

**Program Plan
For the Energy Efficiency and Renewable Energy Technology Account
Under New York’s Clean Air Interstate Rules (CAIR)**

— New York Battery and Energy Storage Technology Consortium —

*Originally prepared April 14, 2009 and revised on September 4, 2012
pursuant to NYSERDA Board Resolution No. 1329 adopted on June 18, 2012*

SECTION I: Introduction/Background

New York State’s regulations that implement the federal Clean Air Interstate Rule (CAIR) programs to control nitrogen oxide (NOx) emissions are set forth at 6 NYCRR Parts 243 and 244. These regulations establish seasonal and annual emissions cap-and-trade programs that are designed to mitigate interstate transport of ozone and fine particulate pollution. These regulatory programs will, in concert with other programs, assist states in the eastern U.S. in attaining the ozone and PM_{2.5} national ambient air quality standards.

Under Parts 243 and 244, 10% of the NOx emission allowances allocated under these regulations are allocated by the New York State Department of Environmental Conservation (DEC) to the Energy Efficiency and Renewable Energy Technology Accounts (the EERET Accounts). The New York State Energy Research and Development Authority (NYSERDA) is designated as the administrator of the accounts and is required to sell the allowances in order to obtain funds to “support programs that encourage and foster energy efficiency measures and renewable energy technologies and cover the reasonable costs associated with the administration and evaluation of these programs by NYSERDA.” [Part 243-1.2(b)(40) & Part 244-1.2(b)(39)]

Pursuant to the terms of the Cooperation Agreement with the DEC, NYSERDA is providing this CAIR Program Plan which summarizes and describes the Program to be supported. NYSERDA used these proceeds to help establish a “New York Battery and Energy Storage Technology Consortium”, (NY-BEST Consortium) to position New York as a leader in energy storage technology research, development, and manufacturing. It is anticipated that batteries will become the most critically important component of a vehicle, exceeding that of the engine, in terms of vehicle performance and value, within the next 20 years. Advancing such technology and developing products will transform the transportation and renewable power generation sectors and reduce NOx emissions. Vehicles, both highway and off road, account for approximately 60% of the NOx emissions in New York.

Plug-in Hybrid Electric Vehicles (PHEVs) are the most promising means to reduce fuel consumption and vehicle emissions from the transportation sector. It has been conservatively estimated that in excess of 40% of mobile greenhouse gas (GHG) production and NOx could be eliminated through the use of PHEVs without negatively impacting the electric grid. Nearly all of the major car companies have plans to introduce this technology over the next several years with the focus on light-duty vehicles. However, advanced battery and energy storage technology is equally applicable to improving energy efficiency in the electric rail and medium and heavy-duty vehicle markets as it is to the light-duty automotive market.

New York is as much the center of heavy-duty transportation technology and product manufacturing as the State of Michigan is to automobile technology and manufacturing. Indeed, New York is the home of companies like Bombardier, Kawasaki and Alstom building electric rail and BAE Systems, General Electric, and Orion Bus, world leaders in heavy-duty hybrid electric, on-road vehicles. With this initiative New York will be an important supplier of this next generation of transportation technology. In addition, NOx emissions from medium and heavy-duty vehicles, which account for approximately 25% of New York's NOx emissions, will be reduced.

NYSERDA has experience with heavy-duty hybrid electric vehicles. The hybrid-electric transit busses developed with NYSERDA support by BAE Systems and Orion Bus were the first and remain the most successful commercial, hybrid electric, heavy-duty vehicle made. With NYSERDA's oversight, the NY-BEST Consortium can play an important role in maintaining New York's leadership in the rail and heavy-duty transportation sectors, contributing New York value-added to the next generation of hybrid-electric vehicles, and developing technologies that can enable the use of intermittent, renewable generation resources to reduce peak-power demand, when applied to stationary applications.

An annual report available on the NYSERDA website is also prepared by NYSERDA pursuant to this Program Plan and describes progress toward meeting the goals and objectives outlined in this Program Plan.

SECTION II: Program Goals and Focus

The NY-BEST Consortium's mission is to facilitate world-class, industrially relevant, applied, and translational research and product development, and to support industrial activity in New York in the commercialization of advanced battery and energy storage technology. The goal is for the NY-BEST Consortium to facilitate a "cluster" of advanced battery/ energy storage research and manufacturing capabilities in New York. This goal will be achieved through coordination and financial support of New York universities' research capabilities and industrial strengths.

The NY-BEST Consortium will provide its members with critical resources for the development of advanced energy storage technologies. This includes: providing specific funding programs for individual researchers, corporate, and academic R&D partnerships; supporting technology transfer efforts related to batteries, supercapacitors, and other technologies; and providing NY-BEST Consortium members with subsidized access to advanced battery testing capabilities. This will be a subsidized, shared-access facility with testing and measurement equipment, and staff with expertise in standard testing protocols to assist in technology development and acceleration of commercial product design.

