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# Analysis and impact of the measures to mitigate climate change in Algeria

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## Abstract

Algeria has adopted various measures of mitigation and adaptation to adverse climate change impacts. Algerian strategy focus on reducing GHG emissions, CO<sub>2</sub> sequestration, expanding forest areas and improving water resources by sea water desalination. This study presents the GHG mitigation potential of Algeria to 2030, the fossil energy saved through promoting renewable energy and energy efficiency and analyses the main barriers that could hamper the success of this strategy of mitigation and adaptation.

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*Keywords:* Adaptation; Algeria; Climate change; Energy efficiency; GHG; Mitigation; Renewable energy

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## 1. Introduction

The issue of global climate change and its impact is a major concern of the 21<sup>st</sup> century. Algeria, like other countries, faces frequent extreme weather events that aggravate drought and water scarcity. At the same time, socio-economic development and sustained improvement in living standards have led to a substantial increase in energy consumption. In 2015, the total energy consumption amounted to about 58 MToe or 1.46 Toe / capita. The energy demand is still increasing. The average annual growth rate remained at about 7% during the last decade [1, 2]. This trend of energy consumption is reflected in CO<sub>2</sub> emissions, which are steadily increasing (about 2% per year) [3].

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Because Algeria is an important energy producer (oil and natural gas), electricity generation is approximately 99 % sourced from natural gas.

Algeria has adopted various measures of mitigation and adaptation to adverse climate change impacts. These measures are supported by coherent legislative framework and financial instruments [3]. The main components of the Algerian strategy focus on reducing greenhouse gas (GHG) emissions, CO<sub>2</sub> sequestration, expanding forest areas and improving water resources through desalination of seawater. This strategy is based in particular on the new national program for renewable energy adopted in 2015. This program aims to reach a large deployment of photovoltaic and wind energy as well as solar thermal energy. The target is to achieve 22 GW capacity of electricity from renewable by 2030. Renewable energies will account for 27% of electricity generation, compared to 0.2% in 2015. Other measures in the field of forest rehabilitation and increasing their surface represent a significant carbon sink and help to combat land degradation, desertification and erosion. Besides these measures, the country has launched a extensive program of energy efficiency in many sectors, particularly, in building and transport.

The implementation of the new programs of renewable energy and energy efficiency will have a large impact in terms of GHG mitigation in Algeria.

## 2. CO<sub>2</sub> mitigation

### 2.1. Renewable energy and CO<sub>2</sub> Reduction

The socio-economic development for several years generates in Algeria a high demand for electricity and natural gas. The currently installed electricity power is about 17.6 GW. To meet future needs, installed capacity is expected to reach 33 GW in 2020 and 59 GW in 2030 [4]. Electricity consumption was 64.6 TWh and is expected to reach at least 75 TWh in 2020 and 130 TWh in 2030 [4]. The already high electricity demand will double by 2030.

In addition to its wealth of fossil energy, Algeria has a very high solar potential. Direct solar irradiance reaches on average more than 3000 hours of sunshine / year [5]. This advantage has led the country to prioritize investments in renewable energy. The integration of renewable in the energy mix represents a major challenge for preserving fossil resources and reducing CO<sub>2</sub> emissions. In this context, Algeria has adopted in 2015 a new program to promote renewable energy. The objective is to reach by 2030 a capacity of 22,000 MW in renewable energy sources, particularly photovoltaic, wind power and solar thermal (Fig. 1). The installed renewable capacity will account for 37 % of the total installed capacity. The implementation of this program achieves 27% of national electricity production from renewable [6, 7]. A coherent legislation and very advantageous financial instruments have been provided for this purpose [3].

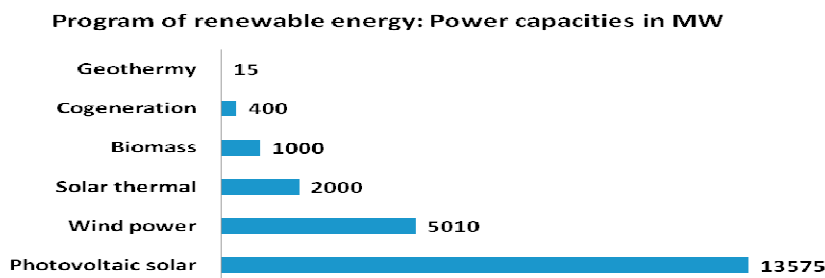


Fig. 1. Distribution of renewable energy by sector of energy production

The program deployment will be in two phases: a first phase (2015-2020) which aims to install 4,525 MW and a second phase (2021-2030) for the rest. Despite its priority nature, the program started very slowly. It was planned to install a capacity of 400 MW by the end of 2016. Fig. 2 shows the yearly evolution of the contribution of renewable sources to the national electricity generation.

By using the emission factors provided by the Intergovernmental Panel on Climate Change (IPCC) and those indicated by the French Agency for the Environment and Energy Management (ADEME) [8], we calculated the

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