

Long Duration Energy Storage Workshop

Nitrate Salt Thermal Storage

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Commercial Solar Projects with Thermal Storage

- 28,300 MWh of capacity, either installed or under construction

Project		Capacity, Storage,		Project		Capacity, Storage,	
		MWe	hours			MWe	hours
Andasol-1	Trough	50	7.5	Khi Solar One	Tower	50	2
Andasol-2	Trough	50	7.5	La Africana	Trough	50	7.5
Andasol-3	Trough	50	7.5	La Dehesa	Trough	49.9	7.5
Arcosol 50 - Valle 1	Trough	49.9	7.5	La Florida	Trough	50	7.5
Arenales	Trough	50	7	Manchasol-1	Trough	49.9	7.5
Ashalim Trough	Trough	121	4.5	Manchasol-2	Trough	50	7.5
Aste 1A	Trough	50	8	NOOR I	Trough	160	3
Aste 1B	Trough	50	8	NOOR II	Trough	200	7
Astexol II	Trough	50	8	NOOR III	Tower	150	7
Bokpoort	Trough	55	9.3	Planta Solar 10	Tower	11.02	1
Casablanca	Trough	50	7.5	Planta Solar 20	Tower	20	1
Cerro Dominator	Tower	110	17.5	Solana Generating Station	Trough	280	6
Crescent Dunes	Tower	110	10	SunCan Dunhuang 10 MW Phase I	Tower	10	15
DEWA Tower Project	Tower	100	10	Termesol 50 - Valle 2	Trough	49.9	7.5
DEWA Trough Unit 1	Trough	200	10	Termosol 1	Trough	50	9
DEWA Trough Unit 2	Trough	200	10	Termosol 2	Trough	50	9
DEWA Trough Unit 3	Trough	200	10	Xina Solar One	Trough	100	5.5
Extresol-1	Trough	49.9	7.5	Shagaya	Trough	50	10
Extresol-2	Trough	49.9	7.5	Ilanga	Trough	100	5
Extresol-3	Trough	50	7.5	Supcon Delingha	Tower	10	2
Gemasolar Thermosolar Plant	Tower	19.9	15	Supcon Delingha	Tower	50	7
Kathu Solar Park	Trough	100	4.5	CGN Delingha	Trough	50	9
KaXu Solar One	Trough	100	2.5	Suncan Dunhuang	Tower	100	11

Electric Salt Heaters

- 10 MWe Chromalox unit, operating at 4160 V
- 565 °C salt outlet temperature



Solana Parabolic Trough Solar Project

- 280 MWe, with 6 hour (1,500 MWhe) storage capacity
- 'Low' temperature storage (385 °C hot salt)



Noor I Parabolic Trough Solar Project

- 160 MWe, with 3 hour (480 MWhe) storage capacity
- 'Low' temperature storage (385 °C hot salt)



Noor III Central Receiver Solar Project

- 150 MWe, with 7 hour (1,000 MWhe) storage capacity
- 'High' temperature storage (565 °C hot salt)



Crescent Dunes Central Receiver Solar Project

- 125 MWe, with 10 hour (1,250 MWh) storage capacity
- 'High' temperature storage (565 °C hot salt)



Nitrate Salt Steam Generator

SolarDynamics



Research and Development Needs

- The majority of storage and steam generation systems in commercial solar projects have performed as intended
- Nonetheless, a limited number of failures in hot tanks have occurred
 - The problems can likely be traced to an incomplete understanding of how the tank and the foundation impose and share loads
 - Additional studies and tests of foundation rigidity and coefficients of friction are needed
- Further, additional studies are needed on the design of the distribution piping inside the tank
 - Current designs may not be promoting adequate mixing
 - Radial and vertical temperature gradients in the inventory can establish temperature gradients in the floor and in the wall which are high enough to compromise the low cycle fatigue life of the tank