

# New Energy Lab

Smart Grid for Training and Applied Research

*NEW with*

- . API
- . Tie Grid

*On request with*

- . HG 198nl/h
- . Solar Tracker

ACADEMIA OFFERING  
RESEARCH SOLUTIONS



WIND



SOLAR



FUEL CELL



GRID



ELECTRONIC DC LOAD



HYDROGEN GENERATOR

## Smart-Grid Training Laboratory for Experiments Related to Energy Management

- » Features up to 30 realistic experiments in new energy management for training and research purposes
- » Comes with new documentation, maintenance guidelines and spare part list
- » Includes software for uploading customer profiles with customized setups
- » Presents a weather data monitor system for recording the weather conditions

# A complete laboratory for renewable energy for colleges, universities and research institutes

The New Energy Lab is a complete energy system that conveys practical knowledge in the field of energy management. The system combines renewable energy generation from solar, wind and fuel cell power with modern energy storage technology to create an autonomous hybrid system.

Optimized for the requirements of universities and vocational schools, the three forms of renewable energy (solar, wind and fuel cell) can be explored as a single process or at the level of an overall system. Students can set up an autonomous power supply and learn about the interrelationships of various aspects of power management by experimenting with the parameters of the system components. The public power supply grid can be used as a backup to simulate the combined use of renewable and conventional energy sources, such as a diesel generator.

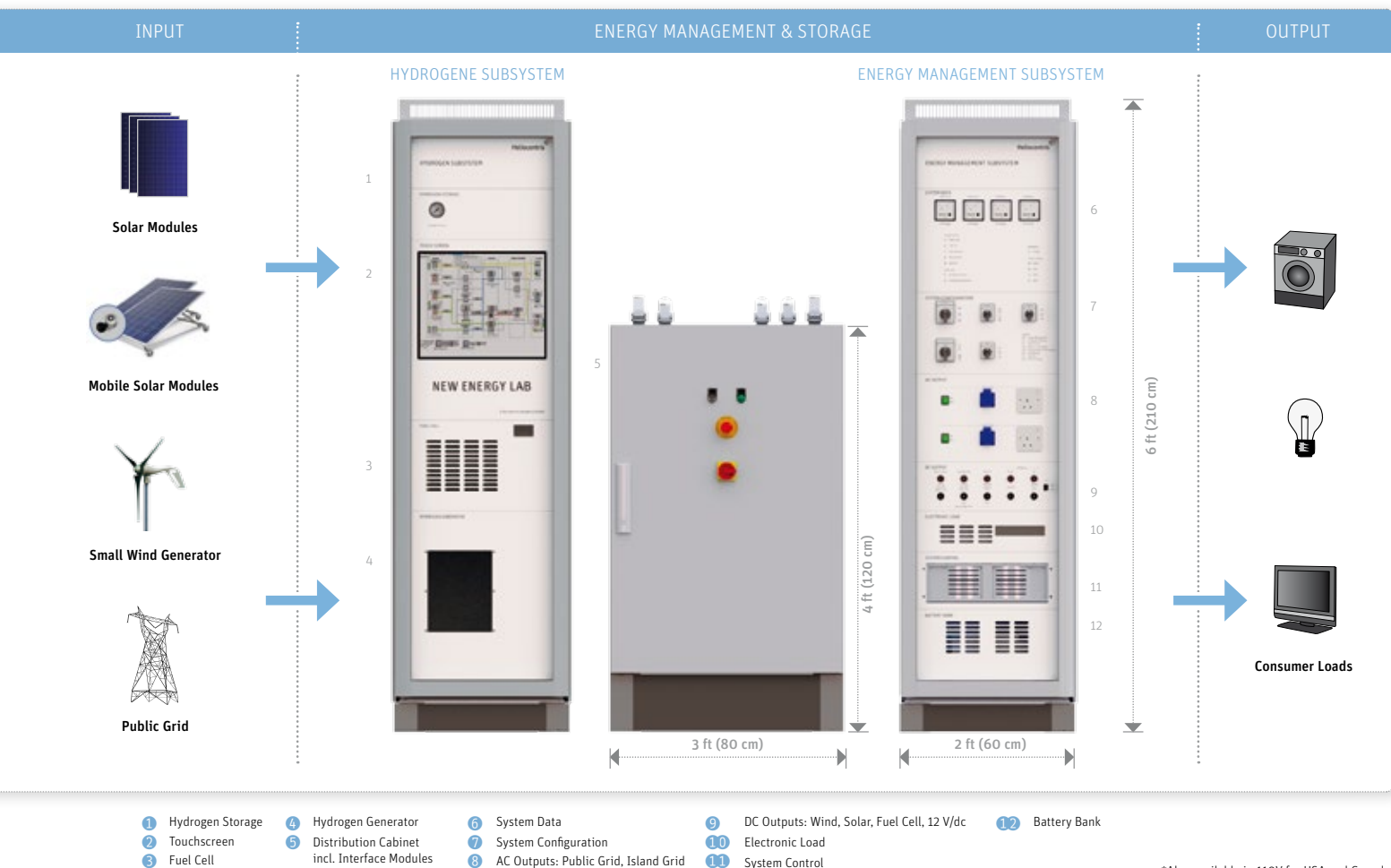
Extensive measuring technology with over 60 sensors, central monitoring and control software and an electronic load enable the recording of characteristic curves and system data.

