

Distributed Generation in Connecticut

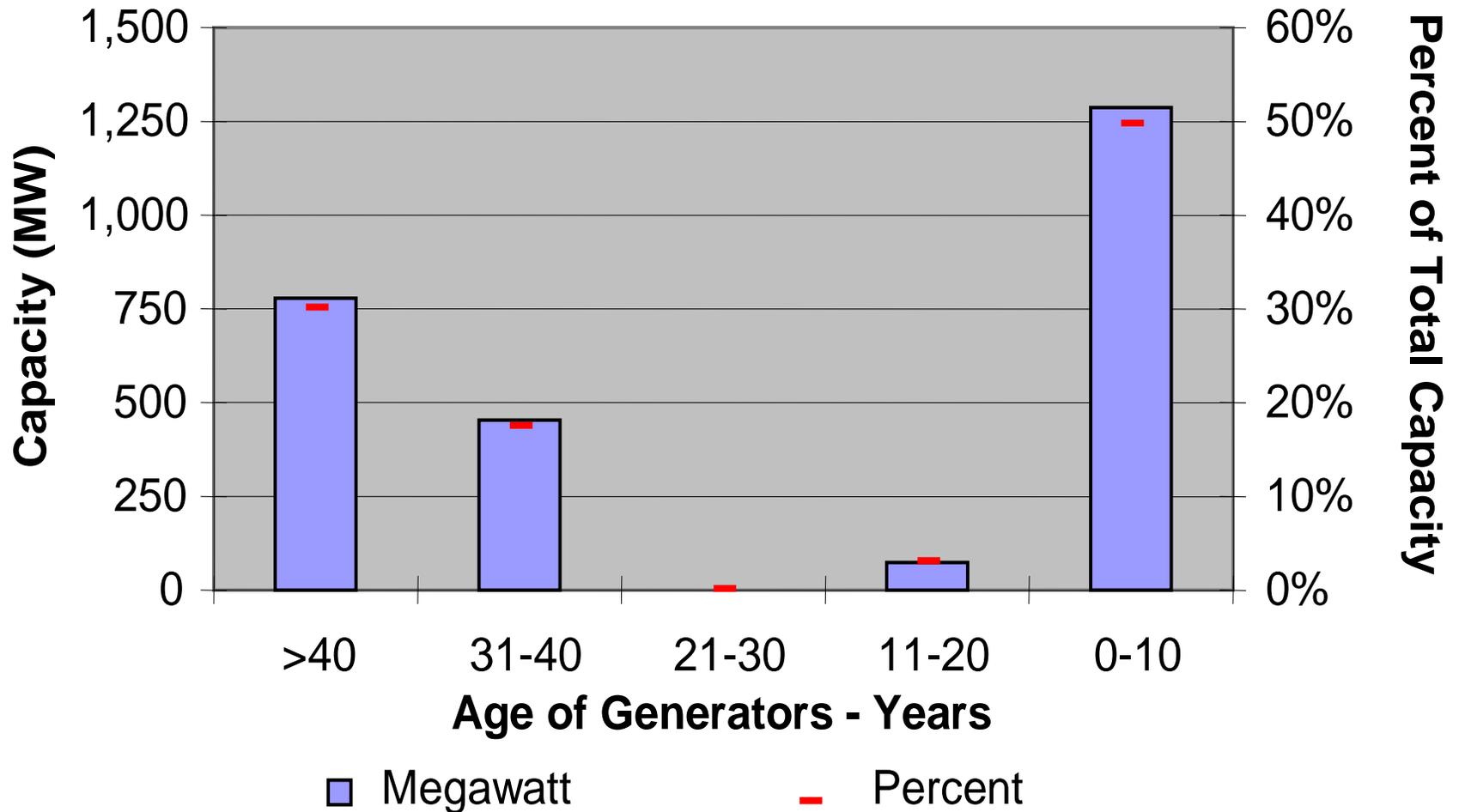
Renew your Energy

October 12, 2006



At Eastern Connecticut
State University

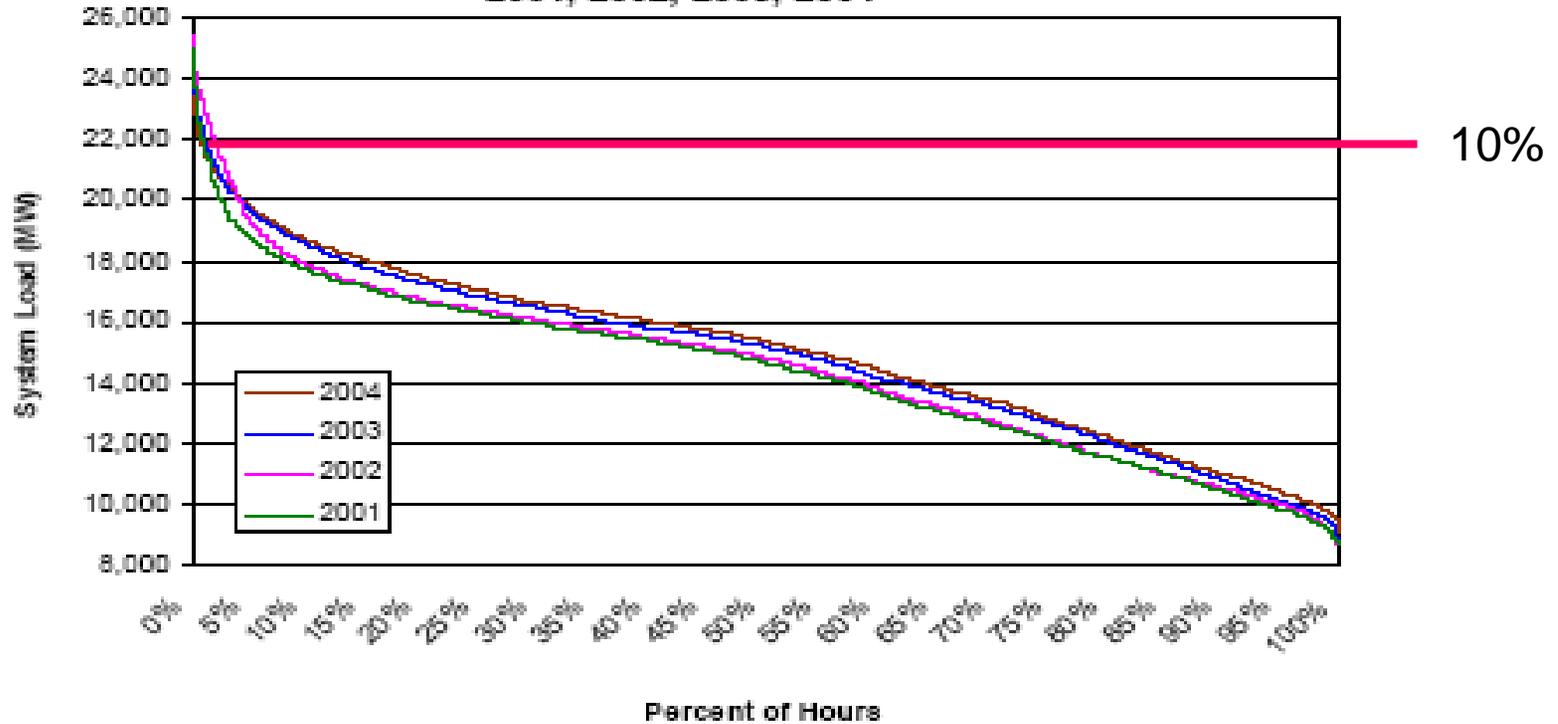
