Instrumentation and controls solutions for Concentrated Solar Power Plants

Performance, reliability, dispatchability and references

Siemens Energy
The leading pureplay energy company

Our offering

Products, Solutions, Services

Across the value chain

Generation, Transmission, Storage

Broad technology portfolio

From Conventional to Renewables

Siemens Energy' solar I&C
a reflection of the world's foremost integration expertise

We provide optimal I&C design for CSP & Hybrid-PV plants to **achieve 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.

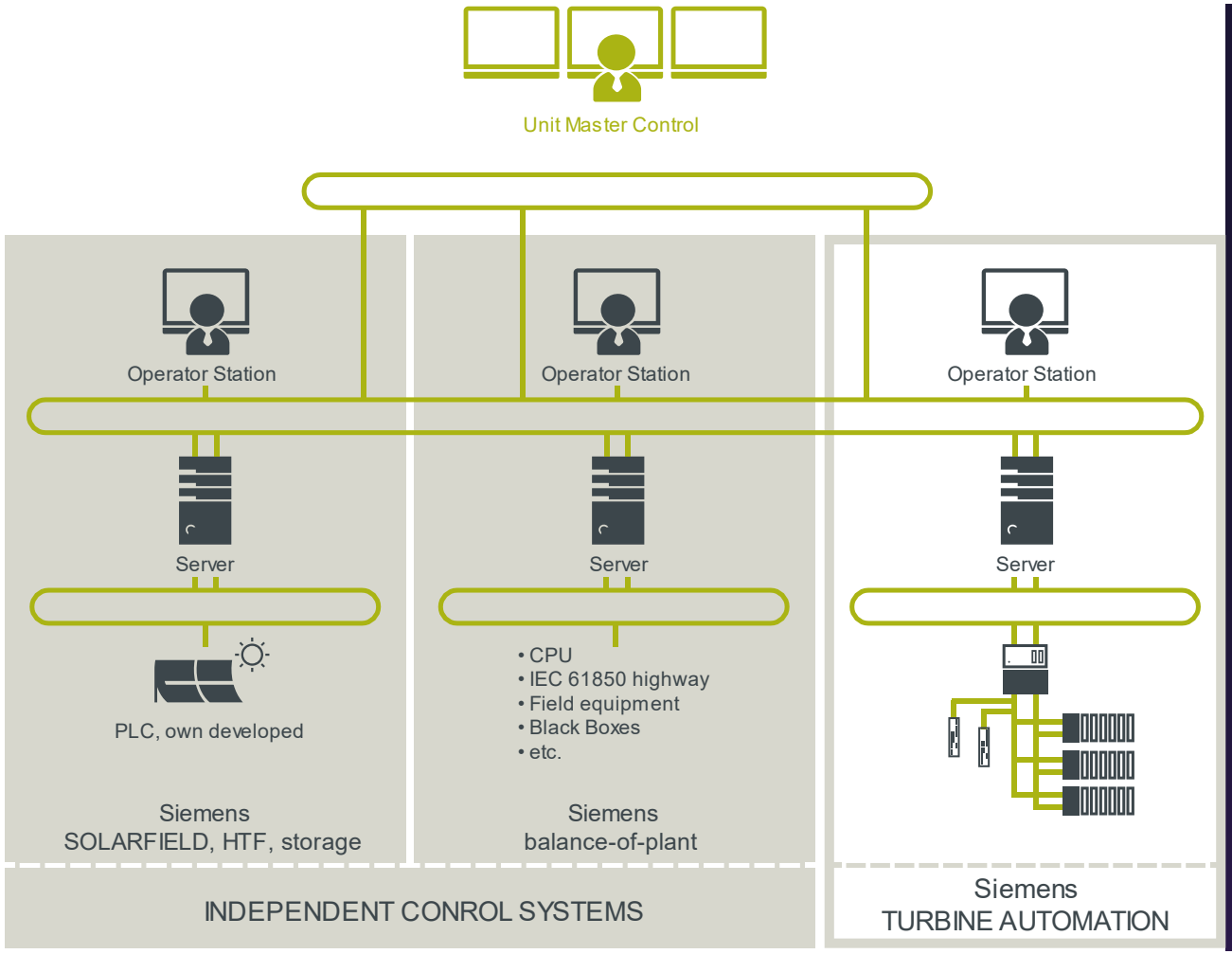
Count on our I&C's integration expertise in **steam turbine controls, balance-of-plant, and solar fields** to optimize your plant's performance and maintain its long-term reliability.

As a world leader in I&C for solar power plants, Siemens Energy 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

