

NY-BEST Program Theory and Logic Model

Final Report

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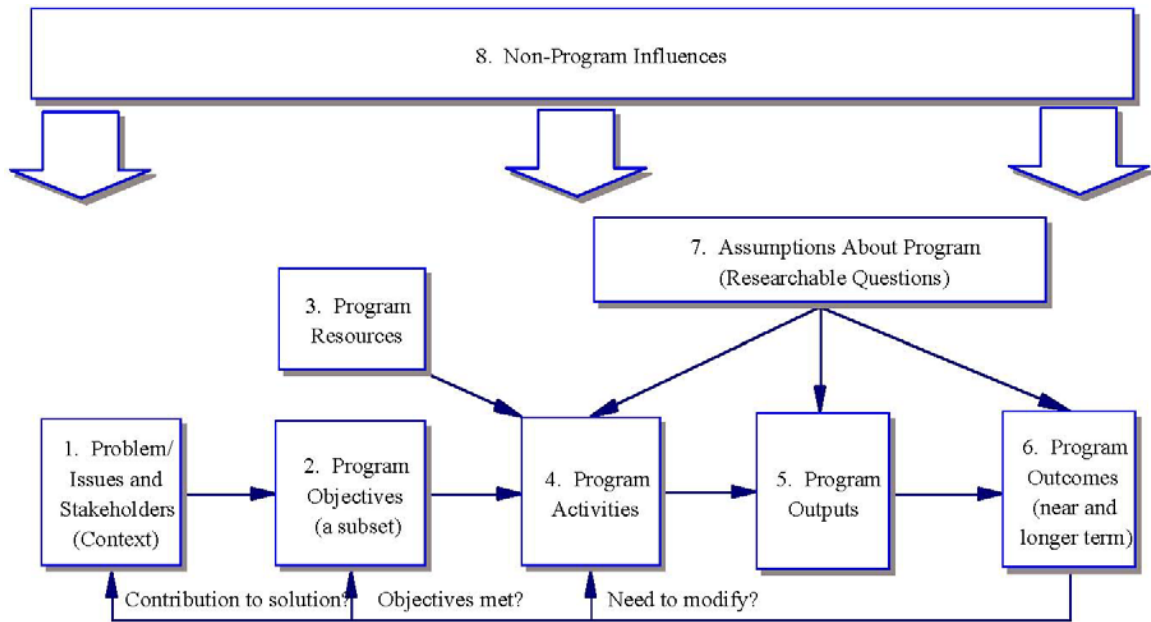
Introduction

The Purpose of this document is to present the overarching logic model for the NYSERDA-supported programs comprising the New York Battery and Energy Storage Technology Consortium (NY-BEST). This document's organization is as follows:

1. **Program Context, Stakeholders, Intent and Design:** Describes the problem(s) the program is attempting to solve, or issues it will address and the regulatory and stakeholder environments (context) within which the program is working.
2. **Program Objectives:** Describes, at a high level, the program's ultimate purpose and targets.
3. **Program Resources:** Identifies the funding, workforce, partnership, and other resources the program is providing.
4. **Program Activities:** Describes the program's various research, product development, demonstration and commercialization progress, and support activities.
5. **Program Outputs:** Describes the anticipated immediate results associated with program activities.
6. **Program Outcomes:** Describes expected achievements in the near, intermediate and longer term.
7. **Assumptions about Program:** Describes assumptions about how program activities and outputs will lead to the desired near, intermediate and longer-term outcomes.
8. **External Influences:** Describes factors outside the program that may drive or constrain the achievement of outcomes.

Figure I-1 shows the relationships among these eight items.

Figure I-1: Program Design Template



1 Program Context, Stakeholders, Intent, and Design

The New York Battery and Energy Storage Technology Consortium (NY-BEST) is a not-for-profit corporation organized in 2009 to help position New York as a global leader in battery and energy storage technology, including medium and heavy-duty transportation, electric grid, and other applications. NYSERDA is helping to seed this industry-focused consortium with approximately \$25 million through Clean Air Interstate Rule (CAIR) proceeds.

In its current state, NY-BEST is governed by a 17-seat board of directors elected by consortium members. The board selected Bill Acker as Executive Director and Capitol Hill Management Services as association manager in 2010.

