

MECHANISMS AND MEASURES FOR THE DEVELOPMENT OF ENERGY SOURCES IN ALGERIA IN LIGHT OF SUSTAINABLE DEVELOPMENT

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ARTICLE INFO

Received: Aug, 14th 2024

Accepted: Oct, 14th 2024

Keywords:

Article history:

Energy; Energy Sources; Sustainable Development; Rationalization of Consumption; Environmental Protection; Algeria.



ABSTRACT

Objective: The aim of this study is to examine the sustainable use of energy sources in Algeria, focusing on the need to improve the efficiency of managing non-renewable resources in light of increasing global energy consumption and its environmental impacts. Given that Algeria heavily relies on non-renewable energies, the research addresses the importance of enhancing the sustainability of these sources to align with global development goals.

Theoretical Framework: The theoretical framework discusses the role of energy in global economies, particularly emphasizing the environmental challenges posed by non-renewable energy sources. It explores concepts related to sustainable development, resource management, and the importance of aligning national energy policies with global sustainability standards.

Methodology: The study utilizes a comprehensive review of existing literature and energy consumption data in Algeria. It assesses current resource management practices, explores policy frameworks, and identifies opportunities for improving energy efficiency and sustainability. The methodology includes both qualitative and quantitative analyses to provide a holistic understanding of the issue.

Findings: The results indicate that Algeria's heavy reliance on non-renewable energy sources necessitates immediate action to improve resource management efficiency. The study highlights key areas where policy improvements can lead to more sustainable use of energy, ultimately contributing to long-term economic and environmental stability.

Research, Practical & Social Implications: The study has significant implications for energy policy development in Algeria, offering insights into how the country can better manage its non-renewable energy resources. Practically, it suggests actionable strategies for improving energy efficiency and aligning with global sustainability goals. Socially, the research emphasizes the importance of addressing energy consumption patterns to reduce environmental harm and ensure sustainable development.

Originality/Value: The value of the study lies in its focus on Algeria, providing context-specific insights into sustainable energy management. It highlights the urgent need for improving the efficiency of non-renewable resource use in a country that heavily depends on such sources, while offering practical recommendations for policy makers to foster sustainable development in the energy sector.

Doi: https://doi.org/10.26668/businessreview/2024.v9i11.5108

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ISSN: 2525-3654

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MECANISMOS E MEDIDAS PARA O DESENVOLVIMENTO DAS FONTES DE ENERGIA NA ARGÉLIA À LUZ DO DESENVOLVIMENTO SUSTENTÁVEL

RESUMO

Objetivo: O objetivo deste estudo é examinar o uso sustentável das fontes de energia na Argélia, com foco na necessidade de melhorar a eficiência na gestão de recursos não renováveis à luz do aumento do consumo global de energia e seus impactos ambientais. Dado que a Argélia depende fortemente de energias não renováveis, a pesquisa aborda a importância de aumentar a sustentabilidade dessas fontes para alinhar-se aos objetivos de desenvolvimento global.

Estrutura Teórica: A estrutura teórica discute o papel da energia nas economias globais, destacando especialmente os desafios ambientais colocados pelas fontes de energia não renováveis. Explora conceitos relacionados ao desenvolvimento sustentável, à gestão de recursos e à importância de alinhar as políticas energéticas nacionais aos padrões globais de sustentabilidade.

Metodologia: O estudo utiliza uma revisão abrangente da literatura existente e dos dados de consumo de energia na Argélia. Avalia as práticas atuais de gestão de recursos, explora quadros políticos e identifica oportunidades para melhorar a eficiência energética e a sustentabilidade. A metodologia inclui análises qualitativas e quantitativas para fornecer uma compreensão holística da questão.

Resultados: Os resultados indicam que a forte dependência da Argélia de fontes de energia não renováveis exige uma ação imediata para melhorar a eficiência da gestão de recursos. O estudo destaca áreas-chave onde melhorias políticas podem levar a um uso mais sustentável da energia, contribuindo assim para a estabilidade econômica e ambiental a longo prazo.

Implicações de Pesquisa, Práticas e Sociais: O estudo tem implicações significativas para o desenvolvimento de políticas energéticas na Argélia, oferecendo insights sobre como o país pode gerenciar melhor seus recursos de energia não renováveis. Na prática, sugere estratégias acionáveis para melhorar a eficiência energética e alinharse aos objetivos globais de sustentabilidade. Socialmente, a pesquisa enfatiza a importância de abordar os padrões de consumo de energia para reduzir os danos ambientais e garantir o desenvolvimento sustentável.

Originalidade/Valor: O valor do estudo reside no foco específico na Argélia, proporcionando insights contextuais sobre a gestão sustentável da energia. Destaca a necessidade urgente de melhorar a eficiência do uso de recursos não renováveis em um país que depende fortemente dessas fontes, ao mesmo tempo que oferece recomendações práticas para os formuladores de políticas promoverem o desenvolvimento sustentável no setor energético.

Palavras-chave: Energia, Fontes de Energia, Desenvolvimento Sustentável, Racionalização do Consumo, Proteção Ambiental, Argélia.

MECANISMOS Y MEDIDAS PARA EL DESARROLLO DE LAS FUENTES DE ENERGÍA EN ARGELIA A LA LUZ DEL DESARROLLO SOSTENIBLE

RESUMEN

Objetivo: El objetivo de este estudio es examinar el uso sostenible de las fuentes de energía en Argelia, centrándose en la necesidad de mejorar la eficiencia en la gestión de recursos no renovables a la luz del aumento del consumo global de energía y sus impactos ambientales. Dado que Argelia depende en gran medida de energías no renovables, la investigación aborda la importancia de aumentar la sostenibilidad de estas fuentes para alinearse con los objetivos de desarrollo global.

