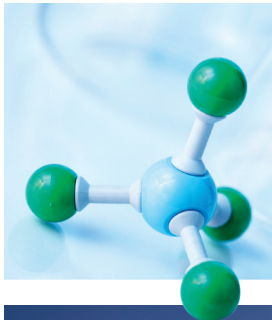
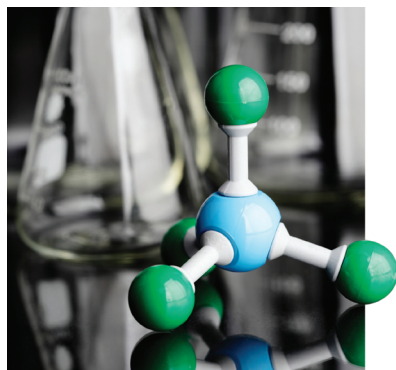




New York: Where focused
Research & Development
helps innovative technologies
come to life.



NEW YORK STATE: The financial and intellectual capital to drive change **is right here.**



New technologies leap from lab to factory floor. New businesses and established leaders bring their ideas to life. New energy alternatives are explored, developed, and brought to market. A clean energy economy is expanding across New York State. Today.

For more than 30 years, the New York State Energy Research and Development Authority (NYSERDA) has helped advance innovative energy solutions in New York State to improve New York's economy and environment by supporting:

- New technology to improve commercial and industrial processes
- New energy alternatives from our own backyard
- New methods to reduce waste and pollution
- New clean energy startups and ventures
- New ways to connect our communities with clean energy transportation and reduce our environmental footprint

NYSERDA: A catalyst for turning innovative ideas into real-world technology— **with widespread impact.**



NYSERDA leads the way in supporting innovative businesses and promoting sustainable technologies. With hundreds of millions of dollars in annual program investment to advance clean and efficient technologies, New York State is currently ranked:

- Top tier in the United States for clean technology patents
- Top tier in the United States—and the world—for clean technology clusters
- Top tier in low carbon footprint in the electricity sector
- Top tier in the United States for clean economy jobs
- Lowest per capita energy use of any state in the nation



NYSERDA helps Prism Solar manufacture PV modules right here in New York State. Their hologram technology directs the sun's rays and reduces the number of costly PV cells typically needed.

PHOTO COURTESY OF PRISM SOLAR

GAME-CHANGING RESULTS

in every targeted area



Focused Research & Development has turned innovative ideas into business success all across New York State. Here are just a few of the most substantial examples. Each is listed by industry sector and tied to at least one of NYSERDA's four mission goals for real world results, including: reducing energy waste and cost, growing renewable energy supplies, creating a clean energy economy, and protecting the environment.

Real World Results



Reducing Energy
Waste and Cost



Growing Renewable
Energy Supplies



Creating a Clean
Energy Economy



Protecting the
Environment



In 2010, NYSERDA supported 210 clean energy companies—including 117 startups—who made significant strides to commercialize their products and grow their businesses in New York State.

The results of these efforts alone are expected to total **\$1.2 billion** in sales and create **950 jobs** in New York State over the next five years, and contribute to \$52 million in private investment.

TRANSPORTATION

This sector accounted for 77% of petroleum consumption and 40% of greenhouse gas production in New York State in 2009, and percentages have increased each year since. NYSERDA R&D and deployment programs are helping the state reduce fuel use and emissions.



New York City Buses Contribute to Market Transformation



As there are more public buses per square mile in New York City than most cities, the return on investment from technology improvements is substantial. Orion Bus of Oriskany, NY's work with BAE Systems of

Johnson City, NY has resulted in 2,300 hybrid buses to date with **fuel savings of more than 25% and corresponding reductions in emissions of particulate matter, NOX and greenhouse gases.** NYSERDA stage-gate funding and support helped reduce the deployment risk and accelerate the use of this market-changing technology in New York and beyond.

HEATING AND COOLING

New York uses more heating oil than any state in the US, accounting for 25 percent of national consumption. With rising prices, families and small businesses across the state will soon be paying on average \$2,400 per year for heating and domestic hot water. NYSERDA programs share the risk in finding solutions.



Promoting Efficient, Cleaner Wood Heat



NYSERDA has spearheaded efforts to increase the efficiency of wood heating equipment by **50% and reduce emissions to less than 2% of conventional technologies by working with in-state manufacturers**

to develop more advanced combustion designs. The effort has also resulted in a change in federal test methods, which facilitates the entry of newer, cleaner technologies into the marketplace. As a result, a home-grown renewable resource can be used in New York manufactured heating appliances in a much cleaner, and efficient manner.



