

2010–2011 CAIR ANNUAL REPORT ON THE NEW YORK BATTERY AND ENERGY STORAGE TECHNOLOGY CONSORTIUM



Program Period March 31, 2011
Final Report



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EXECUTIVE SUMMARY

The New York Battery and Energy Storage Technology Consortium™ (NY-BEST) was announced in 2009 to help position New York as a global leader in energy storage technology for heavy-duty transportation, electric grid, and other applications. NYSERDA was charged with working with industry, academic and government partners to establish this industry-driven Consortium, which is being seeded by NYSERDA with approximately \$25 million through Clean Air Interstate Rule proceeds. The Consortium was incorporated by the NY-BEST Board of Directors in January 2010 as a New York State not-for-profit corporation. This annual report is prepared pursuant to the NY-BEST Program Plan, approved by the NYSERDA Board of Directors in 2009, and provides an update on NY-BEST progress, expenditures, and metrics for the year ending March 31, 2011.

NY-BEST has three primary strategies to build the battery and energy storage industry in New York State. These include supporting networking and technology transfer among the members; providing members with access to testing, characterization, and prototyping capabilities to improve the commercialization of energy storage solutions; and supporting research and development to develop new storage technologies. In turn, these activities will help to expand the energy storage industry in New York State, create economic growth and jobs, and reduce emissions through electrified transportation and grid storage solutions. Program benefits span the stages of research and development, product development, and commercialization. Metrics used to assess the success of NY-BEST are included within each of the following sections.

NY-BEST has grown to 78 members including emerging and established companies, research institutions, and end users (a list of consortium members can be found in Appendices B and C). In 2010, the NY-BEST Board conducted a competitive solicitation to select an Executive Director and an entity to provide operational support to the consortium. In December 2010, Dr. William Acker was selected by the Board to serve as Executive Director of NY-BEST. Dr. Acker is a serial entrepreneur who has been instrumental in the founding of several successful energy-related

businesses. Capitol Hill Management Services was selected to provide operational support to the consortium.

In March 2011, the second annual NY-BEST Meeting and Conference was held in Troy, New York, and attended by 150 members and guests. Featured speakers included Arun Majumdar, Undersecretary of the Department of Energy and Director of the Advanced Research Projects Agency—Energy (ARPA-E), and Frank Murray, President and CEO of NYSERDA, along with two dozen energy storage leaders. Sessions included research and development updates as well as discussions regarding market requirements and opportunities in grid storage and transportation. In a post-conference survey, 91% of respondents rated the conference as very good or exceptional, 86% indicated that networking at the conference resulted in specific contacts that had the potential to develop into commercialization or business partners in the future, and 95% indicated they were likely to attend the conference next year.

Currently, eighteen NY-BEST research and development projects are underway comprising \$15.2 million, with \$7.9 million in cost sharing provided by NY-BEST CAIR funding from NYSERDA. These include 16 seed projects that are identifying whether a technology holds promise for further development and two larger product development opportunities led by GE and Ultralife. These research projects are helping to support 132 engineering, product development, and research staff over the next one to four years and training 18 graduate and undergraduate students.¹

An advisory committee to the NY-BEST Board is also helping to develop the process for identifying needed testing, characterization and prototyping capabilities; recommending usage policies; and beginning to identify equipment that should be considered for purchase. One area the committee has identified as a key opportunity for NY-BEST and New York State is in electric grid-scale storage.

KEY ACTIVITIES DURING 2011-12 WILL INCLUDE:

- Developing a strategic business plan for NY-BEST that outlines the value proposition and goals that will lead to a self-sustaining, thriving consortium.

- Developing and issuing a research and development solicitation, anticipated in fall 2011, based on input from a NY-BEST Research Advisory Committee.
- Identifying, and beginning to procure, specific testing, characterization and prototyping capabilities that are needed by the NY-BEST membership and significantly leveraging budgeted NY-BEST CAIR funds with federal and industry support.
- Continuing to develop partnerships with local, state, and national organizations to leverage NYSERDA's investment and accelerate growth in this critical sector.
- Increasing interaction between NY-BEST members to increase product development and commercialization partnerships, and access to customers.
- Continuing to work with the New York State Smart Grid Consortium, industry, the research community, and government partners to develop a comprehensive application under a potential Energy Storage Innovation Hub that could be released by the U.S. Department of Energy this year, providing \$125 million in federal funds.

INTRODUCTION

NY-BEST was announced in 2009, and incorporated in 2010, to leverage and coordinate New York's significant energy storage innovation resources and help position the State as a global leader in energy storage solutions. Energy storage is a critical enabling technology that will be instrumental in helping to achieve energy independence, facilitating increased use of variable output renewable energy such as solar and wind, and reducing greenhouse gases. NYSERDA was charged with working with industry, academic and government partners to help establish the consortium.

In 2009, a [Program Plan](#) was developed with stakeholder input, and approved by the NYSERDA Board of Directors, outlining the consortium's priorities and budget. In total, approximately \$25 million of Clean Air Interstate Rule (CAIR) funds were committed by NYSERDA to help establish NY-BEST and enable the consortium to become a self-sustaining, membership driven organization. This annual report is prepared pursuant to that Program Plan and provides an update on NY-BEST progress, expenditures, and metrics for the year ending March 31, 2011.

"NY-BEST is a great vehicle for bringing together the best of New York talent and technology to build energy storage solutions for the future. NY-BEST has helped GE build critical alliances for advancing our sodium-metal halide battery technology and has helped foster connections with potential customers."

—Glen Merfeld, General Electric

Funding to help establish NY-BEST was provided from New York's proceeds from CAIR allowances, which are regulated by 6 NYCRR Parts 243 and 244. These regulations established seasonal and annual emissions cap-and-trade programs designed to mitigate interstate transport of ozone and fine particulate pollution, commonly referred to as smog. Ten percent of the nitrogen oxide (NOx) emission allowances allocated to New York was directed by the New York State Department of Environmental Conservation to the Energy Efficiency and Renewable Energy Technology Account, for which NYSERDA is the administrator. This amounted to 23,013 NOx allowances. Through a competitive solicitation, an emissions broker was selected to assist in the sale of these allowances, which occurred during the previous year's annual report. NYSERDA sold all allowances for total gross revenues of \$24,441,850. Details related to specific NOx sales were included in the [2009–10 CAIR Annual Report](#). No additional NOx allowances were sold or made available to NYSERDA during 2010–11.

Energy storage is a critical enabling technology in the reduction of NOx and other greenhouse gases in two key areas. First, electrified transportation reduces fossil fuel use and emissions, even in cases where the electricity is generated by fossil fuel powered plants because of their increased efficiency compared to burning the fuels in internal combustion engines. Second, energy storage will allow for increased integration of renewable energy sources into the electric grid and storage of excess power produced off-peak for use during periods of peak demand. In particular, storage can help alleviate the need for ramping up fossil fuel-powered electric generating stations to meet periods of peak electric demand.