Marco Teórico: El marco teórico discute el papel de la energía en las economías globales, destacando especialmente los desafíos ambientales planteados por las fuentes de energía no renovables. Explora conceptos relacionados con el desarrollo sostenible, la gestión de recursos y la importancia de alinear las políticas energéticas nacionales con los estándares globales de sostenibilidad.

Metodología: El estudio utiliza una revisión exhaustiva de la literatura existente y de los datos de consumo de energía en Argelia. Evalúa las prácticas actuales de gestión de recursos, explora marcos políticos e identifica oportunidades para mejorar la eficiencia energética y la sostenibilidad. La metodología incluye análisis cualitativos y cuantitativos para proporcionar una comprensión holística del problema.

Resultados: Los resultados indican que la fuerte dependencia de Argelia de fuentes de energía no renovables requiere una acción inmediata para mejorar la eficiencia en la gestión de recursos. El estudio destaca áreas clave donde las mejoras en las políticas pueden conducir a un uso más sostenible de la energía, contribuyendo así a la estabilidad económica y ambiental a largo plazo.

Implicaciones de Investigación, Prácticas y Sociales: El estudio tiene implicaciones significativas para el desarrollo de políticas energéticas en Argelia, ofreciendo perspectivas sobre cómo el país puede gestionar mejor sus recursos de energía no renovables. En la práctica, sugiere estrategias accionables para mejorar la eficiencia energética y alinearse con los objetivos globales de sostenibilidad. Socialmente, la investigación enfatiza la

importancia de abordar los patrones de consumo de energía para reducir el daño ambiental y garantizar el desarrollo sostenible.

Originalidad/Valor: El valor del estudio radica en su enfoque específico en Argelia, proporcionando conocimientos contextuales sobre la gestión sostenible de la energía. Destaca la urgente necesidad de mejorar la eficiencia en el uso de recursos no renovables en un país que depende en gran medida de estas fuentes, al tiempo que ofrece recomendaciones prácticas para que los formuladores de políticas promuevan el desarrollo sostenible en el sector energético.

Palabras clave: Energía, Fuentes de Energía, Desarrollo Sostenible, Racionalización del Consumo, Protección Ambiental, Argelia.

1 INTRODUCTION

Pose Energy topics are one of the main components of the progress of countries, as they play a vital role, as their consumption rates have increased markedly due to the growing global demand for them at an accelerated pace, which has increased concerns about the depletion of their resources, especially since the main source of energy consists of non-renewable sources, represented by oil, natural gas and For example, oil will not survive for more than two hundred years at the latest, due to the speed of its consumption as a raw material as well as for other energy sources.

Energy sources, despite the benefits that their use brings, but their use has negative effects on the economy in general, in this context, the calls and voices issued by meetings, conferences and international organizations have called for the need to find ways to avoid these effects and provide the necessary solutions while contributing to relieving pressure on nonrenewable energy sources and supporting them to ensure the continuity of securing energy supply The future of different countries of the world.

In view of this situation, the idea of sustainable use of energy sources was put forward, through diversifying energy sources by moving towards the exploitation of new and renewable energies and controlling their technologies and technologies as an imperative and an optimal way to reach a mix that achieves sustainability, as well as work to improve energy efficiency and rationalize its use to preserve its resources and reduce waste to ensure the right of subsequent generations to benefit from the energy wealth This has prompted many countries to follow this path in order to keep abreast of developments in this field, including our country Algeria, which has a strategic location among the countries of the world, and it also has a wide area. It possesses huge mineral and water resources, especially petroleum. In addition, it has enormous economic potential in terms of mineral and energy, and it is not exploited better,

which would reflect on the strength of the Algerian economy and development plans now and in the future. Based on the foregoing, the research problem can be posed as follows:

What are the most important mechanisms and measures that can be followed to develop energy sources in Algeria sustainably

For the purpose of answering this problem, this research paper has been divided into two main axes, which are as follows:

- first: the basics about energy;
- second: what is sustainable development;
- third: sustainable development of energy sources in Algeria.

2 FIRST: THE BASICS ABOUT ENERGY

Energy is a necessity of life and existence, and man or societies cannot live without energy, but this energy must provide quantities appropriate to the need and from reliable energy sources that do not affect harm to the environment, from this point of view, in this axis of research we will touch on the concept of energy, then we review its traditional and alternative sources, then after So we will explain the importance of energy conservation.

2.1 THE CONCEPT OF ENERGY

Energy is the nerve of life, and the main engine of industrial progress in particular, and economic progress in general, and science has played a major role in transforming economic resources from their initial or original form to other forms, to satisfy and meet the desires and needs of consumers, and given the important and growing role that energy plays in all economies, whether developed or developing, it The topic of energy has received study and attention at the level of the countries of the world.

Energy is meant as the effort exerted by machines and devices. It is also defined as: "the effort exerted by conventional and renewable energy sources to serve human purposes and to perpetuate his life on the planet, some of which are limited in quantity and others are renewable." ⁽¹⁾.

2.2 TRADITIONAL SOURCES OF ENERGY

Conventional energy sources are represented by:

a. Coal: It is from carbonaceous sedimentary rocks, originally from leftover plants from forests that were deposited in inland seas or swamps, docked and covered with water, isolated from the air and then over time, under extreme pressure and heat, and over a period of millions of years, it turned into coal layers varying in thicknes⁽²⁾ Coal has played a huge role in energy generation and has become a symbol of industrial power in the world, but this importance has decreased relatively since the second half of the nineteenth century due to the discovery of oil and the many advantages that are not available in coal, this has affected the percentage of energy supplies, and in turn, the percentage of oil supplies in The global energy balance.

b. Oil or petroleum: It is a dense liquid of black color, has an unpleasant odor, is highly flammable and consists of a mixture of Hydrocarbons, usually found in special reservoirs, between the pores of sedimentary rock layers, and the more these pores, the greater the concentration of oil in them, and the depth of the ground placements ranges from 500 to 3500 m to reach these reservoirs.