Activities funded with the use of CAIR funds will be competitively selected using NYSERDA's procurement process. This process makes use of an expert technical evaluation panel in the selection of program activities and contractors. Evaluation criteria will include: potential to maximize energy, environmental and economic benefits to New York; technical merit and risk; proposer qualifications; and cost share. Particular emphasis will be placed on technologies that have the potential to reduce emissions relevant to the CAIR regulations.

SECTION III: Program Description

A. NY-BEST Consortium Structure

The NY-BEST Consortium will be a distributed innovation and research network whose members have access to unique and valuable battery and energy storage testing capabilities and networking with others involved in leading-edge, battery technology development and commercialization. The NY-BEST Consortium will be organized and operated according to the following principles:

1. Open Membership

The NY-BEST Consortium membership will be open to all businesses and institutions involved in or interested in advancing battery and energy storage technology in New York State. Members will be kept informed of and will be eligible to participate in all NY-BEST Consortium sponsored activities. This includes: submitting proposals for research and in response to solicitations for same; attending symposiums and technical conferences and webcasts sponsored by the Consortium; and accessing facilities and testing capabilities supported by the NY-BEST Consortium. Members may be assessed fees as necessary to cover the administrative costs and expenses associated with some of these activities and services. It will be managed in a manner to firewall and protect member's proprietary information and intellectual property.

2. NY-BEST Consortium Administration

NYSERDA will receive and distribute CAIR funds and have the following responsibilities:

- Organize stakeholder workshops and a NY-BEST Consortium Technical Advisory Group.
- Select and oversee contractors and organizations providing direction, business planning, management, administration, technology transfer, and symposium organization services to the NY-BEST Consortium.
- Work with the Technical Advisory Group and NY-BEST Consortium members to identify priority research areas.
- Fund solicitations for competitively-selected funded research projects.
- Provide contract and administrative management to all NY-BEST Consortium funded activities.
- Select and oversee an entity to operate any facilities and battery testing operations funded by the NY-BEST Consortium.
- Facilitate the establishment of a Consortium management committee to coordinate research activities and collaborative proposals for other sources of funding, including federal research funds.
- Facilitate the use of the NY-BEST Consortium to leverage and attract additional Federal, industrial research funds, and appropriate funding from other NYSERDA managed programs. This may include the use of NY-BEST Consortium funds combined with pooled member funding that is directed to defined research.

3. Technical Advisory Group

A NY-BEST Consortium Technical Advisory Group representing a broad array of industrial, academic and energy experts will be convened to provide advice on NY-BEST Consortium-funded activities. The Technical Advisory Group will meet to review and provide input on annual updates to the Operating Plan. Since the NY-BEST Consortium was incorporated in 2009-10, this Technical

Advisory Group's role is provided through the Consortium's Board of Directors with input from committees and the membership.

B. Targeted NY-BEST Consortium Activities

1. Research Grants

CAIR funding will support research grants to advance the commercial viability of battery and energy storage technology in New York State. Every effort will be made to facilitate multi-year projects, thus assuring a minimum NY-BEST Consortium life of 3 years, with the goal of achieving 5 years of financially supported operation from CAIR. The use of NYSERDA's program staff and administrative services during an initial period will allow efficient program delivery during start-up. Every effort will be made to leverage the available CAIR funding with private investment, federal funding and other state resources, where appropriate, in the mid-term with a long-term goal of self-sustainability.

Research program grant delivery will use a competitive solicitation process. Commitments will be made for multi-year research projects. Projects will be phased with milestone "gates" to minimize risk and allow funding adjustments. Funded project participants will be required to participate in scheduled technical teleconferences/web-casts and symposiums.

Multiple solicitations are anticipated addressing both applied and commercially-focused research. An industry-led Technical Advisory Group will be used to guide commercially focused research, and together with experts from the scientific community, set goals for non-proprietary, collaborative research in support of broad initiative technology advancement.

