The World of CSP

✧ CSP became a commercial electrical power source in the mid 1980’s with the installation of the SEGS parabolic trough plants in 30 MW and 80 MW units in the southern California high desert

✧ CSP plant development steadily increased internationally, early with parabolic trough plants but now with a trend towards power tower configuration

✧ The ability of CSP to include significant thermal storage capability adds considerably to the value of the technology
Best places for CSP
How much CSP is there?
Solana – Arizona

Parabolic trough 250 MWe
Ivanpah – California

Steam-water Towers 400 MWe
Noor I-II-III – Morocco

I  Parabolic trough  146 MWe
II  Parabolic trough  185 MWe
III  MS Tower  134 MWe

Noor I (far left) Noor 2 (middle) Noor III (far right)
CENTRAL TOWER PLANTS with MOLTEN SALT STORAGE (Gemosolar)
Gemasolar plant in Spain: Summer Operation

Turbine operates continuously day and night

Source: SENER
International CSP (Nov 2017)
Locations of some large projects (100-200MW) in construction or operation - troughs and towers
Thank you
4.1 DNI Resource in China

- Max is about 1900 kWh/m²-a
- In high DNI countries max is over 3000 kWh/m²-a
2 Technical Development Situation of CSP

2.3 First Batch of CSP Demonstration Projects

- 50.6%: 20 / 1349MW
- 34.4%
- 14.8%

- 9 Tower, 685MW (7 Molten Salt + 2 Water)
- 7 Trough, 464MW (5 Thermal Oil + 2 Molten Salt)
- 4 Linear Fresnel, 200MW (2 Water + 1 Molten Salt + 1 Thermal Oil)

Some projects have adjusted the solutions in application document. For example, 2 water tower projects have be changed to molten salt tower.
2 Technical Development Situation of CSP

2.3 First Batch of CSP Demonstration Projects

- 20 projects in total capacity with 1.349 GW distributing five province regions.
- Grid purchase price is ¥ 1.15/kWh.
- Such price can only be applied to the projects put into operation by the end of 2018. Most projects are expected to complete construction by then.
- Most projects adopt China’s self-developed collecting technology
- The power plant engineering work is undertaken by domestic design institutes.

Distribution of 20 Demo Projects

- 1 in Xinjiang
- 2 in Inner Mongolia
- 4 in Hebei
- 9 in Gansu
- 4 in Qinghai
4.4 Estimation of Investment Cost & LCOE

Current investment cost for CSP plant is ¥25,000-30,000/kW. By the end of 2020, it is expected that the investment cost will be reduced to ¥15,000/kW, and the LCOE will be lowered to ¥0.75/kWh.

CSP Investment Cost Prediction in China

CSP LCOE Prediction in China