

Engineering Courses

Distributed Energy Resources: Planning for High Penetrations

Training objectives:

How do you plan for and manage a future grid with increased levels of distributed energy resources (DER)? This course covers technical, economic and policy aspects of planning and operations. We will also discuss global lessons learned from integration of high penetrations of distributed solar.

The course is intended for:

Power system engineers, planners, and operators, as well as economists and policy makers working on readiness of the future grid where various elements of DER are expected to play an increasingly greater role.

Main features:

- Distributed resource planning – In a future grid with high penetrations of DER, utilities will need to conduct distribution planning at a new level of technical and economic rigor. Utilities will need to consider hosting capability, anticipate where DER are likely to grow on their system, and consider how DER growth defers or incurs needs for system upgrades. We will discuss plans in California and New York, where distributed resource planning is a current focus, and examine methodologies and outcomes of distribution resource plans.
- Hosting capacity – How much DER can you accommodate where and what impacts those answers. How can you be strategic about upgrading feeders to increase hosting capacity? How do different types of DER impact hosting capacity?
- DER compensation – How will we compensate DER owners when net metering ends? We will discuss the value of solar approach as well as dynamic pricing options that may help cost recovery under net metering. We will discuss upgrade deferral benefits from different types of DER. Distribution marginal prices may be a future option. We will also discuss lessons learned from Germany's feed-in tariff and subsequent market-based approaches.
- Impacts on bulk power system reliability – What happens to bulk power system reliability when high penetrations of DER are interconnected? Recent studies such as the Western Wind and Solar Integration Study Phase 3 have started to examine impacts of high penetrations of DER during system disturbances. We will discuss Germany's recent need to invest \$500M in retrofitting PV inverters to address reliability concerns.
- Load forecasting – Behind-the-meter generation impacts the ability of load forecasters to successfully do their job. We will investigate impacts of DER on load forecasting and how some utilities are addressing this.
- Smart inverters and interconnection requirements – DER interconnection requirements in the US were not originally designed for high penetrations of DER to be connected to the grid. Ride-through and voltage regulation were originally undesirable attributes. However, at high penetrations, these attributes become important. We will discuss revisions to IEEE 1547 as well as state initiatives (California's Rule 21 and Hawaii's rule 14H).

Recommended prior knowledge:

Basic knowledge of economics and familiarity with the electric power industry and utility structures.

Note: The course is held in English. Class subject to change. Class times are 8-4.

For more information visit: www.geenergyconsulting.com



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