Oil is extracted The process usually begins with exploration and exploration, and advanced, highly sensitive methods and means are used, and oil rushes from a reservoir under the surface of the earth, with great force at first, under the pressure of the associated gas, and the pressure of the water in the reservoir, and when the oil rush decreases From the wellhead or hinges other methods of its extraction are used, such as pumps or methods of propulsion with water, or with gases, to push the remainder of it to the surface of the Earth^{(3).}

Oil was discovered as an energy source in the second half of the nineteenth century after Coal gave up its first position in energy, due to the advantages that oil has, namely:

- a liquid that can be transported more easily and at lower costs than coal;
- it is cleaner to use than coal, as it does not leave ash or smoke;
- a liquid that occupies less space and larger volumes;
- the thermal power that it gives exceeds the heat that coal gives.

In addition to the above, oil enters as a raw material and a source of energy through its uses "As a raw material" For many industries such as: petrochemical industry, fertilizers, pesticide industry, Asphalt Industry in paving and paving roads, grease industry...Etc.; as well as its uses "As a fuel material", Where it is used primarily as a fuel material in: fire fuel in cooking and heating homes, fuel in internal combustion engines in cars, trains, ships and airplanes.

It should be noted that oil in Algeria has several advantages, namely:

- abundance of oil wells;
- low costs of its production;
- easy to transport;
- algeria's low oil consumption;
- huge oil revenues.

c.Natural gas: The name natural gas is given to a mixture of several gases such as methane, propane, butane, and it is found in its reservoirs in various forms, it may be found individually in its own fields, or in oil reservoirs separately from it or dissolved in it. In the past, natural gas was burned for disposal if it came out of the field combined with oil or dissolved in it, after being separated by special devices in the field, due to the lack of demand for it in its production sites.

Natural gas contains the same main elements as oil, as a kind of organic hydrocarbons, although it takes a gaseous form, not a liquid because of the high percentage of its elements that volatilize at normal temperatures. The oil reservoir consists of three layers, the water layer below the reservoir, the liquid oil layer above it and the gas layer on top.

The gas is collected by placing special fittings on the wellhead, to extract the gas during its exit with oil, or its independent exit in the case of gas fields, and adjacent wells are connected to collection pipes that pour their inputs into the gas plant, which cleans the gas from impurities, especially sulfur.

Natural gas has increased its importance as an energy source Year after year due to a number of factors, the most important of which are: the lack of impurities in it, its high thermal energy, the cleanliness of its use, and the flexibility of its use.

For our country Algeria, natural gas has not been commercially invested in it except to a narrow extent, because it accompanies oil and may be damaged or burned in the air, and it is also used in most petrochemical industries and environmental technologies have not been used in it that try to reduce environmental pollution and depletion.

d. Nuclear power: The first to put the first nucleus in the discovery of this type of energy, was the physicist scientist *"Albert Einstein*" At the beginning of the last century, this scientist developed the theory of relativity, in which he explained with mathematical equations that matter can be transformed into energy, and expressed this with his famous equation.

 $I = K \times P^2$, Where: I Power: / K The block: / P: The speed of light.

The first nuclear reactor to generate nuclear energy was built in the United States in 1951, and this reactor was of the type in which nuclear fuel is generated, and in 1956 the second nuclear plant was established and it consisted of four nuclear units, each with a capacity of 50 megawatts Over time, the number of nuclear plants in the world has increased, and dependence on them for electricity generation has increased, the number of nuclear plants in the world has tripled. Between 1974 and 1984⁽⁴⁾.

Interest in nuclear energy as the main source of energy in the world has increased precisely after the oil crisis in 1973, and nuclear energy is important because it can fill the shortage of energy if it is used well for peaceful purposes in laboratories and large facilities, and it began to be used in seawater desalination in 1969 and the world's interest in it as an energy source has increased, but On uranium oxide and Therium oxide, which are substances prone to depletion, there are several opinions about the use of nuclear energy in the world:

- opinion in favor: they are the owners of huge and heavy industries, as their need for nuclear energy is able to cope with the shortage of energy, and it is known that the United States of America consumes this energy, and its consumption of this energy is likely to be subjected to a sharp increase;
- **dissenting opinion:** they are the owners of simple and consumer industries and their argument is that nuclear energy is a polluting energy and that uranium reserves are threatened with depletion within a short period of time.

2.3 ALTERNATIVE (RENEWABLE) SOURCES OF ENERGY

Alternative energy sources are an alternative to oil, which still occupies the forefront in the global energy balances, as coal remained the main source of energy before the discovery of oil, and is still used as a source of energy and to generate electric power, in most industrial and non-oil developing countries, to spread later the use of natural gas, because of its low impact on the environment, and Besides, renewable energy sources are constantly being developed, in order to reduce their cost and popularization, which are diverse and numerous and are either partially or completely renewable, the following are the most important:

a. Solar energy: Solar energy is electromagnetic waves emitted by the sun at a temperature of 56,000 absolute degrees, and it is one of the most abundant energy sources, it is also clean and natural energy that does not leave harmful pollutants to the environment, it is an ideal source of energy and continuous⁽⁵⁾.

Man has tried during his civilizational career to exploit solar energy directly, until he came to the use of reflective lenses and mirrors to collect solar rays and collect them to benefit from them thermally or electrically, and is still pursuing his studies and research in order to secure energy from the sun at the cheapest prices and its applications in the widest fields, it is known that the amount of solar energy varies The place is on the sea surface...Etc⁽⁶⁾.

b. Wind power: Wind energy is one of the types of energy produced by solar heat, where the sun's heat falls to different degrees on the globe, which makes some areas hotter than others, so the air heats up in the hottest areas, its density decreases, and it rises to the top, which causes an exchange movement between it and the denser cold air, which creates air movement Their range depends on the extent of the temperature difference, between the cold mass and the hot one.

