

Sonatrach Solar Power Development Program

Houston, TX – March 7, 2019



Agenda

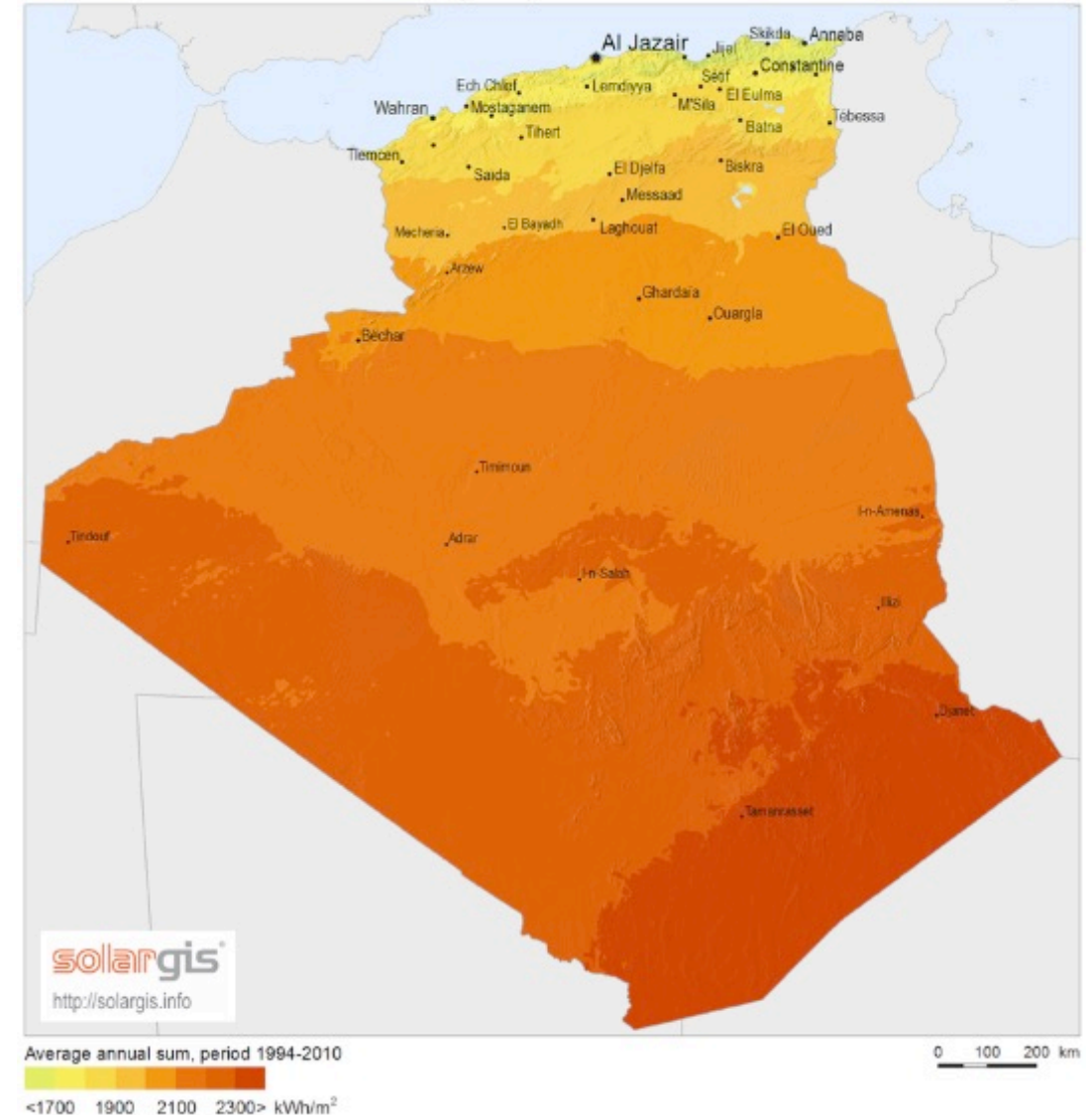
- ❖ Algeria's Advantages in Solar Energy
- ❖ National Renewable Energy Development Strategy
- ❖ Sonatrach 2030 Vision
- ❖ Solar Power Plants Program
- ❖ Sonatrach and Partnership
- ❖ Pilot Project - BRN, Main Information
- ❖ PV Implementation as a Solution
- ❖ Sonatrach's Role in the Development of Solar Energy in Algeria
- ❖ Conclusion

Algeria's Advantages in Solar Energy

- ❖ An annual average irradiation of $\sim 2,000 \text{ kWh / m}^2$
- ❖ Availability of large spaces (South and Highlands)
- ❖ Significant coverage of the national electricity grid
- ❖ An existing photovoltaic installed capacity of $\sim 350 \text{ MW}$
- ❖ Local industry, know-how and expertise at the national level

National Renewable Energy Development Strategy

- ❖ The National Renewable Energy Program considered as a National Priority
- ❖ The National Program for Renewable Energy and Energy Efficiency : Deployment of 22 GW capacity including 13.5 GW of solar energy by 2030
- ❖ Sonatrach's vision SH2030 fits fully into the national strategy of the development of renewable energy



