Gemasolar, Central Tower Technology

Seville, Spain

Gemasolar is the world's first utility-scale solar power plant to combine a central tower receiver system and molten salt storage technology enabling electricity supply 24 hours a day.

The plant was built by Torresol Energy, a strategic alliance between Masdar (40%) and Spanish engineering group Sener (60%). The plant is located in Fuentes de Andalucia in the province of Seville in Spain. Construction began in 2008, was completed in May 2011, and the plant was officially inaugurated in October 2011. Gemasolar's design is a promising alternative generation technology to complement the more widespread parabolic trough technology.

Gemasolar has a high-temperature heat storage system (>550°C), which allows the plant to operate longer than most conventional solar concentrated solar power (CSP) plants. Sodium and potassium nitrate salts are kept in a molten state by the sun's thermal energy. These salts store excess heat accumulated during sunlight hours so that electricity can be generated at night. As a result, Gemasolar can generate electricity for 15 hours without solar irradiation.

The high temperature at which solar energy is captured by the salts receiver helps to produce steam at high pressure. This considerably increases the performance of the steam turbine.

Quick facts

- World's first commercial-scale plant that applies the technology of a central tower receiver and thermal storage
- Operational since 2011
- Generates approximately 80GWh/year
- Powers 25,000 homes.
- Offsets carbon emissions of more than 27,000 tonnes a year
- Generates electricity for 15 hours without solar irradiation

The plant's solar field covers 195 hectares and the facility is able to generate approximately 80GWh/year, enough to supply 25,000 homes. The plant offsets carbon emissions of more than 27,000 tonnes a year.