

Featured Energy I-Corps Teams and Technologies

Efficiency

GreenBlox, *National Renewable Energy Laboratory*

Dan Macumber; Daniel.Macumber@nrel.gov

A web-based service that automates and simplifies energy savings estimates in order to ease financing for energy efficiency measures. GreenBlox ensures that consumers remain protected, while opening the door to new financing options that are not currently available due to high regulatory costs.

SonicLQ*, *Argonne National Laboratory*

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A measurement technology that uses sound waves to locate and size air leaks in building envelopes. SonicLQ allows air leak testers to test any type of building, in any phase of construction, in any state of occupancy, and any time of year, proving testers with better data and more air leak testing opportunities.

EcoSnap*, *National Renewable Energy Laboratory*

Chuck Booten; chuck.booten@nrel.gov

EcoSnap is an R&D 100 award-winning cooling and heating solution that addresses the major drawbacks of room air conditioners and heat pumps. It uses proven technology in combination with novel engineering to provide convenient and local space conditioning in a low-cost, easy-to-install package. EcoSnap does not require windows, virtually eliminating interior noise and improving energy efficiency and home security while decreasing cooling and heating loads.

Grid

Opt-grid, *National Renewable Energy Laboratory*

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A novel, real-time control architecture to optimize the operation of Distributed Energy Resources (DERs) at residential, commercial, and industrial levels. The real-time system enables segments of feeders to emulate virtual power plants providing services to the rest of the grid, while ensuring satisfaction of electrical limits and maximizing customer benefits. This architecture allows end customers to minimize their payments and partake in grid operations while guaranteeing power quality in the distribution network.

DCAT, *Pacific Northwest National Laboratory*

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A Dynamic Contingency Analysis Tool (DCAT) that provides evaluation of power grid cascading outages due to extreme events. DCAT improves the ability of power system planning engineers to assess the impact and likelihood of extreme contingencies and potential cascading events across their systems and interconnections.

GLASS*, *Idaho National Laboratory*

Jake Gentle; jake.gentle@inl.gov

A software tool that informs system planners and operators of available capacity using dynamic line ratings derived from real-time operating conditions, local weather measurements, and physics-based weather forecasts. General Line Ampacity State Solver (GLASS) uses computational fluid dynamics to allow for optimized generation dispatch and transmission network performance without expensive infrastructure improvements and without outages during installation.

Environmental Management

Gamma Rayality, Lawrence Berkeley National Lab

Andy Haefner; ahaefner@lbl.gov

A technology that enables users to visualize gamma-ray emitting radioactive sources by producing 3D maps of an area of interest in real-time. These 3D maps enable faster and more accurate identification and localization of radioactive sources or contamination. The novel approach, which fuses radiation data with data from auxiliary, contextual sensors, can be deployed on aerial or ground vehicles, as well as in handheld configurations.

Fossil Fuels

Oleo Sponge, Argonne National Lab

Ed Berry; edb@anl.gov

A reusable material for recovering oil and other petroleum products from bodies of water, outperforming similar technologies currently on the market. Oleo Sponge can dramatically improve efforts to combat water contamination from oil and other petroleum products, thus mitigating environmental, economic and health impacts.

CuB Fuels*, National Renewable Energy Laboratory

Josh Schaidle; joshua.schaidle@nrel.gov

A proprietary catalyst technology that produces a high-octane synthetic gasoline blendstock from domestic carbon-based resources including natural gas, biomass, and bio-gas. CuB Fuels enables automotive manufacturers and oil refiners to improve fuel economy and meet regulatory mandates while increasing their gross profits.

CO2BOL*, Pacific Northwest National Laboratory

David Heldebrandt; david.heldebrant@pnnl.gov and Phillip Koech; phillip.koech@pnnl.gov

A solvent-based gas separation technology that removes toxic and corrosive gases such as CO₂ and H₂S out of industrial gas streams. The technology consists of drop-in solvents that use existing infrastructure, but require half the energy input for a given separation. The result is a lower cost, more efficient integrated emissions treatment system that is applicable to any industrial gas stream.