For us, performance means the optimum for your invest



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

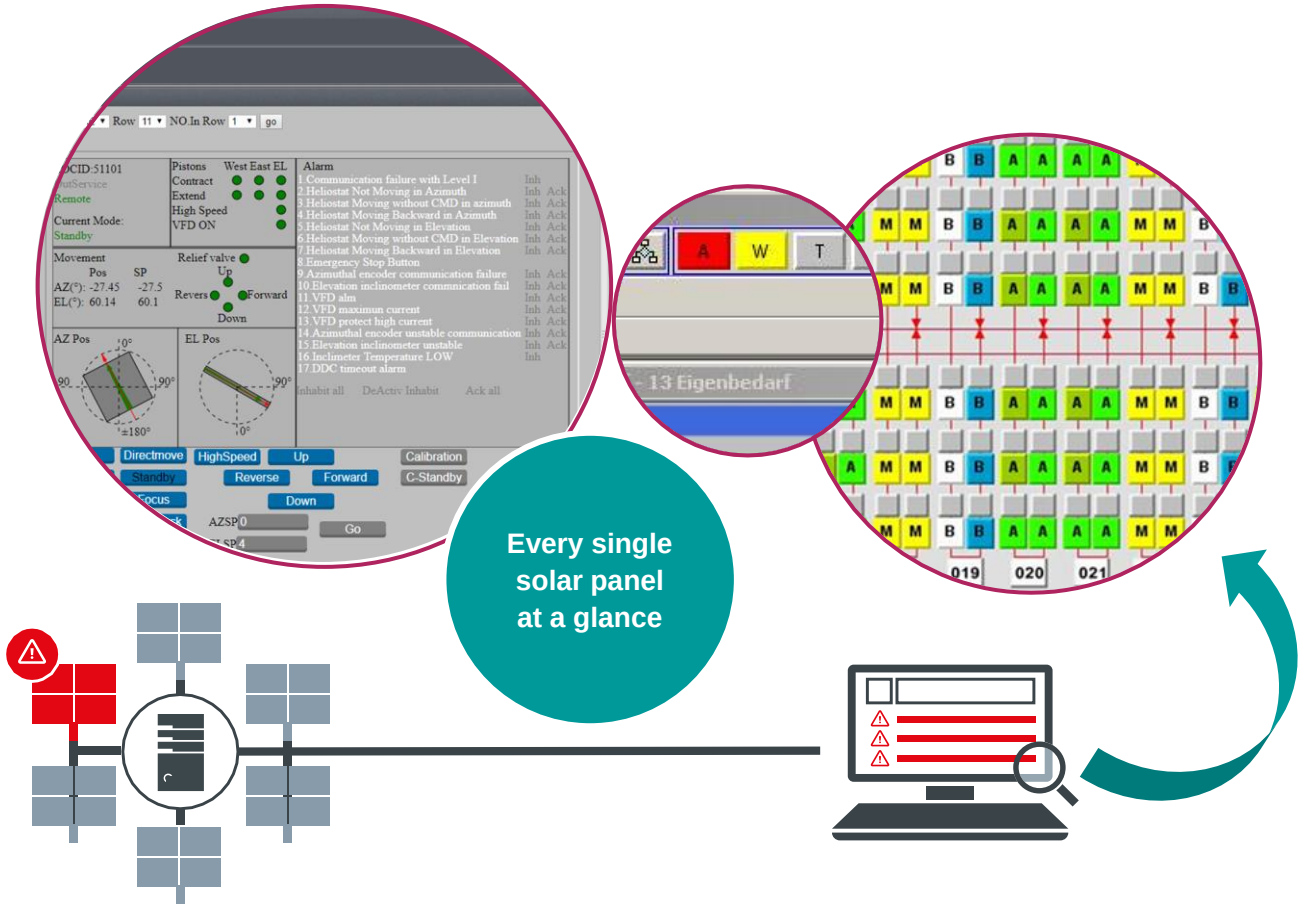
- ✓ HTF distribution coordination

Performance

Optimize closed loop control between solar field and turbine

Intelligent set point guidance to avoid stress for the compo-nents and unpredictable trips

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

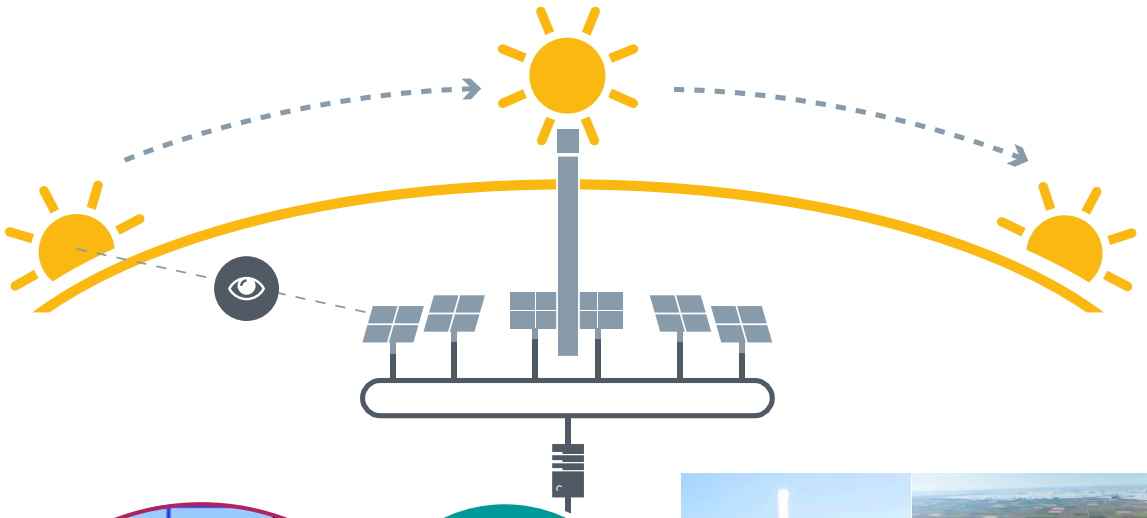
Reliability

One integrated automation software for all automation tasks

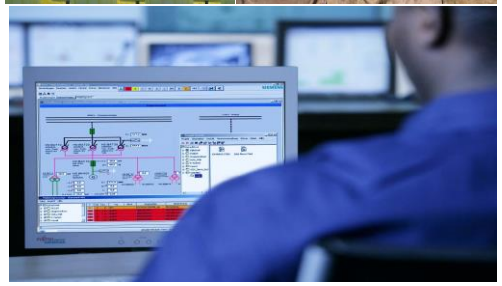
Integrated web server for engineering, control and diagnostics purposes

