

NYSERDA Research and Development

Helping innovative technologies in the
Heating and Cooling Sector come to life.



Maintaining comfortable year-round temperatures in homes and businesses, in the most efficient way possible, affects all New Yorkers.

New York State uses more heating oil than any state in the U.S., accounting for 25% of the national consumption. With rising prices, families and small businesses across the state could be paying on average \$2,400 per year for heating and domestic hot water. While natural gas is relatively inexpensive compared to heating oil, many rural areas in the state do not have access to natural gas pipelines, leaving them with the more expensive alternatives such as oil, propane, and electricity. Other rural home and business owners are heating with wood, which can be environmentally unsound.

Laboratory testing has shown the latest oil- and gas-fired heating technologies are approaching their maximum performance limits. Integrating these systems with advanced controls promotes optimum performance under

real world conditions. Hybridizing these systems with a heat pump allows them to surpass the maximum performance of a standalone system, thereby greatly increasing energy efficiency.

Finding Solutions

NYSERDA is working with equipment manufacturers and energy researchers to help promote these and other solutions. For example, at Brookhaven National Laboratory (BNL), scientists partnering with NYSERDA are working to characterize high-efficiency wood boilers that can pass stringent emissions testing. NYSERDA also sponsors researching the use of heat pumps to augment the function of natural gas systems for both heating and cooling applications, which can push the efficiencies of these systems above 100%. Other strategies include integrating temperature control systems into the main building system to provide smart monitoring of when and how the boilers are fired, reducing the building's overall energy load. These, and other technologies, take advantage of New York State's abundant natural resources and its progressive industrial and manufacturing sector.



Featured Examples

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. NYSERDA is also supporting BNL to research and develop a test method for evaluating advanced wood-fired heating equipment. The findings of the study will inform the EPA as it revises wood burning regulations. As a result, a home-grown renewable resource can be used in New York State manufactured heating appliances in a much cleaner and efficient manner.

Leading the Way in Energy Efficient Alternative Fuels

Photo Courtesy Brookhaven National Laboratory



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

Building a Biodiesel Boiler

Photo Courtesy Brookhaven National Laboratory



A B100-fired boiler in a Brookhaven National Laboratory testing facility

NYSERDA partnered again with Brookhaven National Laboratory and boiler manufacturer Fulton Heating Solutions to test a newly developed boiler that runs on pure biodiesel fuel. By testing with different types of biofuels, including tallow-based and soybean-based products, researchers were able to identify and resolve cold-temperature operating problems that could occur under adverse fuel-storage and boiler room temperature conditions. They were also able to characterize burner performance and conduct corrosion analysis, as well as test for carbon-monoxide, nitrogen-oxide, sulfur-dioxide, and soot emissions during operation. As a result of the extensive testing, researchers found that a properly designed and operated biodiesel boiler could be an efficient commercial alternative to systems currently using natural gas or heating oil.

Learn more at nyserdera.ny.gov

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.