Sonatrach 2030 Vision



UNCONVENTIONAL RESOURCES

Production of 20 bcm in 2030 and 70 bcm in 2040

Creating over 15.000 direct jobs

OFFSHORE RESOURCES

Exploration of -100.000km² surface area

Maturation and development of prospects in partnership



SOLAR ENERGY

Installing 1.3 GW to cover 80% of our needs on site

Exporting the gas made available

Solar Power Plants Development Program

National Renewable Energy Program

13.5 GW

Solar energy
in 2030



Solar projects in progress & in development

344
MW

Sonelgaz power plants (SKTM) in operation

- 23 PV plants in the Highlands and the South

150
MW

Calls for tenders from the CREG

- 7 power stations PV in the south of the country
- Call for tender launched end of 2018

50
MW

Sonelgaz projects

- Hybridization of diesel plants with PV

1000
MW

Sonatrach Program - Connected to the electricity grid

- Achievement target by 2020

1300
MW

Sonatrach Program on its industrial sites

- Achievement target by 2030

Sonatrach and Partnership

SONATRACH is engaged in energy transition by actively solarizing its facilities to cover 80% of site needs

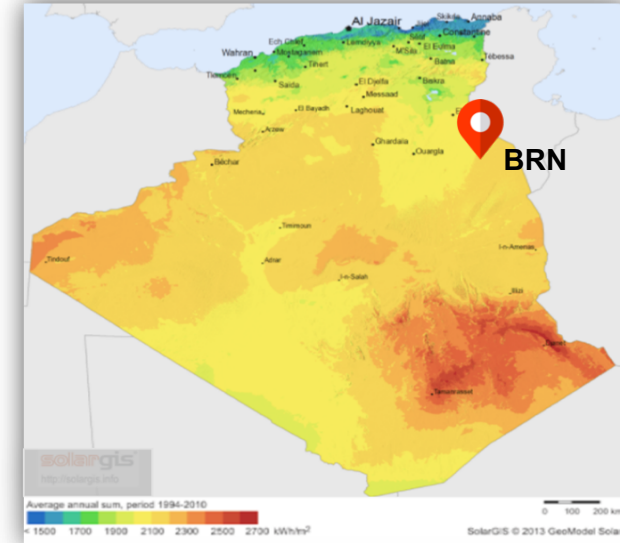
→ Up to **1.3 GW** solar power to supply all eligible sites.

- ✓ Ongoing partnership projects negotiations with Oil & Gas partners; in particular Eni & Total Solar
- ✓ Memorandum of Understanding (MoU) signed with Eni & Total Solar, covering the general aspects of solar development on production sites of Sonatrach (brownfield) and grid connected (greenfield)
- ✓ Sonatrach have implemented –in partnership with ENI- its first pilot project in Bir Rebaa North (BRN) site
- ✓ Ongoing study with Total Solar for implementation of a pilot project
- ✓ Sonatrach is in advanced negotiation with other partners focused on solar electricity generation
- ✓ Several industrial sites have been identified for hybrid solution implementation (Solar/Gas)

Ongoing potential identified brownfield projects totalize more than 300 MW

Pilot Project - Bir Rebaa North BRN, Main informations

- November 25, 2018 : Project inauguration and commissioning .
- Location : Bir Rebaa Nord BRN – Ouargla south of Algeria .
- Area : 20 hectare.
- Solar panels numbers : 31 320.
- Power : 10 MW.
- Annual production : 18 GWh.
- Completion time : 08 Months.
- Realization cost : 16 millions USD.
- Minimum project life : 25 years.
- Owner : Sonatrach – Eni group.
- EPC contractor: Sinohydro CO.LTD (Chinese company).



BRN Technology Laboratory – SolarLab

Objective

1

Hybrid systems
development

2

Compare different PV
technologies

3

Experiment new
technologies

4

Cooperation with
Algerian Universities

5

Training

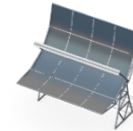
Operations



Different PV technologies



Control room



CSP Prototype



Energy Storage

Location



PV Implementation as a Solution

PV continues to dominate solar market

Key advantages

- Simple to install and operate
- Rapid technological development and market expansion lead to very low prices
→ less than 1\$/kWh
- Controlled investments and relatively short project development
- Over 25 years life



Sonatrach's role in the Development of Solar Energy in Algeria

SH must play a leading role for solar projects



- Provide the grounds, Guarantee the purchase of electricity, Invest in projects (> 51%), Manage tenders & Valorize the saved gas at export

Projects to be developed with all stakeholders:

State

Sets the regulatory framework for tenders, Grant concessions and access, Deliver building and road permits & Establish Incentive Mechanisms¹



Define the connection conditions, Authorize the injection of electricity on grid & Buy electricity



Deliver operating authorizations & Validate the original guarantee certificates

Developers
&
industrials

Develop a turnkey project, Provide the equipment, Design and build facilities & Operate and maintain facilities

1. Loans at subsidized rates, tax exemption, etc.

Conclusion

- ❖ Algeria National Renewable Energy Program with 22 GW at 2030
- ❖ Solar Program of 13.5 GW
- ❖ Sonatrach SH2030 vision with 1.0 GW and 1.3 GW
- ❖ Sonatrach has a Central Role in the development of Solar
- ❖ Development with partnership is a key for success
- ❖ Huge opportunities for US companies

SH2030
LEADING THE CHANGE