Nuclear/Industrial

4Cs, Idaho National Laboratory

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A wireless sensor/communication technology to enable automated monitoring of valve positions in nuclear power generating stations—work that is currently performed manually. INL's technology based on 4Cs (communication, connectivity, co-existence, and cybersecurity) is modular, vendor-agnostic, and appropriate for retrofits. This negates the need for labor-intensive valve re-qualification and allows easy integration with legacy nuclear power plant systems. The information obtained can be used for a variety of engineering, maintenance, and management applications, and the solution is extendable to other critical infrastructure industries such as oil & gas.

ELINA, Idaho National Laboratory

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A computer-based tool that simplifies the complex paper-based procedure process at nuclear facilities and ensures organizations can safely decrease operation and maintenance costs. ELINA (Electronic Instructions for Nuclear Applications) seeks to significantly reduce the more than 70% of nuclear incidents that result from incorrectly following procedures. INLs' computer-based procedure system visually guides workers through each step of a process, validating input and outcomes before moving on to the next step.

QUAKE*, Idaho National Laboratory

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A software package that optimizes the seismic design of critical infrastructure for both cost and safety. MASTODON is a risk-based design optimization software for critical infrastructure such as dams, bridges and power plants, that uses comprehensive and cutting edge seismic risk assessment methods to remove excessive conservatism and effectively leverage innovative risk-mitigation technologies to create an optimal seismic design that is both cost-effective and safe.

Materials

AMAF*, *Idaho National Laboratory*

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An additive manufacturing technique that provides a direct route to fabrication of dense uranium silicide. AMAFT (Additive Manufacturing as an Alternative Fabrication Technique for Nuclear Fuel) uses a novel hybrid laser-engineered net shaping process to create a small localized melt pool from multiple powder sources, forming a pellet with the required microstructure and chemical properties. This process provides the unique capability to use multiple raw material sources.

FAST, *Pacific Northwest National Laboratory*

Piyush Upadhyay; piyush.upadhyay@pnnl.gov

A technique to form continuous linear and curved joints between two dissimilar materials. PNNL's friction stir assisted scribe technique (FAST) process is a breakthrough method that produces a continuous mechanical and/or chemical joint between significantly different materials, such as between polymers and metal or between aluminum and steel.

Re-Mag*, *Idaho National Laboratory*

Donna Baek; donna.baek@inl.gov

An advanced solvent extraction process that recovers high-value rare earth elements from computer hard drive and electric motor magnets. The Re-Mag process recovers >95% of the rare earth value at a processing cost of < \$3/Kg.

Nitrilica*, *National Renewable Energy Laboratory*

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A chemical processing technology that delivers cost advantaged, renewably-sourced acrylonitrile, the main ingredient in the synthesis of lightweight carbon fiber composites. The average carbon fiber manufacturer spends \$80M per year purchasing 50 ktons of this chemical from the petroleum market, while Nitrilica's process can deliver acrylonitrile to carbon fiber manufacturers with a yearly savings of \$30-40M over the conventional petrochemical route.

Solar

SwitchGlaze*, *National Renewable Energy Laboratory*

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A window coating that converts windows into "switchable" solar panels. The SwitchGlaze coating transforms from transparent to tinted when exposed to sunlight, while simultaneously generating electricity. The technology enables on-site generation and significantly reduces the cost of energy-efficient windows in markets that span residential skylights to skyscrapers and vehicles.

STARS*, *Pacific Northwest National Laboratory*

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An *R&D 100* award-winning reactor system that converts natural gas into syngas using a more efficient concentrated solar power design. The Solar Thermochemical Advanced Reactor System (STARS) enables natural gas power plants to use about 20 percent less fuel when the sun is shining, and enables power plant operators to simply bypass the system and burn natural gas directly at night. STARS offers nearly 70% solar-to-chemical energy conversion, a world record, and can produce other chemicals, such as methanol and hydrogen.

* Energy I-Corps alumni

For more info on the teams or the Energy I-Corps program,
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