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Energy policy in the context of sustainable development: Case of Algeria and Tunisia.

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Abstract

At the dawn of the twenty-first century, one of the major problems of mankind is to combine the energy, the respect for environment. A problem of sustainable development has been clearly demonstrated in the Earth Summit in Johannesburg 2002. Among the major battles to be fought in this century for the survival of the planet is to include energy efficiency as an international political priority, reduce emissions of greenhouse gases. Renewable energy, inexhaustible, clean, are needed in these conditions as a priority. Algeria has entered its energy strategy in the context of sustainable development by integrating the promotion of renewable energy. The legislative and regulatory framework adopted in recent years testifies to this irreversible commitment. Three major laws govern the field of renewable energy and state incentives enjoyed by this sector. The law on energy management enacted in 1999 provides for the creation of a National Fund for Energy Management (NFEM) which helps to finance renewable energy projects. As part of the implementation of the law on electricity and public distribution of gas by pipeline passed in 2002, executive decree on the costs of diversification of electricity production promulgated in 2004 provides for the granting of premium for green electricity up to 300% of normal rate. Some projects for electrification of rural villages in the sun have been made in Great South of Algeria.
Since twenty years, Tunisia has established the institutional and regulatory framework of energy management in general and has launched a national program in this area focused on the rational use of energy but also on promotion of renewable energy. Initially it was proceeded to update the regulatory and institutional framework and this by enacting a new law on energy management (Law No. 2004-72 of August 2, 2004) amended by law n° 200 9-7 of February 9, 2009. Also, a system of energy management

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with the aim of supporting actions aimed at rationalizing of energy consumption, promoting renewable energy and alternative energy has been created by law n ° 2005-82 of August 15, 2005. Rates and premium amounts relating to the shares covered by this system are established by Decree N° 2005-2234 of 22 August 2005 amended by Decree 2009-362 of February 9, 2009.Thus, for achievements in the field of wind energy, it is the installation of a wind farm in Sidi Daoud of 55 MW and installation of 12 small wind turbines to supply electricity to rural areas. In the field of heating of domestic water by solar thermal energy, it is the installation of 400 000 m2 of solar collectors for heating domestic water in residential and tertiary sectors. In the field of solar photovoltaic, it is the electrification of 12,500 rural households and 200 rural schools and the equipment of 200 wells by photovoltaic pumps.

1. Introduction

At the dawn of the XXI century, one of the major problems of mankind is to combine the energy, the respect for environment and economic development, particularly for southern countries, an issue of sustainable development has been clearly demonstrated in the Earth Summit in Johannesburg 2002.

In this perspective, large battles are to be undertaken during the century for the survival of the planet: include energy efficiency as a priority in international politics, reduce emissions of greenhouse gases, save energy for economic development and reducing inequalities, empower stakeholders, strengthen the global regulation [1].

Algeria has entered its energy strategy in the context of sustainable development by integrating the promotion of renewable energy. In addition, a favorable legal framework for renewable energy development has been adopted. Three major laws govern the field of renewable energy and state incentives enjoyed by this sector.

Algeria has one of the largest solar fields in the world. It is valued at more than 3,000 hours of sunshine per year and 5 KWh of daily energy received on a horizontal surface of 1 m2 on most of the country [2]. The objective of the strategy for developing renewable energies in Algeria is reaching to achieve, by 2015 a share of these energies in the national electricity balance that would be 6%.

Since twenty years, Tunisia has established the institutional and regulatory framework of energy management in general and has launched a national program in this area focused on the rational use of energy but also on promotion of renewable energy.

Tunisia has a high potential for development of modern renewable energies, as estimated by the strategic study to 1.3 Mtep accumulated by 2010 to 7 Mtep by 2020 and 19 Mtep by 2030. The mobilization of this potential will significantly improve the contribution of renewable energies in primary energy consumption: 2.7% for 2010, 5.6% for 2020 and 6.5% for 2030.

That level of electricity production that the penetration of renewable energies would be more consistent. The wind energy industry for the production of electricity represents the largest share of this potential, 70% at 85% according to the horizons. In second place, come the solar hot water (10% of potential), and biogas. The photovoltaic will begin to have a significant contribution after the 2020. The mobilization of this potential requires the establishment of an ambitious program but realistic, in each sector [3].

