

## CLIMATE CHANGE SUCCESS STORIES

# LARGEST CONCENTRATED SOLAR PLANT IN AFRICA REDUCING MOROCCO'S DEPENDENCY ON EXTERNAL POWER

### PROJECT SNAPSHOT - Ouarzazate solar complex (NOORo I; II and III solar plants)

**Country:** Morocco

**Sector:** Renewable energy and power generation

#### AfDB Related financing:

€200 million from AfDB (Noor I, II and III); €200 million from the Clean Technology Fund (Noor I, II and III) of the Climate Investment Funds

#### Outputs:

- Construction of two concentrated solar power plants with parabolic troughs with 3 hour (Noor I), 7 hour (Noor II), and a concentrated solar power plant with tower 7-8 hour (Noor III) storage capacity

#### Impacts:

- Reduction in the country's energy dependence through the additional production of: 160 MW power generation expected by end 2015 from Noor I and an additional 350 MW power generation expected by end 2018 from Noor II and Noor III
- Reduction in CO<sub>2</sub> emissions by 762,000 tons per year, or 19 million tons over 25 years from Noor I, II and III
- Realization of its 42 percent renewable energy objective in its energy mix by 2020 and the development of a local renewable energy industry
- 250 permanent jobs and 2,400 temporary jobs created during construction of Noor I and 850 new jobs expected from construction of Noor II and II

### Situation

Morocco currently depends on external sources for 95 percent of its primary energy needs. Between 2002 and 2012 alone, the country's energy consumption increased by an average of 7.2 percent. Meanwhile, Morocco's demand for primary energy is expected to triple, while demand for electricity is set to quadruple by 2030.

In response to this, the country has prioritized improving its home-grown power supply under its new 2010 to 2030 energy strategy. One of its aims is to diversify sources of production and generate value from the potential of renewable energy sources to increase its share of electricity production to 42 percent by 2020.

### Objectives

Since 2010, the AfDB, in partnership with the Clean Technology Fund, European Investment Bank, European Union, French Development Agency, Germany Development Bank, Moroccan Agency for Solar Agency and the World Bank, has worked with the Moroccan Solar Energy Program – NOOR – which aims to develop minimum capacity of 2,000 MW by 2020 in order to secure power supplies for the population and productive sectors of the economy. The construction of the first 160 MW solar power station (Noor I) began in 2013 and is scheduled to come into operation by the end of 2015. Subsequent power stations, Noor II and III, expect to generate a total capacity of 350 MW and average estimated cumulative production of over 1,100 GWh per year by 2018.

### Unique project features

The project is one of the largest concentrated solar plants in the world. It also utilizes an innovative financing structure which leverages the capacity of a consortium of independent power producers to sell the power generated by the plant back to the government in a public-private partnership arrangement. The project's financing support mechanism will bring down the capital cost of the concentrated solar power to levels comparable with traditional technologies and the wholesale cost of power in Morocco. It is expected to reduce the concentrate solar power global cost curve by 3 percent.



## Lessons learned

The following valuable lessons were learned during Noor I which are being used to improve the relevant processes of Noor II and Noor III:

- **Optimizing plant design supplies more power at peak hours.** In Morocco, peak hours are from 5 pm to 10 pm in winter and 6 pm to 11 pm in summer) with minimum levels of storage required and not only on a set amount of thermal storage alone.
- **Shave off as much as a year in procurement time by including draft legal documents for bidders.** In the case of Noor I, the process to develop and negotiate the related legal agreements that followed award of the project took over a year. Including sample legal agreements from past similar projects for bidders to review and comment upon during the procurement process may therefore save a lot of time compared to starting the discussions only once a bid has been awarded.
- **Undertaking the bulk of the environmental and social impact assessment during the procurement process saves additional time.** The plant-specific environmental and social impact assessment for Noor I was started after award of the project and took considerable time. To accelerate this process, terms of reference for consultants to be hired by bidders to undertake most of the assessment during the procurement process should be included in the bidding documents. Bidders are then required to submit a draft of the assessment as part of their final bids. Once the bidder(s) have been selected, they can then begin their public consultation process and subsequently disclose the assessment(s), after Bank review, for the requisite disclosure period.

## Testimonials

"The Moroccan solar program will have a direct and immediate impact on the environment once it is completed. This program is going to help Morocco avoid 3.7 million tons of CO<sub>2</sub> emissions. It is also going to allow Morocco to reduce the consumption of combustible fossil fuels by the equivalent of 1 million tons of petrol per year. The goal today is twofold: reduce our energy dependence and at the same time reduce CO<sub>2</sub> emissions and preserve the environment"

**Abderrahim El Hafidi, Secretary General, Ministry of Energy, Mining, Water and Environment and former Renewable Energy Director, Morocco Ministry of Energy**

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