NY-BEST has three primary strategies to build the battery and energy storage industry in New York State: networking and technology transfer; providing access to testing, characterization, and prototyping capabilities; and supporting research and development to develop and commercialize new energy storage technologies. Each of these strategies is described in greater detail below.

FINANCIAL INFORMATION

Financial data for the program through March 31, 2011 is presented in Table 1. Of the total available funding for NY-BEST, \$13.6 million has been committed.

PROGRAM ACTIVITIES AND BENEFITS

NY-BEST's primary objective is to help build a vibrant energy storage sector in New York State. This involves support along various stages of the product development pipeline such as research and development, prototyping, manufacturing, and systems integration. Specifically, NY-BEST will help to accelerate commercial introduction of energy storage technology in New York State, build the human capital and expertise needed to sustain a vibrant commercial energy storage industry, and leverage NYSERDA's seed resources to create a sustainable organization that provides value to its members and to New York State.

Program benefits related to product development include longer horizons associated with the timelines that cover research and development, introducing product to market, and product lifecycle. Principle activity for NY-BEST during 2010–11 focused on establishing the management team for a vibrant organization positioned to grow the energy storage industry in New York. Metrics used to assess the success of NY-BEST are included within each of the following sections. Data and indicators of

performance are included wherever possible. As the consortium expands during the next year, additional data will be included. Funds are also budgeted for two independent, external evaluations of the NY-BEST initiative. These evaluations are expected to occur after year three (2012–13) and again after year five (2014–15).

CONSORTIUM OPERATIONS

During the past year, a major operational milestone was reached when the NY-BEST Board hired a management and support team. A solicitation seeking an Executive Director and Operational Support Organization was developed by the NY-BEST Board of Directors, with input from NYSERDA, and released in July 2010. This solicitation was publicized through numerous electronic and print channels and through national associations and membership organizations. An informational session was also held by webinar and written questions were accepted and answered on the NY-BEST web site for all potential applicants to see. Proposals were reviewed by a non-conflicted review committee established by the Board and interviews were conducted with the leading applicants.

In December 2010, the Board selected Dr. William Acker to serve as Executive Director. Dr. Acker is a well known and highly-regarded scientist and entrepreneur in the energy field. Dr. Acker is a founder of MTI MicroFuel Cells, a leader in the design, development and implementation of direct methanol micro fuel cells where he served as the Company's CEO from its inception in 2001 until

Table 1. Available Funding and Financial Status through March 31, 2011

	Budgeted ¹	Committed ²
Consortium Operations and Management³	\$4,548,000	\$4,429,898
Research and Development Awards	13,055,000	7,889,470
Technology Transfer	500,000	0
Testing and Characterization Equipment	3,445,114	0
NYSERDA Administration⁴	1,711,000	1,208,336
Program Evaluation and Accountability	500,000	0
Brokerage Fees for NOx Allowance Sales	266,736	266,736
New York State Cost Recovery Fee⁵	416,000	43,017
Total	\$24,441,850	\$13,837,457

Source: NYSERDA

¹ The budget reflects the amounts included in the CAIR Program Plan and approved by the NYSERDA Board of Directors on April 27, 2009. At the time, total funding from allowance sales was unknown and three ranges were included. This budget reflects the pro-rated amounts based on allowance sales and has not changed since 2009–10.

² “Committed” includes funds already expended, encumbered, and contracts in negotiation.

³ A contract between NYSERDA and NY-BEST, Inc. comprises \$4,350,000 of this amount to support an Executive Director, operational support, and operating expenses of NY-BEST over approximately five years, as the consortium works toward self-sufficiency.

⁴ “NYSERDA Administration” relates to the development, implementation and administration of this initiative.

⁵ The New York State Cost Recovery Fee is a shared services fee assessed by the NYS Division of the Budget and billed to NYSERDA. This fee can vary from year to year and is allocated to all programs based on their proportional share of expenditures for the year. The fee increased in fiscal year 2010–2011 and, as a result, the Consortium Operations and Management budget has decreased proportionately.

May 2006. He is a Founder and Chairman of Taconic Energy, a developer of fuel additives to improve vehicle efficiency and of Optiwind Corp., a developer of accelerated wind turbines. Dr. Acker previously served as Vice President of Technology and product development at Plug Power, where he was instrumental in building Plug from a small research and development lab to a product development and manufacturing company. He has also held managerial and scientific positions at Texaco Fuel and Lubricants Technology. He is a co-founder of the New Energy New York consortium and serves on the advisory board for the Center for Future Energy Systems at Rensselaer Polytechnic Institute (RPI). He also serves on the advisory boards of Energy Rotors (Schenectady) and the Severino Center for Technological Entrepreneurship at RPI. Dr. Acker received a Ph.D. in Applied Physics and Engineering from Yale University and a B.S. in Physics from RPI.

In early 2011, Capitol Hill Management Services was selected by the Board of Directors to provide operational support for NY-BEST and office space for the consortium. Dr. Acker and his team will be responsible for establishing a strategic plan, building the membership base, supporting growth in the energy storage industry in New York State, and growing NY-BEST into a self-sustaining organization.

METRICS USED TO EVALUATE CONSORTIUM OPERATIONS:

1. Increase in number of members and retention of existing members
2. Progress toward reaching self-sufficiency
3. Technology transfer activities such as conferences, symposia, workshops, seminars, and publications
4. Commercialization success at specific companies or organizations including:
 - Outside funding received by consortium members and NY-BEST including federal funds, angel investments, and venture capital
 - Product sales and new products launched by consortium members
 - Licenses executed and licensing revenue at consortium members and NY-BEST
 - Cost savings such as research savings or avoided costs realized by consortium members as a result of their involvement with NY-BEST
 - Capital expenditures by consortium members to expand their facilities in New York State
 - Jobs created and retained at consortium members
 - Energy, economic, and environmental benefits, such as greenhouse gas reductions, through the incorporation of energy storage technologies into transportation, electric grid, and other applications

“States fight for resources and prestige. New York is home to world-class universities and research institutes as well as innovative companies both large and small whose core capabilities together encompass all elements necessary to lead advancements in energy and storage technologies. NY-BEST facilitates cooperation between these entities, empowering New York to become the nation’s cleantech epicenter.”

—Ellen Gooch, Director of Marketing,
Sendyne Corp

PROGRESS DURING THE PAST YEAR:

At this point, the consortium has a track record of only 15 months since it was legally incorporated and only three months since the Executive Director was hired. As the consortium builds momentum during the next few years, greater detail will be included in this section.

