The Stratigy Of Renewable Energies In Algeria In Order To Address Climate Change And Achieve The Sustainable Development The Realities And The Prospects

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ABSTRACT:
The climate changes which the world confronts today constitute an important challenge because of the effects of global warning in different fields, moreover, the problem of misusing the natural resources and the decline of the environment have a big impact on weakness of economic development. These challenges have pushed the world countries to seek for alternative, and the renewable energies were the best solution which can provide energy to ensure the continuity of economic activity without harming the environment. In this case Algeria has pursued this international method toward keeping environment by adopting the necessary measures and elaborating the suitable strategy to get energy and achieve the sustainable development.
Key Words: renewable energy, sustainable development, natural resources, the strategy.

الملخص:
تشكل التغيرات المناخية التي يواجهها العالم اليوم تحديا مهما، نظرا لما صاحب ظاهرة الاحتباس الحراري من انعكاسات طالت مختلف المجالات والأبعاد الإنسانية، كما أن مشكلة سوء استخدام الموارد الطبيعية وتدهور البيئة أصبحت لها أثرا واضح على إضعاف التنمية الاقتصادية. هذه التحديات وضعت دول العالم أمام واقع جديد يفرض عليها البحث عن البديل، فكانت الطاقات المتجددة الحل البديل الذي يسمح بالحصول على الطاقة لضمان سيرورة النشاط الاقتصادي دون الإضرار بالبيئة. الجزائر وبدورها سلكت هذا النهج الدولي نحو الحفاظ على البيئة من خلال الاعتماد على التدابير الضرورية ووضع الإستراتجية الملائمة للحصول على الطاقة وتحقيق التنمية المستدامة.
الكلمات الدالة: الطاقة المتجددة، التنمية المستدامة، الموارد الطبيعية،الإستراتجية.

Introduction

Energy is one of the basic elements required to reduce poverty and achieve the socioeconomic development. Day by day, the needs to use more energy in different fields of life grow rapidly. As a result, the greenhouse gas emissions and other negative effects on the environment increase. In other side, different researches affirm that the natural resources which are used to provide energy will disappear very soon. That's why it's necessary to look for other ways to get and consume energy with

rational way, a big challenge for the global world. In this case, the use of renewable energies is one of the most efficiency solution which can provide energy without polluting environment; it contributes in solving many serious socioeconomic problems as unemployment and ensures the sustainable development. The international community recognizes the vital importance of renewable energies. Algeria, as a country, is aware for the challenges and the opportunities which will be taken if it investigates in this field, because Algeria has not only extensive gas reserve but also huge renewable energy resources especially wind and solar power; for that Algerian government is showing great efforts to integrate renewable energies into their power market by developing several researches and technologies in order to identify Algerian strategy. These efforts have permitted to Algeria State to improve the use of renewable energy by means of series of laws and official programs. The aim of this research is to give a review about Algerian capacities in renewable energy, and what will be released by following the adopted strategy, thus, the fundamental question is: **what are the sources of renewable energy that's Algeria market power has to develop?** To answer this principal question, we have divided them into several axes which are:

- **The importance of renewable energy and its sources;**
- **renewable energy capacity of Algeria ;**
- **the strategy and the framework laws used to develop renewable energy in Algeria;**
- **Algeria renewable energy realities and the prospects hoped to achieve;**
- **Renewable energy in the context of sustainable development.**

1. The importance of renewable energy and its resources

There are many debates about how to define and distinguish renewable energy from non-renewable one. The terms and definitions chosen can have huge impacts on policy and regulatory efforts aiming to promote clean energy resources. This axe will try to identify and clarify three elements:

- Renewable energy;
- Sources of renewable energy;
- The importance of renewable energy.

1.1. Renewable energy

Renewable energy can be defined as:

"Natural energy which does not have a limited supply, Renewable energy can be used again and again, and will never run out."[1]

This definition describes how renewable energy is an infinite source of energy.

