SCALEUP—Seeding Critical Advances for Leading Energy technologies with Untapped Potential

PROJECT DESCRIPTIONS

24M Technologies, Inc. – Cambridge, MA

Next-Generation Lithium Metal Anode Cells for Electric Aviation - $9,000,000

Over the last decade, the cost of lithium-ion (Li-ion) energy storage systems has fallen while energy density has improved steadily. The current generation of Li-ion batteries is approaching performance and cost plateaus, however, just as new electrified transportation applications are emerging. The 24M team will develop and scale up batteries incorporating a Lithium Electrode Sub-Assembly and SemiSolid cathode that deliver lower cost energy storage (<70 $/kWh), superior power (>1.5 kW/kg), and improved energy density (450 Wh/kg) for electric aviation. The 24M Technologies team will develop and scale up a commercial, modular large-pilot line (1 MWh/y) for customer validation with a clear path to GWh/y production capacity of new Li metal-based batteries.

Cambridge Electronics, Inc. – Cambridge, MA

8" 3DGaN FinFET Technology for Energy Efficient Data Centers and 5G Network - $4,320,000

Cambridge Electronics Inc. (CEI) has developed a disruptive 3D gallium nitride (GaN) technology with far greater capabilities than today's planar GaN transistors. CEI aims to create an ecosystem around the 3DGaN technology by transferring it to a US-based 8" silicon wafer manufacturing plant and partnering with epitaxial wafer vendors, foundries, and semiconductor chip and module manufacturers for collaborative product development. The success of the proposed project will have a broad impact in improving energy efficiency, reducing greenhouse gas emissions, and creating high-tech jobs in the U.S. energy efficiency and green energy industries.

Sila Nanotechnologies – Alameda, CA

Scale-up Technology for Accelerated Adoption of High-Capacity Silicon Anodes in Mass Market Electric Vehicles- $10,000,000

With prior ARPA-E support, Sila developed a unique drop-in replacement silicon (Si) dominant composite anode powder that boosts automotive lithium-ion battery (LIB) energy density by 20%+ and enables fast charging. Sila has built a pilot production line, operating 24/7 for the last 2 years, and is commissioning its first factory (50 MWh) to introduce its Si anodes in wearables and portable electronic devices as well as for qualification electric vehicles. As part of SCALEUP, Sila aims to develop a portfolio of technologies focused ON advanced reactor designs with more efficient material processing, on-line diagnostics, improved precursor utilization, and improved material handling. This proposed project will significantly (1) reduce Si anode costs; (2) improve efficiency and reduce waste in production; (3) reduce engineering and cost risks; and (4) reduce EV battery costs and accelerate the move to clean transportation and renewable energy.

Switched Source LLC – Vestal, NY

Scaling Up Cost-Effective Grid Modernization – $8,560,000

Switched Source is introducing the next generation of distribution automation technology for large commercial and industrial customers and electric utilities, which cost-effectively improves the electric distribution grid's reliability, resiliency, and distributed generation hosting capacity. Switched Source's product portfolio consists of two patented smart grid devices that actively manage real and reactive power flows on medium voltage systems. The critical next step to gain acceptance as a viable investment and validated utility technology is through structured demonstration projects on partner utility electric distribution systems, with third-party performance evaluations. SCALEUP will enable Switched Source to resolve remaining technology and commercial adoption risks by establishing the processes, infrastructure, and technology validation to bring a game-changing ARPA-E technology to the utility market.

LongPath Technologies Inc. – Boulder, CO

Basin-SCAN: Basin Scale Continuous oil and gas emissions Abatement Network –$5,000,000

LongPath Technologies proposes the largest continuous emissions monitoring network for the oil and gas industry. The network will be able to locate and size natural gas emissions in real time across 700 square miles of the Permian basin in the Southwest U.S. Project objectives include scaling up a network to cover 850+ oil and gas facilities, reducing system costs, expanding value-added services on the sensor platform, and quantitatively proving net gains of continuous monitoring. Potential impacts include reducing oil and gas production emissions by 60-80% basin wide.

AutoGrid Systems, Inc. – Redwood City, CA

Highly Scalable Virtual Power Plant (VPP) PLATFORM for Mass Storage and EV Deployments - $2,250,000

AutoGrid's Flex™ is an energy flexibility management and virtual power plant software platform that enables utilities and energy-as-a-service providers to aggregate and optimize distributed energy resources. Flex™ allows its customers to maximize monetization of value streams, such as time-of-use arbitrage (purchasing and storing energy when the cost of electricity is low and selling or using stored energy when the cost is high) demand charge (charges determined during peak demand) management, and grid services. This project proposes to significantly increase Flex™ capabilities by co-optimizing, in real time, the number of storage assets to 100,000 and expanding its features and functionality for the electric vehicle fleet management use case.

SkyCool Systems, Inc. – Mountain View, CA

Saving Energy in Commercial and Industrial Refrigeration Systems Using Radiative Sky Cooling - $3,500,000

SkyCool Systems has developed a rooftop radiative cooling panel that improves the efficiency of air conditioning and refrigeration systems by as much as 40%. The panels cool without evaporating water and require only electricity to run a small circulation pump. The radiative cooling effect from SkyCool's panels occurs all day and night, which aligns with the 24/7 operation of refrigeration systems in supermarkets and cold storage facilities. With support from the ARPA-E SCALEUP award, SkyCool aims to scale the manufacturing of its panels; train HVAC/refrigeration and energy service company partners to install/maintain panel arrays; and deploy panel arrays as efficiency add-on to existing cooling systems. SkyCool will validate the cooling panel performance, and energy savings with key supermarket and cold storage facility operators.

SCALEUP "Fast Track"

Natron Energy – Santa Clara, CA

Domestic Manufacturing of Sodium-Ion Batteries - $19,883,951

The project aims to scale up production of Natron Energy's (Natron) Prussian blue electrode sodium-ion batteries by 30x to 18,000 trays per year, and fully de-risk the resulting supply chain and products through continuous production and sales for six months. The primary product is an 8-kilowatt, 50-volt battery tray for use in data centers to manage peak compute load and provide critical backup power. Natron's tray provides data center operators up to 2x higher power density and 10x longer cycle life than existing products, along with superior safety performance. To build the supply chain, Natron and its partners will adapt industry-standard chemicals synthesis and battery manufacturing equipment and processes to produce Natron's cells and battery systems for data center applications. The project will also position Natron's Prussian blue electrode sodium-ion batteries for emerging applications, such as electric vehicle fast charging and dispatchable storage for grid power.

Bridger Photonics, Inc. – Bozeman, MT

Scaling Disruptive Methane Leak Detection and Quantification- $4,572,000

Bridger Photonics, Inc. (Bridger) developed the next generation of methane leak detection and quantification, Gas Mapping LiDAR™ (GML). This innovative technology scans oil and gas infrastructure to detect and quantify leak magnitude using an aerial platform eliminating the need for costly conventional ground-crew site visits. To scale and expand GML operations, Bridger proposes to (1) fully automate job planning, data processing and management tools, (2) finalize second-generation hardware designs with improved sensitivity and accuracy and scale manufacturing, (3) advance predictive algorithm capabilities, and (4) integrate into customer operations. The project will dramatically improve oil and gas operational efficiency for leak detection and emissions tracking, reduce greenhouse gas emissions, and secure U.S. technological leadership in emissions detection and quantification.