

Emerson Total Solution for Concentrated Solar Power - Central Receiver Plants

Challenges

Utilities are faced with intense pressure to improve operations and lower costs. As a further complication, demographic trends point to the fact that utilities will have fewer experienced staff with which to meet these emerging issues.

Government policies to increase renewable usage and meet environmental protection standards intensifies these challenges and presents others: How do utilities plan to operate and coordinate a generating fleet that includes a widely distributed base of renewable assets? How can the inherent variability of renewable assets be accommodated? What are the ramifications of renewables on the balance of the generating fleet?.

Power Producers are seeking to implement renewable assets in a manner that ensures regulatory compliance while mitigating cost, risk, and staff impacts.

Consider it Solved.

Time and again utilities with concentrated solar power plants using central receiver technology turn to Emerson. With our extensive industry experience and innovative solutions, Emerson is uniquely positioned to deliver proven instrumentation, automation, optimization, and project management expertise to concentrated solar central receiver applications.



Emerson has developed a broad array of capabilities, from consulting expertise to industry-transforming products and comprehensive service platforms.

As a technology leader, we recognize that customers require broad scope solutions that encompass both technology and services. For concentrating solar power applications, Emerson can provide integrated solutions that encompass the entire plant including the solar field, central tower, and the interfaces to external systems. Our solution will technically and commercially connect your central receiver unit with the grid.

Emerson Offerings for Concentrated Solar Power - Central Receiver Plants

- Fleet/Enterprise Management & Optimization**
- Enterprise-wide systems integration
 - Fleet financial performance optimizer
 - Fleet emissions optimizer
 - Fleet performance monitoring and visualization
 - Fleet-wide asset management reliability programs

- Plant Optimization Software and Plant Performance Monitoring**
- Plant financial performance optimization
 - Steam temperature optimization
 - Unit response optimization
 - Real-time on-line monitoring
 - Plant heat rate & unit efficiencies performance calculations
 - Controllable losses
 - Equipment performance deviations from design
 - Web-based remote equipment performance monitoring of:
 - Turbines, heat exchangers, condensers, solar tracking, cooling towers, thermal storage tanks, desuperheaters, pumps, etc.

- Unit Controls & Monitoring System**
- Distributed control systems (HMIs, controllers, I/O, networks, etc.) for:
 - Balance of plant
 - Burner management
 - Cooling tower
 - Heat transfer fluid
 - Heat exchanger
 - Solar tracking
 - Steam turbine
 - Switchyard
 - SCADA systems
 - Unit historian and report generator
 - Electronic documentation
 - Integration with other systems and intranet/Internet
 - Fieldbus solutions (HART, Foundation Fieldbus, Profibus, DeviceNet, ASibus, etc.)
 - Wireless

- Simulation**
- Embedded models
 - First-principle high-fidelity
 - Tie-back
 - Virtual technology

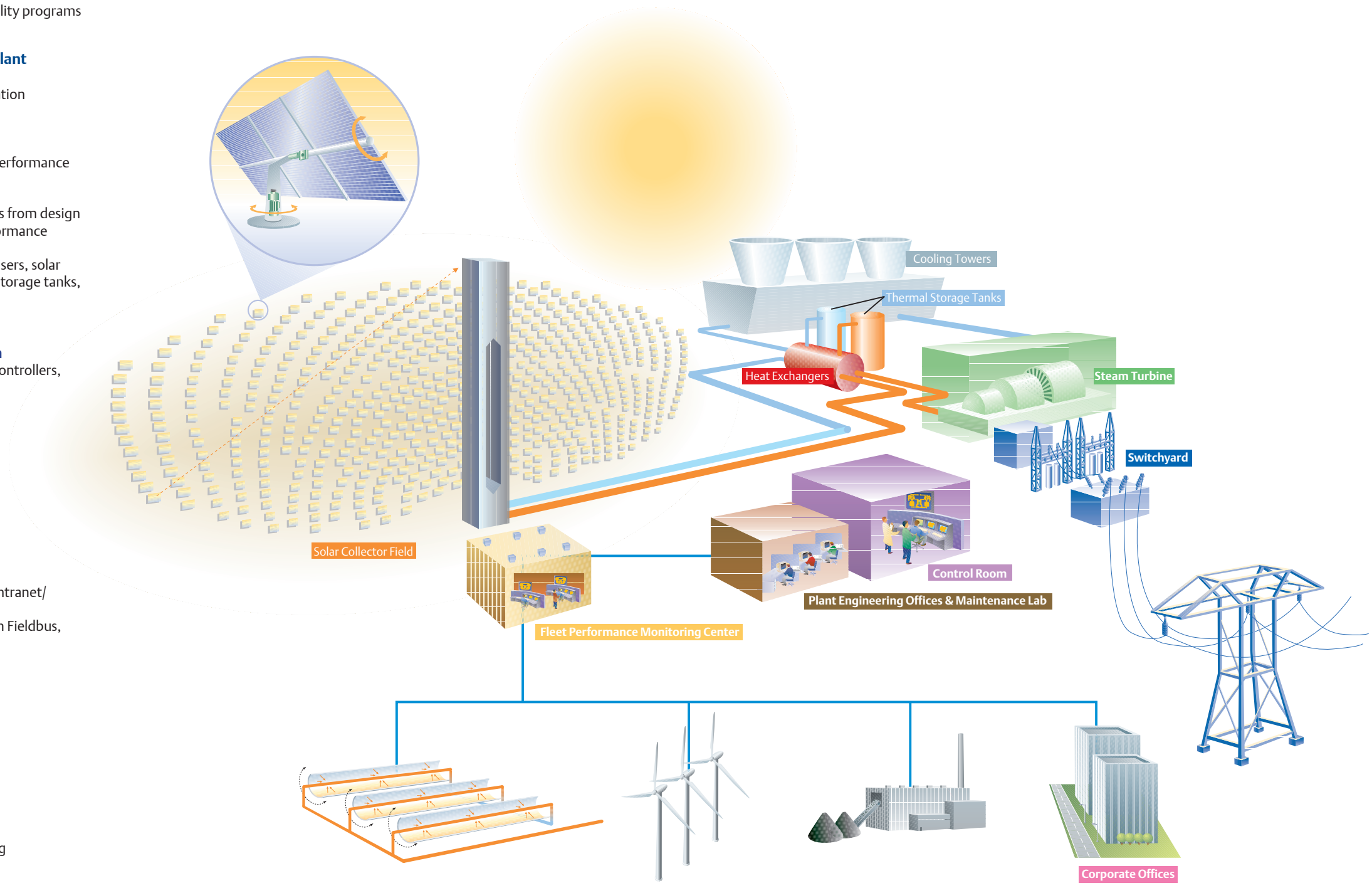
- Equipment Condition Monitoring**
- Online/portable vibration monitoring
 - Motor diagnostics
 - Infrared thermography
 - Laser alignment/balancing
 - Oil analysis