1. Increase in number of members and retention of existing members
 - Consortium membership grew 53% from 51 to 78 members between March 31, 2010 and March 31, 2011. No members have left the consortium. Appendix B shows a map of all New York State members and Appendix C lists all members of NY-BEST.
2. Progress toward reaching self-sufficiency
 - Revenues from the annual conference increased from \$900 in 2010 to \$20,000 in 2011.
 - In 2011, annual membership fees increased from the initial \$500 level to \$1,000, with larger levels for economic development partners. Startup companies will continue to pay \$500 to encourage broad participation from emerging companies. Over time, membership fees are expected to be commensurate with the value proposition offered.
3. Technology transfer activities
 - Annual Meeting and Conference: almost 150 attendees participated in the second annual NY-BEST Meeting and Conference held March 9–10, 2011 in Troy, New York. The two-day forum provided an opportunity for members and interested parties to learn about leading trends and innovations in the energy storage field and included featured speakers Arun Majumdar, Undersecretary of the Department of Energy and Director of ARPA-E, and Frank Murray, President and CEO of NYSERDA, along with two dozen energy storage leaders. Two sessions were held to update attendees on research and development projects supported under NY-BEST and NYSERDA, and

two market analysis and customer needs sessions were held for grid storage and transportation. All presentations were either video or audio recorded and are available on the NY-BEST website, www.ny-best.org. In a post conference survey, 91% rated the conference as very good or exceptional; 86% indicated networking at the conference resulted in specific contacts who might develop into business or commercialization partnerships in the future; and 95% indicated they were likely or definitely to attend the conference next year.

- Advanced Energy 2011 Conference, New York City: NY-BEST had a very successful presence at Advanced Energy 2010 in New York City on November 8-9, 2010. In addition to a booth, 23 NY-BEST members exhibited, seven panel sessions were held on battery and energy storage anchored by 12 NY-BEST members, and attendees were able to see a new fuel cell powered forklift from Raymond Corporation. NY-BEST organized the entire Energy Storage track of the conference, which was attended by over 1,100 participants.
 - The NY-BEST website, www.ny-best.org, continues to be updated with funding opportunities identified for members, market studies, industry news, and member profiles. A searchable database identifying testing and characterization capabilities is also included on this site for members. During 2011, the website is expected to be redesigned by the NY-BEST Executive Director and his team to add additional features and increase exposure.
 - The NY-BEST bi-weekly E-News distribution continued, which includes NY-BEST and member developments, energy storage announcements, and discoveries from New York and beyond. Potential research and procurement funding opportunities are also provided for members of NY-BEST. The e-news distribution increased 60% from 400 individuals in 2010 to 638 individuals as of March 31, 2011.
4. Commercialization Success at Specific Companies or Organizations:
- **Ioxus** (Oneonta) raised \$21 million in venture capital to expand production of its advanced ultracapacitors which are used in a range of applications from hand-held electronics to industrial and automotive needs. Ultracapacitors are electrical storage devices that can store high-density energy for fast release. Because the high power density allows for fast recharge and

bursts of power, ultracapacitors are an attractive application for cell phones, digital cameras, LED lighting, and for larger applications such as hybrid buses and cars, and integrating intermittent renewable energy sources into the electric grid. Ioxus also acquired AEC Systems (Schenectady), which specializes in energy conversion systems. Today, Ioxus has grown to 35 employees and expects to hire 30 to 50 new production and R&D employees in 2011. The company has received significant NYSERDA support and continues to develop its ultracapacitor solutions through NYSERDA and NY-BEST support.²

- **GE** (Schenectady) has begun recruiting machine operators for its new \$100 million battery plant and expects to have 50 employees on board by June 2011. The plant, which is under construction and on schedule to begin production at the end of November, will hire 130 employees by the end of 2011. GE ultimately plans to hire 350 workers for the Schenectady battery plant. The batteries will be used in GE's hybrid locomotives, in backup power systems for the telecommunications industry, and for other applications. A NY-BEST award will help GE develop the next generation of its sodium-metal halide batteries.³

Other announcements by members of NY-BEST included:

- The HybriDrive series propulsion system developed by **BAE Systems** (Johnson City) with NYSERDA support is currently enhancing the fuel efficiency and cutting emissions on more than 3,000 transit buses in cities around the world, including New York and London. To meet the needs of applications that have higher operating speeds and less frequent stops, BAE is now developing a new parallel hybrid propulsion system to bring these fuel-saving benefits to medium and heavy-duty trucks. BAE Systems is also supplying the military with hybrid electric drive systems for ground combat vehicles.⁴
- **Plug Power's** GenDrive® fuel cell units replace lead-acid batteries in material handling and industrial trucks for some of North America's largest distribution and manufacturing businesses. Over 1,000 units operate in the field and have accumulated over two million hours of runtime. During the past year, Plug Power received new orders for 543 of its GenDrive fuel cell units and manufactured and shipped 650 units. The company also added new customers including CVS, Coca-Cola, BMW, UNFI, WinCo, and Wegmans to its list of GenDrive users. Plug has received several NYSERDA awards.⁵

“Cerion is a materials science company with a focus on exploring novel nano-materials and developing them into globally transformative applications. Our partnership with NY-BEST has been immensely beneficial, helping us to identify contacts for resources to advance our science. NY-BEST contacts have enabled us to more rapidly test materials, develop a robust data set, provide credible assessment of our technology and ultimately has aided in accelerating the materials development cycle.”

—Bob Curtis, VP Operations, Cerion Enterprises

- **Electrovaya** is assembling its proprietary lithium-ion battery packs at NYSERDA’s Saratoga Technology + Energy Park in Malta, NY. During the past year, Chrysler showcased its Ram Truck plug-in hybrid electric vehicle equipped with a 12 kWh Li-Ion battery pack from Electrovaya, allowing up to 20 miles of driving on electricity only. The demonstration was initiated as part of the American Recovery and Reinvestment Act with NYSERDA support. Hero Motorcycles also announced that it plans to start selling electric scooters fitted with Electrovaya’s batteries in the Canadian market in 2011. Electrovaya also announced it was selected by a major U.S. utility to provide a 1.5MWh Lithium-Ion SuperPolymer System for grid storage.⁶
- **Bren-Tronics** (Long Island) was awarded a contract worth \$84.2 million to supply military batteries to the U.S. Army, Navy, Air Force, and Marine Corps⁷.
- **Ultralife Corporation** (Newark, Wayne County) was awarded over \$72 million in Defense contracts for energy storage solutions for the military. Ultralife ranked 11th on the most recent *Rochester Business Journal* list of manufacturers with 553 employees⁸. Two NYSERDA / NY-BEST awards are helping Ultralife to demonstrate grid-scale electric storage using its proprietary technology.
- **NewWorld Capital Group** (New York City) announced it expects to begin raising capital for its inaugural, green private equity fund in fall 2011.⁹
- **Ice Energy** (based in Colorado with manufacturing at Mercury Corporation in Hammondsport, NY) completed a \$24 million financing round. Their system stores energy at night during off-peak periods by freezing water in an insulated storage tank. During the day, the system works in conjunction with the HVAC system to relieve the compressor and reduce peak electric demand. During the past year, the company partnered with Carrier Corp. and Trane to deliver their hybrid storage solution for commercial customers. Ice Energy also announced an agreement with Southern California Public Power Authority to implement a 53 MW storage project involving thousands of Ice Bear systems to reduce peak electric demand by

as much as 64 GWh hours annually, enough energy to power 10,000 homes.¹⁰

FUTURE PLANS:

- One of the key activities during 2011-12 will be the Executive Director and Board’s development of a strategic plan for NY-BEST that outlines the value proposition and goals that will lead to a self-sustaining, thriving consortium. NY-BEST will also continue to develop partnerships with federal, State, and local organizations to leverage NYSERDA’s investment and accelerate growth in the energy storage sector in New York State. Finally, the consortium will increase interaction between members to increase product development and commercialization opportunities, and access to customers.

