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Study of management strategy of energy resources in Algeria

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HIGHLIGHTS

- Introduce the energy potential of Algeria.
- Analysis of political and energy policy in Algeria.
- Compare this strategy with other countries.
- Show the role of renewable energies in the development of the energy strategy of Algeria, particularly in the production of electrical energy.
- Suggested some recommendations to improve the energy strategy of Algeria in the future.

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ABSTRACT

Algeria is one of the largest energy-producing and exporting countries in the world. This has been achieved through the implementation of strategies and policies to promote the economic, social and environmental utilization of energy resources. However, the efforts and policies deployed have not yet placed the country in its proper place with regard to the diversification of energy sources. Such efforts have yet to fully exploit its capacities and reserves of renewable and non-renewable energy resources to diversify its economy, reduce its dependence on the hydrocarbons sector and achieve its economic security.

This study aims to establish projections on the strategy of management of energy resources in Algeria.

The study will be carried out in different phases: The first phase will be oriented towards the renewable and non-renewable potential available in Algeria.

Then, understanding and analyzing the different aspects of the country's energy strategy (production, export), which will be presented in this article, shows that the Algerian economy is mainly based on the export of exhaustible and polluting fossil fuels. While the integration of renewable resources into its energy strategy remains very low compared to the available potential.

Finally, an analysis of the current and future energy situation of Algeria to guarantee the energy security of countries.

1. Introduction

In terms of energy potential, Algeria has the tenth world gas reserves and third in shale gas. It also has the third oil reserves in Africa, according to the US Agency for Energy (Anon, 2014d).

The country has great potential in solar energy. With an average annual sunshine 2000 h and assessed a territory composed of 86% of the Sahara desert, its solar power is estimated at about 1700 KWh/m^2/year in the north and 2650 KWh/m^2/year in the south, which corresponds to a capacity 8 times higher than the natural gas reserves of the country, and the largest solar fields in the world (Sulmont and Meley, 2013b; Anon, 2007).

The potential of other renewable energy sources is more modest, especially hydroelectricity and wind power when wind speeds vary between 2 and 6 m/s only. The potential of biomass, which includes the recycling of waste from human activities, urban and agricultural waste, is estimated at 1.33 Mtoe/year. Geothermal energy has a more favorable outlook with 200 hot springs listed (Sulmont and Meley, 2013b; Anon, 2007).

The levels of the natural gas needs of the domestic market would be about 45 billion m3 in 2020 and 55 billion m3 in 2030. To these are added the needs volumes dedicated to the export whose revenues contribute to funding of the national economy (Benhamed, 2014).

Similarly, electricity generation should be between 75 to 80 TWh in 2020 and between 130 to 150 TWh in 2030 (Benhamed, 2014).

All these considerations justify the strong integration of renewable energies into the long-term energy supply strategy, while giving an important role to energy savings and energy efficiency.

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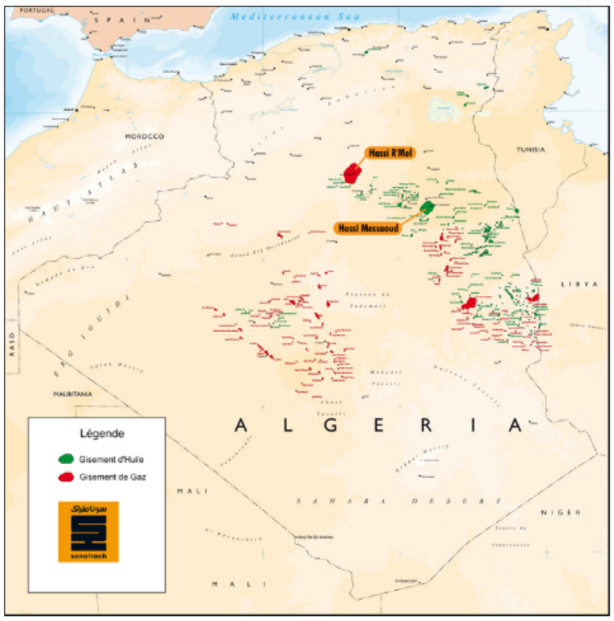

Fig. 1. Map of hydrocarbon fields in Algeria (http://www.energy.gov.dz/francais/index.php?page=geologie-des-provinces-petroliere-en-algerie-2).