One alarming system for the entire plant

For us, dispatchability means SMART control designed to meet your requirements



Solar Tracking for all plant types



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

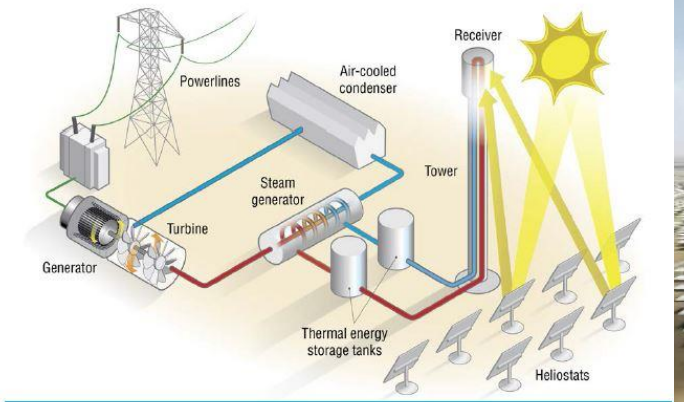
Dispatchability

Fast, reliable and reproduc-ible fully automatic „Golden button“ unit startup

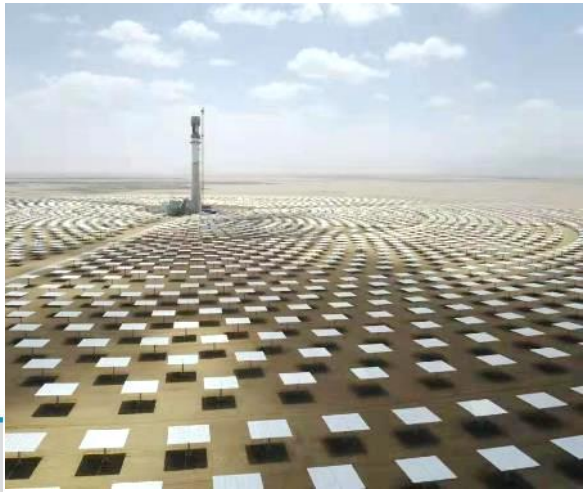
Flexible and optimized plant operation with minimized operator interactions

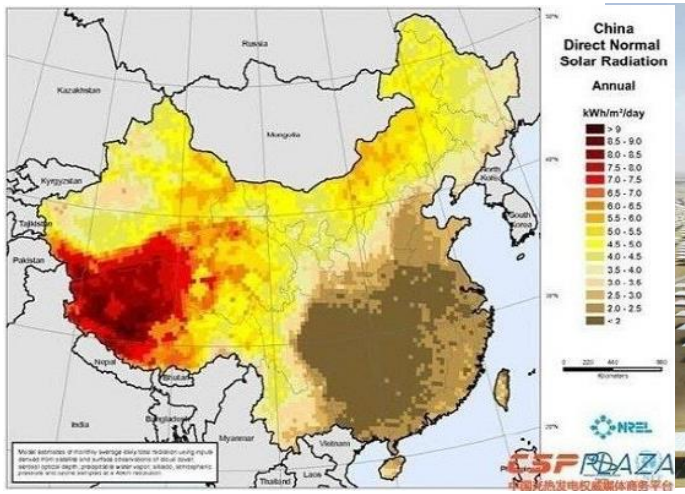
Reference project tower
CSP with storage in China

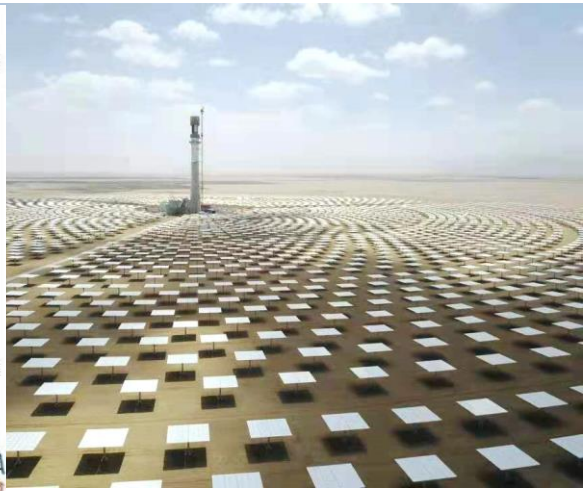
- Tower CSP
- molten salt as HTF, with 12h storage
- Capacity 50MW
- 4,400 Heliostats, 12mx12m each, hydraulic drive
- Siemens scope: steam turbine and I&C system



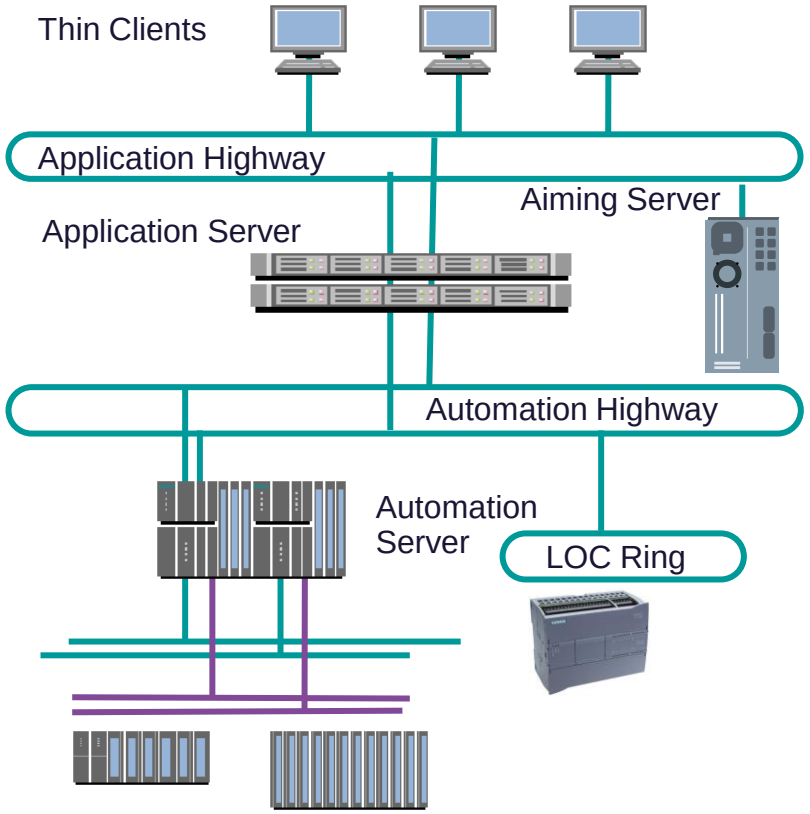
In a CSP system with thermal energy storage, the heat transfer medium, such as molten salt, retains heat so well that it enables the plant to generate electricity for hours when the sun is not shining.