RESEARCH AND DEVELOPMENT

NYSERDA has a long history supporting development and demonstration of emerging energy storage technologies. NY-BEST CAIR funds are augmenting these efforts by providing resources to develop technologies that could have significant value added in New York State—and, in turn, create high-paying jobs. Eighteen research and development projects are underway comprising \$15.2 million, with \$7.9 million in cost sharing provided by NY-BEST through NYSERDA. These include 16 seed stage projects that are exploring whether the technologies hold promise for further investment and development, and two larger product development opportunities led by GE and Ultralife Corporation.

Industry-Led Commercialization Partnership Awards:

- General Electric Co. (Schenectady) is developing improvements to its sodium-metal halide batteries for use in heavy duty transportation applications, uninterruptible power backup systems, and grid applications such as smoothing intermittent renewable power generation as it interconnects with the grid. Partners on this project include Alfred University (Alfred), Clarkson University (Potsdam), Columbia University (New York City), and Stony Brook University (Long Island). NY-BEST CAIR funding: \$2.5 million
- Ultralife Corporation (Newark, NY—Wayne County) is integrating lithium-ion batteries and ultracapacitors with renewable energy sources to store electricity for the electric grid. This could enable increased renewable-energy contributions to the grid, provide backup electricity during power outages, and allow

peak shaving. Partners include Rensselaer Polytechnic Institute (Troy), Rochester Institute of Technology (Troy), Dayton T. Brown (Long Island), Electrical Power worX (Alfred), FSI Systems (Farmington), and Future Energy Development (Rochester). NY-BEST CAIR funding: \$2.3 million

Lithium-Ion Technology Development:

- Cerion Enterprises (Rochester) is developing innovative nanoparticle materials for next-generation lithium-ion batteries. NY-BEST CAIR funding: \$200,000
- Cornell University (Ithaca) is developing non-flammable battery electrolytes with improved safety, temperature and voltage performance. NY-BEST CAIR funding: \$200,000
- General Motors (Honeoye Falls—Monroe County) is evaluating new materials for improved lithium-ion battery electrodes for automotive applications to increase performance and reduce cost. NY-BEST CAIR funding: \$196,090
- Rensselaer Polytechnic Institute (Troy) is developing next-generation lithium-ion rechargeable batteries featuring nano-engineered electrodes that can enable greater power and energy density and reduce cost. NY-BEST CAIR funding: \$200,000

Other Battery Chemistries:

- Binghamton University is pursuing a lithium air energy storage system that could develop low cost storage for electric vehicles and the electric grid. NY-BEST CAIR funding: \$200,000
- Brookhaven National Laboratory (Long Island), Binghamton University, and University at Buffalo are partnering on three projects to develop improved batteries for stationary grid scale storage applications including lithium-air, lithium-ion, and lithium-titanate batteries. These solutions could help increase renewable integration into the electric grid and reduce the need for additional fossil-fuel powered plants to meet electric demand. NY-BEST CAIR funding: \$552,890
- City University of New York with Dayton T. Brown (Long Island) is developing a nickel-zinc flow battery that could result in less expensive hybrid vehicles. NY-BEST CAIR funding: \$200,000
- Hollingsworth & Vose, Co. (Easton—Washington County) is developing an advanced separator for more efficient valve-regulated lead-acid batteries, which are used in hybrid vehicles and uninterruptible power supply backup systems. NY-BEST CAIR funding: \$200,000

“As an institution that considers the nation’s energy security a key part of our mission, Brookhaven National Laboratory sees strategic value in being a member of NY-BEST. This outstanding consortium brings together all the key New York stakeholders in energy storage and allows Brookhaven a venue where our facilities and expertise can help accelerate the deployment of novel energy storage discoveries. The consortium also provides a unique opportunity to charter a vision for the future in this key sector of the energy challenge and therefore helps to guide our internal strategy in energy storage.”

—James A. Misewich, Ph.D.,
Associate Laboratory Director for Basic Energy
Sciences, Brookhaven National Laboratory

Ultracapacitors:

- Ioxus (Oneonta), under two projects (one with IBM and the other with CUNY) is exploring new enhancements to its ultracapacitors by developing a novel electrode-electrolyte interface. Instead of storing energy electrochemically as in a battery, ultracapacitors store energy in an electric field and are excellent choices for high power, fast discharge applications. They also can withstand tens of thousands of complete charge/discharge cycles. NY-BEST CAIR funding: \$400,000
- College of Nanoscale Science and Engineering at the University at Albany is developing new electrolytes to improve performance of ultracapacitors. NY-BEST CAIR funding: \$200,000

Diagnostics and Reuse:

- Impact Technologies (Rochester) is developing a novel method to increase the lifetime of batteries by assessing battery health through use of in-cell measurement techniques. NY-BEST funding: \$99,766
- Rochester Institute of Technology is developing methods that can help to recycle and reuse lithium-ion batteries to minimize landfill waste and maximize reclamation. NY-BEST CAIR funding: \$195,869

METRICS USED TO EVALUATE RESEARCH AND DEVELOPMENT AWARDS:

1. Publications resulting from research and development awards
2. Presentations at technical and business conferences
3. Invention disclosures and patents
4. Licensing agreements executed and licensing revenue
5. Additional research funding received
6. Research and development jobs supported

“We have found involvement in NY-BEST to be a very efficient way to become aware of and develop fruitful connections with a wide variety of companies with energy storage capability in New York State.”

—Dr. Mark Mathias, R&D Director,
Electrochemical Energy Research, General Motors

7. Recognition awards to NY-BEST members or affiliated researchers
8. Significant research accomplishments

PROGRESS DURING THE PAST YEAR:

The majority of these projects are in the initial stages. None have reached their first anniversary at which time annual metrics reports will begin to be collected. Initial benefits that have accrued are reflected below. Additional data will be included in future annual reports.

1. Publications resulting from research and development awards
 - This metric is not yet applicable. Data will be provided in subsequent years.
2. Presentations at technical and business conferences
 - 14 of the NY-BEST Research and Development Projects were presented at the NY-BEST Annual Meeting and Conference in March 2011.
3. Invention disclosures and patents
 - This metric is not yet applicable. Data will be provided in subsequent years.
4. Licensing agreements executed and licensing revenue
 - This metric is not yet applicable aside from licenses between universities and their specific industry partners. Data will be provided in subsequent years.
5. Additional research funding received
 - **The City University of New York’s Energy Institute** received two awards totaling \$4.6 million from ARPA-E. The first award comprising \$1.6 million will allow CUNY to work in partnership with **Ultralife Corporation** (Wayne County) to develop low-cost grid-scale storage using a flow-assisted rechargeable zinc-manganese oxide battery. The goal is a rechargeable battery system that lasts ten years and costs under \$100 per kWh.¹¹ At this level, widespread adoption of grid-scale energy storage would be possible. The second project will develop metacapacitors with increased storage capability for use with the electric grid, working in partnership with **Columbia University** (New York City). NY-BEST and NYSERDA research funding helped to leverage this funding by demonstrating

in the ARPA-E proposal that these technologies had successfully been peer-reviewed and funded.

