

SOLAR PROJECT EXPERIENCE

Solar Thermal and PV

San Diego Gas and Electric Owner's Engineering Projects Southern California

POWER provided owner's engineering support in relation to various solar PV technology needs. These services included conceptual site design, visualizations, and site shading studies.

AREVA Solar Detailed Design and Construction Support for Solar Steam Generator Bakersfield, California

POWER provided detailed engineering design, for installation of the fourth solar steam generator (SSG 4) at AREVA's Kimberlina (formerly Ausra) solar facility. The SSG 4 is located on an existing solar boiler installation site and supplies steam to an existing generation facility. POWER's responsibilities included detailed structural, mechanical and electrical design for integrating the AREVA designed SSG into the existing facility. POWER also provided AREVA with analysis, concrete design, and preparation of construction drawings for the foundations. Home office and on-site construction support was also provided.

Tessera Solar 1.5 MW Stirling Energy Systems Demonstration Plant Electrical Design

POWER Engineers provided electrical engineering design to Tessera Solar to develop a permit and construction electrical design package for their 1.5 MW demonstration plant. The high profile fast-track project utilized 60

Stirling Energy Systems (SES) SunCatcher™ solar thermal generators and was the first SES commercial power interconnect to the power grid using SunCatcher™ solar power generators. POWER was responsible for final detailed design of the power collection system and the grid interconnection documents necessary for permitting, contractor bid and construction. POWER provided a short circuit and load flow study as well as the development of relay and breaker settings in coordination with the Salt River Project and their required direct transfer trip protection scheme.

AREVA Solar 3-D Preliminary Design of 177 MW Solar Power Plant Carrizo Plains, California

This project was the first utility-scale application of AREVA's Advanced Solar Thermal Technology (formerly Ausra) in the U.S. POWER provided detailed 3-D preliminary and high-level conceptual design for the 177 MW AREVA Carrizo Plains collection system and power block. Services included site and grading design for the 550-acre collector system, foundation design for receiver arrays, feed water, steam, and drain piping systems, and design of the power block and switchyard arrangement.

As designed, the plant used AREVA's proprietary Compact Linear Fresnel Reflector (CLFR) collection and steam generation system. The 550-acre array of mirrors and collection piping heats water into high-pressure steam, which is piped to the project's power plant where the steam is used to spin



turbines and generate electricity. The power plant uses water-thrifty air-cooled condensers to condense the steam and recycle the water back to the collection system.

The AREVA solar collector approach is distinctive in its economical construction using modular components, and its economical land use in which numerous mirror arrays heat a shared heat collection tube, inducing high temperatures in the circulating feedwater.

POWER also provided support for the permitting process.

AREVA Solar 5 MW AREVA Kimberlina Demonstration Plant for Solar Thermal Power Generation Bakersfield, California

AREVA Solar (formerly Ausra) hired POWER to deliver fast-track design for its commercial demonstration plant for its proprietary concentrating solar collection and generation system. POWER provided full multi-discipline design for the 5 MW project. The plant located near Bakersfield, California opened for solar generation business in October 2008 and was the first solar thermal plant completed in California for several decades.

SOLAR PROJECT EXPERIENCE

The Kimberlina pilot plant, at 10 acres and 5 megawatts, generates 0.5 megawatts per acre, or 320 megawatts per square mile, efficiently converting solar energy into electrical power.

Pristine Power PV Solar Generation Development Ontario, Canada

POWER completed a site evaluation report defining options in PV materials and mounting techniques.



Veizades & Associates 80 MW Solar Panel PV Assessments California

POWER provided Owner's Engineering support in a cost analysis of the medium voltage collection system, switchyard and two miles of tie-line to a substation.

Rio Tinto Minerals Cogeneration Plant Repowering Engineering Study Boron, California

Rio Tinto Minerals, Boron Operations (aka U.S. Borax) contracted POWER Engineers to provide an engineering study for repowering an existing 45 MW cogeneration plant at the Rio Tinto Borax mining and refining facility. The engineering study was

the next step to confirming a feasibility study previously provided. Using a basic repowering approach, POWER developed configuration options and a conceptual design for Rio Tinto's preferred option. Once the conceptual design was completed, a project plan was developed which included a project schedule and cost estimate. The final report presented to Rio Tinto included recommendations for meeting the operating parameters identified.

