

A. EXECUTIVE SUMMARY

In 2022, Binghamton University assembled a cross-sector coalition that secured \$113M under the EDA Build Back Better Regional Challenge (BBBRC) for the **New Energy New York (NENY)** initiative to foster post-pandemic regional economic resurgence through the growth of a battery cell development and manufacturing cluster in Upstate NY. NENY is enabling a pilot manufacturing facility, supply chain expansion, technology innovation, environmental justice, and workforce development. A **Tech Hub Designation** will supercharge this momentum and transform the cluster into a leading battery technology innovation ecosystem that:

- Broadens goals from regional economic recovery to promoting U.S. global competitiveness.
- Expands the focus from battery cell manufacturing to the entire battery lifecycle and supply chain.
- Extends the region of service, core consortium, and external partnerships.
- Launches new synergistic ecosystem- and equity-building projects.

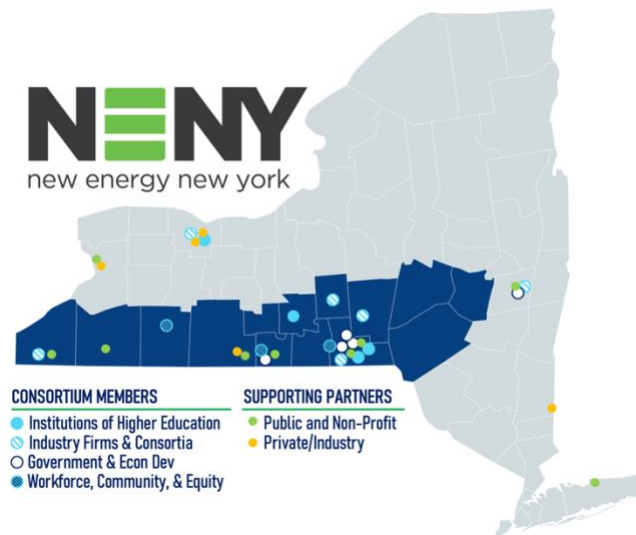
A.1. Technology Focus. **Advanced energy and industrial efficiency technologies: Batteries (Topic #9).**

As the dominant form of energy storage, batteries are driving the transition to a carbon-free economy, with global demand expected to increase 5× by 2030¹. While battery manufacturing and supply chain security are recognized as national priorities¹⁻⁴, the currently limited U.S. capacity jeopardizes our global position and climate change mitigation goals. For the U.S. to meet the increasing demand for storage, attain carbon neutrality by 2050, secure its supply chain, and gain competitive ground, it must grow not only a strong manufacturing and workforce base, but also a domestic ecosystem to support technology innovation and translation across the battery lifecycle spanning materials, components, applications, and end-of-life processing. The proposed Tech Hub will bolster **battery technology development and manufacturing across the entire value chain**, focusing also on key topics of safety, certification, policy, equity, and environmental justice.

A.2. Region. Southern Tier (ST) of New York, comprising 14 counties with ~1M residents⁵, spans 3 Economic Development Districts (ST West: Allegany, Cattaraugus, Chautauqua; ST Central: Chemung, Schuylar, Steuben; and ST 8: Broome, Tioga, Tompkins, Otsego, Cortland, Delaware, Schoharie, Chenango), across 38 Opportunity Zones⁶, with high poverty rates⁷. All counties are >95% rural by land area, and half are majority-rural by population (>60% outside micropolitan areas⁵).

A.3. Hub Priorities. The Hub will augment the BBBRC NENY ecosystem-building efforts to grow a stronger base and attract more private investment to ensure sustainability. It will expand existing and develop new industry-responsive and community-informed projects under 5 key pillars (*potential projects indicated in parentheses*):

1. **Technology Innovation** to support battery innovation, technology translation, and startup growth (*Pilot and demonstration projects; Manufacturing readiness support; Manufacturing incubator space*).
2. **Supply Chain Development** to reinforce domestic supply chain, connect existing manufacturers, and accelerate certification (*Supply Chain Incubator; Southern Tier Technology Park; Shovel-ready sites*).
3. **Workforce Development (WFD)** to offer multi-institution networks, innovative training programs, and wraparound services (*Safety and certification training; ST Advanced Manufacturing Training Center*).



