4 auction design to be implemented.^{xvii}

Among the greatest obstacles and challenges facing investment in Algeria (real estate), Algeria has developed several bodies and institutions to facilitate the process of approving the application for acquisition of property. These bodies are represented in:

- Ministry of Processing, Directorate General, Ministry of Interior, Directorate General of Environment and Preparation.

- Housing Development Agency for the upgrading of the property.

- Local land agency conducting municipal land lists.

- CALPI, which responds to investors' requests at the state level

A list of land destined for investment projects should be provided with a technical profile



Per piece. Slow taking in all these bodies led to:

- Delay or length of DRA's file for the order of the plot.
- The high cost of land allocated for investment.
- The failure to guarantee justice, the settlement of proceedings, the inflexibility of these bodies and the large number of files required.
- Administrative corruption, embezzlement and arbitrariness in the granting of land intended for the industrial sector and converted into other uses;
- The problem of rationality in the allocation of land for approved activities.
- The presence of several lands in unregistered industrial zones and the length of the allocation of the industrial property.
- The legislation on real estate is scattered between several unclear texts of management and not even economic dealers, which doubles the procedure's transparency.^{xviii}

04. Technical and technological challenges:

These challenges involve everything directly related to the energy industry and its development, namely the technical work that affects the devices as well as the problem of maintenance and development of the right and energy of gas and oil "The technical and technological challenges in Algeria are reflected in the attraction of modern and foreign technologies in the field of research, extraction, transport and treatment of all the energy materials available in Algeria, including renewable energies and all related to their development and development. It also faces many challenges in terms of technical performance and lack of services Specialized engineering in addition to the problem of intellectual property thefts to emerging markets in the field of renewable and alternative energy."^{xix}

05-Industrial capacity: Industry is a catalyst and promoter of the energy transition process and its weakness is a major obstacle to the process. It is imperative to use foreign offices and industries, which raises production costs and which necessarily leads to weak competition in international markets.^{xx}

The production and use of advanced technology in the production of alternative energy requires concerted efforts of manufacturing companies, users, relevant legislative and executive authorities, scientific research and other actors Roles and implementation plans must be defined and an integrated management system developed to coordinate these Parties' access to energy production from renewable sources, Algeria lacks a coordinating aspect and has such difficulty storing.^{xxi}

06-Economic Challenges:

These challenges are mainly the constant volatility and instability of energy prices in the global market and the difficulty in controlling global production, which contributes to this volatility. The greatest challenge for Algeria is to strive internationally, especially within the framework of OPEC, to balance supply with



demand by controlling production policies in producing countries so as to create a balance in the world's prices of incinerators. Because energy is generally a product that is vulnerable to foreign exchange rate fluctuations As for renewable energy retention, it is usually associated with either energy-producing companies or countries' rents.^{xxii}

Economic and political obstacles include:

- Mismanagement that characterizes some of Rafah's pain that is necessary for the speed and effectiveness of certain activities

Trade and investment.

- The lack of effectiveness of the banking system through the lack of professionalism of its users and lack of material capabilities in addition to the narrow financial market and the difficulty of its integration with the global market.

- Legal ambiguity through the ambiguity of certain legal and regulatory aspects of the overall privatization of public institutions, which prevents foreign investors from being encouraged in investing in the State The persistent deterioration and instability of the local currency leads to lower prices compared to other currencies, resulting in lower real value of investment compared to foreign currencies, which necessarily erodes investors' profits when converted.

07-Political Challenges:

In addition to all kinds of challenges we have addressed, there are a number of challenges of a political nature to Algeria's energy security processes, including the prospects of countries reversing energy purchase agreements that secure long-term revenues and incomes and the continued inclusion of energy projects. and the lack of stability in the legal system for the production of renewable energy that stimulates investment in the sector, thereby increasing contractual risks and the energy sector is directly influenced by the political positions of States and political systems, which directly affects this energy security for producing or consuming States, Evidence of this political relationship between Russia and the European Union and the impact of political positions on Europe's energy security.

