



DESTINATION STARTUP

OTORO Energy

One-Sentence Summary of What You Do: OTORO Energy manufactures megawatt scale energy storage systems to support the electric grid and infrastructure with safe, patented battery materials.

Affiliated Institution: University of Colorado Boulder

Have you formed a company yet? Yes

Funding/Financing: Grant Funding, Direct/Indirect University Support, Angel Funding (including Self or Friends/Family)

Please describe your company and the problem you are trying to solve: Long-duration energy storage is critical for improving grid stability and reliability as well as increasing the share of intermittent renewables. Current battery technologies including lithium-ion batteries require expensive and geographically limited resources such as lithium, nickel, and cobalt.

Over the last five years, Prof. Marshak's team at CU-Boulder developed a new type of battery chemistry—one that uses earth abundant and inexpensive chromium and iron. Based on transparent, peer-reviewed, and externally validated chemistry, this is a fundamentally new battery system that has been rigorously cycle-tested and projected to achieve a 20+ year system lifetime. Moreover, the batteries use materials sourced from the steel industry that can be sourced and manufactured domestically. The system uses non-toxic water-based liquids, making the system nonflammable and non-corrosive, enabling the batteries to be placed next to customer demand.

With grant funding from ARPA-e, Prof. Marshak partnered with industry experts at Raytheon in 2020 for rapid development and system prototyping. Otoro Energy was founded with the goal of coordinating the manufacturing and scaleup of these prototypes. Otoro has obtained an exclusive licensing option from CU Boulder for Prof. Marshak's patented battery chemistry and has developed a battery production plan that leverages domestic chemical manufacturing infrastructure to enable a high-speed and flexible process to system scale-up.

What is/was your go-to-market strategy? The market for energy storage has been projected to approach \$426bn in annual revenue by 2030 (UBS) and \$546bn by 2035 (Lux Research). The US Dept. of Energy predicts the largest markets for energy storage to be North America, China, and Europe. Otoro's patent-pending battery technology has been filed internationally across 6 continents.



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Otoro will manufacture megawatt-scale battery systems that support 10–100 hour storage durations for less than half the cost of lithium batteries. Otoro currently is leading a scale up manufacturing program with partners at Raytheon to demonstrate a multi kilowatt grid-connected system prototype, which will enable customer engagement and serve as the basis for our product.

Our commercialization strategy focuses first on supporting critical infrastructure including military microgrids, hospitals, and data centers. Otoro's non-flammable materials provide a critical safety advantage over lithium-based technologies in these markets. As our battery manufacturing capacity grows, Otoro will be positioned to engage with utilities and larger-scale customers.

How will/do you generate revenue? The increasing frequency of grid interruptions and carbon-neutral commitments from businesses is driving enormous interest and investment in energy storage systems. Otoro will generate revenue by selling energy storage systems to customers requiring safe and reliable power from renewable sources.

The US government has committed to aggressive greenhouse gas emissions targets and recently announced a "Long Duration Storage Energy Earthshot," driving increased government support towards battery technologies like Otoro's that can be manufactured domestically. In fact, the Department of Energy just announced the funding of Otoro Energy at \$4.14m to support our battery manufacturing efforts. These tailwinds should provide a favorable environment for Otoro's manufacturing, demonstration, and commercialization plans.

How will this showcase benefit your company or technology? OTORO is seeking \$25 million in Series A equity funding to grow our team and accelerate our system manufacturing and commercialization plans. In addition, we expect this showcase to expand awareness of our battery technology and facilitate customer engagement.

Who are the members of your team, and why is this the right team to get the job done?

- Prof. Michael Marshak, Founder & CEO, leads business and technical development. Michael developed the battery technology at CU-Boulder. Prior to his faculty appointment in 2015, he worked in energy storage at Harvard University and MIT, where he received his PhD in chemistry.
- Dr. John Walzer, Director of manufacturing, leads scale-up manufacturing R&D. Prior to working for Otoro, John has led several successful projects scaling chemistry from bench to pilot scale and has over two decades experience working in geographically disparate, multidisciplinary teams across two or more organizations.
- Dr. Richard Fisher, Director of business development, leads business and commercialization strategy. Richard brings over 20 years of technology commercialization to OTORO in markets ranging from pharmaceuticals to chemicals and energy.
- While looking to grow our business and technical teams, Otoro continues to work closely with our partners at Raytheon Technologies, who have decades of experience in energy storage and battery system development.



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