

SUPCON Solar



2019/04

SUPCON SOLAR EXPERIENCE

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01

ABOUT SUPCON SOLAR



01 COMPANY PROFILE

Founded in 2010 , focus on CSP Tower

✓ Technologies

✓ Key Equipments

Heliostats, Heliostats Field Control System, Receiver, SGS.....

✓ Project Development

✓ CSP Plant Operation & Maintenance

To provide **low-cost**, **high quality**, and **clean** energy,
for **A Green Future in Sight**

01 BACKGROUND



- ◆ **Zhejiang University :**
- ✓ **Top 3** University in China



- ◆ **SUPCON Group :**
- EPA (Ethernet for Plant Automation)**
- ✓ IEC 61784-5-14 in 2007.
- ✓ DKE DIN EN 61784-5-14 in 2011.

01 BACKGROUND



- ◆ **Hangzhou Boiler Group :**
 - ✓ **64 years** experience in boiler and thermal equipment, leadership in waste recovery boiler.



- ◆ **Hangzhou Turbine Group :**
 - ✓ China's biggest industrial steam turbine R&D and manufacture center with **61 years** experience.

01 PROVEN TECHNOLOGIES

◆ 9 Years Continuous Research in CSP technologies, 100 million+ US Dollar in R&D.

- ✓ Fully patented technologies : **161 patents, 26 software copyrights**
- ✓ The only technology provider from China in IEC Tower CSP Design Standard(**PT62862-4-1**) drafting committee.
- ✓ Only CSP in World Bank CRESPP Program.

◆ Proven Track Records:

- ✓ Pilots - 10MW DSG - 10MW Molten Salt - 50MW Molten Salt



2011-2012
Pilot DSG



2012-2013
10MW DSG



2013-2015
Pilot Molten-salt



2015-2016
10MW Molten-salt



2016-2018
50MW Demonstration Project

01 INTEGRATED MANUFACTURING



Auto Welding



Auto Mirror Adhesion



Receiver Welding



Mirror Surface Inspection



Heliostat Assembly



Receiver Assembly

02

SUPCON SOLAR REFERENCE



02 REFERENCE



● DELINGHA 10MW

Investment, Technology &
Core Equipments

DSG : Jul, 2013

Molten Salt : Aug, 2016



● DELINGHA 50MW

Investment, Technology &
Core Equipments

Started: Apr ,2017

Commissioned: Dec, 2018



● GONGHE 50MW

Technology &
Core Equipments

Started: Nov,2017

Commissioned: Jun, 2019



● MINOS 50MW

Crete Island, Greece

EPC
Technology Provider

Commissioned: Dec, 2021

SUPCON DELINGHA 10MW PILOT PROJECT

China's 1st CSP project

World's 6th CSP tower project and 3rd molten salt based CSP tower project



02 DELINGHA 10MW: PROFILE

ITEM	VALUE
Installed Capacity	10MW
Storage Time	2 Hours
Total Area	250,000m ²
Reflection Area	63,000m ²
Efficiency	15.9%
Max Temp. of Molten Salt	568°C
Steam Parameter	8.83MPa , 510°C
Commissioning Time of DSG	Jul., 2013
Commissioning Time of Molten Salt	Aug., 2016
Feed-in-Tariff	RMB1.2/kWh



