

Status of Latest Operating CSP Projects and Technology in key CSP Countries

International CSP plants

The Role of CSP in the Evolving Energy Market in the Western US
Sacramento. February 18, 2020

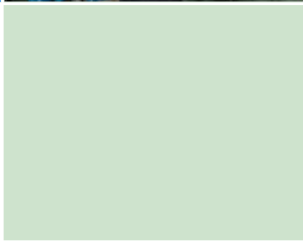
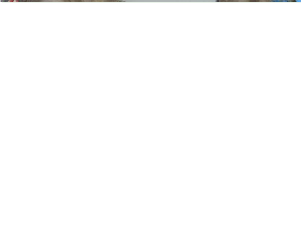
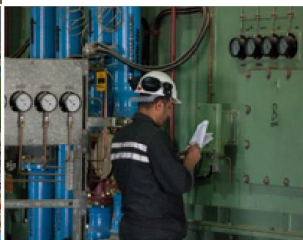
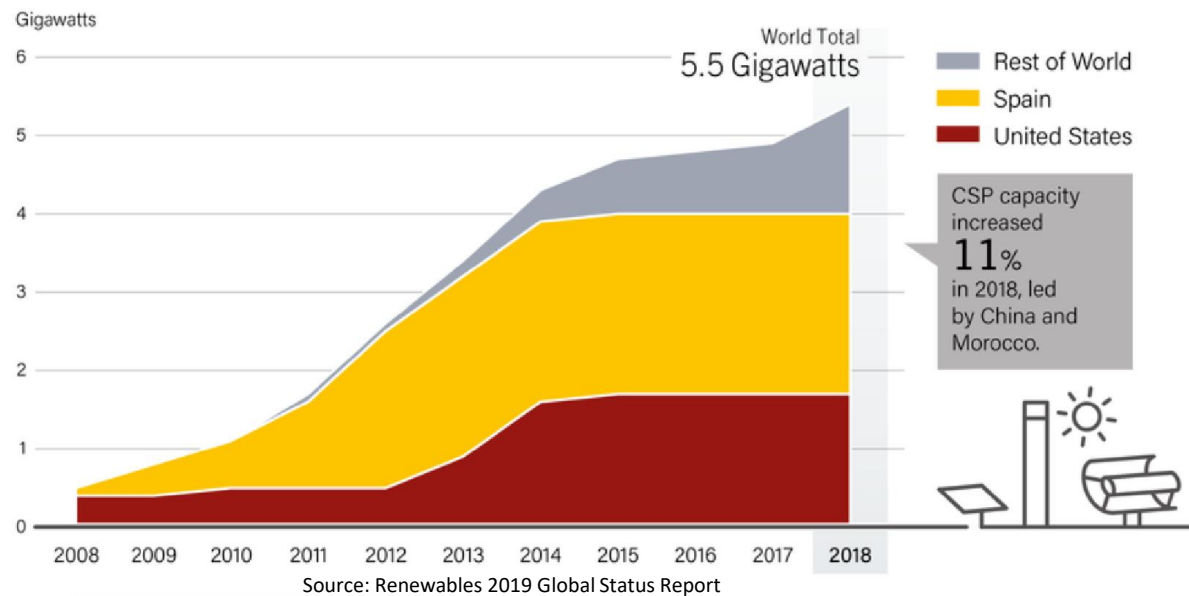


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INTRODUCTION

Concentrating Solar Thermal Power Global Capacity, by Country and Region, 2008-2018



ACWA Power CSP Portfolio

in Operation
565 MWe

under Construction
700 MWe

in advanced development
100 MWe

Total: 1.4 GWhe

25% of worldwide
Installed capacity (2018)



ACWA CSP PORTFOLIO - BOKPOORT CSP

SOUTH AFRICA Northern Cape Province	
TECHNO-COMMERCIAL	
Offtaker	Eskom Holdings SOC Limited
Offtake Contract	PPA-BOO 20 years
Power	50 MWe (net) with 9.3 hours of thermal energy storage
Project Cost	USD 517 Mn
COD	Q1 2016
ACWA Power Effective Stake	40%
STAKEHOLDERS	
Other Investors	Lereko (13%), PIC (25%), Community (10%), others (12%)
EPC	Spain's TSK Electronica y Electricidad, Acciona Infraestructuras, Acciona Ingenieria, Sener Ingenieria y Sistemas and Crowie Concessions
OSM	NOMAC



Status : Operational

Technology: Parabolic Trough

Capacity: 50MW (net) with 9 hours of Storage

Size: Approximately 450 hectares

Location: Northern Cape, South Africa


DNI: 2718 kWh/m2 per year

Term of PPA: 20 years from ICOD

Initial COD: 19 Mar 2016

ACWA CSP PORTFOLIO - NOOR PLATFORM

**NOORo I
CSP IPP**



MOROCCO
Ouarzazate

TECHNO-COMMERCIAL

Offtaker	Moroccan Agency for Sustainable Energy (MASEN)
Offtake Contract	PPA 25 years
Power	160 MWe
Project Cost	USD 841 Mn
COD	Q4 2015
ACWA Power Effective Stake	73.13%

