



NREL + GINER ELX

At current levels of renewable generation, there are already periods when the supply of electrical power significantly exceeds the level of demand. The penetration levels of renewable energy sources (RES) require an energy storage solution that can include hydrogen generated via polymer electrolyte membrane (PEM) electrolysis.

R&D STRATEGY

Current state-of-the-art PEM electrolysis indicates that the largest PEM-based stacks range from 150–250 kW and that a significant scale-up of the technology is required to accommodate multimewatt energy storage solutions in large-scale RES applications. Giner ELX has developed a megawatt-scale PEM-based electrolyzer stack design that is ideal for RES applications.

To facilitate the commercial production of this technology, validation of the stack efficiency, membrane lifetime, catalyst performance, and cell component durability are needed. The validation of Giner ELX's high-current-density megawatt-scale electrolyzer requires large test platforms and electrical requirements currently available at the Energy Systems Integration Facility (ESIF) of the National Renewable Energy Laboratory.

Giner ELX and NREL will report on the operational conditions, voltage-current curves as a function of temperature and pressure, fluoride release data, time series of the stack voltage and histogram/summary tables of hours of stack current levels, cathode pressures, and stack temperatures during 5,000 hours of operation.

This operational data will be used to calculate stack voltage efficiency and stack decay rate, and it will predict lifetime based on stack current, fluoride release rates, average stack temperature, and anode/cathode pressures.

IMPACT

This work enables scaling the PEM-based electrolyzer stack designs for renewable energy generation applications from the current 150-kW platform to 15-MW platforms, thereby enabling increased storage of renewable generation. Utilities and consumers can benefit from the expanded storage capacities through this method.

Company URL: <http://www.ginerelex.com>



Giner ELX's high-current-density, megawatt-scale electrolyzer stack. Engineers at the ESIF will validate the efficiency and durability of the new stack design. (Photo by Monjid Hamdan/Giner ELX)

Partner with NREL at the ESIF

User facility access to the ESIF is awarded through the review and approval of user proposals, depending on the scientific merit, suitability of the user facilities, and the appropriateness of the work to DOE objectives, and includes a signed user agreement for the facility.

For more information, please visit:

www.nrel.gov/esif/work-with-us.html

or contact:

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The Energy Systems Integration Facility (ESIF) at the National Renewable Energy Laboratory (NREL) provides the R&D capabilities needed for private industry, academia, government, and public entities to collaborate on utility-scale solutions for integrating renewable energy and other efficiency technologies into our energy systems.

To learn more about the ESIF, visit: www.nrel.gov/esif.

National Renewable Energy Laboratory

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