NY-BEST aims to support the development of the energy storage industry in New York State via the following three strategies:

1. Facilitate product development and commercialization partnerships
2. Provide members with access to testing, characterization, and prototyping capabilities
3. Promote research and development of energy storage technologies

Program stakeholders include its members and partners representing a variety of companies, academia, research institutes, government, and energy storage end users.

The table below shows the allocation of CAIR funding to NY-BEST by activity. Most of the CAIR funding is expended or committed to be expended. However, the remaining operations funding will last about 18 to 24 more months at declining spend rates, and NY-BEST is expected to continue as a self-sustaining entity.

Table 1-1. Budgeted CAIR Funds as of August 2014

Activity	Budgeted
NY-BEST Operations and Management	\$4,548,000
Research and Development Awards	\$13,585,000
Technology Transfer	\$500,000
Testing and Characterization Capabilities	\$3,445,114
NYSERDA Administration	\$2,211,000
Program Evaluation and Accountability	\$500,000
Brokerage Fees for NOx Allowance Sales	\$266,736
New York State Cost Recovery Fee	\$443,000
Total	\$25,498,850

Table 1-2 summarizes the barriers the NY-BEST program is intended to address and identifies the stakeholders affected by each.

Table 1-2: Problems to be addressed by NY-BEST

Problem Area and Barrier Details	Stakeholders Impacted and/or Involved
1. Technical Barriers	
Lack of testing infrastructure	Researchers, product developers, potential testing facility workers
2. Economic Barriers	
Insufficient investment in battery and energy storage technologies development	Researchers, product developers, potential testing facility workers
3. Informational Barriers	
Insufficient knowledge and expertise exist for optimal battery and energy storage technologies development Insufficient familiarity with potential partners leads to high risk in battery and energy storage technologies development endeavors	Researchers, product developers, potential investors
4. Institutional Barriers	
Insufficient knowledge sharing pathways to form critical partnerships Legislation currently favors investment in other competing technologies over battery and energy storage technologies	Product developers, potential investors, legislators

2 Objectives (High Level)

Program stakeholders have established the following goals for NY-BEST. These are described in more detail in the New York State Energy Storage Roadmap, developed and published by NY-BEST in 2012.

1. Create value chain clusters of companies comprised of suppliers, material and component manufacturers, system integrators, and product manufacturers to provide the manufacturing capabilities necessary to grow the sector in New York State and support global markets.
2. Establish robust New York markets for energy storage through appropriate technologies, policies and incentives.
3. Continue New York's technology leadership and stimulate commercialization of advanced energy storage technologies through research and development, product development, commercialization partnerships, leveraging intellectual capital, and equipment and supplier relationships.
4. Create a self-sustaining consortium in NY-BEST

3 Resources

NY-BEST operates using a variety of resources with a strategy of using outside resources (e.g. seed funding) to grow its internal resources (expertise and success of members in obtaining outside investment) such that the consortium may eventually become self-sustaining. The table below summarizes these resources.

Table 3-1: NY-BEST Consortium Resources

NYSERDA Resources
<ul style="list-style-type: none"> • Seed funds from New York State proceeding from participation in CAIR • NYSERDA staff
Internal Resources
<ul style="list-style-type: none"> • NY-BEST Operations Staff • Researchers and private companies (NY-BEST members) engaged in developing and deploying energy storage products and committed to consortium development
External Resources
<ul style="list-style-type: none"> • Utility, economic development, and federal funding • Researchers and private companies (NY-BEST non-members) engaged in developing and deploying energy storage products • Private sector investors who may further support technology development and deployment • Other trade associations for energy storage products
Intangible Resources
<ul style="list-style-type: none"> • High concentration of foundational technical and research expertise within New York State • Established manufacturing advantage of New York State • Significant markets for energy storage in New York State, particularly in electric grid storage Downstate

4 Activities

In pursuit of the program goals identified above, NY-BEST engages in a wide range of activities designed to further energy storage technologies in New York State. Evaluators, in collaboration with NYSERDA staff, grouped activities into the seven types described below; however, it is important to note that activities in each category are not executed independently but rather are coordinated efforts intended to complement one another.

