



NREL + COGENT ENERGY SYSTEMS

WASTE-TO-ENERGY

NREL is collaborating with Cogent Energy Systems (Cogent) to introduce small-scale waste-to-energy technology in microgrids. Cogent has developed an innovative, proprietary waste-to-energy (WTE) system, the company's HelioStorm Gasifier, capable of efficiently operating on small amounts of heterogeneous municipal solid waste feedstocks, converting them into a clean syngas (a synthesis gas comprised primarily of hydrogen, and carbon monoxide) that can be used to fuel an electricity generator, all with rapid on/off cycle times. The focus of the project is to test and demonstrate the feasibility, reliability, and usefulness of integrating electricity generated using a simulated syngas composition matching the syngas stream to be produced by a HelioStorm-based WTE gasifier to power a microgrid as a means of addressing and complementing the intermittency of other sources of electricity.

R&D STRATEGY

The project team will develop a real-time dynamic simulation of the HelioStorm syngas production at the output of the scrubber as a function of feedstock type, feedstock feed rate, and controlled air and/or steam input. The real-time model will be used to control the mix, concentration and rate of gases that will be fed to an onsite engine/generator capable of combusting the syngas and producing electricity. The generator will electrically connect to the Research Electrical Distribution Bus (REDB), which will connect to one of ESIF's 250 kVA resistive/inductive/capacitive load banks. The load banks will be used to simulate the WTE combined load of a standalone microgrid such as an Army forward operating base. Once the system is demonstrated to operate in steady state, NREL will work with Cogent to develop a control system (control algorithms) that will automate the simulated HelioStorm Gasifier and electrical generator to supply electricity in response to changing load and solar conditions, and enable it to operate in a microgrid.



A Cogent waste-to-energy system can convert the trash collected in a single garbage truck like the one picture here into electricity to power a 250 kW microgrid for a day. *Photo from iStock, 840972220*



POTENTIAL IMPACTS

This waste-to-energy technology has the potential to enable any entity with carbonaceous solid waste to generate electricity onsite. The rapid dispatch capabilities of the HelioStorm Gasifier will allow for greater penetrations of renewable resources in microgrids by augmenting the variable generation with dispatchable power from the gasifier. The successful demonstration of this technology will be of particular interest to the Department of Defense, island and remote communities, and other municipalities and entities that wish to decrease their dependence on fossil fuels for electricity generation.



Photo by Dennis Schroeder, NREL 40870

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/esi/working_with.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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