Leading the Way in Energy Efficient Alternative Fuels



Given New York's reliance on fuel oil, research into ultra low-sulfur heating oil, bio-oil blends and high efficiency/performance wood systems is a priority for New York. Efforts at Brookhaven

National Labs, supported by NYSERDA, may lead to a national reduction in foreign oil and have already **saved \$2.5 billion in energy costs**—mostly in New York State. That means more money in the hands of New Yorkers.

COGENERATION

Combined Heat and Power (CHP) installations provide users with more options for improving power reliability and quality and reducing costs. They also alleviate grid constraints and reduce fossil fuel use by improving efficiency. NYSERDA's CHP program includes more than 100 sites and has been awarded the American Council for an Energy-Efficient Economy States Stepping Forward Award.



Powerful New Technology Sets a Precedent



The installation of a 7½ megawatt power system by New York Presbyterian Hospital in Con Edison territory was enabled by a specialty pyrotechnic device called a fast fuse. The fast fuse enabled a combined

heat and power system that allows the hospital to generate 60–100% of its own energy and **save more than \$169,000 per year** without putting Con Edison's wires at risk. The benefits of this installation are shared by the community and the hospital. The utility has now approved this as a **standard technique for future use.** NYSERDA funding and support helped enable the demonstration and acceptance of the fast fuse.



Groundbreaking Change in Regulations

Faxton St. Luke's Hospital and Utica College, with support from NYSERDA, **obtained precedent-setting permission** to run private wires across a public right of way for their combined power and heat project — **influencing an important change in state regulations** concerning non-utilities and paving the way for future CHP projects.

MANUFACTURING

Ceramic manufacturing is an important—and energy-intensive—industrial sector for New York State. NYSEERDA is working with companies throughout the state to help improve manufacturing processes.



Helping One Hot Company Helps a Whole Industry Sector



NYSEERDA worked with World Kitchen on technology and process improvements in its Corning, NY location. The resulting energy savings and reduced carbon footprint achieved by World Kitchen demonstrate how new

technology can be used for other ceramics manufacturers and has had a positive impact on the city's economic development. World Kitchen not only improved its production capabilities, but also realized a **\$1.6 million reduction** in annual energy costs and protected **400 jobs**.

BUILDINGS

According to the United States Department of Energy, the building sector is the largest consumer of energy—more than transportation or industry. NYSEERDA funds research and development capabilities of component and material suppliers, facilitates communications between the design and construction industries, and promotes the availability of information and price signals to increase adoption of innovative technology. This has already helped New York small businesses introduce 40 new products, create 334 new jobs, increase product sales by \$238 million and decrease energy costs by \$161 million, all in the last decade.



Renovations with Constructive Results



There are substantial opportunities to improve the energy efficiency of low-income homes. NYSEERDA's Deep Retrofit program has provided significant training for contractors, led to the needed renovation of existing

homes and provided the **intelligence to launch the next phase** of the Deep Retrofit program. This work will promote comprehensive insulating, air sealing and cladding products to integrate into the retrofit market.

WASTEWATER TREATMENT

Water and wastewater treatment facilities in New York State consume more than three billion kWh of electricity each year, enough to power almost 500,000 average homes for a year. With rising infrastructure demands, increasingly stringent regulations and decreasing resources, municipalities are looking for ways to reduce their costs and carbon footprint. Through a variety of cost-shared technical assistance, research, demonstration, and outreach programs, NYSEERDA encourages municipalities in New York State to adopt commercially available and innovative technologies that improve the energy efficiency and economics of their treatment facilities, while also meeting or exceeding regulatory requirements and reducing the overall environmental impacts of these facilities.



Eliminating Wasted Spending on Waste

NYSEERDA provided funding to AnAerobics, Inc., now called Ecovation, Inc., to use Mobilized Film Technology (MFTSM) for wastewater treatment. Ecovation, Inc.'s innovations have generated more than **\$50 million in revenue/year** from five plants across New York State and **440,000 gal/month in savings of sludge hauling and landfill**, as well as over **186 MW/month savings in electricity**. Municipalities can use these savings to fund other critical services in their communities.

LIGHTING

Artificial lighting consumes 8% of US energy and 22% of our electricity. In New York, NYSEERDA teams with lighting manufacturers to develop quality, energy-efficient products.



Shining a Light on Real Energy Savings

NYSEERDA and Lamar Lighting recognized the opportunities energy-efficient technologies could realize in stairwells. With NYSEERDA funding and support, Lamar Lighting developed the Occu-Smart lighting system. This system can provide **energy savings of up to 53%** in residential buildings and **77%** in commercial buildings.