4.1 Distribute information and build membership

NY-BEST serves its members and makes efforts to recruit additional members to build the energy storage cluster through distribution of relevant information and provision of resources to members and (to a limited extent) non-members. Specifically, NY-BEST distributes information by:

- Implementing a coordinated communication that includes
- Distributing a semi-monthly newsletter (including member spotlights)
- Being active in social media
- Reaching out to news media
- Funding opportunity announcements
- Maintaining supply chain and resource databases on Website
- Helping to facilitate new partnerships between members such as product development, supplier or research opportunities
- Serving as an information clearinghouse for members and policymakers on issues relevant to energy storage deployment
- Assessing member needs and opportunities through a member satisfaction survey
- Representing NY-BEST and New York's energy storage sector at national or international conferences

NY-BEST also participates in national and international energy-storage-related events, is active in social media, and aims to improve its Website functionality and keep content regularly updated in 2014 and into the future. NY-BEST tracks its presence in the news and other media to understand trends and improve its communications going forward.

4.2 Host conferences and webinars

NY-BEST educates members and encourages collaboration and partnerships through conferences and webinars. In 2013, NY-BEST organized five conferences and seven webinars. In 2014, NY-BEST organized a pre-conference educational seminar for the Capture the Energy Conference in March and will offer 4 regional and focused conferences between June and November 2014.

4.3 Provide targeted introductions

NY-BEST staff directly communicates with members and introduces members whose partnership could be beneficial to each other. This communication can be by phone or in person and results in meetings between members to discuss ways in which they may collaborate and partner. NY-BEST also facilitates communication between members and non-members.

4.4 Promote and distribute project funding opportunities

NY-BEST staff direct members with projects to funding opportunities, including: regional economic development councils, federal sources, and NYSERDA PONs. Projects have been funded through NYSERDA and with input from the NY-BEST membership and board of directors through two separate PONs.

- PON 1704 (March 2010) – 16 seed stage and development projects
- PON 2458 (2012-2014) – commercialization projects from lab to prototype (at least TRL 3)
 - Round 1 (applications were due May 2012) – 7 commercialization projects
 - Round 2 (due Nov 2012) – 7 commercialization projects
 - Round 3 (due Sep 2013) – 6 commercialization projects
 - Round 4 (due June 2014) – 9 commercialization projects
 - Round 5 (due December 2014)
 - Round 6 (due June 2015)

4.5 Provide testing and prototyping capabilities

NY-BEST is collaborating to provide a battery testing facility in Rochester, NY known as the Battery and Energy Storage Technologies Test and Commercialization Center (partnering with DNV GL, the center opened April 30, 2014). This facility provides a way for new technologies to be tested to industry standards. In addition, NY-BEST is working with the Rochester Institute of Technology to provide a battery prototyping facility. Both of these facilities are operated by third parties (not the NY-BEST operator directly) and provide cost-effective services to NY-BEST members and, in the case of the BEST Test Center, revenue sharing back to NY-BEST beginning in the second year of the center's operations.

4.6 Provide business support

NY-BEST offers business and technical support to member companies. This support includes helping companies prepare for grant funding or investor presentations. It also includes providing business guidance for beginning or expanding businesses, particularly as it relates to understanding the electric regulatory structure in New York State.

4.7 Promote policies that support energy storage

NY-BEST represents the battery and energy storage industry, encouraging policies and regulations that are amenable to the growth of the industry in New York. In particular, NY-BEST works with state and local officials involved in codes and standards development to encourage regulations that are friendly to energy storage implementation. Any NY-BEST lobbying activities (i.e., attempts to influence decisions of government officials) are supported entirely with non-NYSERDA funding.

5 Outputs

The table below summarizes the anticipated outputs, that is, the immediate results, of NY-BEST activities. For each output, the table describes types of information that indicate the extent to which outputs actually occur and identifies possible sources for that information.

