

# CONSULTING AND ANALYTICAL SERVICES FOR RENEWABLE-PROJECT DEVELOPERS AND ENGINEERING, PROCUREMENT, AND CONSTRUCTION (EPC) COMPANIES



As leading experts in power system analysis backed by more than a century of experience in switching, control, and protection, S&C's engineers have helped customers around the world plan, design, implement, and maintain their power systems. The team at S&C consists of specialists in generator interconnection at both transmission and distribution voltage levels. S&C has provided consulting and analytical services to renewable-project developers and EPC companies with the deployment of more than a gigawatt of wind and solar generation, projects with almost 1,000 MVA of combined energy storage, and numerous advanced microgrid projects globally.



## RENEWABLE ENERGY

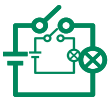
S&C provides consulting and analytical services for renewable energy solutions for:

- Collecting data and implementing models for generator interconnection studies
- Designing generator interconnection requirements in accordance with National Electricity Rules guidelines
- Reviewing designs of medium-voltage protection and control specifically for wind and solar projects
- Identifying methods to reduce system footprints, construction costs, and project duration
- Conducting analytical studies to support electrical grid engineering designs and to ensure reliability under high-renewable-penetration, low-inertia environments
- Supporting renewable energy roadmap/grid-modernization strategies



## ENERGY STORAGE AND DYNAMIC REACTIVE POWER COMPENSATION

S&C's consultants provide support for storage-technology evaluation and ensure the equipment for your project is properly specified and commissioned for a variety of applications, including peak shaving, renewable smoothing, islanding, frequency regulation, demand response, power quality improvement, and transmission system voltage support.



## MICROGRIDS

Drawing on S&C's experience with advanced microgrid deployments, S&C experts can provide support with the following:

- Techno-economic feasibility studies to determine whether a microgrid is the right solution for the customer
- Complex microgrid systems design aligned to meet customer objectives
- Specification development for the core components of a microgrid, including the microgrid controller, energy storage system, switchgear, and key control requirements for diesel or natural gas generators
- Expertise in distributed energy resources, including wind, solar, energy storage, and conventional (i.e. diesel or natural gas) generators
- Natural gas and diesel generators, photovoltaic inverter/wind turbine generator, energy storage system, and plant controller transient and dynamic simulation model development in PSCAD and PSS®E
- Performance of transient stability, power quality, short-circuit, protective device coordination, and arc-flash studies to support engineering



## ADVANCED ANALYTICAL STUDIES

Our team of experts is well qualified to supplement your engineering with advanced analytical studies and support for renewable generator interconnections across both transmission and distribution voltage levels. S&C's advanced analytical studies team can support the following:

- Power-flow and short-circuit analyses
- Protective-device coordination studies
- Arc-flash analysis
- Harmonic analysis, including harmonic filter design analysis and specifications
- Insulation coordination studies
- Dynamic reactive power compensation system design and specification
- Distributed energy resources integration studies
- Photovoltaic inverter/wind turbine generator, energy storage system, and plant controller transient and dynamic simulation model development in PSCAD and PSSE
- R1 pre-connection data preparation and R2 post-commissioning data- and model-validation support in accordance with NER guidelines
- Benchmarking report; PSSE model acceptance test report; PSSE releasable user guide (RUG); PSCAD RUG, PSSE, and PSCAD connection studies; and wide area network studies
- Reactive power capability curve creation, voltage control strategy development, power system design setting data sheet development, and development of generator performance standards
- Design review of medium-voltage protection and control
- Energy storage application and specifications



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