

New York Interconnection Procedures: Current State and Best Practices

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Standardized Interconnection Requirements (SIR) in New York

- Standardized Interconnection Requirements (SIR)
 - Defines application process / deadlines for connecting customer-sited generation to the grid
 - Defines technical interconnection requirements
 - Applies to systems 2 MW and below
 - Contains model contract language and application
- Intelligent rules developed collaboratively
 - Utilities implement rules
 - DPS Staff / PSC enforces rules and resolves conflicts
 - Certified equipment list
- Connection is governed by the utilities
 - Safety is primary focus

Source: Mike Worden, NYSDPS, “New York State Standardized Interconnection Requirements (SIR)” (PowerPoint)



Interconnection Procedures

- Interconnection process can become time-consuming, costly, and unpredictable
- Standards must be clear and address all major issues involved
 - Application
 - Technical requirements
 - Costs
 - Timelines
 - Insurance



Revisions to NY Standardized Interconnection Procedures (SIR)

Procedures were revised in February 2010

- Specification of residential micro-CHP and fuel cell interconnection cost responsibility
- Incorporation of micro-CHP and fuel cells into the references made to net metering
- Definitions for micro-CHP and fuel cell

www.dps.state.ny.us/distgen



SIR Application Procedures

Applications for Systems $<$ or $=$ 25kW

- Simplified 6-step process
- Reduced utility review
- May submit application via web
- Typically interconnect within 30 days and formal acceptance within 30 days after verification

Applications for Systems between $>$ 25kW and 2 MW

- 11-step process
- Formal acceptance should be received within 150 days
- Systems between 26kW and 200kW may follow the 6-step process if “the inverter-based system has been certified and tested in accordance with UL 1741”



Best Practices

- Set fees that are fair and predictable
- Cover all generators
- Ensure policies are transparent, uniform, and public
- Prohibit requirements for extraneous devices, and do not require additional insurance
- Apply existing relevant technical standards
- Process applications quickly
- Standardize and simplify forms

Source: Network for New Energy Choices

<http://www.newenergychoices.org/index.php?page=publications&sd=no>

- Make public aware of location-specific issues



How New York Shapes Up

- **Costs:** Applicant made aware of costs throughout process
- **Coverage:** Limit is 2 MW
 - 20 MW suggested by NNEC
- **Policies:** Clear steps and easily accessible
- **Devices:** Disconnect switch for 25kW+
- **Technical Standards:** Applies UL 1741
 - Certification directly to utility, not PSC
- **Timeline:** Steps specify deadlines, but may take longer depending on complexity



Fault Current Issues in Manhattan

Problem

- Con Edison experiencing problems with DG systems using synchronous generators
- Currently, synchronous generators are only permissible in designated areas
- Fault Current Margin Queue
 - Synchronous generator applicants not using protective equipment must wait until there is sufficient fault current margin available


Solutions


- Utility investment in upgrading T&D lines
- Tecogen Inverter-Based Product (CM100)
 - Converts DC to utility-standard AC





Manhattan Key

 Potential areas for synchronous generation without fault current mitigation*

 2022 Synchronous Generation requires fault mitigation. The number indicates the planned year for upgrade completion.

All boundaries are approximate. Contact your CPM for exact boundary details. Upgrade years and boundaries are subject to change without notice. Breaker replacement at substations is an ongoing process, requiring several years to complete a substation.