ENERGY MARKETS & EMERGING TECHNOLOGIES

New York has an aggressive goal of obtaining 30% of its electricity from renewable sources by 2015, often referred to as "30x15." NYSEERDA supports this initiative by working to build a vibrant renewable energy industry in the state and providing programs that bring industry, workforces, inspectors, and associated businesses together.



Wind Powers Jobs, Income and Clean Air

At the time it was built, the Maple Ridge Wind Farm was the largest wind farm east of the Mississippi. Pre-competitive marketplace intelligence to improve site selection helped create this 321 megawatt wind farm in Lewis County. The farm supports **hundreds of jobs**, generates **income to farmers**, **raises tax revenue**, and **displaces fossil fuels**—totaling a **\$136 million economic benefit** to New York State over the next 20 years.



Renewable Energy is Happening

The one-of-a-kind Renewable Portfolio Standard (RPS) is a central procurement system made up of Main and Customer-Sited tiers. NYSERDA administers the RPS for New York State. The Main Tier is a competitive, closed-bid auction that brings cost-effective renewable energy resources online. The Customer-Sited Tier provides an open-enrollment process for smaller-scale renewable energy technologies. By 2015, installations supported through the RPS are expected to produce **10.4 million MWhr of clean renewable energy**, enough to power 1.5 million average homes per year.

ENERGY STORAGE

One of the greatest challenges in the chain of energy production and delivery is storage. In 2009, the New York Battery and Energy Storage Technology Consortium (NY-BEST™) was launched to help position New York as a global leader in energy storage technology for heavy-duty transportation, electric grid and other applications. NY-BEST represents a key public/private partnership to promote broad, statewide implementation of a safe, secure and reliable smart grid. NYSERDA seeded the initiative with approximately \$25 million from Clean Air Interstate Rule (CAIR) proceeds.



Proven Success Leads to Federal Support

Beginning with state funding, NY-BEST has gone on to attract federal dollars. One NY-BEST member, GE, is pursuing the use of batteries for both stationary and transportation applications leading to a factory, and more than **300 jobs**. This industry-led coalition is building and promoting a vibrant, world-class, advanced battery and energy storage sector in New York.

TRANSMISSION AND DISTRIBUTION

According to the United States Department of Energy, transmission and distribution losses in the US are approximately 10%. NYSERDA helps support the

development of advanced technologies that will improve the efficiency and delivery of power for electric customers across the state. These investments strengthen the reliability of the New York grid and have the potential to benefit electric customers around the world.



Lower Cost Energy and Zero CO₂

NYSERDA awarded \$2 million to Beacon Power Corporation for the deployment of a 20 MW advanced flywheel-based energy storage system

in Stephentown, NY to provide fast-response frequency regulation to the New York Independent System Operator electric transmission system. The flywheel, built of carbon fiber composite material and installed in underground concrete vaults to mitigate noise and safety risk, can raise or lower frequency in real-time as needed. This technology has **low variable operating costs, and produces zero direct CO₂ greenhouse gas or other emissions.**



NYSERDA brings together the people, resources and funding for **the clean energy world.**



**Supporting
Goals**
**Connecting
People and
Partners**
**Strengthening
Business**
**Expanding
Market Potential**
**Developing
Technology**
**Sharing
Risk**

R&D leaders who offer expertise, leadership and results.

NYSERDA staff has the academic credentials and industry experience to successfully support business innovation and connect New York's talent with needed resources.

Investment is working—in real dollars

- New York's renewable energy program delivers \$4 to \$5 in benefits for every \$1 invested.
- Every \$1 co-invested with our New York business partners in energy product development provides an increase of approximately \$5 in Gross State Product—totaling \$200 million per year in sales.
- NYSERDA's R&D program has supported the development of over 175 products.

Investment is working—creating real power

- RPS Main Tier Program incentivized 27 operating facilities to produce 1,829 GWhs of electricity in 2010—enough to power 265,000 homes for a year.
- RPS Customer-Sited Tier Program helped 1,950 small-scale installations generate 50 GWhs through grid-connected renewable resources—enough to power 7,200 homes per year.

Investment is working—for real change

- NYSERDA's environmental research has been used to support mercury pollution control, acid rain policy, and the design of air quality planning tools and strategies.
- NYSERDA's environmental expertise led to the drafting of a New York State Climate Action Plan.

Connecting the intelligence and resources that drive innovation

The world is changing. To see individuals and businesses embrace new forms of energy and environmentally sound behaviors, we must create an environment where bold ideas get the nurturing and funding they need to become reality. We need to encourage collaboration and healthy competition at the same time. We need a playing field where risks are mitigated and results are rewarded. This is the research and development landscape that NYSERDA fosters across New York State—every day.

 **Learn more at www.nyserda.org**

About NYSERDA

New York State Energy Research and Development Authority (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.

