



National Renewable Energy Laboratory

# Hybrid/Distributed Energy Test Facility

Ian Baring-Gould

National Renewable Energy Laboratory

Wind/Diesel 2002  
September 23-24, 2002



**NWTC Site View and Location  
of HPTB - DERTF**



# Original Test Bed Design

- Wind turbines: 1.5 to 100 kW AC, 0 to 10 kW DC
- Diesel gensets: 125, 80, 40, 40 kW
- AC renewable energy simulator: 75 kW
- DC battery banks 24, 120 and 228 volts
- Village load simulators: 0 to 120 kW, three phase inductive and resistive
- Dump load



# Update on NREL Test Facility



- Concrete Pad for DG Testing installed
- Installation of Capstone Turbine completed – initial startup expected October 15



- Expansion of HPTB building is completed
- Electrical and Mechanical modifications for research testing completed

# Equipment update on NREL Test Facility



Construction completed and General Purpose Equipment installed

200kW Grid Simulator – Simulate utility grid and full control of voltage and frequency to test DG response to grid disturbances



Yokogawa PZ4000 - Power analyzer – For Data Acquisition and measurement



KeyTek Surge Tester – Simulate high-voltage (up to 20,000V) lightning strikes on DG equipment





# Hybrid/Distributed Energy Systems Testing



AC Bus



Inverters



Not yet installed

DC Bus



Not yet installed



Thermal Converters

Building Thermal Loads

Utility Grid



Wind Turbines



PV Array

# Current Research Program

## Current Research

- Inverter testing being completed (Trace Technologies)
- Large Scale RO water purification system
- Battery Testing for small wind applications

## Planned Research

- Fuel Cell / Electrolyzer
- Interconnection standards





# Hybrid/Distributed Energy Web Links

## **Distributed Energy Resource Center**

[www.nrel.gov/energy\\_resources](http://www.nrel.gov/energy_resources)

## **Distributed Power**

[www.eren.doe.gov/distributedpower](http://www.eren.doe.gov/distributedpower)

[www.eren.doe.gov/der](http://www.eren.doe.gov/der)

## **National Wind Technology Center**

<http://www.nrel.gov/wind/>

## **Solar Radiation Research Laboratory**

[www.nrel.gov/srri](http://www.nrel.gov/srri)

## **Hybrid Power Test Facility**

<http://www.nrel.gov/wind/hybrid.html>

## **Hybrid Power Test Facility (PDF)**

[http://www.nrel.gov/villagepower/program/briefs\\_2000/hybrid.pdf](http://www.nrel.gov/villagepower/program/briefs_2000/hybrid.pdf)

## **National Wind Technology Center**

<http://www.nrel.gov/wind/>