"Renewable energy is generated from sun light, rain, tides, geothermal heat and wind. These sources are naturally and constantly replenished, that is why they are deemed as renewable. The usage of renewable energy sources is very important when considering the sustainability of the existing energy usage of the world. While there is currently an abundance of non renewable energy sources, such as nuclear fuels, these energy sources are depleting. " [2]

This definition discusses about the different sources of renewable energy and non renewable one.

We can result here that, renewable energy comes from the natural replenished (renewable) energy sources such as sunlight and wind. Renewable energy sources are environmentally friendly sources of energy that do not pollute our environment and do not contribute to climate change and global warming like traditional sources do. This is the main reason why renewable energy is so closely connected to environment and ecology according to many people.

1.2. Sources of renewable energy

According to above definitions of renewable energy, we find that is necessary to talk about renewable energy without making reference to its sources, below we find a list of renewable energy sources that will be subjected to details.

1.2.1. Solar energy

The use of the sun as a source of the energy is among the alternative sources of oil held, because it considered as a clean energy which does not disappear. Many countries develop this source in order to use it in different fields such as Domestic water heating, swimming pools, heating and cooling, as is happening in Europe, America and Israel, while in the third world countries, it is used to move water pumps in dry desert areas. Now, they are trying seriously to use this energy in the water desalination and electricity production.[3]

Solar cells, also known as photovoltaics, use semiconductor materials to convert sunlight into electric current. Now, They have just provide a tiny slice of the world's electricity: their global generating capacity of 5,000 megawatts (MW) is only 0.15 percent of the total generating capacity from all sources. Yet, sunlight could potentially supply 5,000 times as much energy as the world currently consumes. [4]

1.2.2. Wind energy

Or wind power is a clean form of renewable energy, where wind generates mechanical power or electricity. Wind is considered as a plentiful and widely distributed source of energy, where about 1.5 percent of electricity in the world is delivered from. This source is rapidly developing and is considered as one of the fastest growing energy sources that can conserve water, lower natural gas prices, provide an alternative to fossil fuels, expand manufacturing, and lower greenhouse gas emissions.[5]

The main issue with wind is that it is not constant, thus it tends to be less energy producing than solar energy.

1.2.3. Water energy

Water, like many substances, contains two kinds of energy. The first one is called kinetic energy. It is used during the execution of processes, such as movement. Because of kinetic energy water can flow and waves can exist. But water can also contain potential energy. This is the energy that is stored in the water. Stored, but not used. This energy can become useful when water starts to flow. It will be transferred to kinetic energy and this will cause movement. When water flows or falls, energy will be generated. The generation of energy through water is usually carried out in large water power plants, with a number of process steps and the use of several devices, such as turbines and generators. The energy in water can be used to produce electricity by falling or streaming water. Hydroelectric power is a so-called renewable

energy source. This means that the source, which provides the energy, can be renewed.[6]

1.2.4 **Biomass energy**

Biomass sources can be defined as agricultural crops and residues; dedicated energy crops (herbaceous and tree species); forestry products and residues; residues and byproducts from food, feed, fiber, wood, and materials processing plants (sawdust from sawmills, black liquor (a byproduct of paper making), cheese whey (a byproduct of cheese-making processes), and animal manure); post-consumer residues and wastes, such as fats, greases, oils, construction and demolition wood debris and other urban wood waste, municipal solid wastes/wastewater, and landfill gases. It still produces sulphur dioxide during electricity production.[7]

1.2.4. **Geothermal energy**

Geothermal energy is the heat from the Earth. It's clean and sustainable. Resources of geothermal energy range from the shallow ground to hot water and hot rock found a few miles beneath the Earth's surface, and down even deeper to the extremely high temperatures of molten rock called magma.