Some have estimated that about 2% of the solar energy on the surface of the Earth is converted into wind energy, and most of this energy is lost in deserts, over the oceans and between mountains, but a large part of it can be exploited and taken advantage of, and several successful attempts have been made to exploit wind energy for more than a thousand years, where the wind Moving windmills, sailboats⁽⁷⁾.

c. Organic (**vital**)**energy:** Organic energy is intended to convert plant and animal waste into liquid fuel by fermentation in order to meet local needs, and this gives about 30% of the total energy contained in the waste, and this energy is represented in its primary form in what is known as primitive energy or non-commercial energy, where it is converted directly into thermal energy by combustion, or into kinetic or mechanical energy⁽⁸⁾ Brazil has started converting sugar cane into alcohol mixed with gas and used as fuel for cars instead of gasoline, thus contributing to filling the need of fuel for cars, and Brazil also produced alcohol from another plant called cassava, a plant that gives tubers swollen with starch and other yeasts are added to it to turn it into sugar and then into alcohol.

d. Underground (thermal)energy: Geothermal energy is the natural heat of the Earth, arising from the presence of radioactive elements in the Earth's interior, that is, they are energies buried in the Earth's interior, and they are heat that increases with depth.

Thermal or underground energy has been used since ancient times, when the Romans used hot natural water for bathing, and it was used to generate electricity only in 1904 in Italy, then in 1958 in New Zealand, and in the United States, it began to be used in 1960 in California. It is used directly in heating and cooling buildings, in agriculture and others, and Iceland is considered a pioneer in the use of geothermal heat for heating on a large scale, as 80% of its homes are heated in this way⁽⁹⁾.

e. Mechanical energy of water: It is the potential energy in the water as a result of the difference in the water level from one place to another, and this energy is used in the production of electricity, by erecting power stations on the water courses in rivers, waterfalls and dams. Water as a natural source of the environment of life, is a carrier of Mechanical, Chemical and thermal energy, the mechanical energy that can be produced during the movement of water in the form of waves and water currents in the middle of the seas, oceans or rivers.

f. Chemical energy of water: There is a chemical energy of water that appears through the analysis of saline solutions in water, and this energy is renewable because it depends on water, where energy can be generated by hundreds of thousands of megawatts, and many countries of the world have invested this energy, but the remaining potential is huge, and neighboring developing countries can cooperate in the development of hydropower, especially As for the African countries, as for the Arab world, it has a huge water wealth, as it is surrounded by water from all sides, in addition, cooperation and coordination can be carried out between its countries in order to generate this important type of energy.

g. **Firewood** (**wood**)**energy:** The problem of depletion of this energy and industrial resource can be solved by planting more trees in rural areas, increasing other forests, and the state can also play a big role in its cultivation and taking care of it as plant wealth.

2.4 THE IMPORTANCE OF ENERGY CONSERVATION

Energy rationalization means taking the necessary measures to reduce its use, while maintaining the volume of production achieved, increasing its efficiency, and reducing waste, so that the unit of product can be produced with less energy, in other words, energy rationalization means reducing the rate of its use in order to achieve economic savings, and maintaining energy reserves for longer periods of time, it also reduces At the same time of emissions and negative effects on the environment.

The importance of energy conservation stems from many reasons that lead decision makers in most countries, whether developing or developed, to adopt a clear strategy to rationalize energy use as one of the main goals, and these reasons can be mentioned below⁽¹⁰⁾:

• **the first reason**: it is primarily a financial reason, and consists in working to rationalize the agreement, by not building new stations, and raising the capacity of

existing energy networks. This reason is increasing in countries that depend on the import of energy of all kinds;

- **the second reason**: it is also becoming increasingly important in energy-importing countries, especially in light of the expectation that energy reserves will decrease over time, or political or military changes affecting imports;
- **the third reason** it is known that the combustion of fuel, whether in industry, transport or other sectors, produces a second gas or carbon dioxide, which is one of the main gases causing the greenhouse phenomenon;
- **the fourth reason**: it is related to the current global trends, associated with increasing attention to the environment and sustainable development, which requires that people in their various activities, whether productive or consumer, take into account rationalization in the use of resources of all kinds, including energy, as well as reducing its negative effects on the environment, and therefore the work to achieve sustainable development, requires the need to reduce Energy with its multiple sources, which means working to rationalize its use in various sectors.

3 SECOND: WHAT IS SUSTAINABLE DEVELOPMENT

3.1 HISTORICAL DEVELOPMENT OF SUSTAINABLE DEVELOPMENT

The concept of sustainable development emerged through a series of conferences, the first of which was Held in Stockholm In 1972, the United Nations conference on The second was held in Rio de Janeiro in 1992 under the name of the United Nations conference On Environment and development, the third in Johannesburg in September 2002 under the name conference The United Nations on Sustainable Development.

The multiplicity of conference names reflects the evolution of concepts Sustainable development of the world, the assimilation of the relationship between man and the biosphere in which he lives In it, he practices life activities in it.

In 1972, the report"limits to growth" was published, which explained the idea of limited natural resources. And that if consumption rates continue to increase, natural resources will not meet the needs of The future, and that the depletion of renewable environmental resources and non-renewable resources, threatens the future.

In 1973, the oil crisis shook the world and warned that resources were limited in size, but in In 1980, the global maintenance strategy document was issued, this document called attention to The importance of achieving a balance between the human resources of the environment and the ability of ecosystems to In 1987, the world Commission on development and the Environment issued a report entitled "Our Common Future", the message of which was Report calls for the development of environmental resources to be taken into account Meeting the legitimate needs of individuals in their present Without compromising the ability of ecosystems to To meet the needs of future generations, and when the United Nations conference on Environment and development in 1992, the idea of sustainable or continuous development emerged as one of the bases of National and global action, the conference developed a detailed document (program of action in the XI century Twenty) included forty chapters, which dealt with what should be guided in the areas of development The participation of sectors of society in development endeavours and in obtaining A fair share of their fruits.

