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IDEAS + PRODUCTS + PROFITS

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Akron+ Canton+ Youngstown

WE HELP

COMPANIES ADVANCE IN ENERGY STORAGE PRODUCTS & TECHNOLOGIES

From research, to supply chain, to end-use application, Northeast Ohio is an ideal location for companies focused on advancing energy storage products & technologies.

ROBUST SUPPLY CHAIN

From core to enabling technologies as well as testing and evaluation, Northeast Ohio provides a wide range of assets within energy storage. A roadmap study revealed the extent of technologies, from lead acid and lithium ion batteries to energy storage systems and control solutions that are prevalent and strong in the region.

Corporations including the following are engaging in activities serving to advance the industry as well:

ABB provides turnkey energy storage systems that are ready for connection to medium- or high-voltage grids and cover a power range from hundreds of kilowatts (kW) to tens of megawatts (MW). The optimized systems enable fast response times to variations in demand and supply, helping to maintain grid stability and ensuring reliable and high-quality energy supplies through a range of applications.

Rockwell Automation provides comprehensive control solutions for energy storage systems, from balance of plant through power conversion, and a complete suite of connected services that deliver secure site and cloud-based monitoring and control solutions.

Parker Hannifin Corporation manufactures energy storage systems to support a variety of power utility applications to improve power reliability and availability, and reduce consumption and dependence on fossil fuels when used in microgrids.

Beckett Energy Systems manufactures lithium-ion battery solutions for a broad array of applications. Utilizing Beckett's standard 24Vdc lithium-ion battery module as a building block together with their proprietary battery management system, you can create advanced battery solutions from 24Vdc to 500Vdc and 1kW to 100kWh of capacity.

GrafTech International offers innovative graphite material solutions in industries including advanced energy applications and latest-generation electronics.

The CSA Group understands the vital role batteries play, how they have evolved with technology over the past century, and the importance of thorough product evaluation. Their labs are equipped to execute a variety of critical tests,

including vibration and shock, crush, impact and nail penetration, fire exposure, short circuit and overcharge, and environmental, for all types of battery cells and battery packs.

The Eaton Corporation, with its global headquarters in Cleveland, offers energy storage solutions that include DC and AC switching and protection, bi-directional storage inverters, metering and monitoring, and grid tie inverters.

ELECTRIC UTILITY STRENGTH

Ohio is home to two of the largest electric utility companies in the U.S.:

FirstEnergy is one of the nation's largest investor-owned electric systems, serving over 6 million customers, and has more than 24,000 miles of transmission lines that connect the Midwest and Mid-Atlantic regions, and a diverse generating fleet with a total capacity of nearly 17,000 MW. FirstEnergy's *Energizing the Future* involves upgrading many of its existing transmission facilities with advanced equipment and technologies that will reinforce the power grid and help prevent or reduce the duration of customer outages.

American Electric Power is focused on building a smarter energy infrastructure and delivering new technologies and custom energy solutions to customers. They have the nation's largest electricity transmission system and more than 224,000 miles of distribution lines to efficiently deliver safe, reliable power to nearly 5.4 million regulated customers in 11 states. AEP also is one of the nation's largest electricity producers, with about 33,000 MW of diverse generating capacity, including 4,200 MW of renewable energy.

Both utility companies participate in **PowerForward**, the Public Utility Commission of Ohio's review of the latest in technological and regulatory innovation that could serve to enhance the consumer electricity experience. The goal is to help better frame the grid of the future.

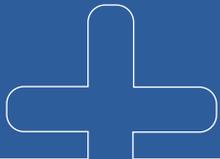
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ENERGY STORAGE

OHIO
is among the **top 5**
states for front-of-meter
energy storage
projects

Source: GTM Research



TARGETED FUNDING FOR TECHNOLOGY COMPANIES

JobsOhio Research & Development Grant is a \$50 million R&D grant program to extend the breadth and strength of Ohio R&D to spur innovation and job creation.