Age of Generators in Southwest Connecticut



Load Duration

Figure 3

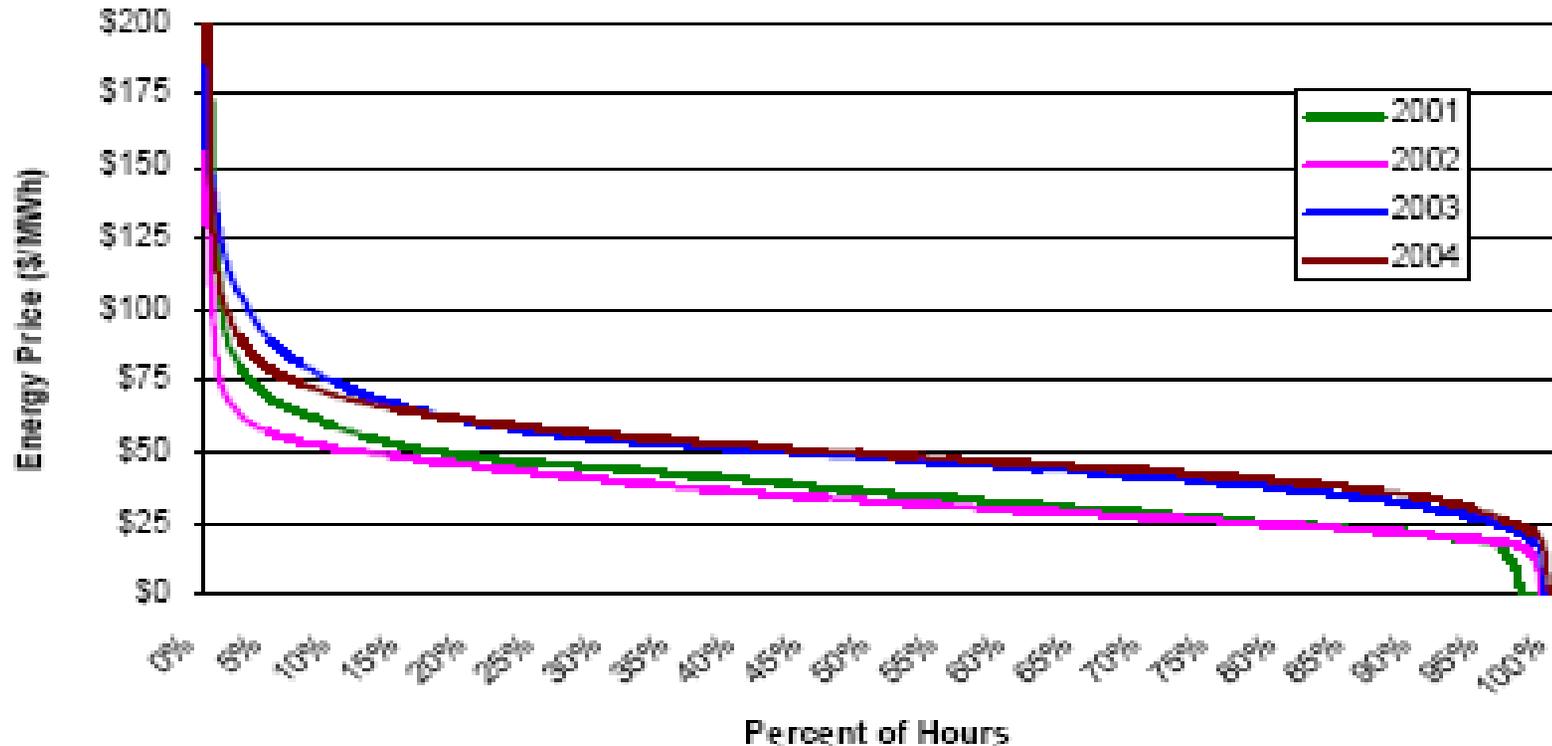
New England Hourly Load-Duration Curves
2001, 2002, 2003, 2004