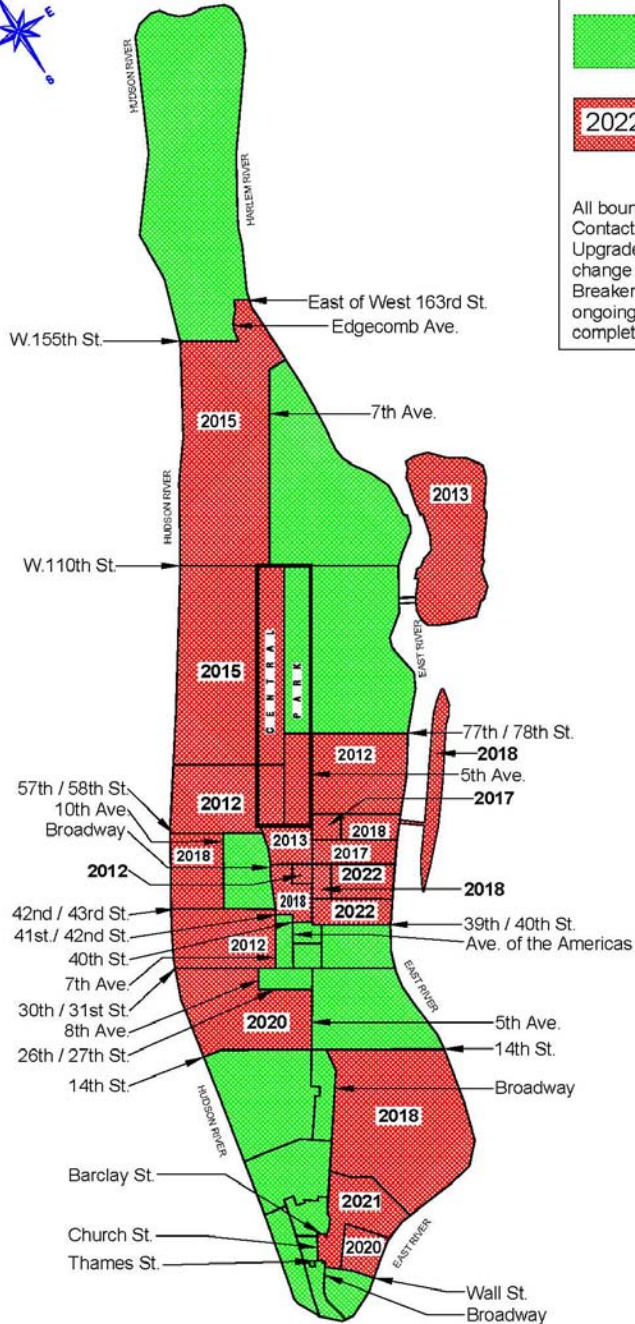
*All applications are queued when determined to be complete by Con Edison in accordance with its procedures. Each evaluation of synchronous generation will include all prior fault current contributors on the queue. Customer DG's may require fault mitigation if the resulting fault current exceeds the capacity of the DG's associated load area.

Synchronous generation is prohibited at the grid network (120/208 volt) level.

DC Generation with inverters (Fuel Cells, Photovoltaic, Microturbines) or induction generation may be installed at all locations.

Notwithstanding the available margin or type of generation, each proposed location and installation must be evaluated for eligibility.

Status as of: January 1, 2010
Next Update: June 30, 2010



Con Edison Synchronous Generation Map for Manhattan

www.coned.com.dg



Model Rules

- Several model rules exist
 - FERC
 - Mid-Atlantic Demand Resource Initiative Procedures (MADRI)
 - California's Rule 21
- Common themes
 - Interconnection of systems up to at least 10 MW
 - Pro forma interconnection agreements
 - A scoping meeting if screens are not met to review expected costs and duration of studies



New York Air Permitting Procedures

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Air Regulatory Authorities

- New York State Department of Environmental Conservation. (DEC)
- US. Environmental Protection Agency (EPA)

DEC

Types of Permits:

1. Registration (minor source)
2. State Facility Permit (synthetic minor source)
3. Title V Permit (major source)

NO_x thresholds in tons per year (TPY)

- 100 TPY, moderate non-attainment areas
- 25 TPY, severe non-attainment areas
- Every 5 years Title V permits need renewal