Nomenclature

APRUE	Agency for the promotion and rational use of energy
NFEM	National fund for energy management
ICEM	Intersectoral council for energy management
HCDS	High Commissioner for Development of Steppe
NPEM	National program of energy management
NEAL	New Energy Algeria
SWH	Solar water heater
UNPE	United Nations programme for environment
CEEG	Company of engineering electricity and gas

2. Algerian energy strategy in the context of sustainable development

2.1 Law on energy management

The energy management covers all measures and actions implemented for the rational use of energy, renewable energy development and reducing the impact of the energy system on the environment and the development of renewable energy aims the introduction and promotion of processing industries of exploitable renewable energy, including solar energy, geothermal, biomass, hydroelectricity and wind energy [4].

A National Agency for Energy Management (APRUE), responsible for the leadership and facilitation of the process of implementation of programs and actions of energy management has been created.

The primary mission of the APRUE is the elaboration of the National Program of Energy Management (NPEM), to ensure the monitoring and evaluation [5].

Under this law on energy management 99-09 of July 28, 1999 a National Fund for Energy Management (NFEM) was established. It finances projects of energy management.

The national fund for energy management (NFEM) contributes to financing renewable energy projects. Article 33 provides various tax and customs benefits granted to projects that contribute to the promotion of renewable energy.

Measures concerning renewable energies are expected to be funded in this context under the national plan of energy management (NPEM) 2006-2010. These transactions involving residential and tertiary sectors. This is for tertiary sector, installation of 400 solar water heaters to produce hot water. For the residential sector, actions concern 20 operations of installation of solar equipment for the production of hot water and heating [6].

2.2 Law on electricity and gas distribution by pipeline

The law (N° 02-01 of 5 February 2002) on electricity and public distribution of gas liberalizing this sector has made provisions for the promotion of electricity production from renewable energy and its integration into the network.

As part of the implementation of this law, a decree entered into force March 25, 2004, on the costs of diversification of electricity production was promulgated. It creates an incentive scheme for the production of electricity from renewable sources.

Bonuses are granted significant benefits to producers of electricity from renewable sources. The premium can reach 300% of applicable fare [7].

2.3 Law on the promotion of renewable energies in the context of sustainable development.

The promotion of renewable energies in the context of sustainable development is achieved through a national program to promote renewable energy in the context of sustainable development, and an annual balance of renewable energy use and as well as instruments to promote energy renewable and that national program includes all information campaigns, of training or extension as well as incentives for research, production, development and use of renewable energy [8].

This law also provides incentives for renewable energy development and the establishment of a National Observatory of Renewable Energy in charge of the promotion and development of renewable energy.

3. Achievements in the field of renewable energies

3.1 Some projects

The electrification of rural villages and electric power utilities are both axes pursued by the government. Thus, nearly 1000 households in 20 villages in four south wilayas enjoy access to electricity since 2000, through photovoltaic kits which will add 16 more villages in the same area (900 households) and feeding more than 100 telecommunications sites.
Similarly, a central hybrid solar / diesel by 13 KWC installed in Illizi allows 300 households or 2000 people, to benefit from access to electricity.

Projects led by the High Commissioner for Development of Steppe (HCDS), a public institution whose mission is the development of stepiques and pastoral areas, have also allowed the electrification of more than 3000 homes with a capacity of 550 KWC, the provision of 160 solar pups for a power of 240 KWC and 80 wind pumps equivalent to a power of 120 KWC.

In the North, citing a 10 KWC photovoltaic plant that is connected to the national grid (this project is part of the Algerian-Spanish cooperation) CDER, a service station Naftal powered by solar energy (Staoueli with a capacity of 7 KWC), pilot plants for the benefit of the National Gendarmerie and the photovoltaic power supply of traffic monitoring stations.