Price Impact

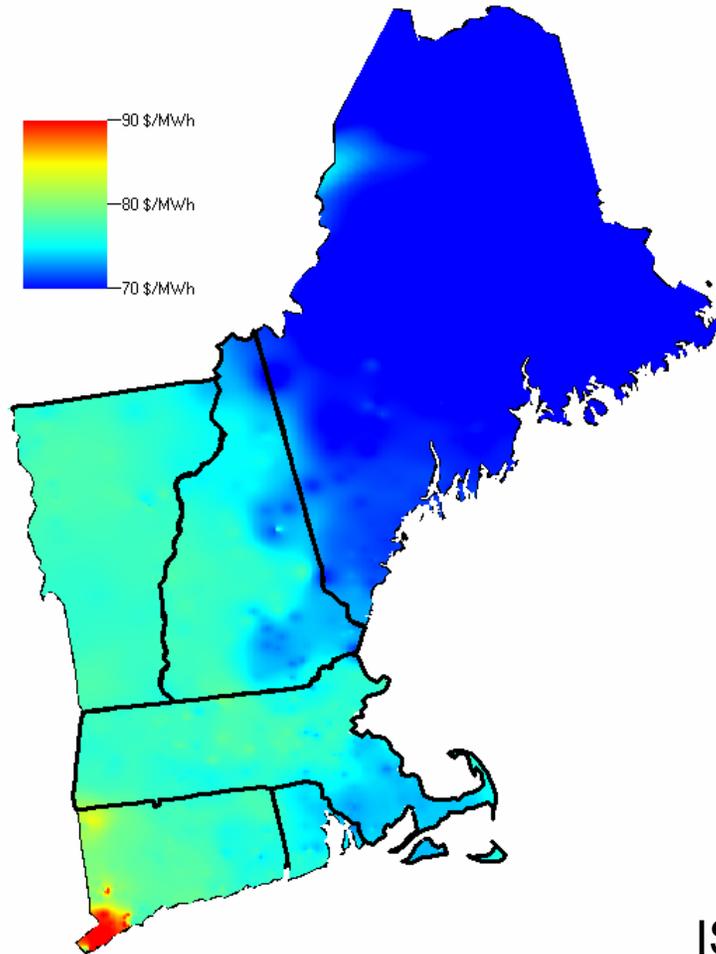
Figure 17

System Price Duration Curves, Prices < \$200
2001-2004



System Price is single Energy-Clearing Price for Interim Market Period ending Feb. 28, 2003, and load-weighted Real-Time Energy Market LMPs for Mar. 2003 - Dec. 2004.

The Red Zone!!!



ISO Day-ahead Pricing

PA 05-1 Act Concerning Energy Independence Encourage Distributed Resources

Customer side Distributed Generation

The generation of electricity from a unit not more than sixty-five megawatts on the premises of a retail end user, including; CHP, quick start units, fuel cells, photovoltaic systems or small wind turbines,

Welcome to CEAB

In 2003, An Act Concerning Long-Term Planning for Energy Facilities (PA 03-140) reconstituted the Connecticut Energy Advisory Board (CEAB) and revised its mission. The primary goal for the new entity is to encourage competing energy solutions and to provide the opportunity to review multiple energy solutions simultaneously.

The CEAB is responsible for identifying and coordinating state energy needs and recommending strategies and solutions to meet those needs in a manner that is not only environmentally responsible, but also meets reasonable cost and reliability criteria.



CEAB Guiding Principles

Citizens and businesses in Connecticut must have access to a safe, affordable, diverse and reliable energy supply.

Connecticut's policy makers must act in forums where the state's energy interests can be advanced.

Connecticut's policy makers must act in a coordinated fashion on both a state & regional basis to address energy issues using CEAB's energy plan as a blueprint for action.

e-Alerts

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What's New:

CEAB has issued its first proactive request for proposal. (See [RFP 0001](#).) You can find both the board's preferential criteria and all open RFPs by clicking on [Requests for Proposal](#) link along the top of this page.