Table 5-1: Outputs, Indicators, and Potential Data Sources

Outputs	Indicators	Data Sources and Potential Collection Approaches
Outputs from Information and Recruitment Activities		
Newsletters and external conference presentations	Breadth of distribution Number of recipients Recipient characteristics (i.e., which industries, levels, etc) Change in number of subscriptions Number of conferences and meetings where NY-BEST was represented	List of recipients by sector/geography Newsletter-related correspondences and/or social media presence Program reports on attendance
Conferences and webinars	Number of conference/webinars held Number of attendees Attendee characteristics (i.e., diversity of industry/interest groups, and hierarchical levels) Attendee feedback Sponsorship Summary of topics covered	Conference records Webinar slides and records Post-event surveys implemented by NY-BEST
Introduction meetings/phone calls	Number of introductions/meetings Continuance of relationships after introduction Number of collaborative outputs (papers/projects/product development or supplier relationships)	Evaluation surveys with NY-BEST members Meeting notes Program records of collaboration outputs
Outputs from Technology and Commercialization Activities		
Promising projects receive funding	Number of projects Quantity of funding and outside co-funding leveraged Number of publications, presentations, and patents from	Program records Evaluation surveys/interviews with funded project leaders Evaluation surveys with projects that were not funded

	<p>funded projects</p> <p>Advancement in Technology Readiness Level (or Manufacturing Readiness Level) as a result of funded project</p> <p>Representativeness of project portfolio (i.e., how well does breadth of projects represent battery and energy storage technology industry?)</p> <p>Relative outcomes to non-funded projects</p>	<p>Evaluation surveys with NY-BEST members</p>
<p>Products tested/prototyped at BTCC facility and prototype facility</p>	<p>Number of products tested over time</p> <p>Number of facility users over time</p> <p>Revenue generated</p> <p>Product progress toward successful commercialization</p>	<p>Facility usage records (aggregated)</p> <p>Program records on funded projects</p> <p>Evaluation surveys with NY-BEST members</p>
<p>Meetings; phone calls; business and marketing plans; business advice</p>	<p>Number of businesses directly assisted</p> <p>Characteristics of businesses receiving assistance</p> <p>Summary and value of assistance</p>	<p>Program records</p> <p>Evaluation surveys with NY-BEST members</p>
<p>Studies, meetings, and events promoting policies that support energy storage</p>	<p>NY-BEST identified as an expert in energy storage technologies and related policies</p>	<p>Evaluation interviews with industry experts</p> <p>Program policy briefings</p> <p>Evaluation surveys with NY-BEST members</p>

6 Outcomes and Logic Diagram

The following table describes the short-term and long-term outcomes anticipated to result from NY-BEST activities. The table also describes some possible indicators of the extent to which outcomes are realized and identifies sources of this information.

