

# New Energy Lab

Smart Grid for Training and Applied Research

**NEW** with • API  
• Tie Grid

*OPTIONAL* • HG 198nl/h  
*(on request)* • Solar Tracker

ACADEMIA OFFERING  
RESEARCH SOLUTIONS



WIND



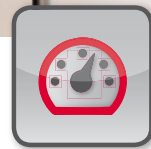
SOLAR



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.

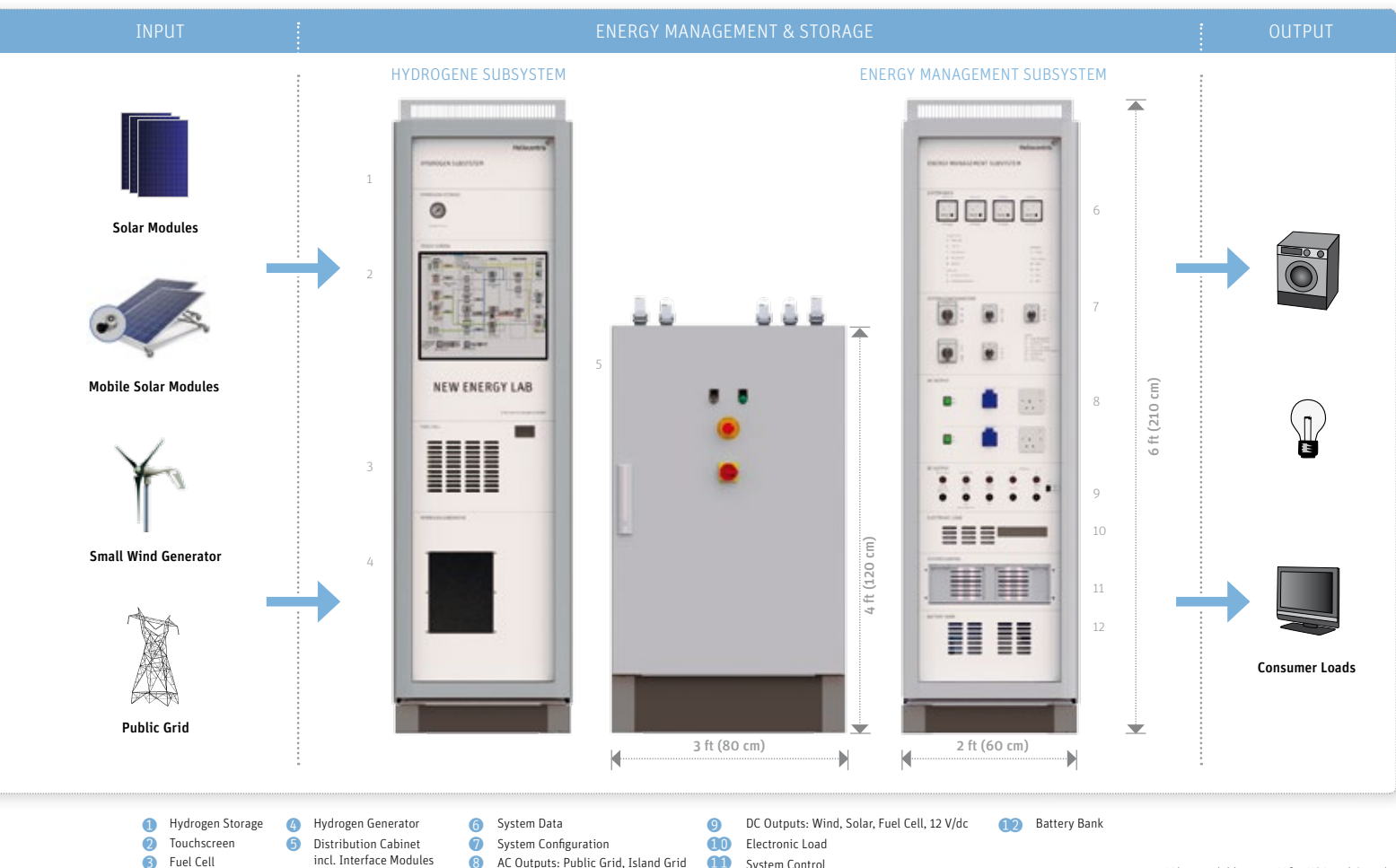
Extensive measuring technology with over 60 sensors, central monitoring and control software and an electronic load enable the recording of characteristic curves and system data.

## Topics covered

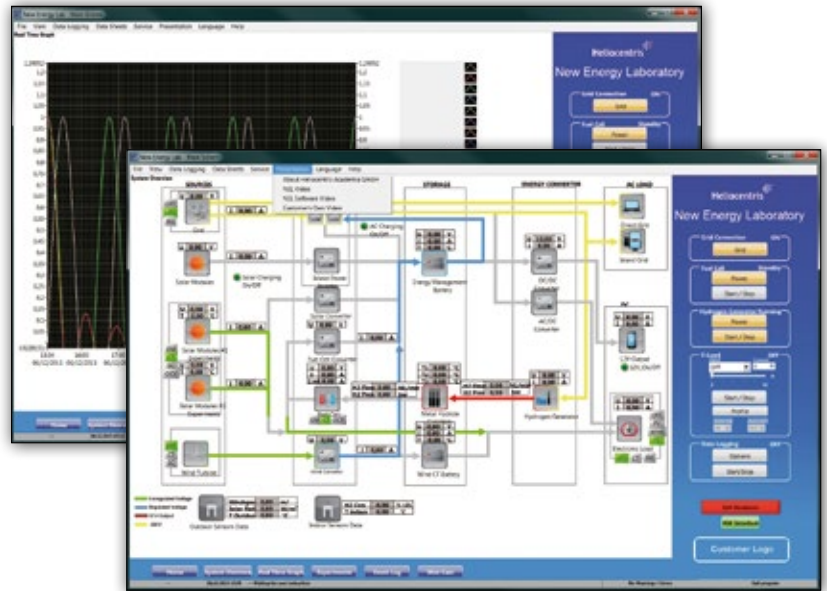
- » Renewable energy generation & energy management
- » Introduction to solar, wind, hydrogen and fuel cell technology
- » Design, set-up and operation of hybrid energy systems
- » Examination of renewable energy sources and energy storage technologies
- » Off-grid operation of consumer loads (230, 12V)\*
- » 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.



## 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

## 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





# 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   |  |
|---|--|
| <b>Solar</b>  |  |
| 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)                              |  |
| <b>Wind</b>   |  |
| Wind speed  |  |
| Output power (current, voltage)   |  |
| Recording of time curve (current, voltage, wind speed)  |  |
| <b>Fuel Cell</b>  |  |
| 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) |  |
| <b>Hydrogen Generator</b>   |  |
| Power consumption (current, voltage)  |  |
| Hydrogen flow rate  |  |
| Hydrogen pressure   |  |
| <b>Battery</b>  |  |
| 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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\*Optional to the Mobile Solar Module, Solar Tracking System



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