Board Activity

- [Meeting Agendas](#)
- [Calendar](#)
- [Meeting Minutes](#)
- [Schedule](#)
- [News Releases](#)

**CEAB's recommends a two part,
five year, state-wide
Energy Goal:**

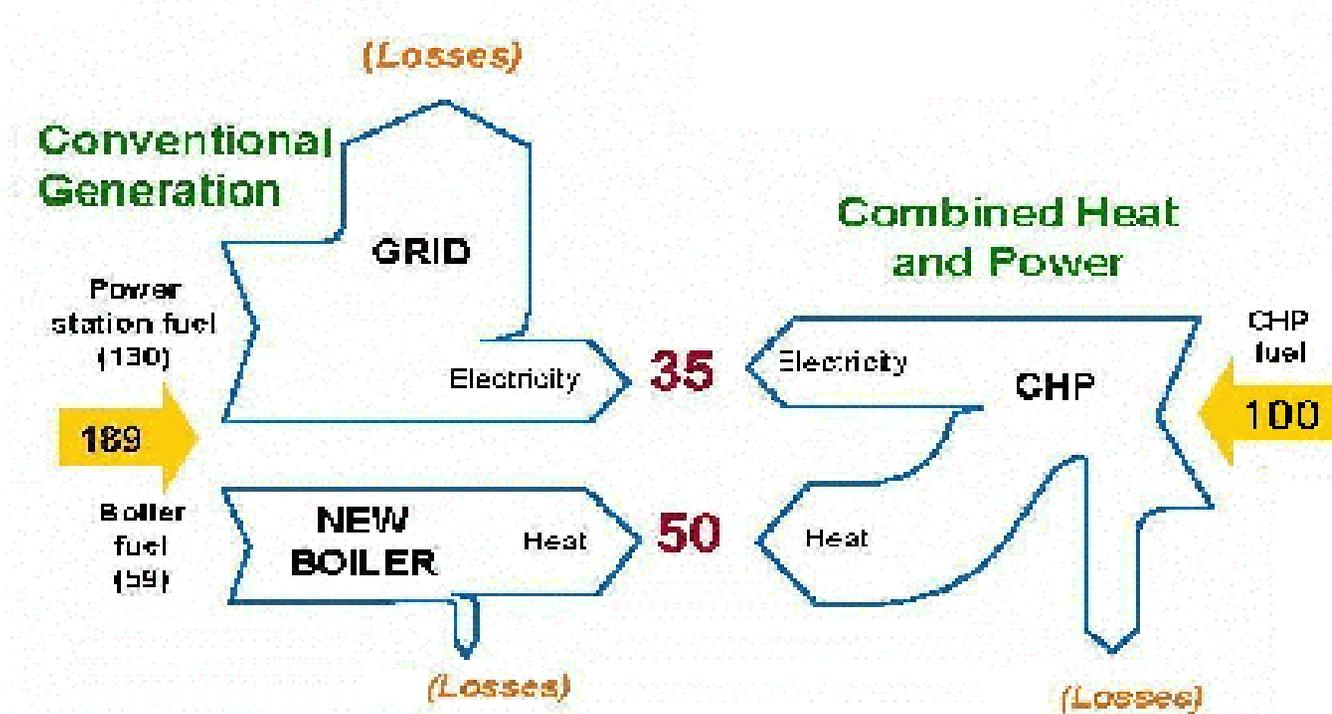
- **Reduce the state's peak
electric demand by 10% by 2010
and**
- **Reduce fossil fuel
consumption by 10% by 2010**