The funding for NY-BEST Consortium activities will be independent of other NYSERDA programs and will have separate financial accountability and metrics. However, Consortium grant recipients will also be eligible to participate in other NYSERDA programs and receive funding for activities that are not eligible for or not funded under the NY-BEST Consortium program. These additional funds may augment research thereby providing additional funding continuity in the commercialization phases for successful Consortium research. These NYSERDA programs include:

- Clean Energy Advanced Research Centers (potential RGGI funding)
- Transportation, Renewable Generation Product Development Program (NYSERDA, Statutory Program and SBC programs funding)
- Clean Energy Products Manufacturing Incentive Programs (SBC Program funded)
- Early adaptor incentive programs for market development (SBC Program funded)
- Clean Energy Economy Workforce Training

2. NY-BEST Consortium Sponsored Battery Testing Facility

Access to battery testing capabilities is a critical element in the advancement of battery technology. Developmental testing capabilities are different than those of production line testing and few facilities exist due to the expensive and specialized equipment that is necessary, together with trained technical staff. The NY-BEST Consortium will establish such a testing facility in New York State. The NY-BEST Consortium will underwrite the equipping and operation of the facility for an

initial three years and provide access to and use of the testing capabilities to NY-BEST Consortium members at reduced rates during those initial three years.

The NY-BEST Consortium will procure the specialized multi-channel, performance and life-cycling testing equipment required to accomplish developmental testing capabilities on the wide range of battery and energy storage products of interest to Consortium members. An operating entity will be selected to staff and manage the operations of the facility for an initial three year term. It is anticipated that, in addition to the battery testing operations, the facility would house, and the operating entity would provide, NY-BEST Consortium business, technology transfer and management operations. The operating entity, with guidance from the NY-BEST Consortium Technical Advisory Group, will be responsible for facility oversight and resolution of scheduling conflicts or budgetary issues.

3. NY-BEST Consortium Coordinated Technology Transfer Activities

A critical element of the distributed innovation model of this Consortium is active communication. The NY-BEST Consortium will sponsor technology transfer and commercialization activities aimed at increasing the probability of capturing economic benefits within New York. This will be an important part of the overall program. This will be achieved through teleconference, web conferences, and technical symposiums. These briefings and networking opportunities will feature presentations of the work being funded by the NY-BEST Consortium as well as the status and results of leading-edge research being done around the world. It will also include presentations relating to business and financial topics of interest to the community.

Section IV: Funding and Budget

According to 6 NYCRR Part 243 (“Part 243”) and 6 NYCRR Part 244 (“Part 244”), fossil-fueled power plants must comply with the programs by obtaining and retiring one allowance for every short ton of NO_x emitted during the compliance period. Pursuant to Part 243 and Part 244, DEC has allocated 10% of the 2009, 2010, and 2011 allowances to NYSERDA to be made available for sale in the existing NO_x Allowance marketplace. Through the issuance of a competitive solicitation NYSERDA retained the services of a professional emissions broker, Amerex Brokers, LLC, to assist in the sale of the allowances. The total quantity of NO_x Allowances available for sale was 23,013 allowances, comprised of:

- 9,327 for the Ozone Season Program. (3,109 each year for the 2009 through the 2011 allocation period).
- 13,686 for the Annual Program (4,562 each year for the 2009 through the 2011 allocation period).

Sales of the Annual Program allowances began in February 2009. The NYSERDA strategy was to engage end users who had a need for compliance allowances. In light of the regulatory uncertainty, the early strategy was to place more of an emphasis on selling the 2011 and 2010 allowances. This strategy proved to be effective in capturing higher value in a downward trending market, and it also allowed Amerex to be more selective in the offers it would consider.

NYSERDA sold all of the *Annual Program Allowances* it was allocated for total gross revenues of \$23,968,500. Aggregate sales results, along with various market prices, can be found in Table 1.1.

Table 1.1: Annual NOx Allowance Sales Data

	Vintage		
	2009	2010	2011
Weighted Average Price (per allowance)	\$ 2,316	\$ 1,722	\$ 1,216
Highest Price Achieved	\$ 3,000	\$ 1,750	\$ 1,550
Lowest Price Achieved	\$ 2,000	\$ 1,500	\$ 725
Number of Allowances (13,686 total)	4,562	4,562	4,562
Gross Revenue (\$23,968,500 total)	\$10,564,500	\$7,855,500	\$5,548,500

NYSERDA sold all of the *Seasonal Program Allowances* it was allocated for total gross revenues of \$473,350. Aggregate sales results, along with various market prices, can be found in Table 1.2.

Table 1.2: Seasonal NOx Allowance Sales Data

	Vintage		
	2009	2010	2011
Weighted Average Price (per allowance)	\$ 83.83	\$ 53.70	\$ 15.40
Highest Price Achieved	\$ 140	\$ 125	\$ 20
Lowest Price Achieved	\$ 35	\$ 35	\$ 15
Number of Allowances (9,327 total)	3,109	3,109	3,109
Gross Revenue (\$473,350 total)	\$260,622	\$164,843	\$47,885

Cumulative interest earnings of \$1,057,000 on CAIR funds was also realized through March 31, 2012 resulting in total available funding of \$25,498,850 budgeted as follows:

	Budget
Consortium 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

SECTION V: NYSERDA Administration

NYSERDA's administrative costs for staffing and direct costs are described in this section. NYSERDA management will use its best efforts to balance the need for minimized administrative expenses while ensuring delivery of a quality program.