In 2002, the United Nations conference on sustainable development was held to review the outcome of the The idea of continuous development of the world. So the evolution from the idea of human ecology in 1972 to the idea of Environment and development in 1992 to the idea of Continuous development in 2002, implies mature progress, so that the relationship between man and the environment does not It is not limited to the effects of the state of the environment on human health, as was believed in 1972, but to the relationship Another aspect is that the environment is the treasury of resources that man transforms by his effort and with what he has obtained from Scientific knowledge and technical means into riches, transforming Resources to riches is the essence Development.

3.2 THE CONCEPT OF SUSTAINABLE DEVELOPMENT

There have been many definitions about the concept of sustainable development, the most important of which are the following:

Sustainable development is a development that serves the current generations in a way that does not harm or prejudice the interests of future generations. That is, leaving the resources available now to future generations in the same or better condition as they are ⁽¹¹⁾.

"It is the attempt to reduce the conflict that leads to environmental degradation by finding a way to integrate the environment and the economy⁽¹²⁾.

The world Commission on Sustainable Development defines it as: "it is to meet the needs of the present without compromising the ability of future generations to meet their needs with others⁽¹³⁾.

"It is a process in which the exploitation of resources, investment directions, technological development and institutional change are in harmony in a way that enhances both the present and future potentials to meet human needs and aspirations⁽¹⁴⁾.

It is also defined as: "real development with the ability to continue and communicate from the perspective of using natural resources, which can occur through a strategy that takes the environmental balance as its controlling axis, so the balance that can be achieved through the socio-environmental framework, which aims to raise the living of individuals through political, economic, social and cultural systems that maintain the integration of the environmental framework⁽¹⁵⁾.

From the above, it can be said that sustainable development is the development that meets the needs of the present without compromising the ability of the future and future generations to meet their needs, and below we will mention the basic features of sustainable development:

- sustainable development differs from development in being more overlapping and more complex, especially with regard to what is natural and what is social in development;
- sustainable development is oriented mainly to meet the requirements and needs of the poorest classes and seeks to reduce global poverty;
- sustainable development is keen to develop the cultural aspects and preserve the civilization of each society;
- elements of sustainable development cannot be separated from their elements and their indicators can not be measured for the intensity of the overlap of qualitative and quantitative dimensions of them;
- sustainable development is a community development, to which all groups, sectors and groups must contribute, and it is not permissible to rely on a few groups or a single resource;
- sustainable development is a conscious process, which means that it is not a random process, but a targeted process, with a long-term strategy, phased goals, plans and programs;
- this requires the process of sustainable development to adopt a solid production base and renewable community energy that did not exist before, and the foundations of this construction should be local, diverse, interconnected and integrated, able to adapt to changes in the order of importance of its constituent elements, and this base also has

proper social organization, resources Trained humanity, technical ability and sufficient capital accumulation.

3.3 CHARACTERISTICS OF SUSTAINABLE DEVELOPMENT

For Sustainable Development Four characteristics The main ones are summarized as follows:⁽¹⁶⁾

a. Sustainable development is a generational phenomenon: That is, it is a process of transfer from one generation to another. This means that sustainable development must take place over a period of at least two generations, and then The sufficient time for Sustainable Development ranges from 25 to 50 years.

b. Measurement level: Sustainable development is a process that occurs at varying levels (global, Regional, local). However, what is considered sustainable at the national level is not necessarily It is also at the global level. This geographical discrepancy is due to the mechanisms of transformation, which It is through them that the negative consequences of a particular country or region are transmitted to other countries or regions.

c. Multiple domains: Sustainable development consists of at least three areas:

Economic, environmental, social and cultural. Sustainable social development aims to influence the development of individuals And societies in such a way as to ensure the achievement of justice and the improvement of living conditions and health. In sustainable environmental development, the main goal is to protect natural systems Conservation of Natural Resources. The focus of sustainable economic development is In the development of economic structures as well as the good management of natural and social resources.

The issue here is that these three areas of sustainable development theoretically seem to be harmonious, but they are not So is actually the practitioner. The basic principles are also different, while they represent Efficiency the main principle of sustainable economic development considers justice as the focus of development Sustainable social, sustainable environmental development emphasizes resilience or potential. The earth needs to replenish its resources.

d. Multiple interpretations of sustainable development: The current and future human needs for Sustainable Development and how to meet them vary according to their concepts, but in fact it is not possible for any assessment of those needs to be objective, as well as that any attempt will be surrounded by with uncertainty. As a result, sustainable development can be interpreted and applied according to perspectives different.

3.4 SUSTAINABLE DEVELOPMENT GOALS

The most important challenges faced by Sustainable Development are the elimination of They also strive to achieve many goals without excessive dependence on Natural Resources:⁽¹⁷⁾

a. Waters: Economic sustainability aims to ensure an adequate supply of water and raise Efficiency of water use in agricultural, industrial, urban and Rural Development. Sustainability aims to ensure access to water in the area sufficient for domestic use and agriculture The small and poor majority. Environmental sustainability is aimed at ensuring adequate protection of watersheds, groundwater and fresh water resources.

b. Food: Economic sustainability aims to raise agricultural productivity and production in order to achieve regional and export food security. Social sustainability aims to Improve the productivity and profits of small-scale agriculture and ensure household food security. The aim is Environmental sustainability to ensure sustainable use and conservation of land, forests and water Wildlife, Fish and Water Resources.

c.Health: Economic sustainability aims to increase productivity through care Health, prevention, improvement of Health and safety in the workplace. Social sustainability aims to impose air, water and noise standards to protect human health and ensure health care Primary for the poor majority. Environmental sustainability aims to ensure adequate protection of resources Biological, ecological and health-supporting systems.

d. Accommodation and services: Economic sustainability aims to ensure adequate supply Efficient use of construction resources and transportation systems. Social sustainability aims to ensure Get the right housing at the right price in addition to sanitation and transportation to the poor class. Environmental sustainability aims to ensure sustainable or optimal land use Forests, energy and Mineral Resources.

e. Entry and operation: Economic sustainability aims to increase purchasing power for individuals and to support small and medium enterprises. Social sustainability aims to create Jobs, job opportunities and minimizing work risks. Environmental sustainability aims to ensure Sustainable use of natural resources necessary for economic growth in the public sector and private.

