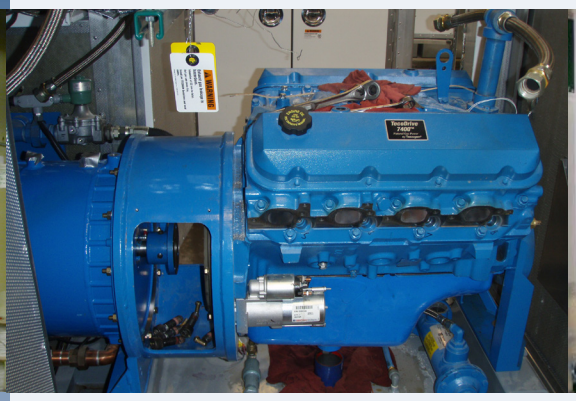
The New York State Energy Research and Development Authority's


Combined Heat and Power Program Guide

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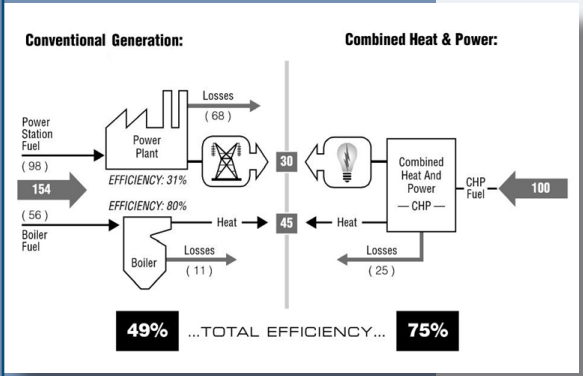
Combined Heat and Power (CHP)



Typical comparison of Combined Heat and Power versus Separate Heat and Power

NYSERDA has supported the installation of over 50 Operational CHP projects throughout New York State

Combined Heat and Power (CHP) is the simultaneous generation of two or more forms of energy from a single fuel source. By recycling valuable heat from the combustion process, CHP results in far greater efficiencies than centralized power generation. The recovered thermal energy may be used for industrial processes, space heating, and refrigeration or space cooling through an absorption chiller. CHP is considered the most viable and economical use of distributed generation (DG) when implemented at or near the point of use. CHP offers many benefits to energy consumers choosing to adopt this technology including:

- Modern equipment is environmentally friendly
- Uses available heat (thermal energy) to improve fuel-use efficiency
- Diversifies electric supplies to the end-user and enhances energy security
- On-site generation alleviates geographical transmission and distribution load constraints

NYSERDA's ROLE

NYSERDA recognizes the end-user and societal benefits offered by DG/CHP as well as the risks and hurdles facing it, and in 2000, it initiated a DG/CHP demonstration program to validate in-field experiences with a wide array of CHP technologies. Having clearly demonstrated that certain technologies and applications are reliably effective, in 2006, NYSERDA created a suite of CHP performance programs to encourage widescale adoption of proven systems.

NYSERDA's support and proliferation of CHP technology have met with considerable success, but NYSERDA has reached only the tip of the iceberg. There is much more that can be accomplished using this energy saving technology. NYSERDA programs seek to: raise awareness and adoption rates; improve equipment (especially integration into pre-packaged systems to reduce costs, simplify installation, increase efficiency, minimize emissions, and improve reliability); simplify interconnection of systems designed with stand-alone capability; improve compatibility for operation using renewable fuels; and advance the new and emerging state-of-the-art technologies such as fuel cells, Stirling Engines, Organic Rankine Cycle systems, and microCHP sized for a single-family residence.

As of mid-2008, NYSERDA programs support and fund over 110 projects for the installation of CHP at customer sites, and over 150 feasibility studies for CHP technologies, as well as numerous product development projects and technology transfer studies. Collectively, these projects represent a NYSERDA funding contribution of over $85 million, and at full-build these systems will produce 153 MW of electricity. As of mid-2008, 54 projects are operational, producing over 30 MW of electricity.

NYSERDA Programs

NYSERDA has established numerous CHP programs that have tailored features to specifically address the needs of the marketplace at various stages of decision making or technology maturity. A detailed list of the programs is located on Page 6.

The following are the five categories of projects that NYSERDA currently supports. Please note that many of NYSERDA's programs cover more than one category of projects.