- **Rensselaer Polytechnic Institute** (Troy) received a \$396,000 National Science Foundation award to further develop Next Generation Li-Ion Batteries featuring Nano-Engineered Anode Architectures.¹² The NY-BEST research award helped to leverage this funding by demonstrating that the technology had successfully been peer-reviewed and funded.

Other notable research funding received by members of NY-BEST included:

- Several New York based projects were selected by the highly-competitive ARPA-E for research that aims to dramatically improve how the U.S. uses and produces energy.¹³
 - **Brookhaven National Lab** (Long Island) and **SuperPower** (Schenectady) are partners with Swiss engineering firm ABB to develop an advanced superconducting magnetic energy storage device with a goal to become cost-competitive with lead-acid batteries.
 - **Brookhaven National Lab** is a partner with Missouri University of Science and Technology on lithium-air battery development.
 - **GE** (Schenectady) was awarded \$1 million to develop a novel magnet to support compact power interfaces between solar PV and the electric grid.
- **Binghamton University** was one of eight awards under the Department of Energy’s Batteries for Advanced Transportation Technologies Program, comprising \$8 million nationally, to explore Metal-Based High-Capacity Li-Ion Anodes.¹⁴ This work complements work supported under a NY-BEST R&D award. **Binghamton University** was also awarded \$10.5 million in federal funds for several research initiatives including developing super-capacitors for electrical storage.¹⁵
- **Rochester Institute of Technology** was awarded \$13.1 million from the National Institute of Standards and Technology to construct a new green facility that will house the University’s Golisano Institute for Sustainability. The Institute was also awarded \$1 million from Kodak.¹⁶
- **RPI** (Troy) was awarded \$2 million from the National Science Foundation to develop a new type of ceramics for capacitors.¹⁷
- **Widetronix** (Ithaca), a startup from Cornell University, received \$2.2 million in federal funds to develop beta voltaic batteries, which generate electrical current using energy from radioactive isotopes that emit electrons. They are particularly well-suited to low-power electrical applications where long storage life is

needed, such as implantable medical devices, military or space applications.¹⁸

- Several NY-BEST members were awarded funding by NYSERDA to support development of promising energy storage solutions.¹⁹
 - **Ultralife Corp.** (Newark, Wayne County) was awarded \$1.5 million to demonstrate the benefits of co-locating a 2 MW lithium-ion battery storage system to modulate power sent to the grid from renewable energy.
 - **Electrical Power WorX** (Alfred) was awarded \$910,000 to demonstrate a trackside ultra-capacitor storage system to provide voltage support to Long Island Railroad and potentially eliminate the need for a transmission upgrade.
 - The **City University of New York** was awarded \$1 million to further develop a rechargeable flow-assisted nickel-zinc battery for cost-effective transportation and grid stabilization applications.
 - **Customized Energy** (Endicott) was awarded \$85,000 to study electric storage to power refrigerated trailers that transport produce from Albany to New York City via barge, displacing diesel-powered refrigeration and reducing congestion and fuel (a single barge can handle the equivalent cargo of 60 trucks).
 - **University at Albany, CNSE**, in cooperation with **Cornell** (Ithaca) and **Alfred University** was awarded \$250,000 to evaluate nanoscale materials for fabrication of micro fuel cells and batteries.
 - **American Aerogel** (Rochester) was awarded \$270,000 to develop a new material to insulate refrigerated trailers. This material could reduce the energy required to maintain interior temperatures and increase efficiency of storage for refrigerated trailers.²⁰
- 6. Research and development jobs supported
 - The 18 NY-BEST research and development projects described under Section B above are helping to support 132 engineering, product development, and research staff over the next one to four years and training 18 graduate and undergraduate students.
- 7. Recognition awards to NY-BEST members or affiliated researchers
 - SUNY Distinguished Professor and Greatbatch Professor of Advanced Power Sources. **Dr. Esther Takeuchi** from University at Buffalo was inducted into the National Inventors Hall of Fame, which honors legendary inventors whose innovations have changed the world. Dr. Takeuchi, who is principal investigator on a NY-BEST research award, has earned more patents than any other woman in the United States—148 as of April 2011. Dr. Takeuchi

was honored for developing the battery that enabled implantable cardiac defibrillators, a feat that brought her to the White House in fall 2009 where President Obama presented her with the National Medal of Technology and Innovation.²¹

- **Stan Whittingham**, Director of the Institute for Materials Research at Binghamton University, was honored in the Greentech Hall of Fame as one of 40 innovators who have made a significant difference for his work in Li-Ion battery development²². Dr. Whittingham is principal investigator on two NY-BEST research awards into advanced Lithium battery systems.
- **Ioxus** (Oneonta) was included in *AlwayOn's* 2010 GoingGreen Top 50 in the Energy Storage Systems category. The ranking is comprised of companies developing game-changing approaches and disruptive technologies. Ioxus, which is conducting work under two NY-BEST research awards to further advance its ultracapacitors, also received a “Technology of the Year” Award from Frost & Sullivan for its ultracapacitors.²³

Other recognition awards received by members of NY-BEST included:

- **Clarkson** students (Potsdam) claimed third place in an Electric Snowmobile competition, partnering with Bombardier.²⁴
- **Ice Energy** (manufacturing at Mercury Corporation in Hammondsport) was awarded Breakout Cleantech Company of the Year. Founded in 2003, Ice Energy integrates distributed energy storage through off-peak ice with advanced software and controls to relieve air conditioning demand during periods of peak electric requirements and, in turn, relieve electric demand. This system provides utilities with a cost-effective alternative to inefficient conventional power plants powered by fossil fuels to produce electricity for peak electric demand.²⁵
- **RPI** students (Troy) were selected to participate in the Shell Eco-Marathon where they will compete against other teams for their electric vehicle.²⁶
- **Paper Battery Company** (Troy), a recipient of several NYSERDA awards, was one of 34 companies selected to present at the National Renewable Energy Laboratory’s Industry Growth Forum. Companies were competitively selected by a panel of 120 investors and industry experts to pitch their business plans. Companies presenting at the forum since 2003 have collectively raised more than \$3.4 billion.²⁷

“We have found involvement in NY-BEST to be a very efficient way to become aware of and develop fruitful connections with a wide variety of companies with energy storage capability in New York State.”