DEC/EPA

- DEC regulates CO₂ in RGGI under 6 NYCRR Part 242, “CO₂ Budget Trading Program”
- EPA CO₂ possible rule changes
- EPA sets National Ambient Air Quality Standards (NAAQS) for 6 criteria pollutants:
 - Carbon Monoxide
 - Ozone
 - Particulate Matter
 - Lead
 - Nitrogen Oxide
 - Sulfur Dioxide

DG Siting, Permitting and Process Flow in New York

Tech Type



Emissions/ Size from/of DG Unit



Geographic Location

Upstate (DEC Regions 3B-9)
Downstate (R1,3A-LOCMA)
or New York City (R2)



Type of Air Permit Required

Title V

New Source Review
NSPS for combustion
NESHAPs for VOCs

State Facility Permit

Federally-enforceable
emission caps based on
overall facility's potential-to-
emit as designed

Filing
Requirements

Exempt

No Further
Action

Registration

Modifications

New York City

Air Permit Fees

Department of
Environmental
Protection (DEP)

Boiler Registration



Gas Piping

Venting & Stack Height

Building, Electrical and Fire
Codes

Materials & Equipment
Acceptance

Noise & Aesthetics

Fuel Storage

Department of
Buildings (DOB)



Air Permitting Categories

- Exempt (includes PV, Natural Gas recip or MicroTurbine under 168 kW Downstate and 300 kW Upstate)
- Minor Source Registration (Natural Gas Recip Engines CHP up to 1200 kW at 2.25 lbs/MWH NOx emissions rate)
- State Facilities Permit
- Title V Facility (Major Source) Permit

Is Your facility located within New York's Severe Non-Attainment Area? (e.g., either in NYC, Long Island, Westchester and Rockland Counties or LOCMA*)

*the Lower Orange County Metropolitan Area (LOCMA) includes the Towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick and Woodbury

YES

NO

Is Your Generator Size Larger than 225 Brakehorse Power (BHP) (approx. = 168kW)? (check nameplate capacity)

Is Your Generator Size Larger than 400 Brakehorse Power (BHP) (approx. = 300 kW)? (check nameplate capacity)

YES

YES

NO

Is your Facility's Potential-To-Emit for Nitrogen Oxides (NOx) greater than 12.5 tons per year (tpy) calculated on a rolling basis?

Is your Facility's Potential-To-Emit for Nitrogen Oxides (NOx) greater than 50 tons per year (tpy) calculated on a rolling basis?

NO

Registration Filing Required (6 NYCRR SubPart 201-4)

UNLESS

Your facility is Exempt from Air Permitting Requirements (6 NYCRR SubPart 201-3)

NO

YES

YES

NO

State Facilities Permit Filing Required (see 6 NYCRR SubPart 201-5)

OR

Your facility requires a Title V Operating Permit (see 6 NYCRR SubPart 201-6)

Registration Filing Required (6 NYCRR SubPart 201-4)

UNLESS

Your facility is Exempt from Air Permitting Requirements (6 NYCRR SubPart 201-3)



Natural Gas Recip. Engines

Severe ozone non-attainment area (New York City, Long Island, Westchester, Rockland, or lower Orange County)

If the engine(s) nameplate rating is less than 225 Brake Horsepower (bhp) (or 168 kW) **and** the maximum annual Potential-To-Emit (PTE) of NO_x from *all sources** at site are less than 25 tons per year (TPY), the project is an exempt/trivial source