3.5 DIMENSIONS OF SUSTAINABLE DEVELOPMENT

Sustainable development is a three-dimensional development that is interrelated and interrelated within the framework of interaction characterized by precision and rationalization of resources, these dimensions are:

a. The economic dimension It follows from the fact that the environment is an integrated economic entity as a base for development and any pollution of it and depletion of its resources ultimately lead to weakening the chances of its future development, and then the long-term economic perspective should be taken to solve problems in order to save effort, money and resources.

b. The environmental dimension: The environmental dimension is concerned with the management of Natural Resources and the optimal use of them on a sustainable basis and forecasting them for the purpose of precaution and Prevention, which is considered as the backbone of sustainable development. As all our actions are mainly focused on the quantity and quality of natural resources on the planet, and the factor of environmental depletion is one of the factors that contradict sustainable development; therefore, we need scientific knowledge to manage natural resources for many years to come in order to obtain systematic methods of encouragement and interrelated with the management of the ecosystem to prevent increasing pressures on it.

c. The social dimension: It is the natural human right to live in a clean and safe environment through which he exercises all activities while ensuring his right to a fair share of natural wealth and environmental and social services, investing them to serve his basic needs (shelter, food, clothing, air...) As well as complementary needs to raise his standard of living (work, Entertainment, fuel...) And without reducing the opportunity for future generations.

3.6 THE MAIN COMPONENTS OF SUSTAINABLE DEVELOPMENT

To establish the concept of sustainable development, it is necessary to have a number of elements that form the foundations of sustainable development, the most important of which are:⁽¹⁸⁾

a. Meeting the humanitarian needs of the population: The main function of sustainable development is to redirect resources to ensure the fulfillment of Therefore, we find it very much based on the issue of poverty eradication starting from the basic needs of society

and improving their standard of living It is her conviction that a world of poverty and inequality will undoubtedly be vulnerable to environmental, social and economic crises.

This requires ensuring a sustainable population level, i.e. these requirements can be met more easily when the population size is stable over An appropriate level of the scale of the productivity of the ecosystem, as it is also required that there is a moral obligation to do for the sake of future generations. At least what previous generations did for us.

b. Sound environmental management: It is not possible to meet the needs of the present without compromising the ability of future generations to meet their needs, unless there is an administration capable of ensuring the continuity of utilization of natural resources, without waste and within the framework of environmental constraints .

By sound environmental management we mean those that contribute to the achievement of sustainable development by the effective use of all possible tools, (legislation Environmental laws, environmental impact assessment, adherence to the principle of environmental accounting, Environmental Information base and others).

c. Human development: The speakers ' notes-environment and Development - issued by the United Nations, include that human development is equal to Sustainable development, and this confirms that there is no sustainable development without sustainable human development, and human development, is a process Expand the options available to society, the most important of which are the acquisition of knowledge, political freedom, ensuring human rights.

d. Environmental economics: Economics is considered the nervous system of interactions between the environment and development, therefore sustainable development depends on the extent of success in balancing the economic system and the ecosystem.

Environmental economics is defined as a branch of economic science that deals with the relationship between human and environmental activities in the framework of policies Environmental economics, the goal of environmental economics is to integrate the environment into the framework of Economic Sciences, and this is what economists have ignored Neoclassical.

We can distinguish two levels of eco-economics, enterprise-level (partial level), and eco-economics at the level of the economy as a whole (College level).

Microeconomics (at the enterprise level) represents a part of the enterprise economy that is interested in and analyzes the relationship of the enterprise with the natural environment The qualitative development of the surrounding environment and the impact of environmental policies on the enterprise, and the economics of the environment at the enterprise level have the following tasks:

- studying and analyzing environmental protection measures on the enterprise and its goals and on maximizing profit in it;
- provide advice to the appropriate enterprise with environmental protection requirements;
- contribute to the direction of production as required by environmental directives, instructions and regulations;
- study of environmental investments that reduce environmental risks;
- provide information about the costs of Environmental Protection, investment expenses, the impact of Environmental Protection on profit and loss accounts and analyze the environmental feasibility of projects;
- give advice, analyze problems and study the future prospects of some branches of the national economy in light of environmental developments such as service enterprises, transport, environmental protection, trade and insurance.

Macroeconomics deals with environmental problems at the level of the economy as a whole, and one of its goals is to reach higher levels of well-being Sustainable social policy that takes into account the preservation of the quality of the environment at high levels, and addresses the following topics:

- physical and monetary assessment of environmental damage as well as assessment of environmental improvement caused by environmental policy in government and private activities;
- identify and study the links between the environment and macroeconomic objectives as well as the links between economic and environmental policies.

e. Environmentally sound technology (clean technology:) Sustainable development is incompatible with environmentally harmful technology, so to achieve Sustainable development it is necessary to reorient the technology used, making it more environmentally friendly and using less resources and energy generates less pollution and waste.

Therefore, developing countries should import clean technology suitable for their local environment, and constantly develop their own capabilities, in terms of dealing with technology, which makes her gain technical abilities and skills that ultimately provide her with the ability to develop And the production of clean domestic technology.

f. Self-reliance and international cooperation for global environmental problems: Sustainable development is development within the framework of dependence on Within national borders and within the limits of the constraints imposed by natural resources, that is, each state must coexist with its environment, according to for local foundations, in order to allow the alignment between their needs and desires, and the rational management of Natural Resources.