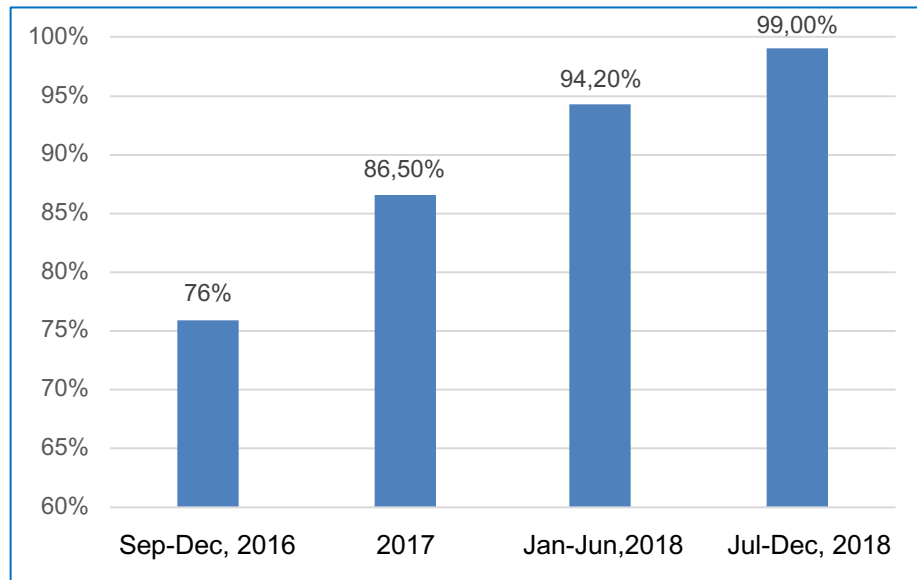
02 EXTREME WEATHER CHALLENGE



02 EXTREME WEATHER CHALLENGE



02 DELINGHA 10MW: OPERATION PERFORMANCE



- 32 months stable operation , Achieving rate increases stably.
- World's highest Achieving Rate (86.5%) Tower CSP in the first operation year
- World's highest annual Achieving Rate (96.7%, 2018) in Tower CSP till now.
- Expected to be world's first Tower CSP reaching 100% Achievement Rate in 2019.

Achieving Rate = Actual Electricity Production / Expected Electricity Production from Performance Model

SUPCON DELINGHA 50MW PROJECT

One of the first 20 demonstration CSP projects of China

Sponsored by Chinese government



02 DELINGHA 50MW: PROJECT PROFILE

ITEM	VALUE
Installed Capacity	50MW
Storage Capacity	7 Hours
Plant Area	247ha
Reflection Area	540,000m ²
Tower Height	200m
Molten Salt Volume	10,093ton
Steam Parameter	13.2MPa , 540°C
Annual Production	146GWh
Construction Commencement	15th Mar, 2017
Commissioned	30th Dec, 2018
Full Load Operation	17th Apr, 2019























GONGHE 50MW

One of the 20 National Demonstration Projects

Technology Provider, and Core Equipments Supplier



02 GONGHE 50MW: PROJECT PROFILE

Project Profile	
Project Location	Gonghe, Qinghai Province
Project Owner	Power China
Technology Provider	SUPCON Solar
Installed Capacity	50MW
Tower Height	210m
Heliostats	600,320 m ² (30016 sets, 20m ² each)
Storage	6 hours by molten salt
Steam Parameter	13.9MPa, 539°C
Commissioned Date	30th Jun 2019



Project Site (June, 2018)



Project Site (September, 2018)



Project Site (8th Nov, 2018)



Project Site (Jan, 2019)



Project Site (Feb, 2019)



MINOS 50MW Tower CSP

The first CSP project in Greece, supported by NER300 program of EU

Welcomed by HENDO and Local Community

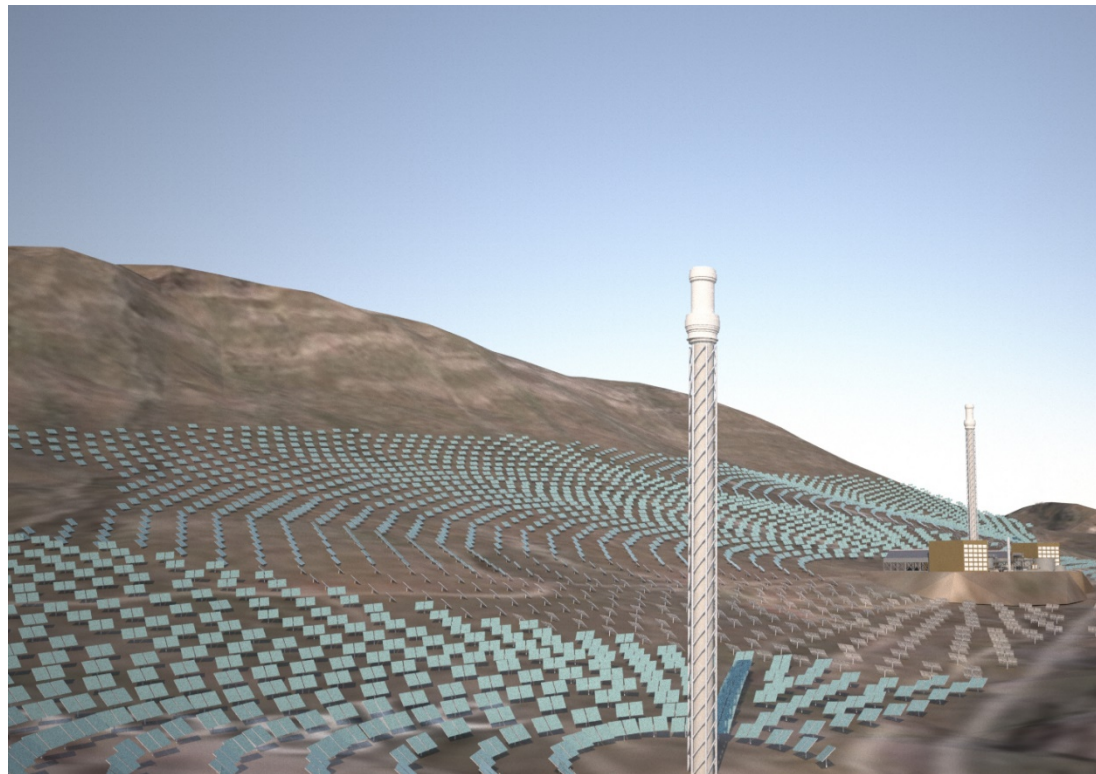
EPC and Technology Provider of the Project