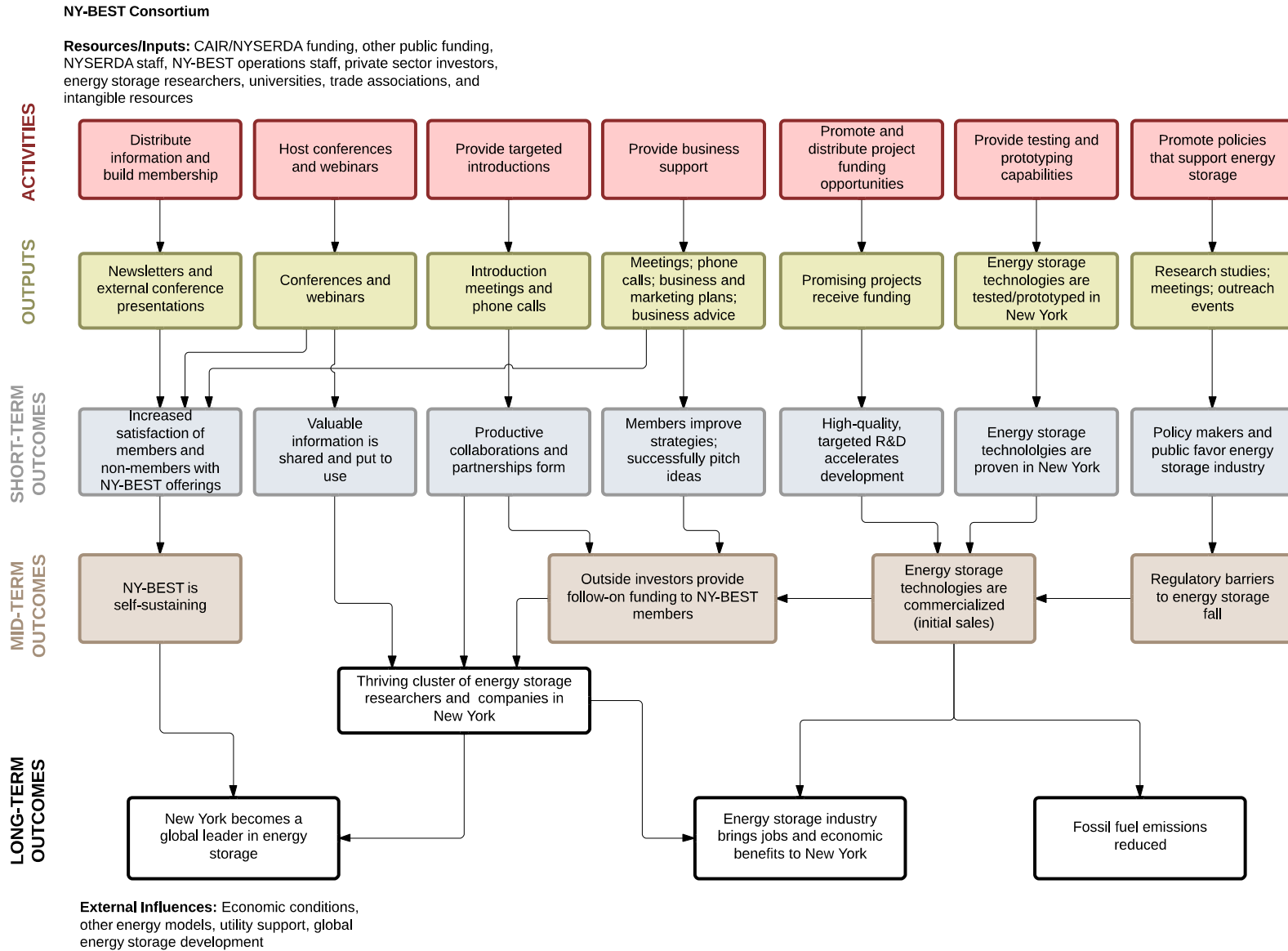
Table 6-1: Outcomes, Indicators, and Potential Data Sources

Outcomes	Indicators	Data Sources and Potential Collection Approaches
Short-term Outcomes from Information and Recruitment Activities		
Increased satisfaction of members and non-members with NY-BEST offerings	Net increase in membership Deep engagement of members in NY-BEST activities	Program records Evaluation surveys with NY-BEST members
Valuable supply-chain and resource information is shared and put to use among members	Increase in collaboration and number of partnerships Use and maintenance of supply chain and resource database	Supply chain/resource database usage information Evaluation surveys with NY-BEST members
Increased number and quality of productive collaborations and partnerships	Collaborative outputs including papers, projects, presentations, and products Sustained communication and information sharing between members Increase in membership	Number of member publications and presence at conferences and events Evaluation surveys with NY-BEST members
Short-term Outcomes of Technology Commercialization Activities		
High quality, targeted R&D accelerates product development	Projects funded by NY-BEST approach/achieve commercialization Projects funded by NY-BEST receive additional funding Increase in demand for BTCC facility services	Facility usage records (aggregated) Program records on funded projects Evaluation surveys with NY-BEST members Program records of outside investment in projects Media coverage of project successes
New technologies are tested and proven in New York	Projects funded by NY-BEST approach/achieve commercialization Projects funded by NY-BEST receive additional funding and companies receive investment	Facility usage records (aggregated) Program records on funded projects Evaluation surveys with NY-BEST