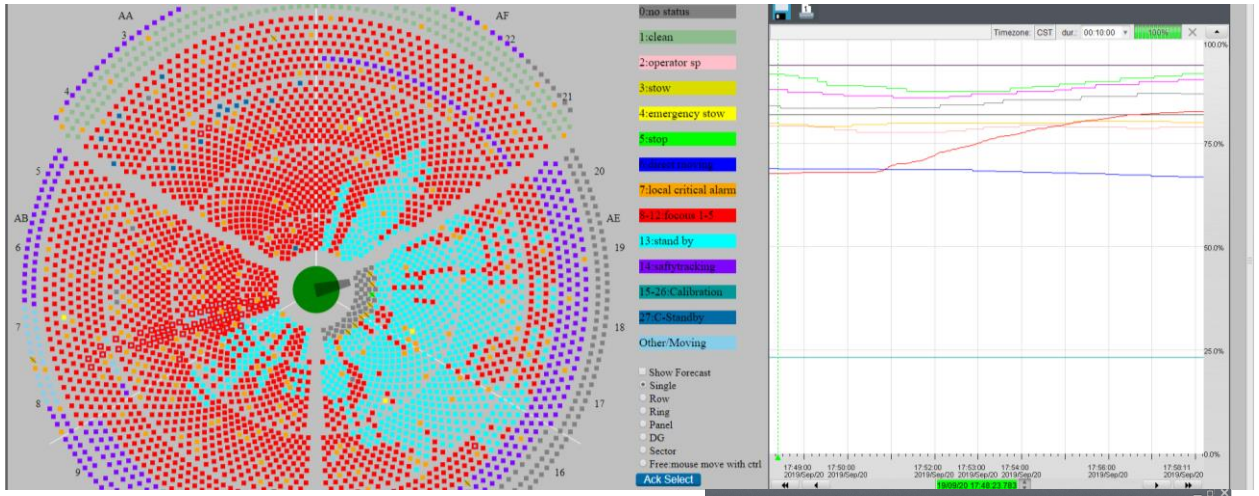


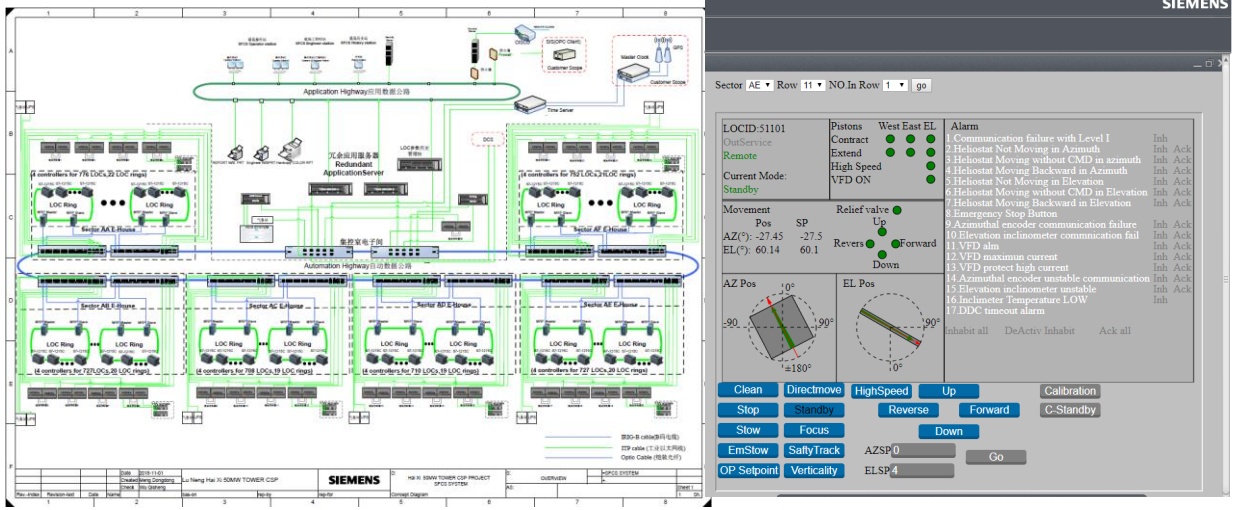




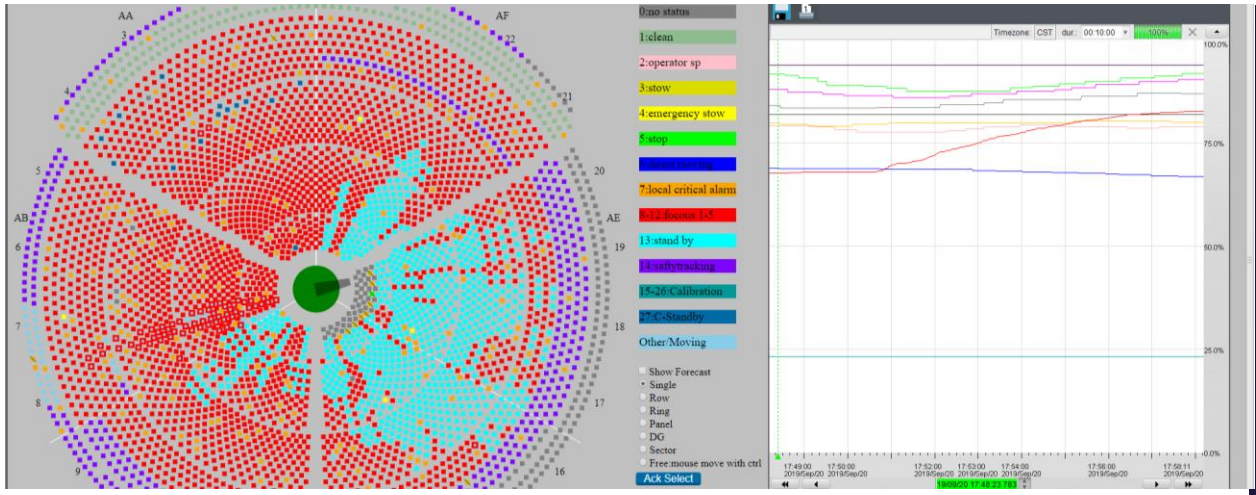
Reference project tower CSP with molten salt storage in China