—Dr. Mark Mathias, R&D Director,
Electrochemical Energy Research, General Motors

8. Significant research accomplishments

- **Cornell University** (Ithaca) developed a new family of solvent-less electrolytes using a simpler one-pot procedure that could reduce the cost of advanced lithium-ion batteries. The electrolytes are temperature- and redox-stable, which makes them suitable for use in batteries, and they have been demonstrated to prevent the growth of dendrites that lead to short circuits in the cells. A NY-BEST research award is also supporting this electrolyte work at Cornell²⁸.
- The hybrid systems research team at **GE Global Research** (Niskayuna) announced a significant breakthrough that could accelerate electrification of bus fleets, delivery trucks and other larger, heavy-duty vehicles. GE’s dual battery combines the best attributes of lithium-ion and sodium battery chemistries into a single system with the lithium battery handling high-power acceleration and braking, and the sodium battery providing an even power flow to extend range. A NY-BEST research award will help GE develop the next generation of its sodium-metal halide battery²⁹.
- An entirely new type of nanomaterial developed at **RPI** (Troy), and supported under a NY-BEST R&D award, could enable the next generation of high-power rechargeable lithium-ion batteries for electric vehicles and electronics. The research team, led by Professor Nikhil Koratkar, used the material to create electrodes that could be charged and discharged 40 to 60 times faster than those used today while maintaining comparable energy density. Performance was achieved in over 100 continuous charge/discharge cycles.³⁰

Other related research announcements by members of NY-BEST included:

- Scientists at **Brookhaven National Lab** (Long Island) are using neutron scanning for analysis of **GE** sodium-metal halide battery cells to non-destructively evaluate performance in real-time as the cells charge and discharge.³¹
- **Cornell** (Ithaca) is working on energy generation from motion and vibration. Applications for the

self-charging batteries include smart energy systems for industrial equipment, lighting controls, monitoring the structural integrity of bridges and roads, and energy monitoring for onboard vehicle systems.³²

- **Corning** (Corning, NY) developed a new non-woven glass fiber veil that could increase cycle lifetime of traditional flooded lead-acid batteries, especially at partial state of discharge. Other benefits include the ability to operate in higher-temperature environments.³³
- Researchers at **GE Global Research** (Niskayuna) are working on new types of nanostructured magnets that would use smaller amounts of rare earth metals than standard magnets and reduce domestic reliance on foreign supplies. The team hopes to demonstrate new magnet materials within the next two years. Rare earth elements are essential ingredients in electric motors used in today’s hybrid-electric vehicles and wind turbines.³⁴
- **RPI** (Troy) developed a new method for using water to tune the band gap of graphene, opening the door to new graphene-based transistors and nanoelectronics that could offer energy storage with increased performance.³⁵

FUTURE PLANS:

An Advisory Committee to the NY-BEST Board of Directors was created to help identify key research challenges confronting energy storage where NY-BEST research funds could play a role. Wolf von Maltzahn, Associate VP for Research at Rensselaer Polytechnic Institute, is chairing this committee. This committee’s guidance will help advise NYSERDA for future NY-BEST research solicitations—the next of which is expected to be released in fall 2011. The NY-BEST business plan being developed by the Executive Director will also complement these strategic research thrusts by identifying opportunities to leverage NY-BEST research funds with federal and other sources.

During 2011-12, NY-BEST will also continue to work with the New York State Smart Grid Consortium, a public-private partnership founded in 2008, to promote statewide implementation of a smart electric grid with storage. In particular, NY-BEST will continue to work with the Smart Grid Consortium, research community, and industry to develop a comprehensive approach for a potential Department of Energy Innovation Hub in Energy Storage that could be released in the next year and provide \$125 million over five years. This type of investment would be game changing for the energy storage industry in New York State.

TESTING, CHARACTERIZATION AND PROTOTYPING CAPABILITIES

Access to testing, characterization and prototyping capabilities is a critical element for the advancement of battery and energy storage technologies. This includes helping companies access existing facilities at New York's research institutions and providing capabilities that do not adequately exist today. In an effort to provide solutions to members' most critical needs, and with the intent to significantly leverage budgeted NY-BEST funds with federal and industry support, this process has intentionally moved cautiously during the past year.

In 2009-10, a survey of needs was conducted and results were analyzed by the [New York Academy of Sciences](#). NYAS reviewed the survey responses, research concept papers received by NYSERDA, and conducted interviews. The most significant recommendation at the time was to create a searchable database of capabilities available within New York for use by NY-BEST members. This database was created and launched in February 2010 and is available for members on the NY-BEST website. It continues to be enhanced as additional capabilities and leading researchers are identified. NYSERDA initially served as facilitator to match member needs with capabilities. This role is now filled by the NY-BEST management team.

An Advisory Committee to the NY-BEST Board was created during the past year to develop the process for identifying needed capabilities, recommend usage policies, and begin identifying equipment that should be considered for purchase. This Committee is chaired by Tom Trabold, Associate Professor and Research Faculty at Rochester Institute of Technology. One area that has been identified as a

key growth opportunity for NY-BEST and New York State is in grid storage. This Advisory Committee is currently conducting an assessment of customer requirements for grid storage to identify the testing protocols and capabilities that will be needed.

METRICS THAT WILL BE USED IN THE FUTURE TO EVALUATE TESTING, CHARACTERIZATION AND PROTOTYPING CAPABILITIES INCLUDE:

1. Use of NY-BEST testing, characterization and prototyping capabilities by members of the consortium and by non-members and fees generated through this use
2. Jobs at NY-BEST testing, characterization and prototyping facilities such as technicians and equipment operators
3. Changes in Technology Readiness Levels and Manufacturing Readiness Levels for technologies examined at NY-BEST testing, characterization and prototyping facilities

FUTURE PLANS:

During 2011-12, specific capabilities will be identified and procured with the intent of significantly leveraging NY-BEST CAIR funds with federal and industry support. As these plans develop, it is possible that an increase may be requested in the current budget for testing and characterization capabilities (\$3.4 million) with a commensurate reduction in other budgeted categories. The capabilities will then be available for members and non-members of NY-BEST, with members receiving preferential access and/or usage rates. Once implemented, these capabilities are expected to enable the consortium to generate revenues to become self-sustaining and help NY-BEST members commercialize new storage technologies, growing the industry and employment in New York State.