Key DPUC Dockets for DG

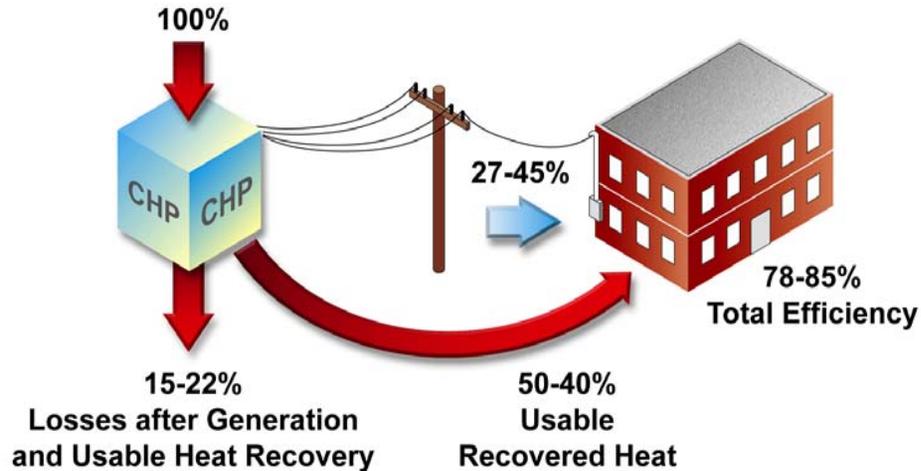
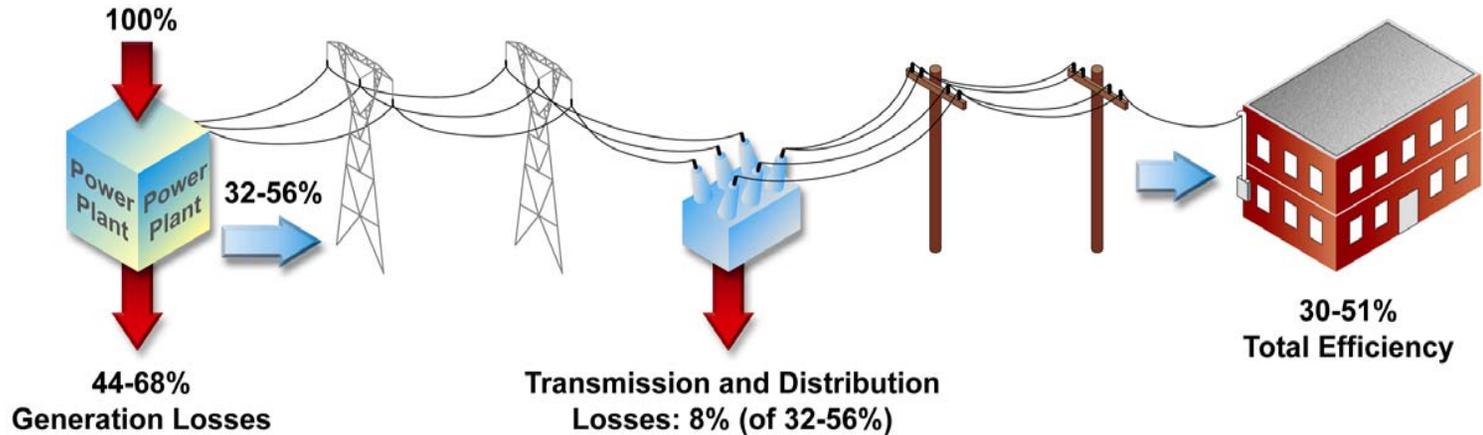
- Docket No. 05-07-16
Establishes incentives for customer side distributed generation.
- Docket No. 05-07-17
Establishes monetary grants for capital costs of customer side distributed generation.
- Docket No. 05-07-19
Includes distributed resources as Renewable Portfolio Standard - Class III.

Combined Heat and Power (CHP)

CHP: Onsite coincident production and use of electrical or mechanical power and thermal energy.



How CHP Saves Energy



CHP Prime Movers



- Combustion Turbines 0.5 – 10MW
- Microturbines 30 – 250 kW
- IC Engines 30 kW – 5 MW
- Fuel Cells 200 kW – 1 MW

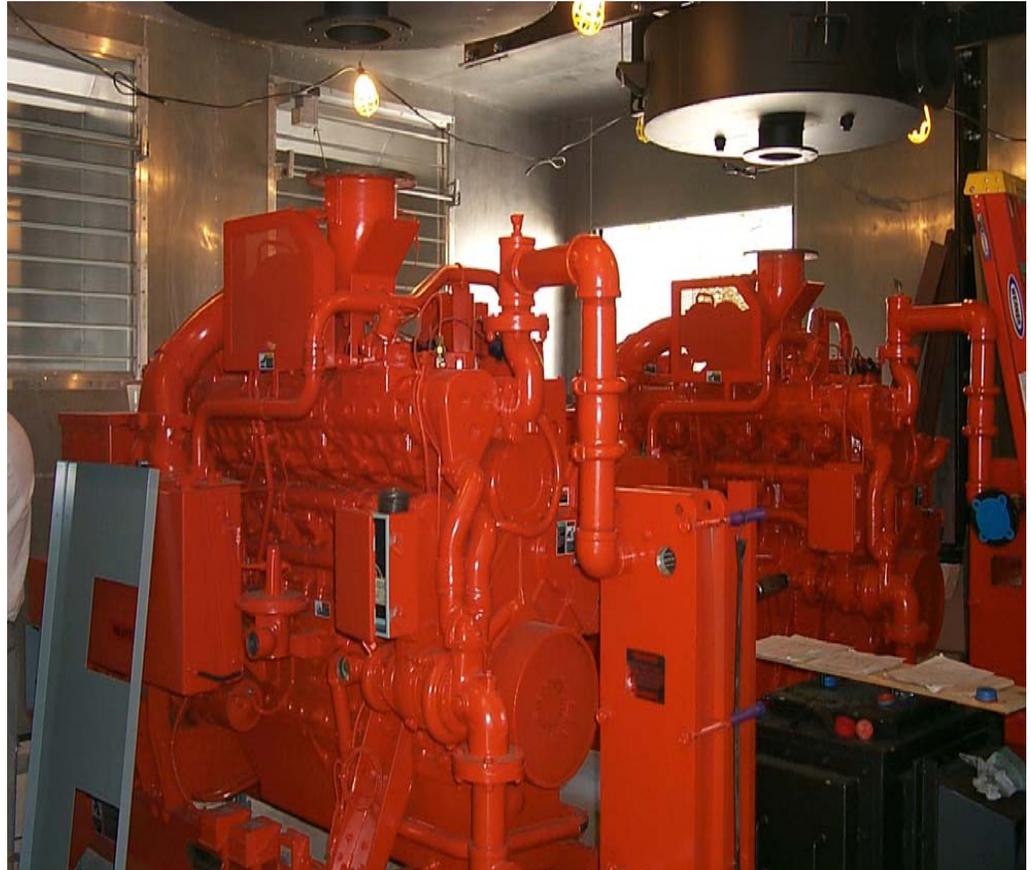
65% - 50% WASTE HEAT

25% - 40% Electricity



Oakwood Healthcare Center

- Three reciprocating engines 850kW (2 NG, 1 Diesel)
- Heat recovery: space heating and DHW
- Integrated with load management strategies



