

LARES energy systems



Photovoltaic power plant



Wind turbine

Institution:

University of Zagreb
Faculty of Electrical Engineering and Computing
Department of Control and Computer Engineering
Laboratory for Renewable Energy Systems

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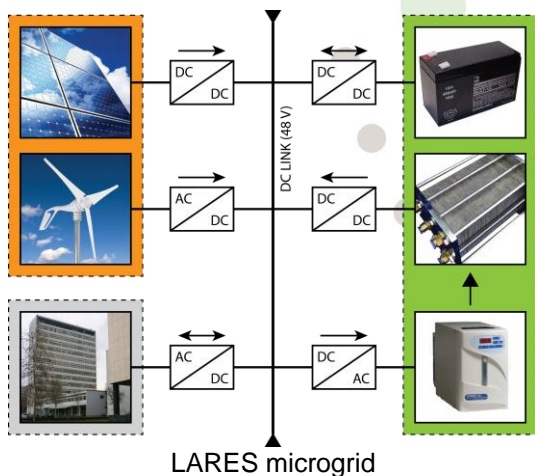
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Laboratory for Renewable Energy Systems (LARES)

Laboratory for Renewable Energy Systems (LARES) of University of Zagreb, Faculty of Electrical Engineering and Computing is focused on research and development of control systems with application in:

- renewable energy systems, with emphasis on wind energy and solar energy sources
- integration of renewable energy systems in power grids, on the level of microgrids and smart grids,
- smartcities, including optimization of energy and water consumption in buildings through interaction with a local microgrid and smartgrid, together with the water distribution network.



Laboratory equipment

Research and development is conducted through international and domestic research projects financed by public or industry funds. LARES staff includes 5 professors and around 15 full time researchers. Laboratory research equipment:

- scaled model of MW size wind turbine placed in air chamber with controllable blower rated **11 kW** for generation of variable wind with speeds up to **11 m/s**,
- 4 fixed photovoltaic arrays rated **3,5 kWp** with the ability of manual tilt adjustment along elevation axis,
- 2 photovoltaic arrays **3,5 kWp** mounted on azimuth–altitude dual axis tracker with full controllability
- DC microgrid comprised of (i) photovoltaic array rated **1.6 kWp** mounted on dual axis tracker, (ii) battery storage system **48 V/200 Ah**, (iii) electrolyser for hydrogen production rated **1 kW**, metal hydride hydrogen storage and a fuel-cell rated **500 W**, (iv) connection to the Faculty distribution grid, (v) controllable converters between microgrid elements and microgrid DC bus,
- meteorological instruments for measurement of solar radiation components (direct, diffuse, reflected, in tilted surface of individual photovoltaic fields).

Research projects

ACROSS – Centre of Research Excellence for Advanced Cooperative Systems, EU FP7 [www.across.fer.hr]

ENHEMS-Buildings – Enhancement of R&D&T Capacities in Energy Management Systems [www.enhems-buildings.fer.hr], EFRR

MICROGRID – Optimization of renewable electricity generation systems connected in a microgrid [www.microgrid.fer.hr], HRZZ

PoC-WTGFTC – Proof of Concept for Wind Turbine Generator Fault-tolerant Control, BICRO PoC

CEEStructHealth – Centre of Excellence for Structural Health, EFRR

DYMASOS – Dynamic Management of Physically Coupled Systems of Systems, EU FP7

UrbanWater – Intelligent Urban Water Management System, EU FP7

Will4Wind – Weather Intelligence for Wind Energy, EFRR

MONGS – Monitoring of Wind Turbine Generator Systems, EU FP7 SEE-ERA.net PLUS

ThermalMapper – Thermal 3D Modeling of Indoor Environments for Saving Energy, EU FP7 SEE-ERA.net PLUS

AEOLUS – Distributed Control of Large-Scale Offshore Wind Farms, EU FP7

MultiWind -- Multi-criteria Wind Turbine Control, HRZZ

Wind turbine control and monitoring system, Končar - Electrical Engineering Institute Inc.