

# Micro-Grid Lab

A Micro-grid is a small-scale power grid that can operate independently or in conjunction with the area's main electrical grid. Any small-scale localized station with its own power resources, generation and loads and definable boundaries qualifies as a micro-grid. Ecosense's micro-grid lab uses sources like PV Emulator, Wind Turbine Emulator and Fuel Cell and Battery bank for storage. This micro-grid lab is a grid connected setup where the output of DC micro-grid is connected to main AC grid via a Voltage Source converter (VSC). This micro-grid can also be configured to work as a Standalone set-up.

## Solar PVE- WTE- FC Hybrid Grid Connected system

### Design

Scalable Design

### Usability

Can be used indoors only

### Specifications

#### Energy Sources:

Wind Turbine Emulator, PV Emulator, Fuel Cell

#### Energy Storage:

Battery Bank

Grid Connected system





## Features

- DC-side Load management
- User controlled, cost effective way to test response of PV system for wide range of solar panels
- Simulate the I-V curve under varying environmental conditions
- Test and verify different parameters of PV system like – MPPT tracking algorithm of PV inverter, efficiency of MPPT tracking
- Measure and verify the overall efficiency and conversion efficiency of PV inverter for variety of solar panels and in varying weather conditions
- Real time Emulation of Static and dynamic behavior of Wind Turbine
- Power balancing using battery bank and bidirectional converter
- 3 phase inverter control for standalone and grid tied system in Wind Emulator
- Exhibits both static and dynamic behaviour close to real wind turbine.
- Intuitive graphical user interface & data acquisition for control and monitoring of various parameters.
- Capability to change wind turbine parameters (within permissible range).
- FPGA board for solving the differential equations in real time, additionally on board ADC channels and PWM port for power electronics converter/inverter firing.
- Suitable for Hardware-in-Loop simulations.
- External control of inverter is possible