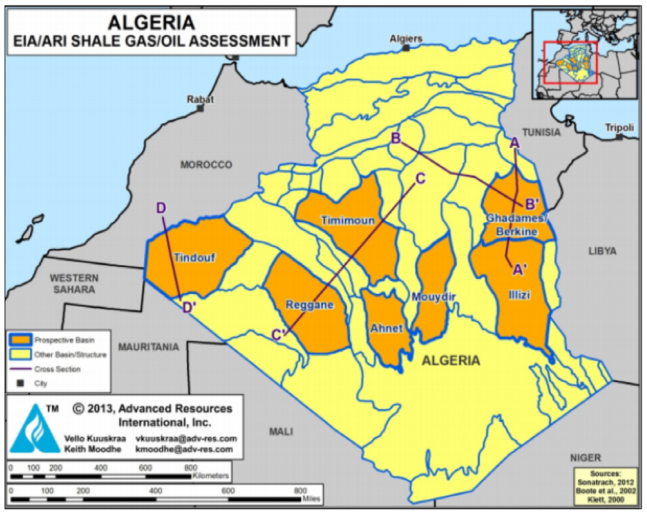

Fig. 2. Seven identified shale gas basins in Algeria (Kuuskraa, 2013).

Table 1
Data on solar radiation in Algeria (Anon, 2007).

Region	Coastal	Highlands	Sahara
Area (%)	4	10	86
Average sun hours per year	2650	3000	3500
Energy received KWh/m^2/year	1700	1900	2650

2. Energy potential of Algeria

2.1. The conventional hydrocarbon reserves

Algeria is the largest producer of natural gas in Africa, the second largest natural gas supplier to Europe and is among the top three oil producers in Africa (Anon, 2014d).

The conventional hydrocarbon reserves discovered in Algeria to date are contained in just over 200 oil and gas deposits, of which 73 are located in the Illizi basin, 57 in the basins of Central Sahara, 34 in basins Ghadames-Rhourde Nouss, and 31 in the Oued Maya basin (Fig. 1) (Sulmont and Meley, 2013b; Attar and Hammat, 2012).

The latest estimate of OPEC, published in 2015, Algeria is estimated at 12.2 billion barrels of proven reserves of conventional crude oil, an estimate that was unchanged for many years. It is the third largest amount of proven reserves of conventional crude oil in Africa and the 15th in the world (Anon, 2014d, 2015d).

Proven reserves of natural gas from Algeria were estimated at about 4.5 trillion cubic meters, the tenth largest natural gas reserves in the world and the second largest in Africa after Nigeria (about 30% proven gas reserves of the entire African continent) According to BP, as early as June 2014 (Anon, 2014d, e).

These statistics, which represent only the volumes contained in the deposits discovered or in the course of production, could increase due to the development of future discoveries and the technological innovations which will make it possible to transfer resources to additional reserves.

2.2. Shale gas in Algeria

The Algeria has seven (7) basins containing shale gas (Fig. 2). These basins Mouydir, Ahnet, Berkine–Ghadames, Timimoun, Reggane and Tindouf. Which are estimated 19,800 billion m3. This corresponds to four times the level of its current gas reserves (Kuuskraa, 2013; Anon, 2013a).

With this estimate, Algeria is ranked 3rd in the world by the US Department of Energy, overtaken by China with recoverable reserves of shale gas 31.220 billion m3, and Argentina with 22.500 billion m3 (Kuuskraa, 2013; Anon, 2013a).

These numbers are the only ones available and are surrounded by many uncertainties, particularly with regard to the experience of other countries that have seen their declared reserves diminish as a trickle once all started explorations.

The exploitation of shale gas in Algeria was made possible by the 2013 hydrocarbons law (Anon, 2014a).

In July 2014, Sonatrach, the national hydrocarbons company, says it plans to begin operation of the Algeria shale gas deposits from 2020, with a production capacity of 30 billion m3 per year in the first phase, equivalent to the current national consumption. For now, Sonatrach is launching a pilot drilling campaign by hydraulic fracturing to more accurately assess the recoverable reserves (Anon, 2014a).

2.3. Renewable potential

In all Mediterranean basins, there is a gigantic reservoir of solar energy in the north of Africa and particularly the southern region of Algeria. The potential of this type of energy in southern Algeria is the largest (Fig. 3).

The sunshine duration of almost all the national territory exceeds 2000 h annually and reaches 3900 h (high plains and Sahara). The energy received daily on a horizontal surface of 1 m2 is about 5 Kwh over most of the country, or nearly 1700 kWh/m2/year in the north and 2263 kWh/m2/year in the south (Sulmont and Meley, 2013b; Anon, 2007).

Table 1 shows the rate of sunshine for each region of Algeria.

The potential of other renewable energy sources is more modest, especially hydroelectricity and wind power when wind speeds vary between 2 and 6 m/s only. The potential of biomass, which includes the recycling of waste from human activities, urban and agricultural waste, is estimated at 1.33 Mtoe/year. Geothermal energy has a more favorable outlook with 200 hot springs listed (Sulmont and Meley, 2013b; Anon, 2007). (See Fig. 4.)