Greater Rochester International Airport

- Two 750 kW Natural Gas Reciprocating Engines
- Heat recovered for space and DHW heating and a 300 ton absorber



SUNY Buffalo

- Two 60 kW Capstones
- Peak Reduction: 300 kW
- Application:
 - Swimming Pool
 - Power to water pumps
 - Heat water heaters
- Measured in 2003:
 - Savings = \$35,000 per year

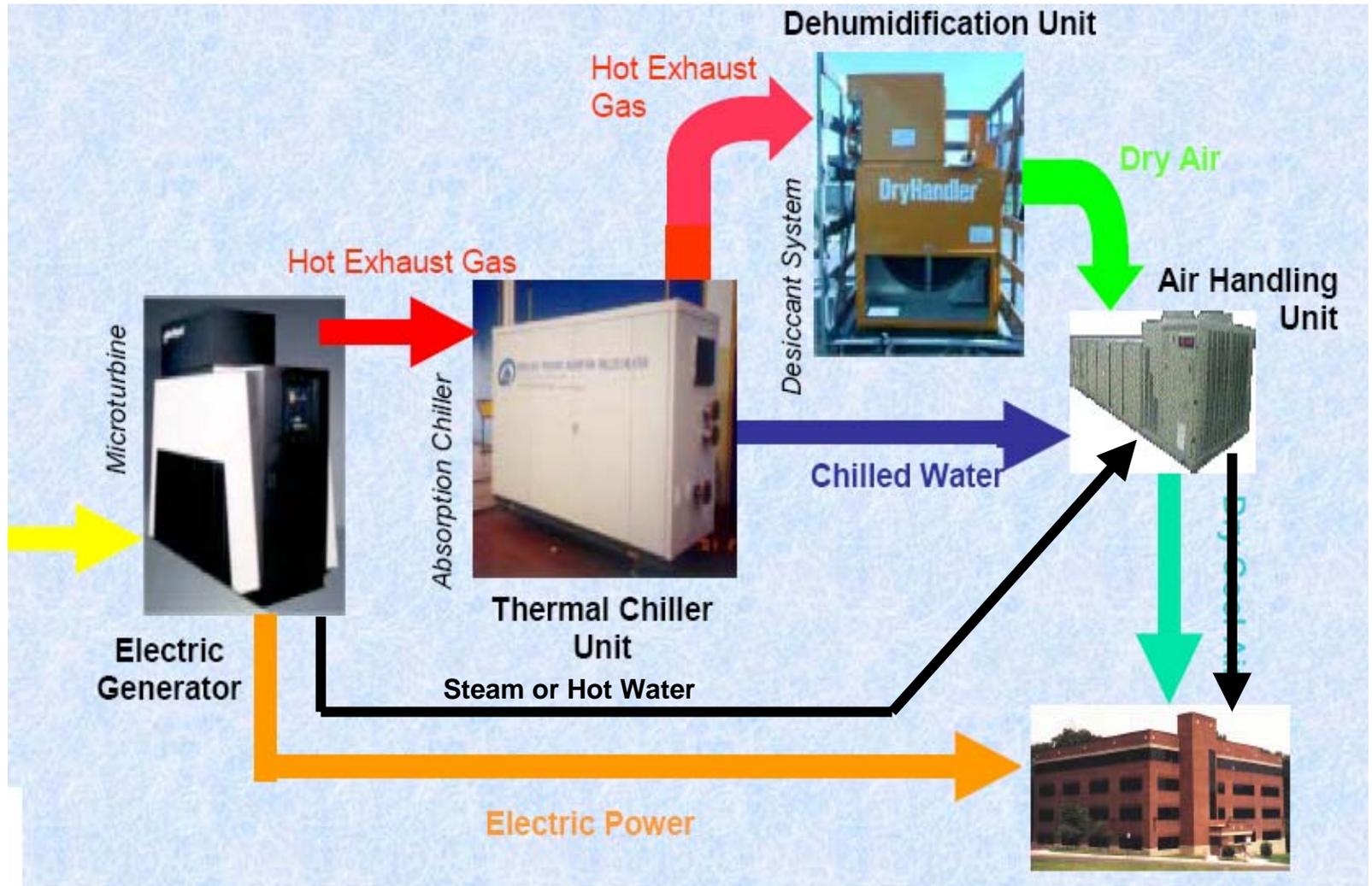


Fuel Cells at WWTP in NYC

- 2 200kW Fuel Cells at Municipal Waste Water Treatment Facility in New York City (NYCDEP)
- Heat Recovered to Support Anearobic Digester
- Reduced On-site Emissions by Eliminating Flare



Advanced CHP System



How DG Technologies Compare?