	funding	members Program records of outside investment in projects Media coverage of project successes
Members improve strategies; successfully pitch ideas to potential investors	NY-BEST members funded by investors	Program records of outside investment in projects
Officials and legislators adopt positions supportive of energy storage industry	Adoption of policies and rules supporting energy storage Increase in number of energy storage-related enterprises	Media coverage of activity in energy storage industry Member and/or expert feedback regarding regulatory and legislative climate for energy-storage technology development Program records of outside investment in projects and NY-BEST
Mid-term Outcomes		
NY-BEST is self-sustaining	Non-NYSERDA funding; primary operating costs to serve the membership are met	Program financial records
Outside investors provide follow on funding to NY-BEST members	Quantity of outside investment [# of firms, # of agreements, \$ invested] Number of investors	Project records
Energy storage technologies are proven and commercialized	Success of PON-funded projects: reach commercialization and technology transfer Increased ease of technological transfer	Program records on funded projects Evaluation surveys with NY-BEST members
Regulatory and policy barriers to energy storage are reduced	Policies or regulations change Favorable public perception of battery and energy storage technologies industry	Passed and implemented regulations or legislation Media coverage Company/industry records and reports
Long-Term Outcomes of NY-BEST Activities		
Thriving cluster of energy storage researchers and companies in New York	Number of battery and energy storage technology companies in NY steady or growing Size or maturity of battery and energy storage technology companies in NY steady or growing Sales of battery and energy storage technologies from NY	Program records on funded projects Evaluation surveys with NY-BEST members US DOE data US Census data (NAICS 3359)

	growing	
Energy storage industry brings jobs and other economic benefits to New York	Growth of companies and employment related to battery and energy storage technologies	Job and sales records from Industry Evaluation surveys with NY-BEST members
New York becomes a global leader in energy storage	<p>Involvement in standards setting NY-BEST associated technologies in place in New York state</p> <p>Sales success of products relying on battery energy storage technologies developed or commercialized in New York State</p> <p>New York is a leader in deployed energy storage solutions for the electric grid and transportation</p>	<p>Records of battery and energy storage technologies-related activities in NY state</p> <p>Record of technology demonstration and use in NY</p> <p>Sales data</p> <p>Comparative sales and use data for other states/nations</p>
Fossil fuel emissions decline as a result of energy-storage technologies commercialized and in use	NOx and SOx emissions proportionately reduced through proliferation of battery and energy storage technologies	<p>Market share information</p> <p>Sales data</p> <p>Engineering calculations of NOx and SOx offset</p>

Figure 6-1: NY-BEST Logic Diagram



7 Assumptions about Strategies

Implicit within the NY-BEST program logic are a number of assumptions. Connections are identified here for strategies.

- Expanding the energy storage industry in New York requires developing the technologies, businesses, and policies in parallel.
- A thriving cluster of energy storage companies will be a basis for jobs, economic benefits, and leadership in energy storage technology in New York.
- Resources and information, such as provided via newsletters, webinars, and conferences, provided to non-members encourages them to join the consortium to gain additional value from the network within the consortium and to support the industry.
- Consortium members gain value from the organization and seek to build the network and develop and grow relationships.
- Facilitated introductions and meetings result in more productive partnerships than would occur without NY-BEST facilitation. The NY-BEST operator is in a unique position to be able to match up researchers and companies who may be effective collaborators; this reduces search costs and development time.
- Collaborations can more readily accelerate technology development and transfer and may be more successful at attracting outside funding to further accelerate development and commercialization.
- Funding research projects results in technology development, technology transfer, or accelerated technology development and/or commercialization.
- Testing and prototyping facilities foster accelerated technology development and technology transfer.
- Providing business support services allows researchers to focus on the technologies they are developing without letting the key business activities fall completely to the side.
- Both supply of and demand for battery and energy storage technologies are currently below the level required for realization of NY-BEST's long-term goals. Program activities will drive both supply and demand.

8 Non-Program Influence on Outcomes

Outside of NY-BEST control, economic factors could influence the development of battery and energy storage technologies in New York State. For example, a deep recession could reduce both the demand for new technologies and the risk investors are willing to take on innovation. Conversely, rapid economic expansion can increase demand and risk preferences, pulling technology to develop faster. In addition, battery and energy storage technologies can be both a complementary and a competing good for traditional vehicle propulsion; this industry will be affected by changes in cost or regulation of vehicle manufacture, emissions, and fuel. Battery and energy storage technologies also support a changing electricity market; this industry will be affected by changes in electricity production and distribution – most notably changes from centralized to decentralized production and costs of fossil fuel resources and emissions regulations.

Other entities besides NY-BEST may have reasons for supporting battery and energy storage technologies and may provide funding or other incentives to develop and commercialize this technology. If so, these other interventions could limit the ability to attribute outcomes to NY-BEST activities.

9 References

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