3.2 Projects in progress and future

Currently, Algeria is engaged in two major projects that provide a place for solar and wind energy, hybrid gas-solar plant of 150 MW is located in Hassi R'mel which the cost is 350 million Euros, a solar technology park that will generate electricity from the sun with a capacity of 6000 MW by 2015 and a 10 MW wind farm in Tindouf, these projects are being implemented by the group New Energy Algeria (NEAL).
The commissioning of the hybrid plant combining solar and natural gas in Hassi R'mel, the first to global scale is expected in 2010. This plant is part of the program of four hybrid units in Algeria and extends over an area of 152 ha. It will use giant parabolic mirrors on an area of 18 ha with solar panels of 100m to generate power. It will allow Algeria to be the pioneer in the Mediterranean in the field of renewable energies [9].
CEEG company (subsidiary of SONELGAZ), launched an international tender to conduct a wind farm with a capacity of approximately 10 MW in Tindouf. The investment cost is estimated at about 16 million US$.

Under the National Program of Energy Management (NPEM), 2006-2010, a large development project of solar water heaters market, funded by the PNUE, was launched in 2008. It is the installation of 10 000 m2 of solar collectors (4000 SWH in the residential sector).

The group Sonelgaz instructed its engineering company CEEG to undertake a project to build a manufacturing of photovoltaic modules in the scope of the industrial area of Rouiba, through a mandate with the client (Rouiba Lighting Company). The envelope that will be allocated to the creation of this first manufacturing plant for photovoltaic modules is 100 million dollars. This future entity, which commenced operations in 2012, will be an annual capacity of 50 MW. It will be financed entirely by Sonelgaz and installed within the company's website Rouiba Lighting over an area of 4 ha [10].

Three other central hybrid solar / gas of 400 MW each are scheduled for 2015. The Minister of Energy and Mines plans a total investment estimated at between 15 and 18 Mds USD: 400/75 MW in Naama: planned start 2010; 400/75 MW in Meghair: start in 2012; 400/75 MW in HR M: planned for 2015.

A wind farm with a capacity of 10 MW, located in Adrar, is under tendering. The project of 16 million USD is the first project of its kind in Algeria and will operate on a hybrid wind / diesel technology. Two other wind farm projects of 10 MW are planned in Timimoun (2012) and Bechar (2015).

The National Agency for the Promotion and Rationalization of Energy Use (APRUE), has undertaken several actions, In particular, under the National Program of Energy Management, the program called "ALSOl". This program aims to promote the solar water heater. It provides a direct financial support to 45% of the cost of the solar water heater installed individually and 35% for a collective solar heating installation through the National Fund for Energy Management (NFEM). For 2010, the "ALSOL" program aimed at the promotion and dissemination throughout the country, of four hundred individual solar water heaters for the production of domestic hot water [11].

4. Tunisian energy policy in the context of sustainable development

The new energy context marked today by the growth of imports of fossil fuels has prompted the Tunisian government to adopt a new dynamic for change of scale in achievement of projects of energy efficiency and renewable energies. Conscious of energy and environmental issues, the Tunisian government is now

determined to strengthen significantly its policy of energy management to meet the ambitious goals made during the 11th plan of economic and social development 2007-2011, aimed improving energy intensity by 2% per year during this period.

Indeed, the guidelines of the 11th plan focused on three areas:

- The intensification of the program of management of energy demand.
- Increasing the share of renewable energies in national energy resources [12].

4.1 Law on energy management

Pursuant to Law No. 2004-72 of 2 August 2004 on energy management and amended by Law No. 2009-7 of February 9, 2009, the energy management is considered a national priority insofar as it constitutes a key element of sustainable development and has a close relationship with the economic and social development and the protection of the environment.

The energy management includes all actions taken for the rational use of energy, promoting renewable energy and alternative energy.
Shares of energy management cover all programs and projects that aim to improve the energy efficiency and diversifying energy sources under the state policy in terms of energy and this in particular through the promotion of renewable energy.
The national program to promote renewable energy consists of the development of wind energy use for electricity production, encouraging the use of solar thermal energy, the exploitation of solar energy in the field of rural electrification and pumping.
A National Agency for Energy Management is created to propose incentives, encouragement and procedures likely to develop the field of energy management and to develop demonstration projects in the field of energy management and monitor their achievements [13].