Technology	Size Range	Electrical Efficiency (%)	Installed Cost (\$/kW)	NOx Emissions (lbs./MWh)	Total CHP Efficiency (%)
IC Engine	30kW - 6MW	28 - 38	500 - 1200	0.4 - 15	80
Aeroderivative Gas Turbine	500kW - 20 MW	22 - 40	750 - 1500	0.3 - 4	80
Micro-turbine	25kW - 300kW	20 - 30	1000 - 3000	0.4 - 2.2	80
Fuel Cell	3kW - 3 MW	30 - 60	4000 - 10000	< 0.02	80
NG Combined Cycle Power Plant	100 MW - 500 MW	45 - 60	500 - 1000	0.3	70

Utility Discounts

- Natural gas rates will be reduced for Customer-side generation projects that use natural gas by waiving as distribution charges.
- Electricity rates for power used when base load customer-side generators are out of service will be reduced by eliminating backup rates and eliminating demand ratchets for these projects.

Project Financing

- $(\text{Capital Cost} + \text{Cost of } \$) + (\text{Annual Maintenance Cost} + \text{Fuel}) \times \text{project life} = \text{Life Cycle Cost}$
- Deduct DPUC incentives from Capital Cost
- Deduct interest saving from DPUC Loan
- Deduct rate concessions from electric & natural gas
- Deduct fuel savings from thermal recovery
- Deduct deferred electricity from annual electric bill
- Deduct tax credits and depreciation

Alternative Financing - Performance Contracting

Benefits of DG to CT

- Improves System Reliability
- Lower FMCC and Energy Costs
- Lower Emissions (including CO₂)
- Conserve Natural Resources
- Offers Price Stability
- Support Grid Infrastructure
- Defer Costly Grid Upgrades
- Utilizes Existing Infrastructure
- Facilitates Deployment of New Clean Energy Technologies

Existing CHP in CT

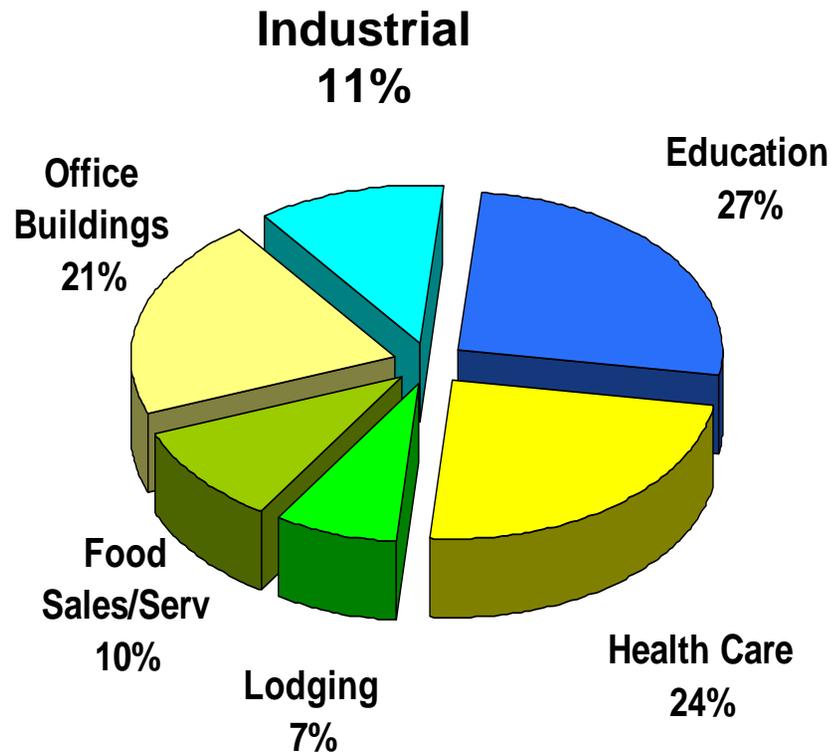
- Commercial 62 Sites 141.4 MW
- Industrial 15 Sites 337.6 MW
- Other 1 Site .2 MW
- Total 78 Sites 479.2 MW