4. **Equity & Justice** to support underserved communities, ensuring diverse participation, equitable access, and broader impacts (*Training stipends; Mentor program; High-school clean energy programs*).
5. **Capacity & Infrastructure** to build out critical shared-use R&D, testing, and pilot manufacturing testbeds, as well as to support site selection (*Grid-level storage system testbed; Battery safety satellite center; Power electronics development center*).

A.4. Consortium. The Hub will expand the NENY coalition to a private-public consortium with supporting partners and external mission-aligned organizations for diverse sectoral and geographic representation.

TABLE 1. CONSORTIUM & PARTNERS (<i>Core consortium members; Supporting partners; *Partners external to the ST region</i>)
<p>INSTITUTIONS OF HIGHER EDUCATION. Binghamton University (lead): home of the 2019 Nobel Laureate inventor of the Li-ion battery M. Stanley Whittingham, the Northeast Center for Chemical Energy Storage, EDA BBBRC NENY lead, under-construction Battery-NY Center. Cornell University: among top academic institutions with \$1.2B in R&D expenditures; home of the Cornell High Energy Synchrotron Source (CHESS), Center for Alkaline-Based Energy Solutions (CABES), Joint Center for Energy Storage Research (JCESR). Rochester Institute of Technology*: 3rd largest private STEM university in U.S. and home of the RIT/NY-BEST Battery Prototyping Facility. These partners host 5+ high-tech incubators, and will work with <i>Stony Brook University*</i>, and <i>Argonne and Brookhaven National Labs*</i> around battery innovation. SUNY Broome Community College (CC) to coordinate with <i>Jamestown CC</i> and <i>Corning CC</i>, instrumental to workforce development efforts.</p> <p>REGIONAL GOVERNMENT. Broome County Executive’s office will coordinate with other county governments in the ST.</p> <p>INDUSTRY FIRMS & CONSORTIA. New York Battery and Energy Storage Technology Consortium (NY-BEST): an energy storage consortium with >185 members. C4V/iM3NY: battery technology and development companies, launching state’s first gigafactory in the ST. Raymond Corporation: subsidiary of Toyota Industries with ~100-year history in the ST, designing and manufacturing electric lift trucks. Electrovaya: Canadian battery development company opening a manufacturing facility in the ST; secured sales agreement with Raymond. he consortium has a network of additional 20+ industry partners.</p> <p>ECONOMIC DEVELOPMENT ORGANIZATIONS. ST 8 Regional Board to coordinate with ST West and ST Central Economic Development District Boards. The Agency (Broome County IDA/LDC) to coordinate with <i>IDAs across the ST region</i>. FuzeHub* (central Manufacturing Extension Partnership [MEP]) to coordinate statewide, including with regional ST MEPs <i>AMT</i> and <i>Insyte Consulting</i>. Additional coordination of economic development resources and assets provided by Three Rivers Development Corporation.</p> <p>WORKFORCE ORGANIZATIONS. Broome-Tioga Workforce to coordinate with counterpart workforce boards throughout the ST region.</p> <p>COMMUNITY NON-PROFITS. IncubatorWorks: regional business incubator serving 4 rural counties in the ST; Community Foundation of Southern NY: leading philanthropy organization in ST, to coordinate with community orgs, including the <i>Southern Door Community Land Trust</i>.</p> <p>STATEWIDE ORGANIZATIONS. Research Foundation for the State University of New York (RF SUNY)*, Empire State Development (ESD)*, and New York State Research & Development Authority (NYSERDA)* to support statewide links and resources.</p>