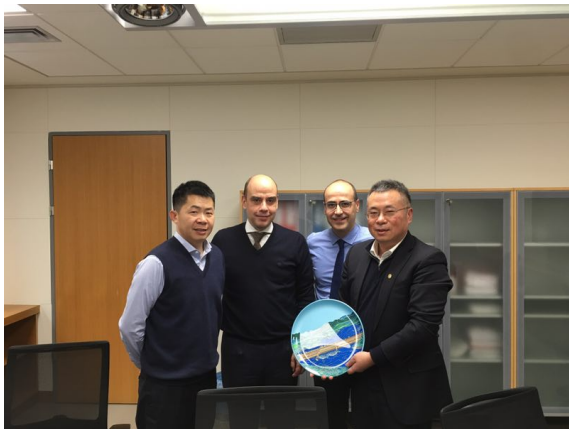
02 PROJECT SPECIFICATIONS

supcon

- Location : Crete, Greece
- DNI : 2216.56 kWh/m²
- Capacity : 50MW
- Storage : 5h by molten salt
- Technology : MSR+DSG Dual Tower
- Land : 1.54km²
- Heliostat: 17500 sets, 20m²
- Annual Gross Production: 122.13GWh
- Annual Net Production: 108.85GWh
- Annual Net Production(with PV): 114.34GWh
- Off-taker: HENDO
- Completion: 31st, Dec 2021



02 SUPPORT FROM PARTIES



03

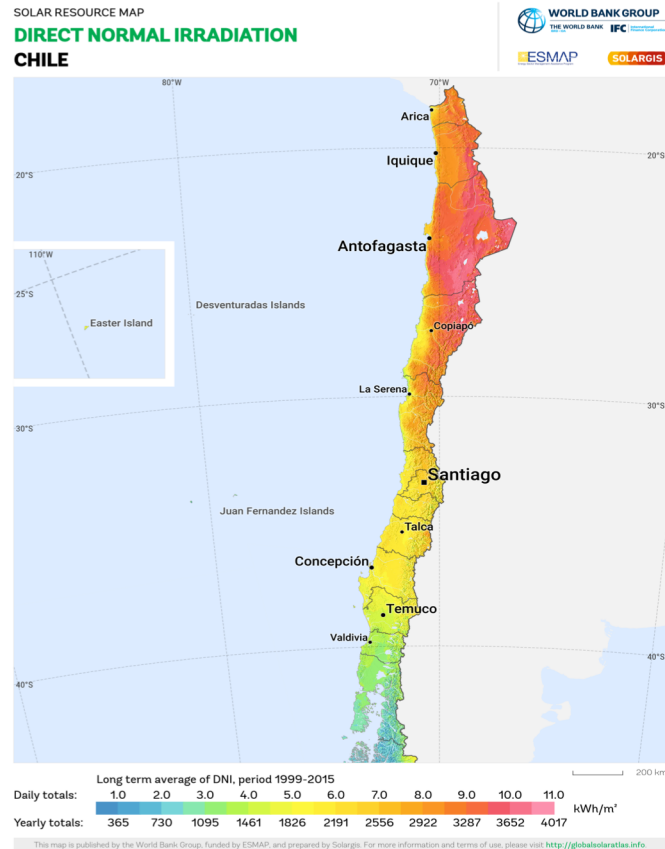
SUPCON SOLAR'S VISION TO CHILE



03 WHY CHILE?

Location	DNI (kWh/m ² /year)
Chile	3700
South Africa	3044
Nevada, US	2730
Morocco	2490
Australia	2400
Dubai	2200
Spain	2130
Delingha, China	2000

- Blessed with the best DNI in the world
- Awareness, vision and insight of the participants