- ***NY/NEW-ENGLAND***

524 sites 9,318.6 MW

Potential for Commercial CHP is Large

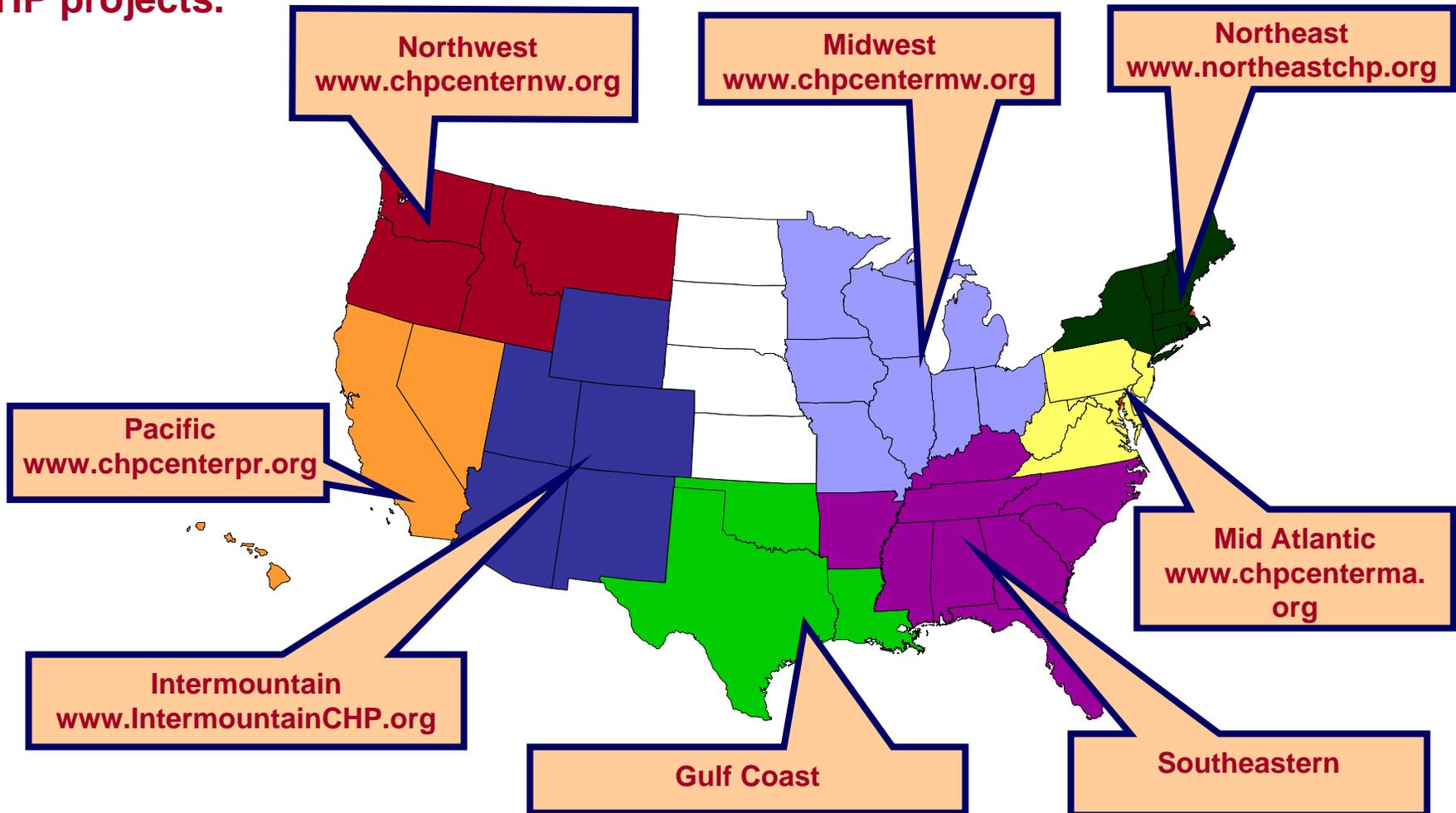
Estimated CHP Potential: 500 to 2000 MW



Source: Nexus

Regional Application Centers

The regional application centers will promote combined heating and power (CHP) technology and practices, serve as a central repository and clearinghouse of CHP information, and identify and help implement regional CHP projects.



EPA CHP Assistance

EPA - CHP - CHP Project Resources - Do I Qualify / Qualifier - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

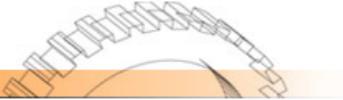
Address http://www.epa.gov/chp/project_resources/qualifier.htm Go Links

U.S. Environmental Protection Agency

Combined Heat and Power Partnership

[Contact Us](#) | [Print Version](#) Search: **GO**

[EPA Home](#) > [Combined Heat and Power Partnership](#) > [CHP Project Resources](#) > Do I Qualify / Qualifier



CHP Project Resources

- [Is My Facility a Good Candidate for CHP?](#)
- [CHP Project Development Process](#)
- [CHP Project Team](#)
- [CHP System Financing](#)
- [Catalogue of CHP Technologies](#)
- [Industry Specific Information](#)
- [CHP Services Available](#)
- [Project-Specific Technical Assistance](#)
- [Public Recognition](#)

Is My Facility a Good Candidate for CHP?

STEP 1	Please check the boxes that apply to you:
<input type="checkbox"/>	Do you pay more than \$.06/ kWh on average for electricity (including generation, transmission and distribution)?
<input type="checkbox"/>	Are you concerned about the impact of current or future energy costs on your business?
<input type="checkbox"/>	Is your facility located in a deregulated electricity market?
<input type="checkbox"/>	Are you concerned about power reliability? Is there a substantial financial impact to your business if the power goes out for 1 hour? For 5 minutes?
<input type="checkbox"/>	Does your facility operate for more than 5000 hours/ year?

Questions?

www.state.ct.us/dpuc/

www.ct-energyinfo.com

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