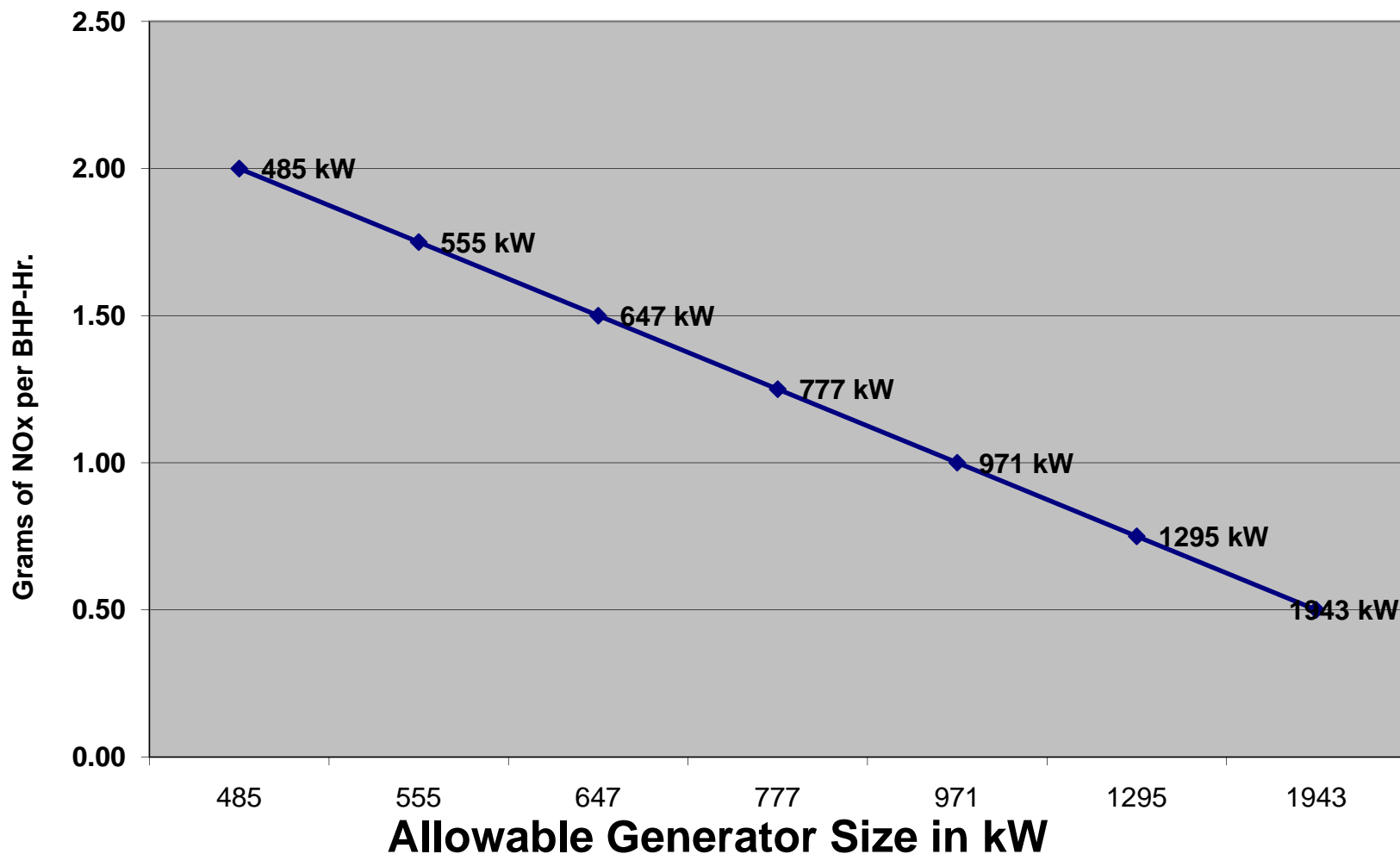
If the engine(s) nameplate rating is greater than 225 bhp (or 168 kW), but:
Less than 870 bhp (or 650 kW+) **and** the maximum annual Potential-To-Emit (PTE) of NO_x from *all sources** at site are less than 12.5 tons per year (TPY), the project qualifies for Minor Facility Registration;

Greater than 870 bhp (or 650 kW+) **and** PTE of NO_x from *all sources** at site exceeds 12.5 TPY but can be capped at less than 25 TPY, the project qualifies for a State Facility Permit;