03 WHAT WE CAN BRING?

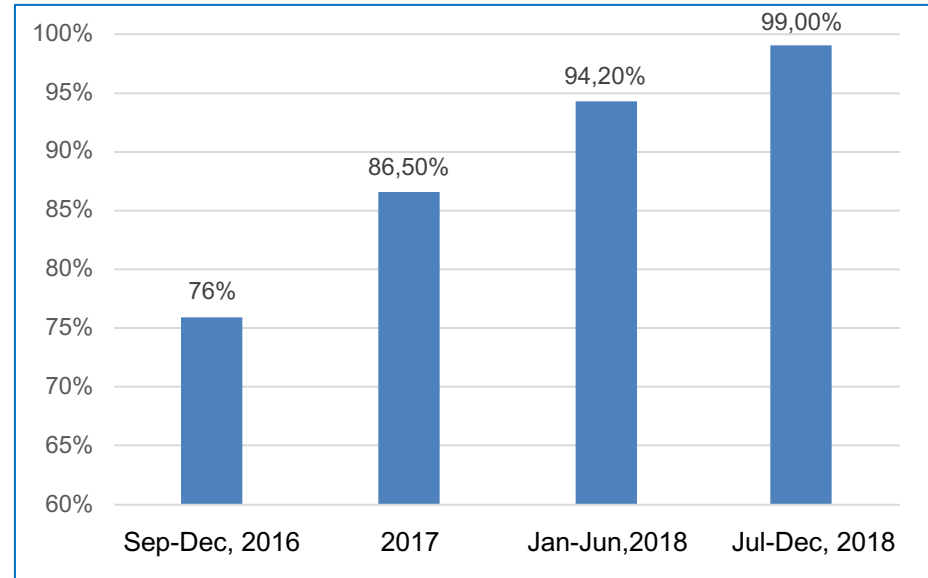
Advantage 1 : More competitive CAPEX

DNI	1898 kWh/m ²
Design Point Heliostat Field Efficiency	61.55%
Heliostat Field Area	2.53km ²
Receiver Tower Height	200m
Receiver Rated Thermal Power	300MWth
Receiver Efficiency	90.3%
Thermal Storage Capacity	13 hours by molten salt
Molten Salt	17133ton
Equipment Availability	96%
Main Steam Parameter	540°C, 14MPa, 141.9t/h
Design Point Light Electricity Efficiency	24.69%
Gross Annual Electricity Power Generation	208GWh
Auxiliary Consumption	11.94%
CAPEX	235m \$

03 WHAT WE CAN BRING?

Advantage 2 : Proven Technology

- 5+ years operation of DSG system
- 2+ years operation of Molten Salt system
- The 10MW molten salt based plant reaches to **86.5%** of its designed performance in its 1st year after commissioning, and **96.7%** in its 2nd year.
- We are full of confidence to reach to **100%** of the designed performance in the year of 2019, which might be **the first** CSP Tower in the world!



Performance of Delingha 10MW Project

03 OUR ROLE

- **Specialized:**

- ✓ Molten Salt Tower CSP Applications

- **Professional:**

- ✓ Package Solution Provider
- ✓ Core Equipment Provider (Solar Field,TESS,SGS)
- ✓ Technology Service Provider

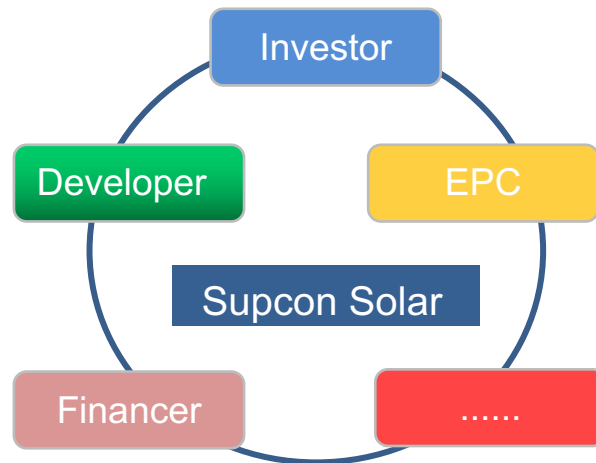
- **Self-definition:**

- ✓ Self-developed Technology、 Made in China、 Standard of World

03 OUR BUSINESS MODE

Cooperation in any possible way

- ✓ As the technology provider, consortium with Investor, Developer and EPC for IPP Tendering.
- ✓ As the technology provider and partner, participate in the whole project development lifecycle phases.
- ✓ Through competitive cost control and excellent performance, add value to Investor or EPC.
- ✓ Through license authorization, cooperate with qualified partners to explore the local markets.



THANK YOU!

SUPCON SOLAR, A GREEN FUTURE IN SIGHT

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