The members of NYSERDA's Board of Directors and NYSERDA management and staff are committed to carrying out their responsibilities with accountability and transparency, through efficient and effective operations. NYSERDA uses an open, stakeholder-based planning process in developing, operating, and evaluating its programs. In administering all of its programs, including the program proposed in this Program Plan, contracts are procured in accordance with NYSERDA's, "Procurement Contract Guidelines, Operative Policy and Instruction" (Guidelines), approved annually by NYSERDA's Board of Directors pursuant to Public Authorities Law Section 2879.

In addition to the rigorous contractor selection process, NYSERDA closely tracks program expenditures by using an automated accounting system which facilitates an accurate and timely accounting of all program expenditures. This system also provides for an efficient and accurate accounting of administrative costs using its well-established system of internal controls and a variety of system procedures.

The estimated administration costs for the NY-BEST Consortium program was based on the program administration budget established for NYSERDA's SBC-funded energy programs, which is limited to not more than 7% of total funding. Ultimately, if staff resources needed to administer the programs are determined to be higher than the amount proposed in the budget in this Program Plan, NYSERDA will present a request to amend the Operating Plan and program administration budget.

The original budget was based upon NY-BEST hiring an Executive Director and staff early in its history. This did not occur until December 2010, almost 21 months after the first NY-BEST stakeholder workshop was held. During this time, NYSERDA staff served as the operating arm of NY-BEST. These activities far exceeded what had originally been planned. This delay was due primarily to ramp-up time associated with developing bylaws, forming working groups, developing membership criteria, forming the board, planning the first organizational meeting, and the NY-BEST Board determining the job requirements and interviewing for an Executive Director. The NYSERDA Administration budget was revised to 8.6% accounting for this increased effort to ensure adequate program oversight and administration including on research and development awards through the remainder of budgeted CAIR funds.

For this research and development program, NYSERDA will be responsible for the oversight of the NY-BEST Consortium activities as outlined in Section III 2. Program staff will review application of contractors, provide oversight of the performance of those partners, and work to resolve any issues that may arise between customers and program partners. In addition, Program staff will coordinate activities with other state agencies, utilities and other organizations that may have related programs, or may be one of several funding sources for programs, and update operating plans as needed to reflect changing market conditions. Finally, Program staff will review individual projects, perform on-site inspections, and follow-up on quality issues and corrective actions.

SECTION VI: Program Evaluation and Accountability

As described above the total cost for program evaluation and accountability will not exceed 2% of the overall budget. The not-to-exceed evaluation budget may be subject to the development of ultimate evaluation activities without compromising the quality of evaluation, and ensuring that a maximum amount of funds are directed to the research grant funding.

It is anticipated that NYSERDA will hire an independent consultant/organization with expertise in evaluating these types of technology-based development programs to verify and assess the benefits of the program and value to New York State. Depending on the scale of the initiative, an evaluation by an independent organization such as the National Academy of Engineering or the New York Academy of Sciences may be appropriate at some point in the program.

NYSERDA will provide an annual report on program activities in the previous year and an evaluation of the results and impacts of the program, consistent with the metrics below.

Research Grants

1. Bibliometrics
2. Patents and Licenses
3. Awards
4. Outside funding received

Battery Testing Facility

1. Jobs (staffing)
2. Technology Readiness Level (TRL)
3. Manufacturing Readiness Level (MRL)

Tech Transfer

1. Teleconferences, symposiums, workshops, seminars, publications, etc.
2. Topics, presenters, attendance, frequency, etc.

Commercialization

1. Capital investment
2. Customer market(s) and market penetration
3. Product sales
4. Supply chain participants and licensees
5. Jobs created and retained
6. Energy, economic, and environmental benefits

The evaluation of the benefits of product research and development is often challenging due to the long time frames required for applied research, the process of introducing the resulting product into the market, and the way in which investments are made during different stages of the product lifecycle. The program evaluation and accountability that will be employed will be consistent with the requirements for measurement, verification, and evaluation in the NYSERDA-DEC Cooperative Agreement, including an annual report on program activities. These annual reports prepared by

NYSERDA describe progress toward meeting the goals and objectives outlined in this Program Plan and are available on the NYSERDA website.

SECTION VII: Anticipated Schedule

The Program Plan was initially developed as a three-year plan. The actual timeline for the implementation of the initiative, and priorities for the next year, are described in the CAIR Annual Reports available on the NYSERDA website. As the-NY-BEST Consortium progresses, the plan will continue to be reviewed annually and adjustments will be made as necessary.