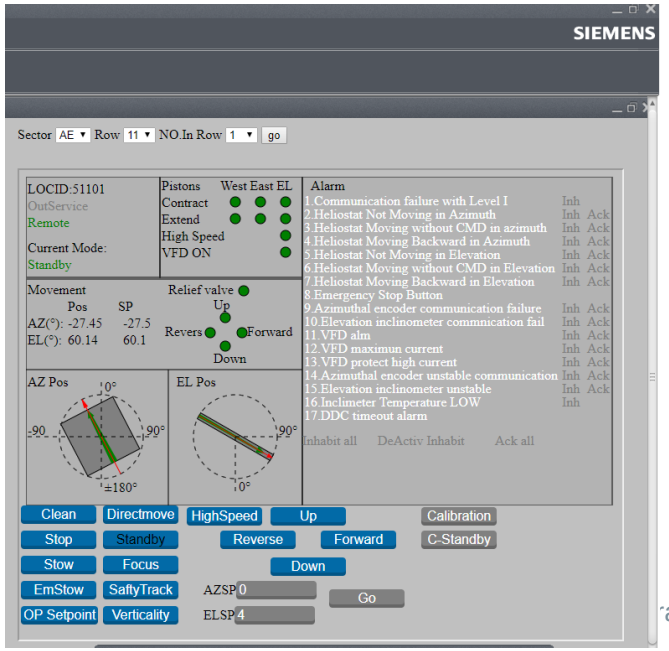


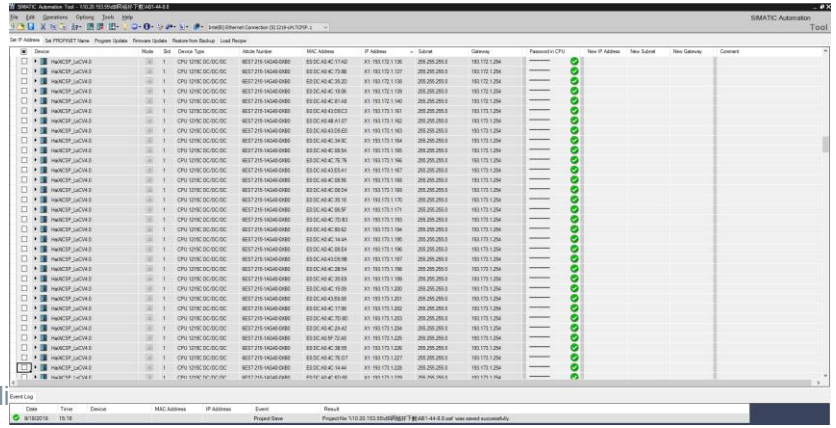
Integration of each heliostat including optimized parameters

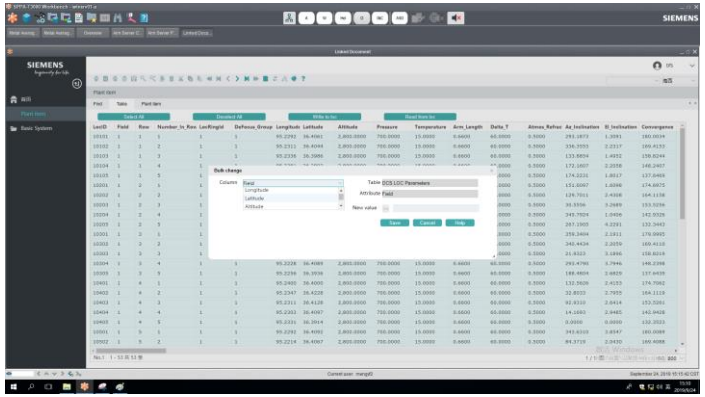


One I&C System

- Solar field + Steam turbine + BoP
- Integrated webserver technology
- Integrated sun-position algorithm
- Heliostat calibration and optimization integrated
- Complete system time synchronized
- Mass code downloads to each Heliostat reduce efforts

