Solar thermal energy plant

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The DEWA project in Dubai, under construction in 2019, held the world record for lowest CSP price in 2017 at US$73 per MWh[21] for its 700 MW combined trough and tower project: 600 MW of trough, 100 MW of tower with 15 hours of thermal energy storage daily.Base-load CSP tariff in the extremely dry Atacama region of Chile reached below $50/MWh in 2017 auctions.[22][23]

No commercial concentrated solar was constructed from 1990, when SEGS was completed, until 2006, when the Compact linear Fresnel reflector system at Liddell Power Station in Australia was built. Few other plants were built with this design, although the 5 MW Kimberlina Solar Thermal Energy Plant opened in 2009.

In 2007, 75 MW Nevada Solar One was built, a trough design and the first large plant since SEGS. Between 2010 and 2013, Spain built over 40 parabolic trough systems, size constrained at no more than 50 MW by the support scheme. Where not bound in other countries, the manufacturers have adopted up to 200 MW size for a single unit,[32] with a cost soft point around 125 MW for a single unit.

Due to the success of Solar Two, a commercial power plant, called Solar Tres Power Tower, was built in Spain in 2011, later renamed Gemasolar Thermosolar Plant. Gemasolar"s results paved the way for further plants of its type. Ivanpah Solar Power Facility was constructed at the same time but without thermal storage, using natural gas to preheat water each morning.

Most concentrated solar power plants use the parabolic trough design, instead of the power tower or Fresnel systems. There have also been variations of parabolic trough systems like the integrated solar combined cycle (ISCC) which combines troughs and conventional fossil fuel heat systems.

CSP is used to produce electricity (sometimes called solar thermoelectricity, usually generated through steam). Concentrated solar technology systems use mirrors or lenses with tracking systems to focus a large area of sunlight onto a small area. The concentrated light is then used as heat or as a heat source for a conventional power plant (solar thermoelectricity). The solar concentrators used in CSP systems can often also be used to provide industrial process heating or cooling, such as in solar air conditioning.

Different types of concentrators produce different peak temperatures and correspondingly varying thermodynamic efficiencies due to differences in the way that they track the sun and focus light. New innovations in CSP technology are leading systems to become more and more cost-effective.[40][41]

In 2023, Australia"s national science agency CSIRO tested a CSP arrangement in which tiny ceramic particles

fall through the beam of concentrated solar energy, the ceramic particles capable of storing a greater amount of heat than molten salt, while not requiring a container that would diminish heat transfer.[42]

GlassPoint Solar, the company that created the Enclosed Trough design, states its technology can produce heat for Enhanced Oil Recovery (EOR) for about $5 per 290 kWh (1,000,000 BTU) in sunny regions, compared to between $10 and $12 for other conventional solar thermal technologies.[50]