Almost everywhere, the shallow ground or upper 10 feet of the Earth's surface maintains a nearly constant temperature between 50° and 60°F (10° and 16°C). Geothermal heat pumps can tap into this resource to heat and cool buildings. A geothermal heat pump system consists of a heat pump, an air delivery system (ductwork), and a heat exchanger-a system of pipes buried in the shallow ground near the building. In the winter, the heat pump removes heat from the heat exchanger and pumps it into the indoor air delivery system. In the summer, the process is reversed, and the heat pump moves heat from the indoor air into the heat exchanger. The heat removed from the indoor air during the summer can also be used to provide a free source of hot water.[8]

3.1. The importance of renewable energy

There is a universal need for efficient technologies that will contribute to the sustainable development of the host countries and communities by providing employment, improving quality of life and protecting the environment.

The international community recognizes the vital importance of renewable energies, besides the energy effectiveness and of its conservation, not only to fight against the health and the environment degradation and to ensure a sustainable development in conformity with the international objectives relating to the climate, but also to contribute to the innovation as well as the regional and national development, and to the equitable commercial prospects and the job creation. The users of clean energy are conscious of the importance of using renewable energies which produce few emissions if not no, which have little incidence on the water resources, the landscapes and the biological diversity and which do not contribute to increase the toxins contents of our environment. Let us mention in this context the electricity produced by photovoltaic solar energy, the wind power, geothermal energy, the hydraulic power To reduce the emissions by an increase in the proportion of energy coming from renewable sources is a significant action, which will result in an improvement of the quality of the air and on public health. Renewable energies offer a considerable potential and could, in theory, provide a

supply almost unlimited in energy of relatively clean and most of the time local one.[9]

At present most renewable energy technologies are not economic competitive to conventional power producing plants. In the way of development countries whose offer of electricity is unsuited, renewable energy could (particularly by the decentralized production) be an alternative to the expensive extensions of the network to the areas of not very dense or rural habitat, where it could contribute to an energy mix using the network to satisfy a request for electricity in fast growth in urban zones.

The actual total cost of renewable energy remains high comparing to fossil fuels, although it continues to fall. Increasing the global share of renewable energy would not only bring environmental benefits, but also enhances overall energy security by diversifying energy supply.[10]

2. Algeria's renewable energy capacity

Beyond its hydrocarbon resources, Algeria has a high potential of renewable energy which it has the aim ambition to develop with foreign partners. We will show below the different sources of renewable energy in Algeria containing:[11]

- Solar energy;
- Wind energy;
- Geothermal energy;
- Hydropower and biomass.

2.1. Solar Energy

Due to its geographical location, Algeria has one of the highest deposits Solar the highest in the world, estimated at five billion GWh / year. Sunshine duration on almost all the country exceeds 2500 hours annually and can reach 3600 hours (Highlands and Sahara). The daily energy received on a surface horizontal 1m2 is around 5 kWh of most of the country, or nearly kWh/m2/year of 1700 North and 2650 kWh/m2/year south of the country. The table below shows the solar potential of Algeria.

Table 1: solar potential of Algeria

Regions	Coastal Region	Highlands	Sahara
Surface (%)	4	10	86
Average sunshine duration (Hours/year)	2650	3000	3500
Received average energy (Kwh/m^2/year)	1700	1900	2650

Source: le rapport de la seconde communication national de l'Algérie sur les changements climatiques a la CNUCC, Alger 2010, p :47.

The data presented is supported by data compiled by the World Energy Council that they stay in the same range: Annual average insolation for Algeria is rated at 2,000 hours while the high plateaus receive around 3,900 hours. This results in an average solar energy potential of 2,400 kWh/m2/.

2.2. Wind energy

The wind resource in Algeria varies greatly from one location to another. This is mainly due to topography and climate diversity. Algeria is a regime of moderate wind (2-6 m / s). The South is characterized by higher speeds than the North, especially in

the south-west, with speeds exceeding 4 m / s and beyond the value of 6 m / s in the region of Adrar. This potential energy can be used for pumping water especially on High Plateaus.