Since sustainable development is the goal of all the peoples of the world, developed and developing, and natural systems and environmental problems do not recognize borders Regional, international cooperation is essential to advance sustainable development.

4 THIRD: SUSTAINABLE DEVELOPMENT OF ENERGY SOURCES IN ALGERIA

Through this axis, we will clarify the nature and goals of sustainable development of energy sources, and then we will address their requirements and the most important problems faced in Algeria, and finally we will address the most important challenges and future mechanisms for the development of energy sources in Algeria under Sustainable Development.

4.1 THE CONCEPT OF SUSTAINABLE DEVELOPMENT OF ENERGY SOURCES

Development is defined as: "an organized process aimed at making a positive change in the life of society that includes economic and social aspects, and is carried out only with the physical and human components, so that the human element will have an active role in planning and organizing the investment of resources without harm to them "⁽¹⁹⁾.

The content of sustainable development as defined by the United Nations Development and Environment Programme is: development Allows to meet the needs and requirements of the present generations without compromising the ability of future generations to meet their needs⁽²⁰⁾. Sustainable development also aims to achieve harmony between human resources and natural resources without pollution and depletion⁽²¹⁾.

While there are those who define sustainable development as the management of available resources in order to ensure the need of future generations in quantity and quality of those resources. This involves achieving a quality of the environment acceptable to society through the control of environmental pollution. In other words, achieving a balance between growth and conservation of resources to ensure the need of future generations of these resources, and this means that the flow of economic activities must take into account the natural environment⁽²²⁾.

Through what has been mentioned before we can formulate the following concept of sustainable development of energy sources as follows: *It is the process of securing human and natural resources through investing traditional and renewable energy sources with scientific methods and methods, away from depletion and environmental pollution, and the right of future generations to benefit from them and to serve comprehensive development plans and programs.*

4.2 SUSTAINABLE DEVELOPMENT GOALS FOR ENERGY SOURCES

The goals of sustainable energy development lie in the following points⁽²³⁾:

- meeting the economic and social needs of individuals without compromising the right of future generations;
- introduction of technology in the field of development of conventional energy sources;
- finding alternative sources far from depletion and environmental pollutions
- adopt proper planning of environmental resources;
- participation of political, economic and legal decision makers in drawing the behavior of individuals and groups;
- spreading new values in consumption patterns within the limits of the environmental potential that everyone aspires to achieve.
- increase the productive potential and ensure equal opportunities for all alike.

Through these goals, we conclude that the sustainable development of energy sources seeks to achieve a major goal, which is to rationalize the use of energy sources and their development through rational exploitation, in addition to the search for alternative sources so that energy resources remain for a long period of time, and this should not lead to harm to the environment.

4.3 REQUIREMENTS FOR SUSTAINABLE DEVELOPMENT OF ENERGY SOURCES

It is known that energy enters into all the facilities of life, Algeria is rich in energy sources, if it is used optimally, it will achieve economic, social and political returns, and below we will present the requirements of economic development in the field of energy, and this requires the Algerian citizen to be responsible for the direction of development of energy sources in light of sustainable development, we highlight the following:

- the Algerian citizen should feel that energy sources can contribute to the creation of political positions towards Algeria's issues as a pressure sheet on international politics and international relations;
- the Algerian citizen should know that the colonial countries are trying to prevent the Petroleum countries from manufacturing it and thus they hinder the petrochemical industries in them from Keeping Up With the markets;
- the Algerian citizen should be aware that the colonial countries encourage the increase of his production and supply in the markets in order to drain his fields and the deterioration of his prices;
- the Algerian citizen should be aware that the colonial countries encourage the oil countries to save oil revenues in their banks to invest in the development of their Western countries, where these revenues annually reach 200 billion dollars;
- the Algerian citizen should feel the need to nationalize oil in order to reduce its depletion and exploitation by colonial companies.

4.4 PROBLEMS FACING SUSTAINABLE ENERGY DEVELOPMENT IN ALGERIA

There are a number of problems and obstacles facing development in general and sustainable energy development in particular in Algeria, highlighted in the following points:

a. Weak security stability: Our country as a whole has registered an improvement in security aspects compared to the past years, especially the Black decade, but it is not without the problem of weak stability and security in some regions, these conditions make capital be employed outside Algeria, because of the lack of security stability, although it is possible to invest it at home.

b. Lack of Stability of climatic conditions: In the sense that low precipitation rates or high temperatures ...It also leads to a lack of production and an acute shortage of Water Resources and polluting existing ones due to the lack of better water exploitation away from pollution and waste, in addition to the lack of good land and other factors, and this problem can be solved by turning to the use of groundwater and the use of other sources.

c. **The problem of poverty**: This problem is experienced by most countries of the world, not only our country, due to the increase in unemployment, lack of job opportunities and the lack of exploitation of human resources, especially the youth category, according to comprehensive development plans with natural resources.

d. **Poor suitability of imported technologies**: Imported technologies can be applied in Algeria, but the lack of technical and scientific personnel prevents their good use.

e. Having health problems: There is a clear decrease in the level of health services in most health institutions in Qatar, a decrease in the proportion of balanced food and a lack of Safe Drinking Water...Etc.

f. The presence of educational problems: As an average percentage of the Algerian people suffer from illiteracy and their academic achievement is below average, as well as a decrease in the level of achievement at all academic levels, a high percentage of tuition expenses and an increase in the number of students...Etc.

