Siemens I&C solutions for Concentrated Solar Power Plants
Performance, dispatchability, reliability and references
Siemens’ solar I&C
a reflection of the world’s foremost integration expertise

Siemens provides optimal I&C design for CSP & Hybrid-PV plants for achieving the full dispatchability of solar energy power plants

With start-up and shut-down 365 days a year, high demands are placed on your plant even on the sunniest of days. Count on Siemens I&C’s integration expertise in steam turbine controls, balance-of-plant, and solar fields to optimize your plant’s performance and maintain its long-term reliability.

As a world leader in I&C for solar power plants, Siemens will be there to ensure your plant reflects the true power of solar.

Achievements

• Increase energy production/day up to 20%
• More reliable and smooth operation especially for big components
• Reduction of maintenance costs more up to 10%
• Ensure faster & reproducible start-up with higher automation degree
• Reduce work load for operators up to 30%
• Able to meet dispatchability requirements
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We are dedicated to grow your business by continuous improvement of your economic value

Run CSP & Hybrid-PV plant under changing operation schemes and weather conditions

**Performance**
- Operate your main components within thermal limits & eliminate trips
- Optimized operation & coordination between solar field, Storage and turbine

**Dispatchability**
- Automatically ensure faster and reproducible start-up – One button Start
- Meet your obligation even under fluctuating weather condition

**Reliability**
- Maximum speed transfer of information between sub-systems
- Reduce engineering and maintenance complexity for the plant
- Remote Diagnostics
For us, performance means the optimum for your investment.

Better performance
- Less operator interactions
- Temperature set point coordination module

Minimized process losses
- Main steam pressure set point coordination
- Patented Thermal Stress reduction module

Improved efficiency
- HTF distribution coordination

Optimize closed loop control between solar field and turbine
Intelligent set point guidance to avoid stress for the components and unpredictable trips
For us, dispatchability means SMART control designed to meet your requirements

- **Shorter start-up time**
  - ✔ Patented solar field closed loop control concept

- **Flexible and optimized operation**
  - ✔ Fast load changes
  - ✔ Utilizing every sun beam

- **Avoid electrical limitations**
  - ✔ Intelligent loads shedding system

- **Minimized operator interactions**
  - ✔ Runback Scenarios

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**Solar Tracking and fast Plant Start-Up for all plant types**
For us, reliability means customer satisfaction

- **High availability**
  - ✔ No maintenance of user-defined configurations

- **Early failure prevention, shorter shutdowns and product evolution**
  - ✔ Remote Diagnostic

- **Faster plant response**
  - ✔ Integrated webserver

- **Minimized number of interfaces for maximum reliability**
  - ✔ Holistic software architecture

**Error warning**

- Every single solar panel at a glance

**Integrated webserver technology**

- Single Operator Screen for all tasks

**Reliability**

- One integrated automation software for all automation tasks
- Integrated web server for engineering, control and diagnostics purposes
- One alarming system for the entire plant
Over 4.7 GW Siemens powered CSP plants are supplying electricity for more than 10 million households.

The CSP Nevada Solar One in the USA is in operation since 2007!
SOLAR POWER COMPLEX, California, USA

Solar Power Tower (Water / Direct Steam)

A privately owned energy company, developed this solar Power Complex in California’s Mojave Desert. It consists of three separate plants using tower technology and provides approximately 400 MW electricity to the US utilities PG&E and Southern California Edison. The whole complex generates enough electricity to power more than 140,000 homes.

Solution

- Steam turbine: 3 x Siemens SST-700
- Plant Control: SPPA-T3000
- Electrical Balance of Plant
- Variable-Frequency Drives

Customer benefits

- Three separate plants generate electricity to power over 140,000 homes
- 392 MW(e) in total
SOLAR POWER COMPLEX, Province Sevilla, Spain

Parabolic trough (Oil)

This solar Power Complex, located in southern Spain in the province of Seville, Andalusia, is a CSP plant predominantly manufactured with Siemens components: The solar field, including nearly 6,000 parabolic collectors, approximately 18,000 solar receivers, and more than 150,000 parabolic reflectors. The power block was built by Valoriza, using a Siemens SST-700 reheat steam turbine. The plant supplies over 50,000 Spanish households with electricity.

Solution

- Steam turbine: 1 x Siemens SST-700
- Plant Control: SPPA-T3000
- Electrical Balance of Plant
- Variable-Frequency Drives

Customer benefits

- The plant generate electricity to power over 50,000 homes
- 392 MW(e) in total
Solar Parabolic trough

This solar Power Complex is a concentrated solar power station located in the Mojave Desert in eastern Riverside County, California about 25 miles (40 km) west of Blythe. The solar power plant consists of two independent 125 MW net (140 MW gross) sections, using solar trough technology.

Solution
- Steam turbine: 2 x Siemens SST-700 DRH
- Plant Control: SPPA-T3000
- Solar Field Control: SPPA-T3000
- Mirror Control: SIMATIC S7-1200
- Electrical Balance of Plant
- Variable-Frequency Drives

Customer benefits
- 250 MW(e) in total
Solar Power Tower (incl. Salt & Malt Thermal Storage)

This solar Power Complex located at Haixi, Qinghai Province in China, Haixi Tower Concentrated Solar Power Station was set with 12h molten salt heat storage system, the capacity of heat absorber is 280MWt, the area of heliostat is 610000m² and annual net power generation capacity is estimated to achieve 160mio kWh.

Solution

- Steam turbine: 1 x Siemens SST-700
- Solar Field Control: SPPA-T3000
- Mirror Control: SIMATIC S7-1200

Customer benefits

- 50 MW(e) in total