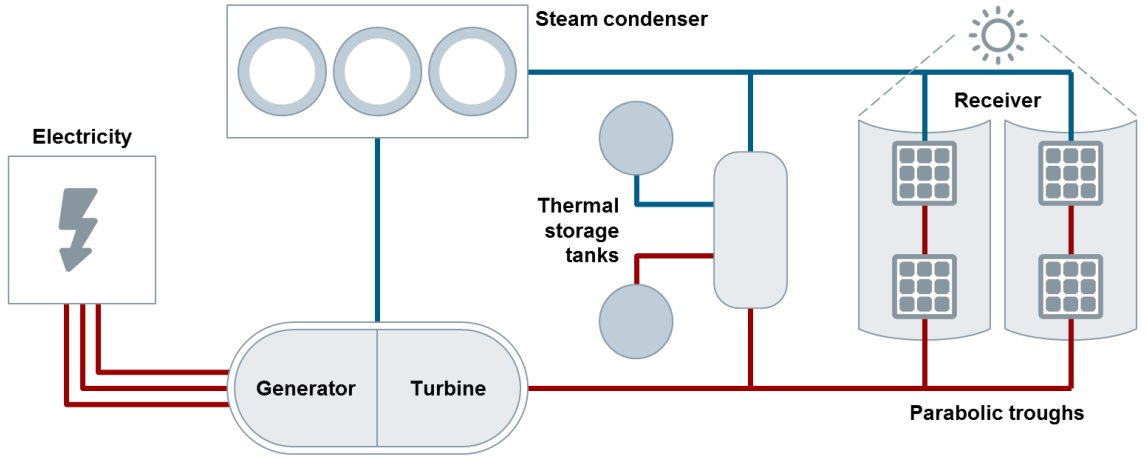




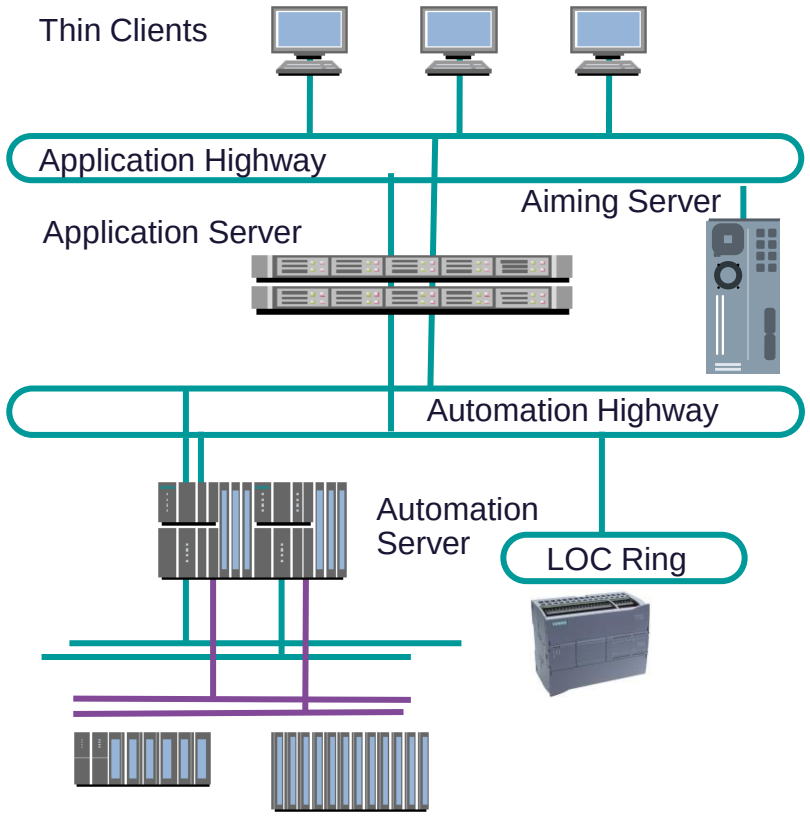


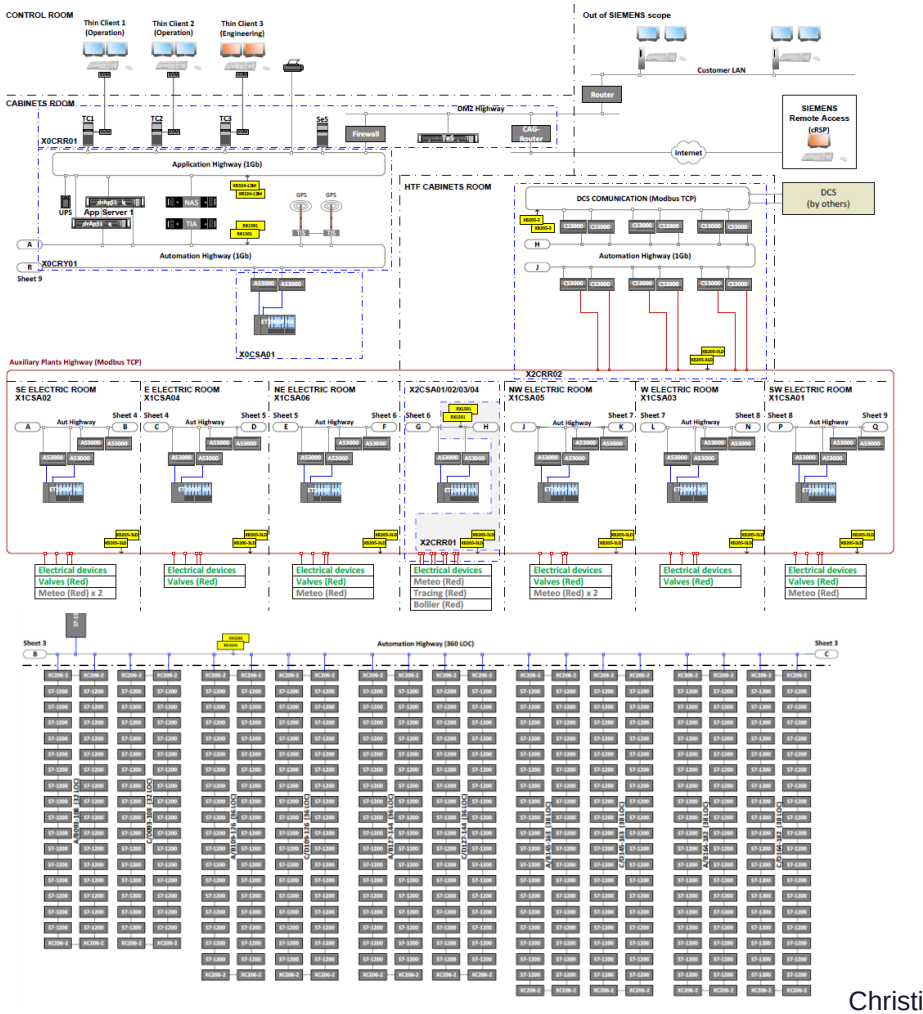
Reference project parabolic through CSP with storage in Dubai

- Parabolic through CSP
- molten salt storage
- Capacity 3 x 200MW
- 2120 collectors per unit
- Siemens scope: steam turbine and I&C system incl. (Solar Collector Assembly)