- Intelligent Device Management**
- Management software for HART & Foundation Fieldbus devices for:
 - Health monitoring
 - Calibration
 - Configuration
 - Audit trails

- Intelligent and Analog Field Devices**
- Transmitters
 - Pressure, temperature, flow, and level
 - Valves and valve actuators
 - General, severe, and specialty services

- Electrical Auxiliaries**
- UPS, power conditioning, and distribution
 - Precision cooling
 - Motors
 - Variable frequency drives (VFDs)
 - Couplings
 - Gear-reduction drives
 - Backup power generators

- Services**
- Installation, commissioning, and start-up services
 - Support, reliability, and maintenance services
 - Mechanical equipment
 - Electrical equipment
 - Process equipment
 - Control systems
 - Instrumentation and valves
 - Optimization programs
 - Operations
 - Automation and information systems
 - Reliability-centered maintenance
 - Educational services
 - Asset optimization, reliability, and safety
 - Process control and automation
 - Engineering, operations, maintenance and management of field devices, control systems, electrical equipment, etc.



Legend

- Cooling Towers
- Control Room
- Corporate Offices
- Fleet Performance Monitoring Center
- Heat Exchangers
- Plant Engineering Offices & Maintenance Lab
- Solar Collector Field
- Steam Turbine
- Switchyard
- Thermal Storage Tanks



Emerson Solutions for Your Concentrated Solar Power Central Receiver Plant

| Emerson Brand | Function | Plant Location |
|------------------------------|--|---|
| PlantWeb™ | Digital plant architecture | Control Room |
| Ovation™ | Distributed monitoring and control system, SCADA | Control Room Solar Collector Field Cooling Towers Thermal Storage Tanks Steam Turbine Heat Exchangers Maintenance & Engineering Building Fleet Optimization Building |
| AMS Suite | Predictive maintenance software | Control Room Maintenance & Engineering Building |
| Smart Wireless | Wireless field and plant networks | Solar Collector Field Cooling Towers Thermal Storage Tanks Steam Turbine Heat Exchangers Control Room |
| Ovation Simulation™ | Plant simulation | Control Room Maintenance & Engineering Building Fleet Optimization Building |
| SmartProcess™ | Plant optimization and performance monitoring | Control Room Maintenance & Engineering Building Fleet Optimization Building |
| ControlWave® | Remote terminal units for SCADA applications | Remote Controls |
| Fisher® | Control valves and severe service valves | Solar Collector Field Cooling Towers Thermal Storage Tanks Steam Turbine Heat Exchangers |
| Machinery Health™ Management | Predictive and protective technology and services for mechanical equipment | Steam Turbine |
| Rosemount® | Pressure, temperature, level, and flow measurement | Solar Collector Field Cooling Towers Thermal Storage Tanks Steam Turbine Heat Exchangers |
| Control Techniques | Power conversion, drives, and control | Solar Collector Field Thermal Storage Tanks Heat Exchangers |
| Leroy®-Somer | Motors and generators | Thermal Storage Tanks Heat Exchangers |
| Browning | Power transmission products – drives and gears | Thermal Storage Tanks Heat Exchangers |
| U.S. Electrical Motors | Industrial motors | Solar Collector Field Thermal Storage Tanks Heat Exchangers |
| Liebert | UPS and precision cooling | Control Room Maintenance & Engineering Building Fleet Optimization building |

For more information visit www.EmersonProcess-PowerWater.com