REFERENCES

- 1 Source: Employment date obtained from contract budgets and reported by contractors.
- 2 [Ioxus Raises \\$21 Million For Improved Power Storage Technology. Ioxus Acquires Advanced Energy Conversion \(AEC\) to Deliver Full Range Ultracapacitor Cells and Modules](#)
- 3 [GE Begins Recruiting for \\$100M Battery Plant. GE Hybrid Locomotive Development](#)
- 4 [BAE Extends HybriDrive System to Trucks. BAE Systems Gains Military EV Business](#)
- 5 [Plug Power Adds WinCo Foods to Growing Customer List. Plug Power Announces Fourth Quarter and Year End 2010 Financial Results. Plug Power Pushes Message of Commercial Viability for Hydrogen Fuel Cell Solutions](#)
- 6 [Chrysler / DOE Ram PHEV Project. ElectroVaya Selected by Major U.S. Utility for Grid-Scale Lithium Battery Energy Storage System](#)
[Electrovaya and Hero Electric Showcase Electric Scooters for North American Market](#)
- 7 [Bren-Tronics Wins Military Contract Worth \\$84 Million](#)
- 8 [Ultralife Battery Order Could Top \\$42 Million. Ultralife Corporation Receives \\$1.3 Million Order for its BA 5390 Military Batteries from Defense Logistics Agency. Ultralife Corporation Receives \\$2.5M Order for Land Warrior Batteries and Chargers. Ultralife Corporation Receives \\$21 Million SATCOM-On-The-Move System Orders. Ultralife Corporation Receives \\$5.5 Million Land Warrior Battery and Charging System Contract](#)
- 9 [New World Capital To Raise Green Private Equity Fund](#)
- 10 [Smart Grid: Press Release: Ice Energy Expands East Coast Manufacturing Capacity with Mercury Corporation Agreement. Ice Energy Partners with Carrier Corp. to Deliver a Hybrid Cooling-Energy Storage Solution for Commercial Customers. Ice Energy to Provide Energy Storage Technology for SunPower Project Under California Solar Initiative Grant. Rollout of 53 MW Ice Energy Thermal Energy Storage Project Is Underway. Trane Teams with Ice Energy to Deliver Energy Storage-Compatible Air Conditioning Solutions to Commercial Customers. Energy Storage Leader Ice Energy Closes \\$24 Million in Series C Funding](#)
- 11 [New York Based Projects Win \\$5.5 Million for Groundbreaking Energy Research](#)
- 12 [“Nanoscoops” Could Spark New Generation of Electric Automobile Batteries](#)
- 13 [New York Based Projects Win \\$5.5 Million for Groundbreaking Energy Research. DOE Exploring Superconducting Magnets for Grid Energy Storage. ARPA-E Awards](#)
- 14 [Binghamton Awarded Funding Under DOE’s Batteries for Advanced Transportation Technologies \(BATT\) Program](#)
- 15 [Hinchey announces \\$10.5 million in research funds for BU](#)
- 16 [RIT Awarded \\$13 Million Federal Grant. Kodak Gives \\$1M to RIT for Research](#)
- 17 [RPI to Innovate the Field of Renewable Energy](#)
- 18 [Cornell-Developed Battery Technology Company Receives \\$2.2 Million in Federal Funds](#)
- 19 [NYSERDA Awards \\$11.3 Million for 25 Innovative Renewable Energy and Energy Storage Projects](#)
- 20 [American Aerogel Awarded \\$270,000 from NYSERDA](#)
- 21 [Takeuchi to be Inducted into National Inventors Hall of Fame. UB Researcher Inducted into National Inventors Hall of Fame](#)
- 22 [The Greentech Hall of Fame](#)
- 23 [NY-BEST Member Ioxus Receives Award](#)
- 24 [Clarkson University Claims Top Spot in Clean Snowmobile Challenge](#)
- 25 [Colorado Cleantech Industry Association awards Ice Energy](#)
- 26 [Car of the Future Competition and RPI](#)
- 27 [Paper Battery Company Presenting at NREL Conference](#)
- 28 [Hybrid Electrolyte for Better Batteries](#)
- 29 [GE Demonstrates “Electric Bus of the Future”](#)
- 30 [RPI Develops New Nanoengineered Batteries that Hold Potential to Charge More Than 40 Times Faster Than Today’s Lithium-ion Batteries](#)
- 31 [Using Neutrons to Peer Inside A Battery Designed for Hybrid Locomotives](#)
- 32 [Shaken and Stirred: ‘Self-Charging’ Batteries from Ambient Vibration](#)
- 33 [Solution to Help Battery Makers Meet the Challenges of Stop-Start Engines](#)
- 34 [New Magnets Could Solve Our Rare Earth Problems](#)
- 35 [Water Could Hold Answer to Graphene Nanoelectronics](#)

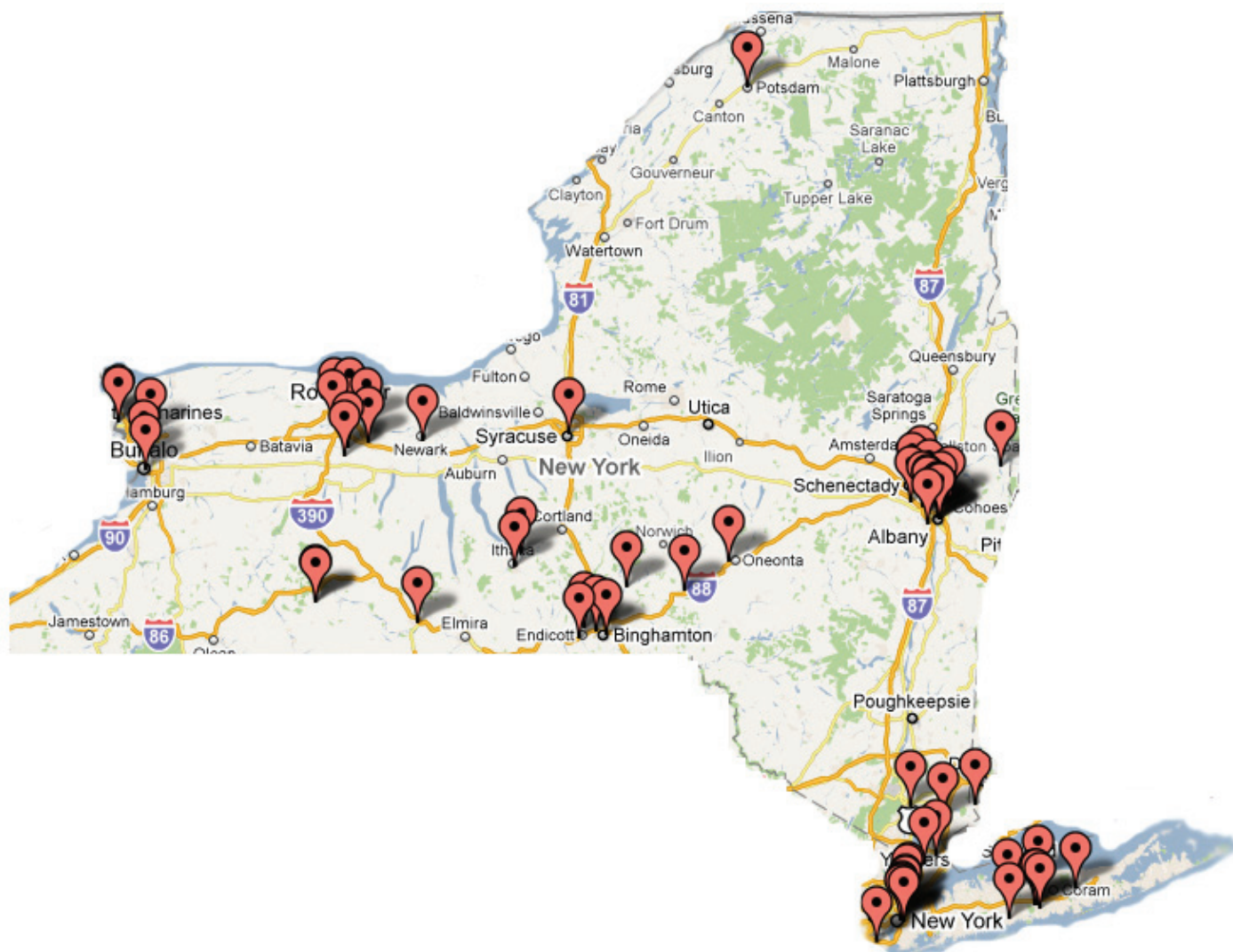
NY-BEST BOARD OF DIRECTORS

The Board of Directors is elected by the NY-BEST membership and represents industry, the research community, end users, and government partners. Board terms are designed so that half the board seats are up for election each year to allow for continuity and member engagement.

