

SCALEUP 2021

Seeding Critical Advances for Leading Energy technologies with Untapped Potential 2021

PROJECT DESCRIPTIONS

IMAGEN ENERGY – Wauwatosa, WI

CHARGED: Commercialization of Highly Accelerated Reliable Grid-Networked Energy Delivery - \$12,000,000

Imagen Energy will use software- and network-enabled smart charging solutions to scale up and pilot deployment of high-power density, efficient, cost-effective, and convenient U.S.-manufactured electric vehicle (EV) charging equipment. This project will remove barriers to EV charging and infrastructure investment by providing products to improve space utilization, reduce installation costs, and provide a foundation for the DC fast charging demands of the future, thereby accelerating EV adoption. The project will also employ planning and infrastructure management to (1) improve decisions on charger locations, including increased deployment in underserved communities; (2) optimize EV charging with grid capacity; (3) increase charging and network security and reliability; and (4) support solutions for EV drivers to find convenient and affordable charging outlets.

QUIDNET ENERGY – Houston, TX

Catalyzing Commercialization of
Geomechanical Pumped Storage -
\$10,000,000

Quidnet Energy will scale its Geomechanical Pumped Storage (GPS) to a 1 MW/10 MWh commercial system, under a 15-year capacity tolling agreement at CPS Energy, the largest U.S. municipal utility. GPS uses the earth as a mechanical battery by storing energy as pressurized water in a storage lens between layers of rock in the subsurface. The key technology

component—the storage lens—has been successfully demonstrated using different geologies across the U.S. Quidnet will advance GPS from its current pilot scale to commercially relevant MW-scale systems by increasing the size of the storage lens, improving lens sealing, and commissioning the first grid-connected system. The objective is 50-75% lower cost long-duration (10+ hours) energy storage to enable more reliable and cost-effective utilization of renewable electricity generating assets.

NIRON MAGNETICS – Minneapolis, MN

Pilot Production for Commercial Sampling of Rare-Earth-Free Iron Nitride Permanent Magnets – \$17,500,000

Niron Magnetics is commercializing the first powerful permanent magnet free of critical materials. Currently, rare earth permanent magnets are expensive. The required rare earth materials are difficult to source because of projected supply shortfalls and geopolitical risk and are environmentally damaging through their extraction and processing. Powerful permanent magnets are essential for clean technologies, including those used by electric vehicle traction motors, wind generators, efficient industrial motors, and more. Niron's Iron Nitride-based Clean Earth Magnet® is made from abundant commodity raw materials, enabling a less expensive, domestically manufacturable solution for the clean economy with minimum supply chain risk and a significantly reduced environmental footprint. SCALEUP will enable the next stage of Clean Earth Magnet® production, charting the path to full-scale U.S. production and supply chain security of rare earth-free magnets equivalent to 167% of the White House's 2030 electric vehicle goal or 103% of its 2030 offshore wind goal.

COREPOWER MAGNETICS – Pittsburgh,

PA

Scaled In-Line Processing Facility for Permeability Engineered Nanocrystalline Magnetics - \$5,000,000

CorePower Magnetics will commercialize new inductors, transformers, and motors based on proprietary magnetic core technology that can reduce their size and weight and improve efficiency. This will dramatically improve electric vehicle (EV) performance. EVs need more efficient, power-dense magnetic components to increase range, charge faster, and decrease reliance on rare earth elements. CorePower will establish the first scaled domestic manufacturing of high-power density magnetic components based on permeability engineered soft magnetics. The technology is based on a combination of new nanocrystalline alloys, high-temperature processing, and advanced computation design techniques. At the project's culmination, a new manufacturing facility will be commissioned with the objective of testing and standardizing five inductor and transformer product classes.

INVENTWOOD – College Park, MD

Carbon Sequestration and Climate Resiliency Via Super Wood - \$20,000,000

InventWood will contribute to the decarbonization of buildings and enable them to store significantly greater amounts of carbon by scaling up a game-changing wood material, MettleWood, that is 60% stronger than construction grade steel but 80% lighter, much less expensive, and far more sustainable. InventWood will (1) build a pilot production facility capable of producing 1 million square feet of MettleWood boards per year, (2) optimize MettleWood's physical properties and quantify its carbon impact for its first application as exterior cladding, and (3) complete all necessary commercialization activities for a successful product launch. MettleWood offers numerous possibilities for deployment in the built environment including as a replacement for structural beams, columns, and connections that could ultimately result in reductions of 37.2 gigatons of greenhouse gas emissions over 30 years. It represents one of the few technologies with

the potential to reduce steel and cement consumption and their associated carbon footprints.

AMPAIRE – Hawthorne, CA

Hybrid Electric Aircraft Technology Platform - \$9,000,000

Ampaire will develop an aircraft integration with hybrid electric powertrain subsystems that can be commercially certified and used by a portfolio of aircraft product applications. Under ARPA-E's CIRCUITS program, Ampaire developed a prototype hybrid electric flying testbed built upon Ampaire's existing electric EEL concept aircraft. The flying testbed improved the functionality of the aircraft and provided a real-world flight test environment for other CIRCUITS technologies. The next critical step in commercializing electrified propulsion technologies requires a significantly more robust development and testing program leading to commercial certification. The result will be practical electrified aircraft commercialization that saves 50% on fuel and emissions (up to 90% emissions reduction with sustainable aviation fuel), and 25% on operating costs.

KENT HOUSTON OFFSHORE ENGINEERING – Houston, TX

Passively Controlled Floating Wind Platforms for Low-Cost Energy - \$17,500,000

Kent Houston Offshore Engineering will advance two disruptive floating offshore wind turbine technologies, integrated with NASA-developed passive control systems to mitigate platform dynamics. These are suitable for water depths beyond which fixed-bottom platforms can operate. This enables access to U.S. deep water wind resources. The team will carry out robust, multi-objective front-end engineering design and model testing. Performance results of Kent Houston's current designs indicate potential for cost reduction through lower fabrication cost; reduced design loads; and lighter, more-efficient, optimized, and cost-effective integrated units, which should result in significantly lower levelized cost of electricity and ultimately profitable floating offshore wind farms.

VIA SEPARATIONS – Watertown, MA

DISPLACER: Deploying Industrial Separation Processes Leading to Accelerated Climate Emissions Reductions - \$9,750,000

Via Separations' DISPLACER system is the first successful implementation of membranes capable of separating out and withstanding harsh black liquor, a byproduct of the papermaking process, while achieving the molecular selectivity required of the process. Current separations in industrial manufacturing processes use energy-wasting thermal technologies across thousands of processes to produce goods, including paper, plastic, and fertilizer. Transitioning to non-thermal membrane technology offers savings of up to 90% of energy costs and emissions reductions of up to 3 gigatons of CO₂ annually. After four successful pilot trials across the U.S., Via's first scaled-up commercial installation will showcase tangible energy reductions of >81% and capacity increases of up to 10% for its customers. The innovative membrane modules can be readily applied to a wide variety of pulp and paper facilities initially while adapting the technology for broader use in industries such as food and beverage production, chemical manufacturing, and petroleum refining.