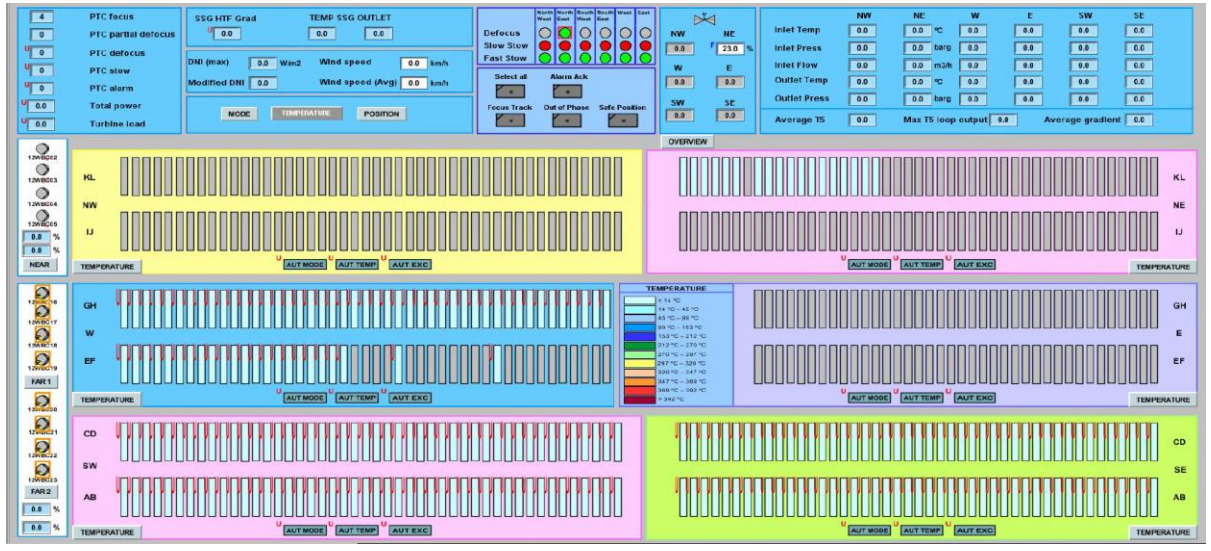


Reference project parabolic through CSP with storage in Dubai



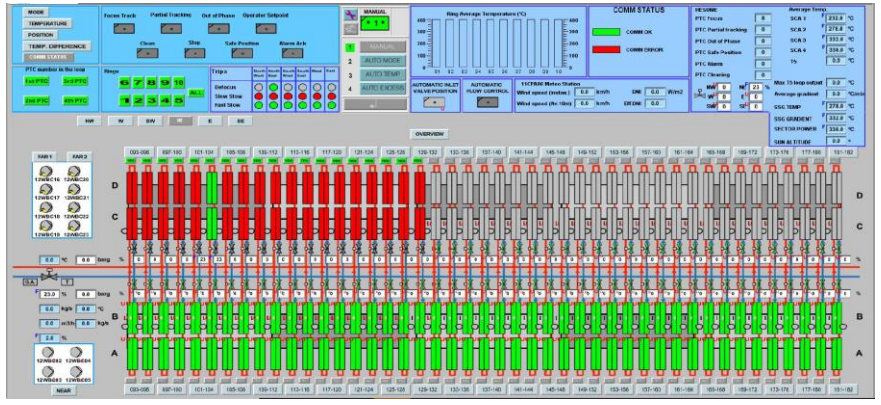


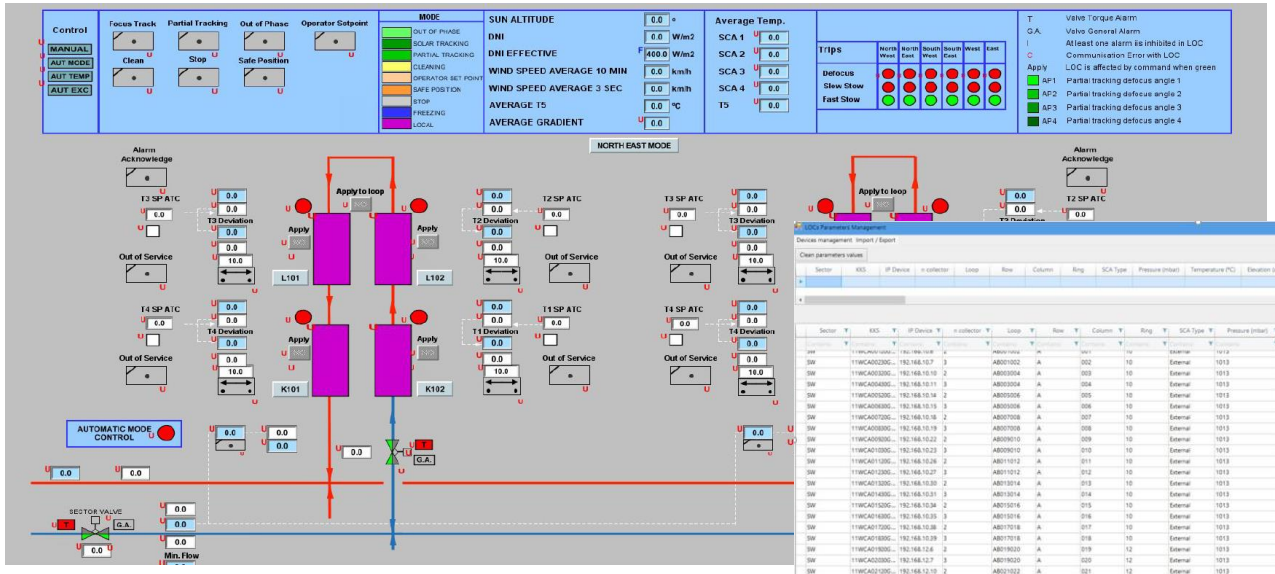
Reference project parabolic through CSP with storage in Dubai