08. Social Challenges:

Algeria is one of the countries most supportive of the price of energy resources, since resources of internal origin are necessarily the property of all people. It is a tool for citizens' social protection and mitigation and is a form of wealth sharing. We share this approach with a group of energy exporters, especially Arab countries. third place in OPEC after both Iran and Iraq in support, Pre-tax support in 2011 was estimated at 11% of gross domestic product (GDP). s energy security ", although the current ratio of support had fallen from 2011, it was one of the greatest challenges to Algeria's energy security.^{xxiii}

9 -Environmental costs: Support adversely affects the environmental situation and environmental protection, contributing to higher energy uses,



increased emissions and greenhouse gases, as well as impeding the development of alternative energy technologies.^{xxiv}

External challenges to Algeria's energy security. These challenges are as follows:

External challenges are all external challenges beyond the will, policies and strategies of the State, expressing extraterritorial effects and affecting Algeria's energy security, including:

01- Security situation in Africa. The security situation on the African continent has become a daunting challenge for Algeria's energy security, particularly in the Sahel region, neighbouring countries and security conditions, which create a range of security threats for the Algerian State along national borders and impose additional security burdens on Algeria

02. The activity of terrorist organizations in general and al-Qa 'idah in particular is growing: al-Qa' idah in the Maghreb, which affects security conditions in the south of Algeria and thus poses a threat to Algerian power stations, which in practice mortgage the production of energy in Algeria. The Ticentorin incident is considered to be the best evidence of the impact of terrorist groups on Alg's energy security, including global energy security.

- The growing phenomenon of illegal migration: Algeria considers that it is a transit zone for African migrants towards Europe. This represents a major challenge for the Algerian State, first, to combat illegal migration and secondly to protect the State from the security threats that accompany the migration process itself.

- 03 Problems of partnership and cooperation: The issue of economic partnership between Algeria and some countries, especially the energy pillar, and the concern of some States to abandon partnerships concluded in the context of fear of security conditions, is a major challenge that may place Algeria in a major stalemate of energy and political security, which increases the likelihood of reduced demand for Algerian energy products by some European countries.

- 04. Burning prices and the global market: fluctuating prices of oil and energy products in international markets are among the greatest external challenges to Algeria's energy security on the one hand and economic security on the other. Fluctuating prices make them difficult to predict. This leads to the need to deal continuously with the various sudden crises that can result from this volatility, including the difficulty of controlling the economic situation and energy policies and strategies on the other. and the sharp decline in the price of incinerators in global markets leads to the need to cope with structural crises occurring in the national economy.

The issue of petroleum depletion is one of the most important concerns at the top of international and United Nations bodies in the face of a major conflict



between those who consider that the KFTC will be implemented in the next few decades and another team who considers that oil will continue as a core material based on new discoveries and the development of exploration and extraction technologies, especially with the emergence of shale gas that has strengthened global reserves. But oil will remain a non-renewable substance that is particularly depletable as demand for it increases at a great pace by China, India and emerging Asian economies.

-05 Competition for energy: This puts the countries in the face of strategies developed by the major Powers, which contributes to the process of building integrated energy security in these countries, where these competition affects the areas of energy presence and affects their global prices.^{xxv}

Many of Algeria's competing energy supply line projects and traditional markets are also in Europe, despite the fact that Algeria is the third largest supplier of gas to European countries. But what is noticeable is the decline in exports due to the new supply of natural gas from the States of America, Australia and Russia, It has caused prices to fall and the Central Asian, Arab East and North African countries are also moving towards several competing pipeline projects.

Algerian gas has become a great bet for the economic and social stability of States, especially industrial doo.^{xxvi}

Axis III: Prospects for Algeria's energy transition

The exploitation of renewable energies in Algeria through its Energy Transition Programme needs to take a series of steps to shift from rent to an open economy that ensures energy security by meeting domestic energy demand with high domestic consumption and anticipating the steps of competitors in the international energy market through a comprehensive vision that combines economic and political dimensions in addition to emulating the successful experiences of developed countries such as Germany by giving preferential prices to alternative energy producers, Launch of industrial fabric specializing in renewable energies through technological innovation.^{xxvii}

Algeria has adopted an ambitious programme for the development and development of renewable energies to ensure promising prospects that will enable it, if successful, to achieve an estimated 27% share of national electricity production from renewable energy. export ", part of which is allocated to cover internal consumption and the remainder is destined for export, which will provide Algeria with an important energy resource, As well as achieving financial and economic abundance and creating jobs that contribute to improving the conditions of life and raising the level of individual and national gross income.

Renewable energies can be exploited to achieve the country's energy security and sustainable development while maintaining the cleanliness and integrity of the environment. Through its energy transition programme, Algeria looks forward to



assessing its renewable energy deposits, thereby controlling the process of transforming and storing these energies and developing the necessary skills to start from study to completion.