Although the study used two LM6000 PC turbines for the configuration, since the site is located in the Mojave Desert, solar thermal technology was another option considered. Preliminary equipment requirements and cost estimates were provided in the study for this option.

Tessera Solar Imperial Valley Solar II Visual and Glint Analysis California

POWER conducted a glint/glare visual analysis study for a proposed solar thermal plant in Imperial County in southern California. POWER developed an accurate 3D representation of the project site, including 30,000 SunCatchers™, and a 200 square mile study area. Virtual cameras were placed using GPS coordinates from actual locations in the field to create a series of animations demonstrating the operation of the SunCatchers™. Through analysis from the created simulations, POWER's Visualization team discovered that through mirror repositioning glint was eliminated. The study was part of Tessera's

Application for Certification (AFC) and their California Energy Commission (CEC) AFC Preliminary Staff Assessment/Draft Environmental Impact Statement (PSA/DEIS). POWER developed modeling protocols and interpreted data and used this to determine the validity of the impact conclusions made in the CEC AFC PSA/DEIS. Conclusions regarding potential glint/glare impacts to aesthetics and transportation safety were developed along with potential mitigation measures to reduce identified glint/glare impacts. POWER prepared an uncontested expert testimony in support of the visual and glint/glare analysis study.

San Diego Gas and Electric Ocotillo Solar Photovoltaic Owner's Engineering California

POWER provided owner's engineering support in relation to various solar photovoltaic (PV) technology needs for a 20 MW PV power plant in the Imperial Valley of California. POWER provided the conceptual site plan, conceptual one-line, and inverter dynamic modeling required to file the Small Generator Interconnection Request (SGIR) with California Independent System Operator (CAISO). POWER's scope included preparing the technical portion of the Plan of Development (POD) and collaborating with the environmental consultant. POWER also performed a fatal flaw analysis of several solar and combined solar/wind farms and developed conceptual site plans and shading analysis for a proposed alternate PV site.

SOLAR PROJECT EXPERIENCE

Unirac

PV Tracker Design Support Southern US

POWER provided a structural review and stamped (P.E.) calculations for a new single axis tracker.

eSolar

Solar Thermal Addition Proposal Support

Burbank, California

POWER provided conceptual design and cost estimating support to eSolar for their proposal to the Sacramento Municipal Utility District's request for adding a solar thermal component to their Cosumnes 2x1 combined cycle power plant. The solar thermal component would utilize feed water to provide cold reheat steam for the steam cycle.

Silverado Power

System Modeling of PV Projects United States

POWER performed Estimated Generation Reports multiple photovoltaic sites across various states. POWER's scope of work encompassed engineering services to create anticipated Photovoltaic (PV) system generation models for 10 sites in four states totaling over 900 MW of anticipated power generation. POWER provided reports documenting items such as the type of technology used, performance ratios, First Full Year Annual Production (kWh/year) and the 8760 Report for each model.

Silverado Power

1000 MV Interconnect Request Documentation for Multiple Photovoltaic Sites and Owner's Engineering Assistance Multiple States

POWER provided the engineering to support this project's series of Large Generator Interconnection Request (LGIR) applications to grid operators in four states, totaling in excess of 1,000 MW on 16 photovoltaic sites. POWER completed the engineering required to prepare applications, and produced one line diagrams and preliminary site layout design. POWER also prepared details for the various interconnection arrangements from the inverters to the utility point of connection including new substation preliminary design. In addition, POWER's Visual Analysis Group developed animations, 3D modeling and video editing of the solar facilities. Completed videos were used for public involvement, regulatory compliance and investor relations.

Confidential Developer

35 MW Interconnect and Site Design Owner's Engineering Assistance

Arizona

POWER provided engineering to support this developer's Small Generator Interconnection Agreement (SGIA) applications to the Arizona Public Service (APS) for 12.5 MW and 15 MW photovoltaic sites. POWER was responsible for providing the one-line diagrams and engineering required to complete the applications to interconnect to 12.47 kV transmission lines.

Confidential Developer

260 MW Interconnect and Site Design Owner's Engineering Assistance

California

POWER provided preliminary electrical design support and small generator interconnect applications for the interconnection of fifteen solar photovoltaic power generating systems. POWER was responsible for providing the inverter modeling, the one-line design documentation with interconnect and protection, and completing the Small Generator Interconnection Request (SGIR) applications for interconnection to CAISO.