Ohio Third Frontier (OTF) is a \$2.1 billion initiative supporting new technology companies and fostering collaboration among industries, economic development agencies and universities to commercialize technology. OTF offers access to a network of resources providing capital, business expertise and mentorship.

JumpStart Entrepreneurial Network has helped nearly 1,000 early-stage entrepreneurs obtain \$1.7 billion in additional risk capital, generate more than \$1 billion in revenue and create more than 10,000 jobs. JumpStart also manages the OTF-supported NEO Entrepreneurial Services Program, a collaboration of 15 organizations supporting entrepreneurs' technology-based commercialization efforts.

ENTREPRENEURIAL ECOSYSTEM SUPPORT

Northeast Ohio is committed to maintaining and growing our thriving energy storage cluster. Here are just a few sources of entrepreneurial support our region offers:

NASA GLENN RESEARCH CENTER

Recognizing that small businesses are vital to the advancement of aerospace research and development, NASA Glenn Research Center supports these companies through financial programs designed to stimulate business development and innovation. In addition to contracting with many of these companies, NASA Glenn provides support through its Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, which fund small business research supporting NASA Glenn's core competencies, including energy storage and conversion.

OHIO AEROSPACE INSTITUTE (OAI)

Founded in 1989 to enhance the competitiveness of aerospace companies in the state, OAI is a nonprofit, joint initiative of the NASA Glenn Research Center, the Air Force Research Laboratory at Wright-Patterson Air Force Base, the state of Ohio, 10 Ohio public and private universities granting doctoral degrees in aerospace-related engineering disciplines, and numerous companies engaged in aerospace activities. OAI uses its network to provide education and training programs designed to build a strong aerospace workforce in Ohio and develop critical skills within its customer organizations. It also provides robust integrated solutions in energy conversion and storage, and a number of additional areas of technology.

NOVEMBER 2017

ENERGY STORAGE INNOVATION AND BUSINESS SECTOR CLUSTER

Team NEO, the region's economic development organization focused on creating jobs and helping businesses thrive in Northeast Ohio, supports the energy storage supply chain – from large corporations to key supply chain partners, including smaller, early-stage and growth-oriented companies – by facilitating cluster-building project teams, conducting knowledge-building events and tools, and providing member-customized growth services. Today, 100+ participants represent 40+ organizations in the grid, transportation and aerospace areas. Leading participants include FirstEnergy, Johnson Controls, Rockwell Automation, ABB, Parker Hannifin, The CSA Group, Beckett Energy, and Harris Battery, as well as institutions such as Case Western Reserve University, Ohio State University, NASA Glenn, the Ohio Aerospace Institute and the Ohio Federal Research Network.

MAGNET (Manufacturing Advocacy & Growth Network)

is a nonprofit organization dedicated to helping manufacturers grow and compete in Northeast Ohio. As part of the Ohio Manufacturing Extension Partnership (MEP), it also supports, educates and champions Northeast Ohio manufacturing.

RESEARCH INSTITUTIONS

Northeast Ohio's research community is supported by 26 universities and many other anchor research institutions, including Case Western Reserve University (CWRU), the University of Akron, Kent State University, Cleveland Clinic, University Hospitals and NASA Glenn Research Center.

One of the energy storage initiatives currently under way:

CWRU Institute for Smart, Secure and Connected Systems

The State of Ohio's Federal Research Network (FRN) awarded Case Western Reserve University \$1.65 million over two years to research and develop energy storage resources for the defense and aerospace industries as part of a statewide strategy to stimulate economic development and jobs. The state investment, designed to encourage further funding from the federal government and industry, creates the Partnership for Research in Energy Storage and Integration for Defense and Space Exploration (PRESIDES) Center of Excellence, a new consortium with other Ohio universities and industry partners that is now part of Case Western Reserve's Great Lakes Energy Institute.

Energy Storage companies
choose **Cleveland Plus**.
From ideas to products to
profits, **we make things here**.
We make things happen.

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Ideas + Products + Profits

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