B. DESIGNATION CRITERIA

B.1. Region Potential for Global Competitiveness. Reinforcing the domestic supply chain, expanding manufacturing, and growing the workforce are critically interdependent with advancing U.S. battery technology innovation and translation leadership^{1,3}. While several states (e.g., Southeast “battery belt”) are seeing increasing construction of battery gigafactories to manufacture current, existing technologies, the ST is uniquely poised to advance U.S. battery innovation leadership by enabling the **design, development, and deployment of next-gen technologies** to be productized in America. Various public and private sector investments have bolstered the ST’s potential as a Tech Hub, including NYS ambitious goals relative to renewables, a carbon-neutral grid⁷, and nation-leading plans for 6 GW of energy storage by 2030⁸. Within the private sector, NENY partner companies and many of the region’s >700 small- and medium-sized manufacturers (SMMs) are investing in battery innovation and manufacturing. In 2022, **iM3NY** opened the state’s first battery gigafactory in Endicott, NY (**\$96M** private, **\$13M** state investment), and **Electrovaya** is initiating battery manufacturing in Jamestown, NY (**\$6M** private, **\$15M** in state investment). Electrovaya has signed a strategic supply agreement with consortium member **Raymond Corporation**, which is focusing on lithium-ion batteries (LiB) to meet growing global demand for automation solutions such as their fork trucks. NENY partner universities are expanding clean energy opportunities by undertaking cutting-edge R&D (**>\$15M battery-related and >\$1.4B total annual R&D expenditures**) and supporting sector-specific incubator programs (network of **4+ high-tech incubators** [>350 companies, >\$1B raised, >1000 jobs created]), which have attracted a stream of startups establishing operations in the region (**>20 battery startups** engaged by NENY in the past year alone).

A key distinguishing aspect of the NENY consortium not available in any other region in the nation is the **unparalleled constellation of networked shared-use battery development infrastructure**. From early-stage prototyping and small-scale cell manufacturing lines to battery cell and system safety testing, NENY provides a robust suite of services and testbeds to accelerate the transition of innovations without the need for major capital investments by an individual company. Major facilities include Binghamton’s **Northeast Center for Chemical Energy Storage Dry Room, RIT Battery Prototyping Center, NY-BEST BEST Test & Commercialization Center**, and the **Intertek Cortland Battery Lab**. BBBRC NENY is investing >\$60M in the construction of the nation’s first **Battery-NY pilot manufacturing and development center**.

NENY has also positioned the ST to become a leader in battery sector WFD (see B.5). The comprehensive approach of coordinating diverse training organizations to deliver industry-responsive and inclusive training at multiple levels, including the **Battery Academy**, is increasingly recognized as a model approach: NENY is an invitee to 2 foundation-driven (America Achieves and Ares Foundation) initiatives aimed at developing best practices in WFD, and is a member of the Naval Postgraduate School (NPS) Battery WFD program development group and stakeholder advisory panel. Together, these NENY developments have attracted innovative battery startups and fostered global partnerships, including with European (EIT InnoEnergy) and Australian (Deakin University) organizations, solidifying the ST’s potential to become a nation-leading Tech Hub.

B.2. Role of the Private Sector. The NENY partners have a strong track record of industry collaborations including: NY-BEST with **>185 battery sector members**; RIT Battery Prototyping Center’s **> 50 user companies**; BBBRC NENY programs with **>50 participating companies**, including **>20 startups**; FuzeHub (statewide MEP) and regional MEPs AMT and Insyte connecting the region’s **>700 SMMs**. The Hub will also be networked with innovative battery companies in nearby Upstate NY regions, including **Li-Cycle** (largest N. American battery recycling company setting up hub in Rochester, NY) and **Viridi** (manufacturing facility for fail-safe battery systems in Buffalo, NY). These companies will drive regional contracts with OEMs and attract suppliers and customers to the region, fostered by the NENY supply chain pillar activities.