DEVELOPMENT – The main objectives of NYSERDA's Development projects are to assess the viability of new concepts, develop proven ideas into new products, improve upon the design of current products and their manufacturing processes, conduct detailed market and technology research, develop business plans, and risk-share with technologists. Programs that include Development projects are: Power Systems, Clean Technology Manufacturing, and NextGen.

DEMONSTRATION – The Demonstration projects rely on experts to select promising technologies for in-field testing, fill gaps in knowledge, scrutinize technology by progressing from simple to complex scenarios, and risk-share with pioneers and risk-share with pioneers and early adopters. Programs that include Demonstration projects are: DG as CHP, Power Systems, and NextGen.

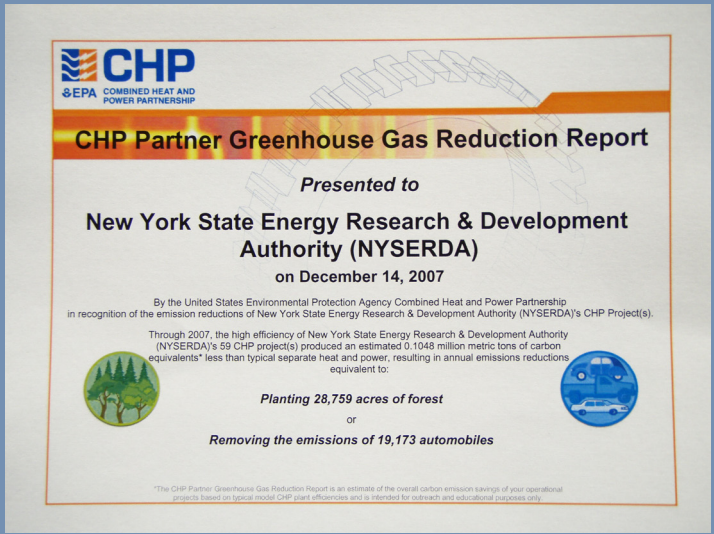
DEPLOYMENT – Deployment projects at NYSERDA accelerate adoption of proven technologies and capture guaranteed savings. The projects also strive to achieve: grid load reduction, energy savings, and emission reductions. Programs that include deployment projects are: Existing Facilities (EFP), RPS CTS Fuel Cells, RPS CST Anaerobic Digester Gas (ADG), and Multifamily Performance program (MPP).

FEASIBILITY STUDIES – Feasibility studies help a specific site evaluate numerous options and make decisions that are custom-tailored to their needs. Programs that include Feasibility Studies are: Technical Assistance and FlexTech.

TECHNOLOGY TRANSFER STUDIES – Technology Transfer Studies provide market intelligence to a broader audience. Some examples of common Technology Transfer Studies are: webinars, conference presentations, and publications. A Program that includes Technology Transfer Studies is the DG as CHP Program.

NYSERDA's Assistance Throughout the CHP Project Lifecycle

As one of the nation's leading CHP supporters, NYSERDA provides assistance to customers as well as CHP suppliers throughout the project lifecycle. As shown in the diagrams on the right, NYSERDA has programs available for each stage of the project lifescycle. Each program is designed to provide customers/suppliers with cost/risk share and technical expertise during each stage. NYSERDA's different programs consist of: a partnership with the Northeast Clean Energy Applications Center (NAC), Technical Assistance, Existing Facilities Program (EFP), Multifamily Performance Program (MPP), R&D Demonstration Program (DG as CHP), R&D Power Systems Program (Power Systems), and Renewable Portfolio Standard
Customer Sited Tier (RPS CST).


CHP
&EPA COMBINED HEAT AND POWER PARTNERSHIP

CHP Partner Greenhouse Gas Reduction Report

Presented to

New York State Energy Research & Development Authority (NYSERDA)

on December 14, 2007

By the United States Environmental Protection Agency Combined Heat and Power Partnership in recognition of the emission reductions of New York State Energy Research & Development Authority (NYSERDA)'s CHP Project(s).

