Renewable energy generator

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Energy-efficient homes and buildings are also better equipped to switch to ...

This energy can be used to generate electricity or be stored in batteries or ...

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Renewable generation differs from traditional generation in many ways. A renewable power plant consists of hundreds of small renewable energy generators (of 1-5 MW) with power electronics that interface with the grid, while a conventional power plant consists of one or two large synchronous generators (of 50-500 MW) that connect directly to the grid. In addition, the variability of renewable energy resources and the reduction in system inertia associated with renewable generators require unique, flexible controls and energy storage for optimum integration.

NREL researchers develop models of renewable energy generators, storage, and renewable power plants to enable:

System planners to perform system impact studies

Renewable energy generation manufacturers to improve control algorithms, efficiency, and reliability

Renewable power plant owners, operators, and developers to optimize their interface with the grid

Independent system operators to improve the stability of the grid by simulating remedial action schemes to stabilize their balancing area or larger power system.

Development of dynamic models of tidal and river generators, adjustable-speed pumped storage hydro, wind turbine generators, wind plants, energy storage, photovoltaic (PV) inverters, and PV plants

Development of transient models of PV generators and storage with power electronics converters

Development of PV inverter control algorithms and validation through simulation

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