STAKEHOLDERS

Other Investors	Masen Capital (Morocco) (25%), Aries (2.5%), TSK (2.5%)
EPC	TSK, ACCIONA, and SENER
O&M	NOMAC Maroc



Status : Operational

Technology: Parabolic Trough

Capacity: 160MW (net) with 3 hours of Storage

Size: Approximately 450 hectares

Location: Ouarzazate, Morocco

DNI: 2517 KWh/m² per annum

Term of PPA: 25 years from ICOD

Initial COD: 20 Jan 2016

ACWA CSP PORTFOLIO - NOOR PLATFORM

**NOORo II
CSP IPP**

MOROCCO
Ouarzazate



TECHNO-COMMERCIAL

Offtaker	Moroccan Agency for Sustainable Energy (MASEN)
Offtake Contract	PPA 25 years
Power	200 MWe
Project Cost	USD 1,100 Mn
COD	Q1 2018
ACWA Power Effective Stake	70%

STAKEHOLDERS

Other Investors	Masen Capital (Morocco) (25%), SENER (5%)
EPC	SENER and SEPCO III
O&M	NOMAC 75%, Masen 25%



Status	: Operational
Technology	: Parabolic Trough
Capacity	: 200 MW incorporating 7 hrs storage
Size	: Approximately 600 hectares
Location	: Ghassat commune, 10 km east-northeast of Ouarzazate, Morocco
DNI	: 2,517 kWh/m ² per annum
Term of PPA	: 25 years from ICOD
Initial COD	: April 2018

ACWA CSP PORTFOLIO - NOOR PLATFORM

**NOORo III
CSP IPP**



MOROCCO
Ouarzazate

TECHNO-COMMERCIAL

Offtaker	Moroccan Agency for Sustainable Energy (MASEN)
Offtake Contract	PPA 25 years
Power	150 MWe
Project Cost	USD 862 Mn
COD	Q4 2018
ACWA Power Effective Stake	75%

STAKEHOLDERS

Other Investors	Masen Capital (Morocco) (25%)
EPC	SENER and SEPCO III
O&M	NOMAC 75%, Masen 25%



Status	:	Operational
Technology	:	Central Tower
Capacity	:	150 MW + 8 h storage
Size	:	Approximately 750 hectares
Location	:	Ghassat commune, 10 km east-northeast Ouarzazate, Morocco
DNI	:	2,517 kWh/m ² per annum
Term of PPA	:	25 years from ICOD
Initial COD	:	October 2018

ACWA CSP PORTFOLIO - NOOR ENERGY 1 (DEWA CSP)

Noor Energy 1



UNITED ARAB EMIRATES
Dubai

TECHNO-COMMERCIAL

Offtaker	DEWA
Offtake Contract	PPA-BOO-35 YR
Power	950 MW
Project Cost	USD 4.3 Bn
ACWA Power Effective Stake	49%

STAKEHOLDERS

Partner & Offtaker	DEWA (51%)
EPC	Shanghai Electric
O&M	NOMAC



Status	Under Construction
Technology/Capacity:	Central Tower 1 x 100 MW + 15 hours of storage Parabolic Trough 3 x 200 MW + 12 hours of storage PV 1 x 250 MW
Size	Approximately 4,000 hectares
Location	Mohammed Bin Rashid Al Maktoum Solar Park, 50 km south of Dubai, UAE
DNI	2,021 kWh/m ² per annum
Term of PPA	35 years from ICOD
Initial COD	August 2021 (First Unit PT1)

How do ACWA CSP projects performed?

- Overall efficiency of the projects better than expected
- All CSP projects in ACWA Power has been in the ramp-up period and learning operational curve up to now despite of that accumulated generation **more than 3500 GWhe**
- Bokpoort has demonstrated in continuous basis 24 h generation with capacity factor above of 95%
- Noor 1 has demonstrated efficient strategies of operation to maximize peak generation with only 3 hours of storage
- Noor 2 is the project with more generation in a single year **more than 635 GWhe** during 2019
- Noor 3 has generated more than 200 GWhe in the first 6 months
- Some forced unavailability issues, but ACWA Power is working to improve and solve them with the different partners in an efficient way to enhance performance and reliability in coming years.
- Acquired knowledge very important for new projects. **All lesson learnt** from projects in operation have been applied in DEWA CSP project.
- ACWA Power is convinced that CSP portfolio will performance better than expected in the following years





Je vous remercie Danke obrigado
 mihi koe рақмет сізге
 Teşekkürler شكرا
 謝謝 Asante மணி
 धन्यवाद Thank you
 Terima kasih Ngiyabonga Tak

ありがとうございました

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