For future projects, the establishment of the Renewable Energy Technology Pole was announced in Ghardaia and will be completed by a unit of applied research in renewable energies of the Center for Renewable Energy Development with the support and supervision of the General Directorate of Scientific Research and Technological Development The project includes four technological platforms: solar photoelectric and solar thermoenergy, It also includes a hydrogen completion platform from renewable sources and solar applications in agriculture.^{xxviii}

Completion of a Special Products Approval Centre - Algeria Plans for 2021-2030. With renewable energy equipment and an integration rate above 80% by expanding the ability to produce photovoltaic cells This period will be characterized by the development of a national contracting network for the manufacture of the necessary devices in the construction of solar-electro plants, as well as full control of engineering and supply activities and the construction of saltwater desalination plants and units, In addition to exporting electricity produced from renewable energies, skill and devices that are involved in electricity production will be exported from renewable energies. and, in the same period, Algeria is looking to achieve an 80% integration rate by expanding mirror-making capacity, expanding the capacity to manufacture heat-borne liquids and storage devices Energy, expanding the capacity to manufacture power mass devices and to manufacture, supply and accomplish plants by means of capabilities, and Algeria seeks to reach during the period. 2030-2021 to a integration ratio of up to 80% thanks to the expansion of the capacity of the pole industry and wind rotors with special capabilities and control. Engineering and supply activities and construction of saltwater desalination plants and units.

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Within the framework of the social and economic partnership for the implementation of the National Renewable Energies Programme, the Algerian Confederation of Employers called on May 24, 2021, to accelerate the reflection of the energy transition project and translate it at the practical and field level by taking appropriate measures to activate this step in order to achieve the results of energy efficiency, rationalize public expenditures and create jobs.



The Chairman of the Confederate Energy Committee stressed that the trend towards re^{xxix}al energy transition and the exploitation of renewable energies is not so much a choice as a necessity imposed by a series of current data, noting that the Committee has prepared a road map to reflect this program by introducing 41 proposals that take into account all aspects involved in this equation and thus arrive at an Algerian 100% model. and called for the establishment of the appropriate legal and regulatory framework for this type of investment as one of the obstacles to the framing of activity in this field and the corresponding action to release the hands of economic dealers wishing to engage in activity in the sector and leave the task of controlling the competent interests of the State.

The translation of this programme as stipulated in the proposed road map will contribute to the creation of direct and indirect employment positions on the basis that the production of 900 gigawatts of renewable energy contributes to the creation of 8.8 million jobs in the world, representing 10 jobs for every megawatt produced, and therefore for Algeria - Add. 300 thousand positions could be created in exchange for achieving the goal of producing 30 gigawatt in one year's horizon. 2050.^{xxx}

Renewable energies will, for the future, receive greater attention from the state, especially in electricity production, increasing their integration into the energy system and taking an important place in the state's concerns for the benefits they provide and their contribution to the achievement of sustainable development requirements.

It is therefore very helpful for those involved in Algeria's energy policy to continue to promote and develop its capabilities and potential for renewable energies, especially solar energy, which is one of the most sustainable resources in which it is abundant. as well as other capacities such as wind and groundwater energy, investing in such energies is the most appropriate strategic option that Algeria must adopt and devote to achieving the requirements of sustainable development.

In the interest of the success of the renewable energies programme, Algeria intends to develop its industrial resources in the coming period through the establishment of a solar PV handling network with the development of renewable energies equipment, beginning with a national integration rate of about 60%. This period will be characterized by the development of a national contractor's network to manufacture the necessary equipment in the construction of photovoltaic solar plants and will also be characterized by the full control of engineering activities and the provision of the construction of saltwater desalination plant, In addition to exporting electricity produced from renewable energies, skill and devices that are involved in electricity production will be exported ^{xxxi}from renewable energies, The program also aims to raise the activity of engineering and has been designed and



accomplished to reach a national integration rate estimated at: 80% by expanding the capacity of making mirrors, expanding the capacity of making heat-borne liquids and energy storage devices, expanding the capacity of making power mass devices and making and supplying the achievement of plants by special capabilities. Algeria has initiated a search for ways to raise its productivity and exploit renewable energy sources as much as possible. In this context, it has planned several future projects for the upgrading of energy resources. Intensive plans have been made to develop their production and utilization and to activate their uses. Hoping that it will diversify, upgrade or maintain its energy exports from accessing alternative energy to its approved energy sources, the study showed the effectiveness of Algeria's 2011 national renewable energy programme - 2030, the contribution of renewable energy to the national mix is severely weakened by less than 1%. This is due to the main constraints that must be overcome in several levels and in many areas to implement the project, which opens the way for renewable energies in the future.