2.3. **Geothermal energy**

The Jurassic limestone of the North Algerian geothermal reservoirs is important, it gives rise to more than 200 thermal springs located mainly in the Northeast and Northwest of the country. These sources are often at temperatures above 40 ° C, the warmest is that of Hammam Chellala (eg Meskhoutine) at 96 ° C. These natural springs, which are usually leaks existing tanks, debiting alone more than 2 m3 / s of hot water. This represents only a fraction of the production possibilities of the tanks. Further South, the formation of continental infill, is a large geothermal reservoir which stretches over 700 000 km2. This tank, commonly called "water Albian" is operated through drilling over 40 m3 / s water of this aquifer is at an average temperature of 57 ° C. If one combines the speed of operation of the water Albian to the total flow of the hot springs, this will represent a power of 700 MW. There are three areas where the temperature gradient exceeds 5 ° C/100 m:

- Relizane and Mascara
- Ain Sidi Aissa and Boucif
- El Jebel Onk and Guelma

2.4. **Hydropower and biomass**

The share of hydro capacity in the electricity production base is 4% or 230 MW. This low power is due to the insufficient number of exploitable hydro sites. The potential of biomass consists of biomass from forests, urban and agricultural waste. The current potential of the biomass of forests is estimated at about 37 Mtoe. The potential recoverable is around 3.7 Mtoe. The energy potential of urban and agricultural waste is estimated at 5 million tons of urban and agricultural waste is not recycled. This potential represents a pool of about 1.33 Mtoe / year.

3. The framework laws and the strategy used to develop renewable energy in Algeria

¶Restraint measures of greenhouse effect gases resulting mainly from combustion of fossil fuels were taken since the Rio Summit of Earth in 1992 and were followed by other rigorous measures decided in Kyoto in 1997 straightforwardly to impose the international community the penetration of Renewable Energies in a progressive and interdependent way. ¶¶In accordance with the national energy policy, Algeria has decidedly chosen sustainable development as its energy strategy, and has defined also their regulatory framework for renewable energies, we will expose in this element:

- Framework laws for Algerian renewable energy;
- The strategy of renewable energy in Algeria.

3.1. **Framework laws for Algerian renewable energy**

The legal and regulatory framework adopted during the past years underscores our strong commitment. We can limit the essential of this framework in the following laws and decrees.

3.1.1. **Law n°01-20 of 12 December 2001**

The law relative to arrangement and sustainable development of costal, the container of this law is implicitly referred to renewable energy.

3.1.2. **Law n°02-01 of 5 February 2002**

The law relative to the electricity and to the public distribution of gas, promulgated in February 2002, liberalized the sector of electricity by opening to competition the production and the marketing of electricity.

This law which takes in account the protection of the environment envisages the integration of renewable energies in the energy mix of the country. It opened in other hand side, the way to the promulgation of other inciting measures in favour of renewable energies. Advantageous premiums are granted to the producers of electricity produced from renewable sources. The purpose of the promulgation of this law is the implementation of a national policy of control of the energy based on the rational use of energy, the development of renewable energies and the reduction of the negative effects of the energy system on the environment.[12]

3.1.3. **Law n°04-09 of 14 august 2004**

The law relative on the promotion of renewable energy in the context of sustainable development, the law on renewable energies within the framework of the sustainable development promulgated in August 2004, makes possible to institute economic incentives founded on the environmental benefit of the electricity produced from renewable sources.

This law will constitute a basis for lawful instruments aiming at the encouragement of the development of renewable energies in their environmental and ecological dimensions.

3.1.4. **Executive decree n°04-92 of 14 august 2004**

This decree is about the diversification of electricity production costs, it was enacted in 25th of March 2004. The incentive premiums of this decree shall attract private investors to implement integrated solar combined cycle plants in Algeria.