NENY industry partners are active across the battery value chain and will drive the development of Tech Hub priorities and projects. With significant workforce needs (>3000 jobs over 5 years) many companies are partnering with NENY to develop training programs (see B.5).



Company discussions heavily informed BBBRC NENY project design, and industry partners will be pivotal in shaping Tech Hub programs. Many NENY industry partners undertake cutting-edge R&D, further solidifying the region’s potential as a nation-leading hub for technology innovation.

B.3. Regional Coordination & Partnerships. Drawing on the foundational structure, governance, and best practices of the BBBRC NENY coalition, the Hub will ensure effective engagement of industry, government, and community stakeholders, from startups and SMMs to large corporations, and from rural areas to low-income urban communities. Consortium members will work with supporting partners to synergize sectoral efforts, creating a collaborative environment (e.g., The Agency, Broome County’s Industrial Development Agency [IDA] to coordinate with other IDAs across the region to develop strategies and implementation plans for business attraction, site selection, and infrastructure development). State partners RF SUNY, NYSERDA, and ESD will further facilitate partnerships and impacts across NYS.

NENY has demonstrated strong capacity for effective partnerships under the key pillars, including innovation (supporting **startups from 5+incubator programs** across the state), supply chain (**industry consortium**

and MEP partnerships to create supply chain database), and WFD (*collaboration between industry and 6 training organizations* to launch the NENY Battery Academy). NENY is building scalable models of collaboration and innovative programs that can be replicated across other regions and states. Beyond NENY, the partners' track record of major collaborations includes: **NSF Interior Northeast I-Corps Hub** (Cornell lead, with Binghamton, RIT, and 7 other universities); **ST Clean Energy Incubator Program** (Binghamton lead, with Cornell, IncubatorWorks, NY-BEST); **New York State Pollution Prevention Institute** (RIT lead, with Binghamton, Cornell, and others); **MidAtlantic Air Force Research Laboratory Regional Hub** (Cornell lead, with Binghamton, RIT, and RF SUNY). NENY's selection as a **finalist in the NSF Regional Innovation Engines program** further underscores the consortium's strong alignment and shared strategic vision.

B.4. Equity & Diversity. While diversity initiatives often start with outreach and recruitment, meaningful outcomes can only be achieved holistically. **Diversity in leadership and operations teams** is a major priority that is already being pursued in building the NENY teams. The **Justice and Equity pillar** is dedicated to projects that advance racial, economic, and climate justice through collaborations with community organizations. The **WFD pillar** (see **B.5**) promotes regional economic equity by providing multi-level access to training through various age- and community-specific programs supported by wraparound services, through a comprehensive partner network of technical schools, community colleges, workforce boards, and industry partners. **Diversity in tech innovation** is driven by supporting minority inventors and founders and focusing on inclusive recruitment, training, and mentoring, which together ensure that diverse voices and perspectives drive innovation, and that high-tech ventures benefit marginalized communities.

In its first year, the foundational NENY coalition has demonstrated dedication to promoting diversity and equity, including through its programs under Broome-Tioga Workforce Board (both total cohort trainees and graduates placed in jobs with regional industry partners comprised **50% minority participants**), NENY Student Startup Experience (of the >50 students placed with >20 startups, **30% women, 53% minorities**), and Koffman Incubator and IncubatorWorks (supported launch of **10+ minority-founded businesses**).

B.5. Composition & Capacity of Regional Workforce. Meeting the growing energy storage demand will require a significant R&D and advanced manufacturing workforce (number of jobs expected to grow $\geq 5\times$ in the next 5 years). The ST, with a population of ~1M, has strong potential for building out next-gen workforce pathways and pipelines. The region has a history of innovation and manufacturing (the birthplace of IBM), as well as a significant educational base (Binghamton and Cornell Universities, nine 4-year colleges and technical schools, and four community colleges) issuing >18,000 degrees annually, including to 6,000 graduate students. NENY is also engaging an existing training pool within established companies. Registered apprenticeships have more than doubled in the ST since 2016, and the NY Workforce Development Institute will build upon this, introducing new sector-specific apprenticeship tracks under the Hub.