Conclusion:

The world is currently undergoing a strong shift similar to the transformation from the coal to the oil age, with the shift towards renewable energies not necessarily linked to oil depletion as much as new sources of energy that are less costly and less harmful to the environment and humanity, and are consistent with the so-called green economy.

In this context, Algeria must keep pace with, integrate into and benefit from this transformation as much as possible, particularly with regard to the acquisition of modern technology associated with this type of energy, within the framework of a comprehensive development strategy aimed at achieving security in all its dimensions, particularly the energy dimension. Its objective is also to maintain Algeria's strategic position at the international level in the field of energy production and export. s Development ", allowing it to activate its relations with the European Union States, which are Algeria's most important energy importer.

The study shows that Algeria possesses enormous potential and potential for a variety of renewable energies such as solar energy, which is the most abundant and abundant resource in addition to wind energy. This wealth of renewable energy inevitably contributes to Algeria's sustainable development if exploited, utilized and qualified to be a leader in the production of this kind of clean energy under sustainability, the new economic orientation on which Algeria relies to contribute to the elimination of dependence on oil rice.

By developing a comprehensive, forward-looking and quality strategy, which includes two key dimensions: first, the adoption of governance mechanisms in the management of energy resources, whether traditional or renewable, and second, the



investment of renewable energies as a means of moving from rent to productive economy, and as a resource for sustainable and effective economic development.

Despite the importance attached to this programme, it has not fully achieved its objectives. In 2015, the initial target of producing 40% of electricity from renewable sources by 2030 was adjusted to only 27%, which Algeria is trying to achieve before the deadlines.

Therefore, Algeria needs to pursue a long-term strategy until 2030, which is summarized in the National Renewable Energies Programme through the optimal utilization of resources for energy efficiency, supported by a series of legislative mechanisms and laws that operate under the custody of national bodies and institutions dedicated to this purpose, supported by financial and tax stimulus privileges and measures for optimal exploitation in order to achieve the objectives of energy transformation, such as energy security, eliminating the dependence of traditional resources and ensuring the right of future generations. In particular, the programme is in line with Algeria's potential. However, the transition project is proceeding at a slow pace owing to the constraints faced, first and foremost, by the lack of effective reflection of Algeria's energy transition strategy.

_ Study results: The study produced a set of results that can be summarized in the following:

_ Renewable energy is clean and does not pose a threat to the environment and is available in nature in an ever-enormous manner, but it needs technology to exploit it. It is the ideal alternative to depleted energies where sustainable resources are considered, which means that it will never be exhausted or damaged and will allow for the equitable distribution of resources between generations by ensuring the right of future generations of energy.

Renewable energies provide a real opportunity to combine economic growth with maintaining the integrity of the environment. Development cannot be limited to economic growth.

Algeria has an enormous potential for renewable energies due to its geographical location, especially solar energy, which would enable it to be the leader in this field if optimized.

Algeria has taken several measures to invest in renewable energies by launching an ambitious program to develop renewable energies from its various sources between 2011 and year. 2030

_ Algeria's growing interest in expanding its investments in the development of various forms of renewable energies s Development ", which has become an essential energy resource supportive of security and energy transition towards renewable sources of energy that serve the goals of sustainable development, Many efforts have been made to invest in the provision of basic, legislative and regulatory infrastructure for the development of renewable energies within renewable energy



development and energy effectiveness programmes to achieve the goals of diversity, transition and energy stability.

Advanced technology can play an important role in optimizing the utilization of renewable energies. Scientific research and innovations in the field of renewable energy technology should be encouraged and their application in the field should be pursued in addition to conducting formative and qualifying courses in the field of renewable energies.

There are three main drivers for driving markets towards the use of renewable energies: global energy security, fear of dependence and low cost of traditional energy resources as a result of technological developments.

– Laws and legislation must be enacted to encourage the use of renewable and clean energy and rationalize the use of fossil energy.

- The State should intervene with some assistance in developing the renewable energy market, given Algeria's qualifications in this comparison with the Maghreb countries, which preceded us by important strides.

- The need to open up to the local private sector and give it financial and financial incentives to invest in renewable energies.

Work on establishing companies with foreign countries with high efficiency and expertise in renewable energies. This will enable them to overcome financing problems and transfer the technology needed to develop these resources and provide many job positions.

- Strive to develop a more flexible legal framework and legislation and stimulate investment in renewable energies.

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