In detail the decree defines technology – specific premiums that the electricity producer receives per KWH of renewable power injected into the gird.

3.1.5 **The 2010 financial law**

This financial law intends to create a new special renewable energy investment fund, financed by a 0.5 percent fee of the corporate oil taxes. This vehicle will have an estimated amount of €40 million p.a. at its command. One of its first projects will be the co-financing of Algeria's first wind park in Adrar that will be built by the French company Vergnet.[13]

As Algerian authorities are aware of the fact that so far, its attempts to incentivise renewable energy investments have been very limited success, a reformulation of its renewable energy law is currently under discussion, but it might take several years until its release.

3.1. **The strategy of renewable energies in Algeria**

Algeria has set up a national programme for the promotion of renewable energy sources in the frame of its sustainable energy development plan for 2050. This programme was approved on 3 February 2011 by the Council of Ministers.

3.1.1. National Programme for renewable energies

Betting Algeria through the project of renewable energies, which is the priority in economic policy energetic to reach the 30 percent of electricity production intended for national consumption of the assets of renewed prospects for 2050 and through the stages starting from testing in all renewable energy technologies, then proceed to

completion of pilot projects to enable then the embodiment of the major projects, especially in the field of solar energy which will be part of an effort to achieve local production in this type of energy for the manufacture of the first solar panel in Algeria at the end of 2013.

The financial Estimated cost of the national project to $ 60 billion equivalent to 4,500 billion dinars within 2030. And in order to access control technologies related to renewable energies in the time taken by all measures for the recruitment of national capacities in this area, as well as to make this branch of industry source generators of jobs.

The programme of renewable energies have 3 types of energy including solar PV production capacity of 3000 MW and about 7000 MW of solar thermal energy, as well as wind energy, with an estimated production capacity of 2,000 megawatts, adding that access to the control technologies of these kinds of energies remains the main objective of this program.[14]

3.1.2. **the principal actors and Instruments to realize Algerian program for renewable energies**

Algeria owns an institution which is able to promote the use of the renewable energy sources within the framework of activities of the diversification of our energy source. The following section provides a list of key players in the Algerian renewable energies sector:[15]

- The Ministry of Energy and Mines (Ministère de l'énergie et des mines)

It control most of the technical, regulatory and economic aspects in the power generation sector through its directorate of electricity, and is responsible for the formulation and the application of a national energy policy. It also houses the Directorate-General for Renewable Energies.

- The Ministry of Land Use Planning, Environment and Tourism

Through its Directorate for Energy and Development, this ministry secures the technological aspects of the power sector and is responsible to enact laws for the promotion of sustainable development.

- **The National Society for Electricity and Gas –Sonelgaz-**

Sonelgaz is the backbone of this ambitious program, it plays a pivotal role, especially in the field of control of solar energy technologies to be considered mandated by the Ministry of Energy and Mines, it oversees all projects included within the program of renewable energies.

- **The company of new energy Algeria –Neal-**

It is a company created between Sonatrach, Sonelgaz and private company (SIM) in July 2002 having as object the :promotion and the development of new and renewable energies, identification and the realization of projects related to these energies and definition, as well as development and the implementation of development strategies.

- **The Centre for the Development of Renewable Energies -CDER –**

The centre was founded in March 1988, as a consequence of the structuring of the High Commission for Research. It elaborates and implements scientific and technological R&D programmes focusing on solar, wind, geothermal and biomass energy. The centre's activities range from the creation of a renewable energies Ph.D. .

- **The Algerian Institute for Renewable Energy and Energy Efficiency - IAEREE –**

Announced by President Bouteflika in September 2009, the IAEREE will be established in the new village of Bellil in the district of Hassi R'Mel (wilaya of Laghouat). The institute will work on technology and economic issues regarding the spread of renewable energies in Algeria and will closely cooperate with NEAL and other public and private sector companies (Anon. 2010a). It will also host expert courses for the construction of renewable energy technology and the spread of energy efficiency measures on different skill levels.

