Distributed Energy Systems Integration

Renewable Energy Sources and Interconnection onto the Electric Grid

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Presentation topics

- Renewable electrical energy sources are being integrated onto the “grid” with rapidly changing technology and rules to allow the interconnection
- Examples of electrical generation technology include:
  - Photovoltaics
  - Fuel cells
  - Wind turbines
  - Microturbines
  - Advanced turbines
  - Reciprocating engines
- Interconnecting these technologies safely and within national standards is critical to the advancement of distributed resources
- IEEE Standard 1547.x are critical in implementing systems and developing new technologies
- Distributed energy has many potential benefits, including:
  - Clean energy
  - Lower energy cost
  - Combined heat and power
  - Reduced utility line loss
  - Possibly improved grid reliability and
  - Deferred grid investments
- Smart grid technology

About NREL:
The National Renewable Energy Laboratory (NREL) is the nation's primary laboratory for renewable energy and energy efficiency research and development (R&D). NREL opened its doors in 1977 as the Solar Energy Research Institute (SERI). George Bush Sr. designated SERI as a National Laboratory and renamed it to NREL. NREL's mission and strategy are focused on advancing the U.S. Department of Energy's and our nation's energy goals. The laboratory’s scientists and researchers support critical market objectives to accelerate research from scientific innovations to market-viable alternative energy solutions. At the core of this strategic direction are NREL's research and technology development areas. These areas span from understanding renewable resources for energy, to the conversion of these resources to renewable electricity and fuels, and ultimately to the use of renewable electricity and fuels in homes, commercial buildings, and vehicles. The laboratory thereby directly contributes to our nation's goal for finding new renewable ways to power our homes, businesses, and cars.

About Michael Coddington:
Michael Coddington graduated from Colorado State in 1989 with his BSEE and spent 20 years working for electric utility companies as a distribution planning engineer and a Key Account Manager. Mike was a primary designer of the electric distribution system for the Southwest Line of the RTD Light Rail system, the Pepsi Center, Coors Field, and the newly renovated Fitzsimons campus (UCHSC/Children’s Hospital/University Hospital/VA MC). Mike spent two years working at one of the largest electrical cooperatives as a System Planning Engineer designing substations, transmission lines and distribution systems. In 2007 Mike accepted the position of Senior Engineer with NREL in the Distributed Energy Systems Integration group. The focus of Mike’s work include implementation of IEEE 1547.x standards in the U.S., developing new standards for interconnection, testing electric systems and grid simulators at the NREL DERTF facility, and is one of NREL’s master electricians. Mike has published several papers for the Department of Energy in PV system design, integrating PV onto secondary networks, large scale PV systems in New York City, which have appeared in IEEE publications, magazines, and one the DOE/NREL online library.