Through 2007, the high efficiency of New York State Energy Research & Development Authority (NYSERDA)'s 59 CHP project(s) produced an estimated 0.1048 million metric tons of carbon equivalents* less than typical separate heat and power, resulting in annual emissions reductions equivalent to:

Planting 28,759 acres of forest

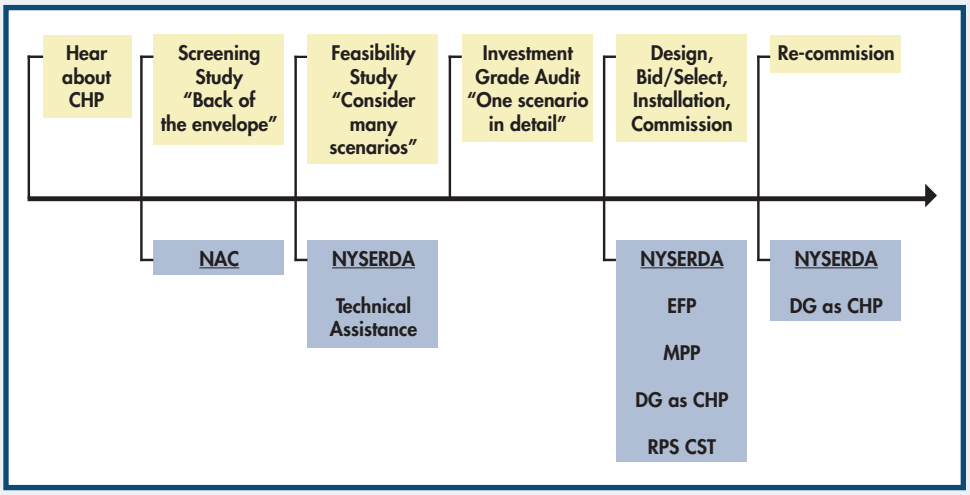
or

Removing the emissions of 19,173 automobiles

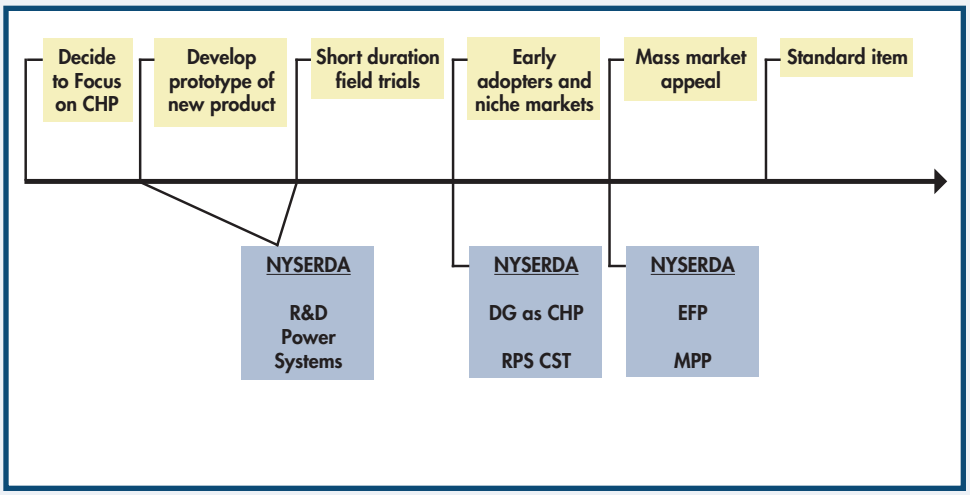
*The CHP Partner Greenhouse Gas Reduction Report is an estimate of the overall carbon emission savings of your operational projects based on typical model CHP plant efficiencies and is intended for outreach and educational purposes only.

"NYSERDA is a founding member of the USEPA CHP Partnership"

Demand (Customer Perspective)



Supply (OEM/Vendor Perspective)



