# Engineering substations for power reliability

WSP USA is a leading provider of substation engineering and program/project management services to the power industry. We help clients meet the challenges of operating efficient and reliable utility-scale systems by upgrading and replacing infrastructure, incorporating new technologies and increasing resiliency.

Our experts have worked on every major component of power delivery systems, high-voltage and medium-voltage substations, HVDC and FACTS, medium-voltage distribution systems, gas-insulated (GIS) and air-insulated (AIS) arrangements, protection and control systems, and supervisory control and data acquisition (SCADA)/distribution management systems. All work is performed in accordance with our ISO 9001-certified Quality Management System.

## COMPREHENSIVE SUBSTATION ENGINEERING SERVICES (ALL VOLTAGE LEVELS)

- Complete AIS and GIS design
- Smart 3D modeling and design
- Physical station layout and design
- Protection and control design and settings: solid-state relaying, electromechanical relaying
- IEC-61850 digital substation
- Control building design
- Intra-substation communication design: Ethernet (CU and fiber) and serial
- Inter-substation communication integration: fiber (direct and multiplexed), microwave, power-line carrier, copper phone line
- RTU, SCADA, HMI, DFR integration
- Low-voltage AC/DC analysis and design
- 3D renderings, aesthetic plans and treatments

## MANAGEMENT SERVICES

- Program and project management
- Owner's engineer services
- Technical specification development and review
- RFP development and proposal evaluation
- Permitting management
- Procurement management
- Constructability reviews
- Construction management and oversight
- Field QA/QC

## SELECTED PROJECTS

### RARP Substation 255, Rochester, New York

WSP designed the greenfield Station 255 substation, rated to operate at 345kV, as part of the Rochester Area Reliability Project (RARP) being implemented by RG&E/ AVANGRID. The RARP aims to improve the electricity transmission system in the Rochester region and provide additional power to meet the growing demand for electricity. The station was designed as a breaker-and-a-half, air-insulated substation with four 345kV bays, two 345/115/34.5kV transformers, two 115kV bays and two 34.5kV sections. The design also considered expansion to one future 345kV bay, one future transformer and two future 115kV bays. WSP's responsibilities included the complete below-grade design, including foundations, trenches and duct bank for the inside-the-fence design, and the complete above-grade design, including the bus layout of the substation utilizing IEEE, NEC, NFPA and RG&E standards. Based on the substation design and its integration within the overall network, WSP designed the control and protection scheme to secure station components and associated transmission lines.

### Goethals Substation Upgrade, New York City

WSP, under contract with General Electric, designed the protection and controls for a new ring-bus configuration at Con Edison's Goethals substation. The purpose of the project was to interconnect two existing 'T' substations, using two additional circuit breakers and associated line disconnect switches, CCVT, surge arrestors and ground switches. Four circuit-breaker failure relays were used to provide two lines of protection along with control and indication. To facilitate this new configuration, five circuit breakers were installed, of which two were utilized with existing monitoring and controls that transferred the function from existing circuit breakers to new circuit breakers.

### Bethel 138/4.16kV Substation Tennessee Colony, Texas

Atmos Energy is the country's largest, fully regulated, natural gas only distributor. The company also manages its natural gas pipeline and storage assets. The Atmos Bethel Storage Facility leaching plant addition supported the construction of gas storage caverns.

To provide power to the leaching plant, a new 138/4.16kV substation and interconnection switch yard (POI) were required. The substation consists of two power transformers, two 138kV circuit switchers, six 4.16kV bays, and a control building. WSP engineers prepared the civil, structural and electrical packages and provided site support throughout the construction. The new interconnection point tapped into an existing ONCOR 138kV line. To connect the substation to the POI 1.4 miles of new transmission line was required.

WSP was responsible for the design, procurement, construction and commissioning of the new substation, POI and transmission line.

## ABOUT WSP

WSP USA is the U.S. operating company of WSP, one of the world's leading engineering and professional services firms. Dedicated to serving local communities, we are engineers, planners, technical experts, strategic advisors and construction management professionals. WSP designs lasting solutions in the buildings, transportation, energy, water and environment markets. With more than 12,000 employees in over 200 offices across the U.S., we partner with our clients to help communities prosper.

## CONTACT US

For more information about how we can help you deliver your next project, contact:

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