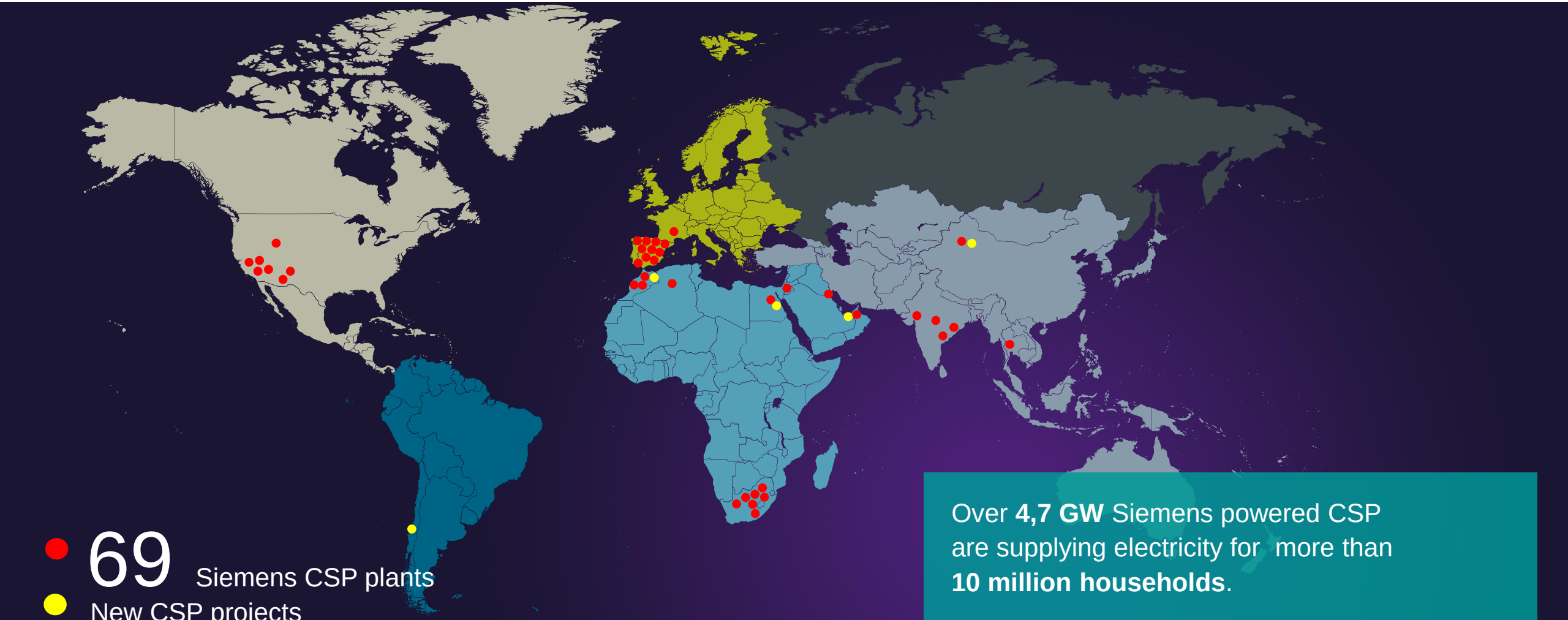
One I&C System

- Solar field + Steam turbine + BoP
- Integrated sun-position algorithm
- EPCs calibration and optimization integrated
- Mass code downloads to each CPU





References

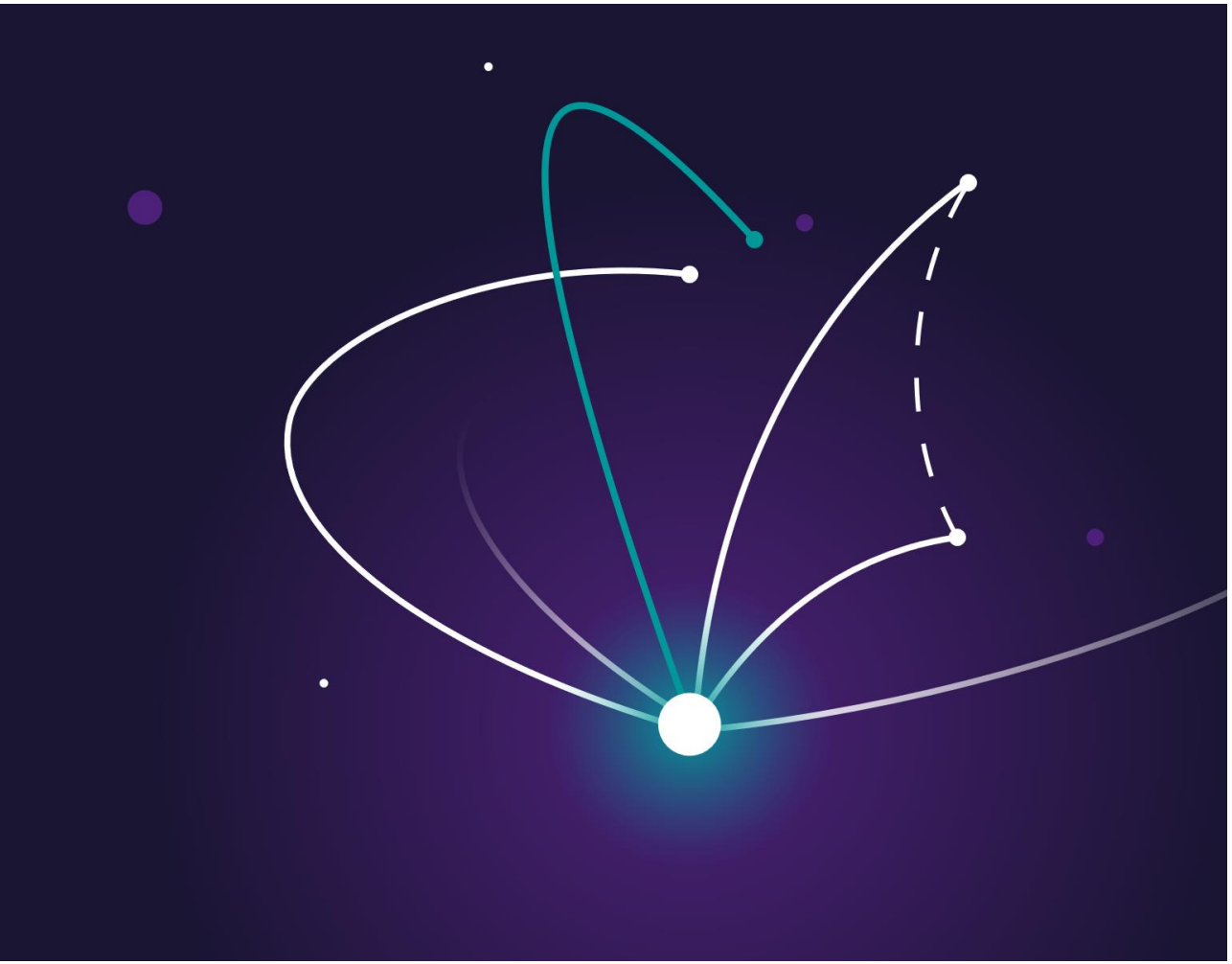


69 Siemens CSP plants

New CSP projects

Over **4,7 GW** Siemens powered CSP are supplying electricity for more than **10 million households**.

Contact



Published by Siemens Energy

Christian Fleischer

Sales Director

SE GP G IC CON-S SAE

Siemensallee 84
76187 Karlsruhe
Germany

Mobile: +49 (173) 6521136
christianfleischer@siemens.com

siemens-energy.com