4.5 FUTURE CHALLENGES FOR THE SUSTAINABLE DEVELOPMENT OF ENERGY RESOURCES IN ALGERIA

Sustainable development requires meeting the basic needs on a sustainable basis in conserving and enhancing resources, and this requires making fundamental changes in policies to cope with the high levels of consumption of the industrial world and the increases occurring in developing countries, including our country due to population growth, and that energy conservation has become a moral and human duty towards future generations, and therefore future trends and plans should be adopted:

- dealing with energy sources according to our needs rationally away from depletion and waste;
- finding alternative sources of conventional energy, i.e. renewable sources:
- pursuing an energy conservation policy with modern scientific methods and methods that are far from environmental pollution;
- raising oil prices, as the problem of oil waste is still at a reasonable rate, especially since the consuming countries own the commodity industry and rely on raising their prices;
- find a balance between oil prices and prices of industrial products;
- the use of oil revenues in the process of economic and social development;
- the use of oil revenues in the petroleum industry instead of exporting it as a raw material;
- marketing of petroleum to the consumer by Algerian transport;
- conducting international and regional cooperation with Arab countries in the development of the Arab energy conservation strategy.

Therefore, the future trends of energy sources depend on the integrated system at the national or international level, which represents the integration of systems in the process of sustainable development of energy sources as follows⁽²⁴⁾:

- political system: believes in the active participation of citizens in decision-making;
- economic system: capable of generating benefits and technical knowledge based on self-reliance;
- a social system: capable of providing solutions to problems caused by unsustainable development;
- productive system: respects the duty to preserve the environmental base of development;
- technological system: constantly looking for new solutions;
- international system: takes into account the developmental patterns of sustainable development of trade and finance;
- administrative system: capable of self-correction.

4.6 MECHANISMS FOR THE DEVELOPMENT OF ENERGY SOURCES IN ALGERIA

There are several mechanisms for the development of energy sources in our country, we summarize them in the following elements:

a. Development of ancient sources through methods of dealing and rationalization of consumption: This is through:

- dealing with energy sources (especially conventional ones) according to our needs, and scientifically to reduce their use rates;
- following energy conservation policies through scientific methods to increase the efficiency of its use;
- raising oil prices from continuous use;
- linking energy sources to national development plans;
- taxation of individuals and enterprises polluting the environment.

b. Search for new sources of energy (renewable): This is done by following modern scientific methods and methods, considering that energy sources are depleted sources and therefore it is necessary to find new sources derived from nature so that they do not deplete and do not pollute the environment and guarantee the right of future generations to benefit from them.

c. Determination of the citizen's responsibility towards the environment and its sources: A citizen plays a key role in preserving energy sources from depletion, and his responsibility for this is manifested by⁽²⁵⁾:

- to feel its responsibilities towards environmental (energy) resources in preserving them as an expiring wealth;
- to participate in solving problems facing the environment, especially energy sources;
- to use alternative pollution-free sources as little as possible;
- to raise his children to love the environment and preserve resources for future generations;
- to respect the laws issued by the state on energy and ways to rationalize it.

d. Determining the the responsibility of the state is a great responsibility in achieving sustainable development, especially as it is the decision-maker, it can control energy and its sources by finding and maintaining an investment plan and educating citizens about patterns of behavior, methods and use of energy, risks and what is required of the citizen in at the national and global levels in activating sustainable development .

e. Building an information base on national energy source: our country needs to build an information base related to traditional and renewable energy resources, which takes data on the type of sources and risks associated with production and consumption processes, and ways to protect and preserve energy sources under Sustainable Development.

f. Conducting more bilateral relations, especially in the Arab energy field: bilateral relations have positive implications at the level of the Arab world, especially if they deal with economic, social, technical issues, trade and financial exchanges and joint projects, and therefore the conclusion of many bilateral agreements between Arab countries on energy sources and information exchange have positive paths to serve sustainable development.

g. Adoption of sustainable energy planning: the use of sustainable planning in the field of energy is of great importance for conventional energy, as the state is responsible for planning by conducting a survey of its traditional sources, the share of energy per capita, the amount of production, consumption and returns, the amount of pollution of the environment regionally and determining international standards for pollution and the degree of depletion of energy resources.

h. Adoption of research and development in the field of energy: our country's dependence on research and development in the field of energy will contribute to sustainable

development, as raising energy efficiency depends on technological developments in the field of energy, and therefore on the role played by governments, to encourage research and development programs in the field of energy.the more governments support and encourage these programs, the more there are prospects for raising energy efficiency⁽²⁶⁾.

i. Activating the role of the media in spreading environmental awareness of energy sources :the media has a great role in spreading environmental awareness through various media devices that broadcast to individuals and society concepts, methods and means that explain guidelines and instructions regarding energy and ways to rationalize its consumption, the per capita share of energy in the world and the best ways to invest it.

5 CONCLUSION AND RECOMMENDATIONS

At the conclusion of this research paper, we can say that renewable energy sources, especially renewable energy sources, will form a corner in the global energy system in the future, so our country's neglect of these sources or not paying enough attention to them currently, will constitute a major obstacle to the possibility of developing them in the future, depriving future generations of the right to The field is constantly growing and is not limited to developed countries only, but there are many developing and Arab countries.

In order to contribute to supporting the development of energy sources in our country under Sustainable Development, we put forward the following recommendations:

- it is necessary to cooperation between institutions, both on a local and international scale, especially with leading ones in the use of renewable energies;
- the need to the private sector with appropriate facilities for the establishment of small scale projects to generate electricity through renewable sources, especially in rural and remote areas;
- theof establishing and developing specialized research and studies centers and holding conferences and seminars for the purpose of scientifically and accurately identifying the available potential of energy sources in our country and ways to develop them;
- to the experiences of specialized foreign companies, especially in the field of expertise and advanced modern technologies, and to remove any obstacles hindering the emergence of a real market for energy sources;
- to the ways of scientific exchange and experience at the national and international levels;

- the of opening departments in Algerian institutes and universities to teach sustainable development in the field of renewable energies, in addition to holding a scientific partnership between universities and companies aimed at serving the development plans of energy sources in our country;
- the aimspread the culture of using clean energy among all segments of society in order to contribute to reducing the risks of environmental pollution.

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ANEXS

LIST OF FOOTNOTES

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