NYSERDA Combined Heat & Power Programs Overview

Program	Title	Category(s)	Purpose	Award Details	Contact
PON 1931	DG as CHP	Demonstration Technology Transfer Studies	Installation of Equipment: Risk sharing to push advances in state of the art technology and applications; also supports technology transfer studies	Competitive selection, Proposals due 12/23/2010	Ed Kear ebk@nyserda.org ext. 3269
PON 1219	Existing Facilities Program	Deployment	Installation of Equipment: Pay for performance, acquire resources that will reliably operate	First-come basis, rolling admission to program	Mark Gundrum mrg@nyserda.org ext. 3256
Open Enrollment	Multifamily Performance Program	Deployment	Installation of Equipment: As part of a comprehensive energy reduction scope designed to achieve a minimum 20% savings	First-come basis, for Market Rate and Affordable Housing	Frank Mace fwm@nyserda.org ext. 3433
PON 1150	RPS CST Fuel Cells	Deployment	Installation of Equipment: Support the purchase, installation and operation of stationary fuel cell electricity generation equipment	Program Closed**	Scott Larsen lsl@nyserda.org ext. 3208
PON 1146	RPS CST ADG	Deployment	Installation of Equipment: Promotes installation of power generation using anaerobic digester gas	Program Closed**	Tom Fiesinger twf@nyserda.org ext. 3218
PON 1197	Technical Assistance	Feasibility Studies	Feasibility Studies: Performed using customer-selected engineering consultant	Program Closed**	Rachel Futrell rrf@nyserda.org (212) 971-5342
Open Enrollment	Flex Tech	Feasibility Studies	Feasibility Studies: Customer chooses from among the 3-dozen engineering consultants pre-approved by NYSERDA	First-come basis, no funding deadline	Joanna Moore jm1@nyserda.org ext. 3220
PON 1670	Power Systems	Development Demonstration	Product Development: Development, demonstration and commercialization of clean power systems and energy storage technologies	Program Closed**	Jim Foster jmf@nyserda.org ext. 3376
PON 1294	Next Gen	Development Demonstration	Development, demonstration of technologies that enhance the delivery or reduction of energy use within a residence	Program Closed**	Greg Pedrick gap@nyserda.org ext. 3378
PON 1260	Clean Energy Business Growth & Development	Development	Provide business assistance to promote clean energy companies in NYS	Program Closed**	Michael Shimazu mhs@nyserda.org ext. 3478
PON 1176	Clean Tech Manufacture	Development	Expand the level of manufacturing of renewable, clean, and energy-efficient products	First-come basis, applications accepted until 6/30/2011	Michael Shimazu mhs@nyserda.org ext. 3478

* For more detailed information visit our website at http://www.nyserda.org/Programs/

** NYSERDA seeks to issue again, pending availability and approval of funds

Other CHP Resources

NYSERDA CHP Tutorial Information – NYSERDA's web-site provides detailed information on all aspects of combined heat & power systems. Including topics ranging from technical detail to siting and permitting issues, this website is a one-stop shop for most combined heat & power questions. **www.nyserda.org/programs/dgchp.asp**

NYSERDA CHP Projects Performance Data – The Monitored Hourly Performance Data allows users to view, plot, analyze, and compare performance data from one or several different DG/CHP sites in the NYSERDA portfolio.**http://chp.nyserda.org**

Northeast CHP Applications Center – NAC serves as a focal point for communication among key stakeholders in seven states within the Northeast (CT, MA, ME, NH, NY, RI, & VT). NAC provides services for Education and Outreach as well as Technical Assistance. **www.northeastchp.org/**

US Environmental Protection Agency CHP Partnership Program – This program was established as a voluntary program seeking to reduce the environmental impact of power generation by promoting the use of CHP. The Partnership works closely with energy users, the CHP industry, state and local governments, and other clean energy stakeholders to facilitate the development of new projects and to promote their environmental and economic benefits. **www.epa.gov/chp/index.html**

US Department of Energy Distributed Energy Program – This program supports cost-effective research and development aimed at lowering costs, reducing emissions, and improving reliability and performance to expand opportunities for the installation of distributed energy equipment today and in the future. **www.eere.energy.gov/de/**

US Clean Heat & Power Association – USCHPA's mission is to create a regulatory, institutional and market environment that fosters the use of clean, efficient local energy generation, including but not limited to combined heat and power, recycled energy, bio-energy, and other generation sources that lead to a demonstrable reduction in global greenhouse gas emissions. **www.uschpa.org**

ASERTTI National DG/CHP Performance and Testing Program – ASERTTI's purpose is to remove a barrier to the increased use of distributed generation technologies - namely, the unavailability of uniform and documented information on the electrical, environmental, and mechanical performance of distributed generation (DG) and distributed generation/combined heat and power (DG/CHP) systems. **www.dgdata.org**

Environment Technology Verification Program Greenhouse Gas Center – The Greenhouse Gas Technology Center is operated in cooperation with Southern Research Institute (SRI). This center verifies the performance of commercial-ready technologies that produce, mitigate, monitor, or sequester greenhouse gas emissions. This center is also part of the Air Pollution Prevention and Control division, which is under EPA's National Risk Management Research Laboratory. **http://www.epa.gov/nrmrl/std/etv/center-ggt.html**

The New York State Energy Research and Development Authority (NYSERDA), a public benefit corporation, created in 1975 by the New York State Legislature, works to improve New York State's energy, environmental, and economic future by sponsoring energy analysis, research and development, and efficiency deployment programs.

New York State Energy
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