3.1.3. The Contribution of national expertise and the most important programs ruler

the contribution of national experience in this project stressed on that the focus will be on the competencies of Algeria and involvement in production, research and conservation, and processing, pointing out that there is work at the level of complex Sonelgaz in coordination with research centers and laboratories with universities under the Ministry of Higher Education and Scientific Research about the capacity building of national engineers, technicians and teach them lessons in physics and English to master the control of new technologies.

The most important programmes ruler in the project of renewable energy will be during the 2012 completion of the solar's power station in Ghardaia. The aim of the next programme which is a school to build up Algerian expertise in all kinds of technologies in the production of silicon in addition to a creation of plant for the production of wind energy in Adrar in 2013, recalling the existence of dual gas station, the sun and sand in Hassi-powered productivity 150 MW.

4. Algerian renewable energies, the realities and the prospects

The total power of all projects to date in the field of energy renewable, except for hydroelectric facilities was 3.7 MW, or 0.05% of the installed capacity for electricity generation. Energy policy advocates increasing the contribution of renewable energy in national energy balance and encouraging energy-efficient systems, we will try to show here:

- The project released in the field of renewable energies;
- The prospect of Algerian renewable energies.

4.1. The project released in the field of renewable energies

The energy policy of Algeria state has achieved to release many projects, wich can be exposed below:[16]

4.1.1. The National Electrification Plan

They have release The Electrification of 18 villages in the solar PV:

- The Electrification of more than 1000 homes.
- The Electrification of 15 mosques.
- The Electrification of 15 schools.
- The Electrification of 20 stations (police stations, guards Communal ...).

4.1.2. The Programme of Highlands HCDS

They have released:

- The Electrification of more than 4000 homes with a power = 800kwc.
- The 160 solar pumps with a capacity of 240 Kwc.
- The 80 wind pumps with a capacity of 120 Kw.

4.1.3. The programme of SONATRACH

This program has achieved:

- The Production of electric power systems by PV (2MW) for control of sinks for the upstream activity telemetry system
- The Realization of power systems électric way PV (0.3 MW) for the cathodic protection of oil pipelines.

4.1.4. Other Achievements

Such as:

- The Marking of 2300 km of tracks.
- The 10 KWP photovoltaic plant connected to the network Sonelgaz CDER (this project is a part of the Algerian-Spanish cooperation).
- The Service Station Naftal powered by solar energy (the Bridja-Staoueli a power of 7 kWp) conducted by the UDES.
- The Power supply PV monitoring stations routièreau advantage of the National Gendarmerie.
- The Reduction of flaring GN in energy industries (12 MTEPen 1978-3 MTOE in 2006).
- A hybrid solar power (PV) / diesel to 13 Kwc Illizi (300 homes # 2000habitants) directed by BP Solar as part of social investment.
- The Power-over 100 telecommunications sites (700 kWp).

4.2. The prospect of Algerian renewable energy Dictionnaire

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The energy sector has developed an indicative program of development of renewable energy structured around the production of renewable electricity and thermal uses in order to achieve objectives of a contribution of 6%, in meeting the energy needs on the horizon 2020 and 30% in 2050. The program for promotion of renewable energy has possible to date the facility with a capacity of 3.7 MW.

4.2.1. **Solar thermal**

Based on projections of electricity generation, the goal of renewable energy penetration

up to 30% in 2050, in national electricity production, results in a power generation of over 13000 GWh for the same horizon

5. Haut du formulaire

- **The Prospects for renewable electricity production for the domestic market**

The table below shows the predictions of the evolution production electricity from renewable energy from, 2007 to 2050, for the domestic market and the raising of national electricity demand in the same period.