Lagging behind the state average, <60% of working-age ST residents participate in the labor force⁹. NENY projects are addressing barriers to unlock this labor pool, with additional projects needed to train and connect it with emerging jobs. With ST population trends historically linked to manufacturing, the battery sector expansion is anticipated to reverse a decades-long population decline and stimulate population growth.

Diverse organizations are partnering under NENY to provide a comprehensive WFD suite across educational levels and the battery value chain with both centralized resources and organization-specific programs. In partnership with InnoEnergy, NENY launched the **Battery Academy**, an online learning platform (Battery Expert and Battery Technician courses) with hands-on learning labs. NENY's innovative approach is increasingly recognized domestically and internationally, including by major philanthropic foundations (see **B.1**). As a designated Tech Hub, NENY will scale and replicate the WFD programs across and outside the region and expand to emerging key topics, including battery safety and certification.

B.6. Innovative Lab-to-Market Approaches. NENY is positioned to become the premier destination for

battery innovators and startups. **A comprehensive suite of incubator and accelerator programs** supports the entire lab-to-market journey, from start-up to scale-up to market entry. NENY has adopted **coordinated support mechanisms** that build synergies rather than competition among regional incubators, as inspired by the ST Startup Alliance. Under NENY, Binghamton’s Koffman Incubator provides student talent and microgrants to non-client energy storage startups with NYS residency or membership in partner programs. Addressing major federal priorities^{1,3}, a **network of cutting-edge shared-use infrastructure** (see B.1), to be expanded under the Hub, allows battery tech innovators to de-risk new technologies with significantly reduced capital expenditures, accelerating market entry and deployment. **Funding programs**, from business development microgrants to technical assistance vouchers, including programs launched under NENY, will further fuel battery startup growth, allowing them to take measured risks. The Hub will reinforce **ecosystem connections**, interweaving the growing manufacturing base, including iM3NY and Electrovaya gigafactories and their supply chain partners, with startups, boosting all stages of battery technology development.

B.7. U.S. Economic and National Security. The U.S. produces 59 GWh of storage annually (8% of global output), while the domestic demand for EV batteries alone is estimated to reach 320 GWh in 2028³. While China and the E.U. have long supported domestic battery and supply chain goals, the U.S. has only recently begun to prioritize the sector. We are dependent on unstable global supply chains and lose many early-stage innovations to China, which is providing battery scale-up capabilities unavailable in the U.S, a challenge that the Battery-NY Center will address. China also controls >75% of cell production, >70% of active material production, and >60% of material processing, capturing >90% of the value of every LiB sold in its market, while the U.S. captures <30%¹. The Federal Consortium for Advanced Batteries has set a goal for the U.S. to secure its LiB supply chain by 2030, with recommendations to secure access to raw materials and accelerate innovations in battery chemistry and recycling – a central focus of the proposed Tech Hub³. The U.S. dependence on unstable global supply chains jeopardizes not only the battery industry, but economic and national security and climate goals. Innovation and increased battery production of battery technologies are essential for achieving carbon neutrality by 2050. An underdeveloped domestic battery sector hinders the growth of downstream industries dependent on battery integration, including EVs, consumer electronics, medical devices, and renewable grid storage. U.S. national security is undercut by the military relying on foreign sources of advanced batteries and foreign adversaries controlling upstream and midstream battery supply chains.

The proposed Tech Hub will address these challenges and help the U.S. gain a competitive global position by providing a nation-leading domestic ecosystem to connect sector stakeholders, support domestic engineering and innovation initiatives, accelerate technology transition, and grow an advanced manufacturing workforce through scalable programs with equitable impact, while supercharging the momentum and reinforcing sustainability pathways for the foundation built under BBBRC NENY.