- Chairman of the Board: Matthew Fronk—Consultant and former Director of GM Fuel Cell Research Lab (retired)
- Vice-Chair Industry: Andrew J. Naukam—Vice President of Technology and Program Management, Ultralife Corporation
- Vice-Chair Academic: M. Stanley Whittingham—Director of the Institute for Materials Research and Professor of Chemistry, Binghamton University
- Vice-Chair At-Large: Michael G. Field—President, Operations and Engineering Division, The Raymond Corporation
- Secretary/Treasurer: Paul F. Mutolo—Director of External Partnerships, Energy Materials Center at Cornell University
- Sanjoy Banerjee—Distinguished Professor of Chemical Engineering and Director of the Energy Institute, City University of New York
- Aubrey Braz—Vice President, Consolidated Edison Company of New York
- Richard Fioravanti—Director of Storage Applications and Support, KEMA, Inc.
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- Rich Hopf—General Manager Transport Systems, BAE Systems, Inc.
- Robert K. Jaworski, Ph.D., CFA—Chief Financial Officer, Ioxus, Inc.
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- Glen Merfeld—Manager, Chemical Energy Systems Laboratory, GE Global Research
- Jim Misewich—Associate Laboratory Director, Brookhaven National Laboratory
- Francis J. Murray, Jr.—President & CEO, New York State Energy Research and Development Authority (the current President and CEO of NYSERDA serves as a permanent director)
- Edward Reinfurt—Executive Director, New York State Foundation for Science, Technology and Innovation (the current Executive Director of NYSTAR serves as a permanent director)



MAP OF NY-BEST MEMBERS IN NEW YORK STATE





NY-BEST MEMBERS

1	ACAL Energy	United Kingdom	40	Hollingsworth & Vose Company	East Walpole, MA
2	AEYCH	Endicott, NY	41	H-Power Americas, Inc.	West Islip, NY
3	Alfred University	Alfred, NY	42	Hydrogenics Corporation	Mississauga, Ontario
4	American Aerogel Corporation	Rochester, NY	43	Hylie Products, Inc.	Watertown, CT
5	American Wind Power & Hydrogen LLC	New York, NY	44	Ice Energy	Latham, NY
6	Amphenol Corporation	Sidney, NY	45	ICL-IP America (Israeli Chemicals Ltd.)	Ardsley, NY
7	Ascension Industries	North Tonawanda, NY	46	Impact Technologies	Rochester, NY
8	BAE Systems Platform Solutions	Johnson City, NY	47	Intertek Testing Services NA, Inc	Cortland, NY
9	Bettergy Corp.	Peekskill, NY	48	KEMA, Inc.	Fairfax, VA
10	Binghamton University	Binghamton, NY	49	NewWorld Capital Group	New York, NY
11	Bren-Tronics, Inc.	Commack, NY	50	NYPA	White Plains, NY
12	Brookhaven National Laboratory	Upton, NY	51	Oak-Mitsui Technologies	Hoosick Falls, NY
13	Center for Economic Growth	Albany, NY	52	Plug Power Inc.	Latham, NY
14	Centerstate CEO (formerly MDA)	Syracuse, NY	53	Primet Precision Materials, Inc.	Ithaca, NY
15	Cerion Enterprises	Rochester, NY	54	Progressive Machine & Design	Victor, NY
16	CG Power Solutions USA, Inc.	Albany, NY	55	Raymond Corporation	Greene, NY
17	City University of New York	New York, NY	56	Rensselaer Polytechnic Institute	Troy, NY
18	Clarkson University	Potsdam, NY	57	Rochester Institute of Technology	Rochester, NY
19	College of Staten Island, CEPM	Staten Island, NY	58	Samsung SDI	San Jose, CA
20	Columbia University	New York, NY	59	Sendyne Corp.	New York, NY
21	Consolidated Edison Company of New York	New York, NY	60	Siemens Corp.	Princeton, NJ
22	CooperHill LLC	Albany, NY	61	Stony Brook University, SUNY	Stony Brook, NY
23	Cornell University	Ithaca, NY	62	SuperPower, Inc.	Schenectady, NY
24	Corning Incorporated	Corning, NY	63	Sure Power	Lester, PA
25	Curtis Instruments	Mt. Kisco, NY	64	Syracuse University	Syracuse, NY
26	Custom Electronics, Inc./Ioxus, Inc.	Oneonta, NY	65	TechCity Properties	Kingston, NY
27	Customized Energy Solutions	Endicott, NY	66	Tecknowledgey Inc.	Peekskill, NY
28	Day Pitney LLP (joined in April 2011)	New York, NY	67	The Paper Battery Company	Troy, NY
29	Dayton T. Brown, Inc.	Bohemia, NY	68	Ultralife Corporation	Newark, NY
30	Electrical Power worX Corp	Alfred, NY	69	Unifrax LLC	Niagara Falls, NY
31	ElectroMotive Designs	Ronkonkoma, NY	70	University at Albany, CNSE	Albany, NY
32	Electrovaya	Malta, NY	71	University at Buffalo, SUNY	Buffalo, NY
33	Energenics Systems, LLC	Bohemia, NY	72	University of Rochester	Rochester, NY
34	EnRG, Inc.	Buffalo, NY	73	Utility Savings & Refund, LLC	Irvine, CA
35	General Electric Company	Niskayuna, NY	74	Whiteman Osterman & Hanna LLP	Albany, NY
36	General Motors LLC	Honeoeye Falls, NY	75	Widetronix	Ithaca, NY
37	Green Charge Networks	New York, NY	76	WilmerHale	Boston, MA
38	Heslin Rothenberg Farley & Mesiti P.C.	Albany, NY	77	Xactiv	Fairport, NY
39	Hoffman Warnick LLC	Albany, NY	78	Xtreme Power	Washington, DC

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce their reliance on fossil fuels. NYSERDA professionals work to protect our environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York since 1975.

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and Development Authority**
Vincent A. Delorio, Esq., Chairman
Francis J. Murray, Jr. President and CEO

1-866-NYSERDA • info@nyserda.org
www.nyserda.org

Albany Office
17 Columbia Circle
Albany, NY 12203
518.862.1090

New York City Office
10th Floor, Suite 1006
485 Seventh Avenue
New York, NY 10018
212.971.5342

West Valley Site
Management Program
9030 B Route 219
West Valley, NY 14171
716.942.9960

Buffalo Office
726 Exchange Street
Suite 821
Buffalo, NY 14210
716.842.1522