Table2: Prospects for renewable electricity production for the domestic market

Year	2007	2010	2020	2030	2040	2050
National electricity demand (GWH)	38658	46905	79504	111662	177090	280856
Domestic origin renewable (GWH)	7	127	4885	14041	37322	84372
Rate (%)	0	0	6	13	21	30

Source: le rapport de la seconde communication national de l'Algérie sur les changements climatiques a la CNUCC, Alger 2010, p : 181.

the production capacity of 6000 MW, will be achieved by 2050 which will result in a production of over 19 TWh, this production is exported mainly to the European market. Already, several sites have stopped to house these solar thermal power plants, projects the number of four developed by the company NEAL, which are located in the South (Hassi R'Mel, Méghaïer, Naâma).

- **The Evolution of production capacity of solar thermal electricity**

The table below describes the result predictions about the development of production capacity and electricity generation from solar thermal on the period of 2007 – 2025.

Table3: Evolution of production capacity of solar thermal electricity

Year	2007	2010	2020	2030	2040	2050
Production capacity (MW)	0	0	0	2200	4000	6000
Electricity generation (GWH)	0	0	0	7049	12852	19338

Source: le rapport de la seconde communication national de l'Algérie sur les changements climatiques a la CNUCC, Alger 2010, p : 181.

Algeria has great potential in the field of solar thermal. For this purpose the predictions of this method of electricity production will reach 20% of total production electricity by 2050. The ability to install, at the end of the program, is estimated at 17 500 MW, this corresponds to an electricity production of 58 TW by 2050. The achievement of program objectives thermal concentration, in the short term (2007 - 2015) should be done by hybrid solar / natural gas, with a share of 5% for solar, for the medium term (2015-2025), solar should take the major part in power hybrid solar / gas. For this purpose the production of solar electricity is expected to reach 80% of the total production of these plants. Finally, the long term, by 2025, these plants will be fully dedicated to the sun. The table below shows the objectives of this sector, in 2050.

- **The Perspectives of solar thermal concentration and of development of solar water heater in 2050**

The tables below show the potential increasing in solar thermal capacity to be installed and the electricity generation from that for the first table, the second table shows also the prospects hoped to achieve in development of solar water heater in the period of 2007 to 2050.

Table4: Perspectives of solar thermal concentration in 2050

Year	2007	2010	2020	2030	2040	2050
Combined capacity to be installed (MW)	0	35	1250	5500	12300	23500
Electricity generation (GWH)	0	112	4000	17607	39454	75595

Source: le rapport de la seconde communication national de l'Algérie sur les changements climatiques a la CNUCC, Alger 2010, p : 181

The prospect of development of this sector is based on the objective of installation of 2 million solar water heaters in 2050 and a collector area of more than 7 million m2. This corresponds to the equipment of community infrastructure and households remote areas.

Table 5: Perspectives of development of solar water heater in 2050

Year	2007	2010	2020	2030	2040	2050
Cumulative number of solar water heaters(Thousands)	0	5	85	283	776	2003

Source: le rapport de la seconde communication national de l'Algérie sur les changements climatiques a la cnucc, Alger 2010, p : 182 .

We can result, during of the first phase, the use of photovoltaic electricity will be reserved for the electrification of isolated sites where the network connection can be expensive. Based on an electrification rate of 98% of the country that would continue throughout the period prediction, the number of households that would not be scattered connected to national grid expected to increase from 170 000 currently to about 220 000 in 2025. The objective suggestion of electrification, by 2025, the PV of 100% of homes scattered. For the realization of this goal, the program consists of the proposed PV program implementation current 2005-2009 for the electrification of 16 villages in the sun (about 1000 households) and start as early as 2010, the more ambitious program that will provide electricity to 220 000 households. The photovoltaic program will result in the installation, by 2025, a capacity of 111 MW.[17]

It is expected, during the period 2026-2050, the development of more consistent Photovoltaic, as the costs of this industry are expected to fall enough to be competitive with solar thermal and even against the wind beyond 2040.The objectives set for the photovoltaic consist of the contribution of this sector to6% in the balance of electricity production in 2050.