## Topics covered

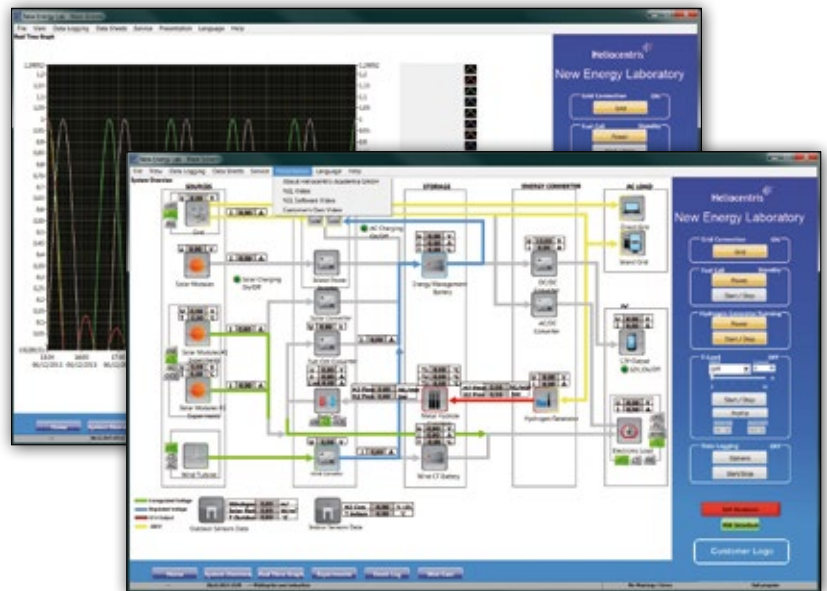
- » Renewable energy generation & energy management
- » Introduction to solar, wind, hydrogen and fuel cell technology
- » Design, set-up and operation of hybrid energy systems
- » Examination of renewable energy sources and energy storage technologies
- » Off-grid operation of consumer loads (230, 12V)\*
- » Observation of the following scenarios: night-time operation, periods of no wind, peak loads

## Service

The New Energy Lab from Heliocentris is offered as a turnkey solution. Service includes everything from consultation to installation and training of users.



The system is designed to run in different set-ups allowing to test electrical paths of different energy sources, e.g., solar module, wind generator or fuel cell in combination with a battery system and an electronic load.



### LabVIEW-based software

The central monitoring and control software allows the user to log and save data as well as analyzing the hardware. Data and system status can be shown online. In addition, energy flow such as current, voltage, hydrogen flow and other valuable data are visualized in real time.

*“The New Energy Lab is an excellent, teaching system for the complex issues of tomorrow’s energy supply.”*

TH Wildau University of Applied Sciences, 2013

### Curriculum and Instructional Materials

- » Comprehensive curriculum for courses in engineering, sciences, environmental studies and business
- » Three renewable energy textbooks with basic and advanced knowledge
- » Includes experiments in the following training and research areas:
  - Solar and wind energy
  - Electrolyzers and fuel cells
  - Island grid mode
  - UPS system mode
  - Off-grid back-up mode



Physical Technical Institute, St. Petersburg, Russia



Advanced Technology Training Centre, Bintulu, Malaysia



University of Lodz, Lodz, Poland



Public Authority for Applied Education & Training (PAAET), Kuwait



National Institute of Technology, Silchar, India

# Technical Data

## Energy Components

Solar panels	1500 Wp
Wind turbine	300 Wp
Fuel cell	1.2 kW
Hydrogen generator	72 sl/h, customised 198sl/h
Hydrogen storage canister	1500 sl
Battery	55 Ah @ 48V
Electronic load	2400 W

## Measuring Technology and Data Recording

### Solar

Solar radiation
Module temperature
No-load voltage
Output power (current, voltage)
Short circuit current
Recording of U/I curve
Recording of time curve (current, voltage, radiation, temperature)

### Wind

Wind speed
Output power (current, voltage)
Recording of time curve (current, voltage, wind speed)

### Fuel Cell

Hydrogen flow rate
Hydrogen pressure
No-load voltage
Output power (current, voltage)
Recording of U/I curve
Measurement of time curve (current, voltage, H <sub>2</sub> flow rate, H <sub>2</sub> pressure)

### Hydrogen Generator

Power consumption (current, voltage)
Hydrogen flow rate
Hydrogen pressure

### Battery

Input power
Output power
Recording of time curve (current, voltage, temperature)

## Software

Monitoring
Data logging
Visualization of current in real time
Visualization of hydrogen flow rate in real time
Visualization of voltage in real time

## System Safety

Hydrogen sensor
Power circuit breaker
Temperature monitoring
Smoke detector
Monitoring of hydrogen pressure

## Hydrogen storage canister

Hydrogen pressure
Hydrogen temperature
Hydrogen flow rate

## External loads

Power consumption
Voltage
Current



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