Also, a system of energy management with the aim of supporting actions aimed at rationalizing of energy consumption, promoting renewable energy and alternative energy has been created by law n ° 2005-82 of August 15, 2005.
Under this Act, grants are awarded under this system for the production of electricity from renewable energy and for heating water by solar energy in homes and private businesses [14].

Rates and premium amounts relating to the shares covered by this system are established by Decree N° 2005-2234 of 22 August 2005 amended by Decree 2009- 362 of February 9, 2009.

Under that decree, the actions aimed at the development of renewable energies are eligible to receive the following bonuses:

- For the use of renewable energies.
- For solar water heating: In the residential sectors and small business, a premium of two hundred dinars (200D) for the solar water heater with a collector area of between one meter (1m2) and three square meters (3m2), a premium of four hundred dinars (400D) for the solar water heater with a collector area of between three (3m) and seven square meters (7m2).

In the industrial and tertiary sectors: A premium of 30% of the cost of the investment with a maximum of one hundred and fifty dinars (150D) per square meter.

For the production of electricity in the agricultural sector: A premium of 40% of the cost of investment, with a maximum of twenty thousand dinars (20 000D) for projects of rural lighting and pumping water by solar energy and wind energy for farms and rural projects.

For biogas production: A premium of 40% of the cost of the investment with a maximum of twenty thousand dinars (20 000D) for the production of biogas.

A premium of 20% of investment cost with a maximum of one hundred thousand dinars (100 000D) for the production of biogas to produce electricity.
For the production of electricity in solar buildings: A premium of 30% of the cost of the investment with a maximum of three thousand dinars (3 000D) for a kilowatt peak and fifteen thousand dinars (15 000D) for a solar building.
For cogeneration: A premium of 20% of the cost of the investment with a maximum of five hundred thousand dinars (500 000D) [15].

4.2 Achievements in the field of renewable energies

For wind energy, important capacity could be installed at 2020 and 2030 taking into account the development of the electricity network and its ability to absorb wind power.
About solar thermal, the objective is to reach a fleet of solar water heaters installed in the order of 1.5 million m2 in 2030 based on the new financing mechanism supporting the market of solar water heaters in Tunisia and implemented from 2005 .

For photovoltaic energy, the focus is primarily on solar pumping which constitutes one of the areas of application of this technology, the most buoyant in Tunisia.

In the field of renewable energies, actions focused on:

- The installation of a wind plant with a capacity of 10 MW in the region of Cap Bon.
- Installation of a wind farm in Sidi Daoud of 55 MW, installation of 12 small wind turbines for supplying electricity to rural areas.
- The electrification by photovoltaic systems of 12 500 rural households and 200 rural schools and several border guard posts, lighting of roads, beaches, equipment of 200 wells by photovoltaic pumps and the establishment of a village photovoltaic in Ksar Guilène (lighting, pumping and desalination of photovoltaic solar water).
- The installation of 400 000 m2 of solar collectors for heating domestic water in residential and tertiary sectors.
- Implementation of fifty family units of biogas production in the North West.
- Installation of an industrial unit of production of biogas in Sousse.
- The distribution of 15 000 covers for home baking bread.

5. Conclusion

A study of the APRUE indicates that energy demand will explode by 2020. The needs of the residential sector will be multiplied by 2.7 while the tertiary sector will increase its power consumption by 3.2, an increase of 40% relative to current consumption.
In Algeria, despite a considerable potential, the share of renewable energies in the energy balance is still low especially in the production of electricity, is only 0.02 % of national electricity consumption (5GWh).

The rise of renewable energies in Algeria cannot be conceived without the completion of a phased program more important of projects to produce electricity.
Energy policy should encourage the introduction of hybrid possibilities and support other forms, including electricity generation by the private sector to share the heavy burden on her. This is the only condition that the energy mix of Algeria will grow potential of renewable energy.

Taking advantage of rising energy prices and the need to limit the independence of external energy, combined with the growing sensitivity in relation to environmental problems, renewable energies prove a necessity for sustainable development of Tunisia.

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