4.2.2. **Wind energy prospect**

The development programme for the production of wind power on the horizon 2050 will be approximately 4% of national electricity production. For the period 2008 -

2015, it anticipated the completion of a 100 MW wind farm, and the ability to install the end of the program from 2050, 5650 MW, representing a production of 11 300 GWh. The table below shows the prospects hoped to achieve for wind power until 2050.

Table 6: Prospects for development of wind power

Year	2007	2010	2020	2030	2040	2050
Combined capacity to be installed (MW)	0	0	400	1100	2700	5650
Wind power (GWH)	0	0	800	2200	5400	11300
Part of photovoltaic in the national electricity production (%)	0	0	1	2	3	4

Source: le rapport de la seconde communication national de l'Algérie sur les changements climatiques a la cnucc, Alger 2010, p : 182 ;

This table shows clearly that Algerian renewable energies policy is more important in the solar power than in the wind power.

5. Renewable energy in the context of sustainable development

Sustainble development was tightly coupled with climate change at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil in 1992 that sought to stabilize atmospheric concentrations of greenhouse gases at levels considered to be safe.

Several definitions of sustainable development have been put forth, including the following common one: development that meets the needs of the present without compromising the ability of future generations to meet their own needs.[18]

The relationship between renewble energy and sustainability can be viewed as a hierarchy

of goals and constraints that involve both global and regional or local considerations. Though the exact contribution of RE to SD has to be evaluated in a country specific context, RE offers the opportunity to contribute to a number of important SD goals: (1) social and economic development; (2) energy access; (3) energy security; (4) climate change mitigation and the reduction of environmental and health impacts. a starting point is that mitigation of dangerous anthropogenic climate change will be one strong driving force behind increased use of renewble energy technologies worldwide. To the extent that climate change stabilization levels (e.g., a maximum of 550 ppm CO2eq atmospheric GHG concentration or a maximum of 2°C temperature increase with respect to the pre-industrial global average) are accepted, there is an implicit acknowledgement of a strong sustainability principle.[19]

Given Algerian's abundant solar, wind resources, biomass, geothermal, etc. represent a potential market for renewable energy technologies. Algeria could benefit from the targeted interventions that would reduce the local air pollution and help the country to tackle greenhouse gas emissions. Many factors that need to be considered and appropriately addressed in the shift to its sustainable development. These include a full exploitation and promotion of renewable energy resources, energy efficiency practices, as well as the application of energy conservation measures in various sectors such as in the construction of industrial, residential, and office buildings, in transportation, etc.

Conclusion

The level of fuels today are steadily declining, *for this reason, the Renewable energy* is indeed very important to mankind, the future of Sustainable energy can be only done with the help of renewable energy sources and this is really the main advantage that these energy sources have over traditional fossil fuels. World has come to a point where it has to not only satisfy ever-growing energy demand but also to do this on ecologically acceptable way in order to save our environment, and this can't be done without the renewable energy sources

Conscious of the need to face its environmental problems and aware to take part in the fight against the climatic change, Algeria has affirmed its commitment to boosting the role of renewable energies, the government appears determined to maintain control over production. With significant growth in demand expected in coming years, along with a government open to investing in renewable energy, Algeria is endowed with significant resources of renewable energies and particularly solar and wind energies, for which the country has several sites among the most promising in world.

Algeria could well become a leader in developing non-oil energy sources. However, aware of the risks posed by volatile oil prices and the resulting need to diversify its energy mix, Algeria must tackle a number of difficult issues before it can take advantage of the long-term opportunities offered by renewable energy sources¶. Beyond this Algeria is looking for a close partnership with the European Union so that Algerian plants may help deliver the green energy needed for Europe to meet its targets.

Footnotes, **references and web sites**

1. **Footnotes**

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