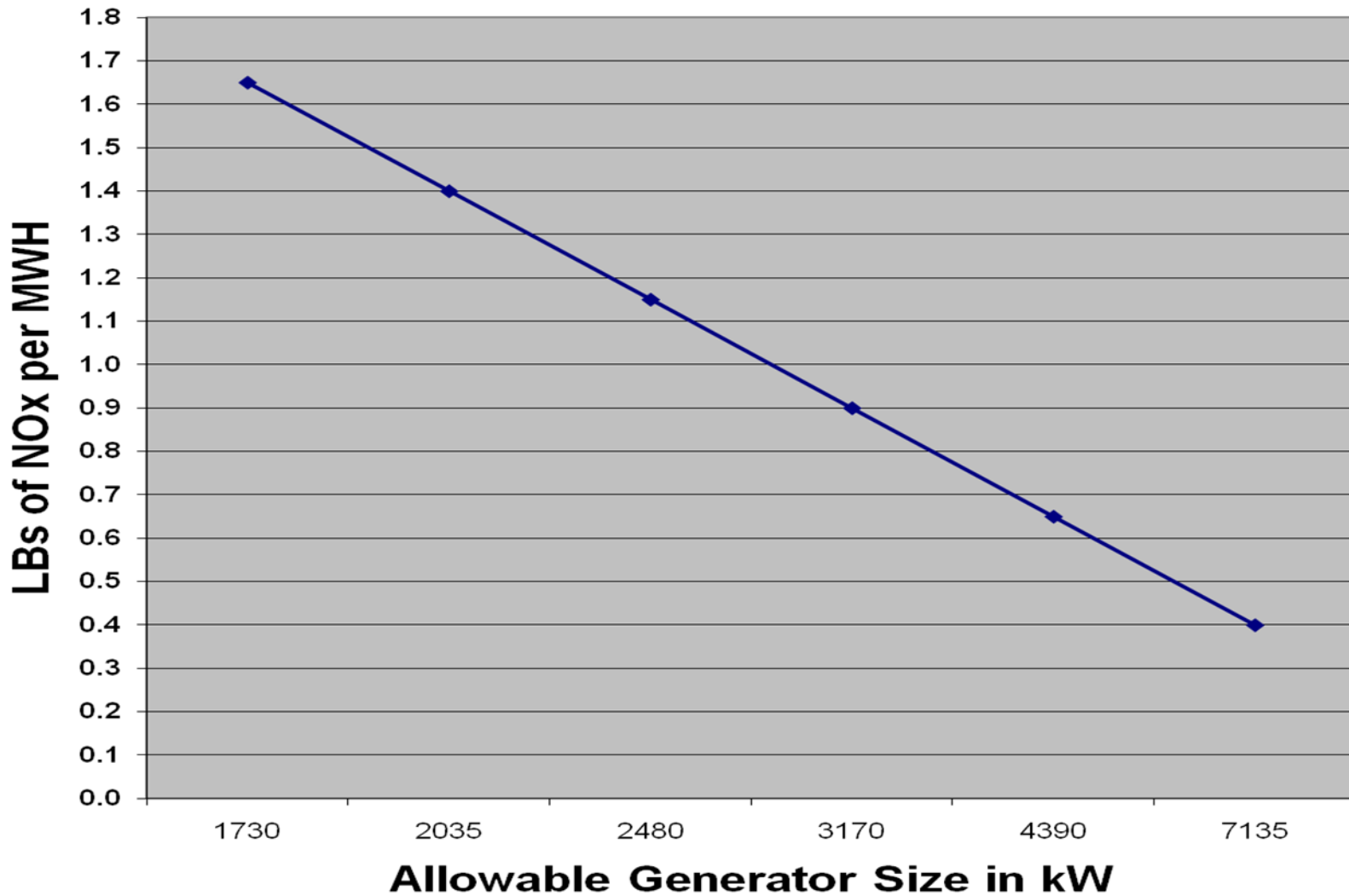
Greater than 1740 bhp (or 1300 kW+) **or** PTE of NO_x from *all sources** at site can not be capped under 25 TPY then the project qualifies for a Title V Permit.



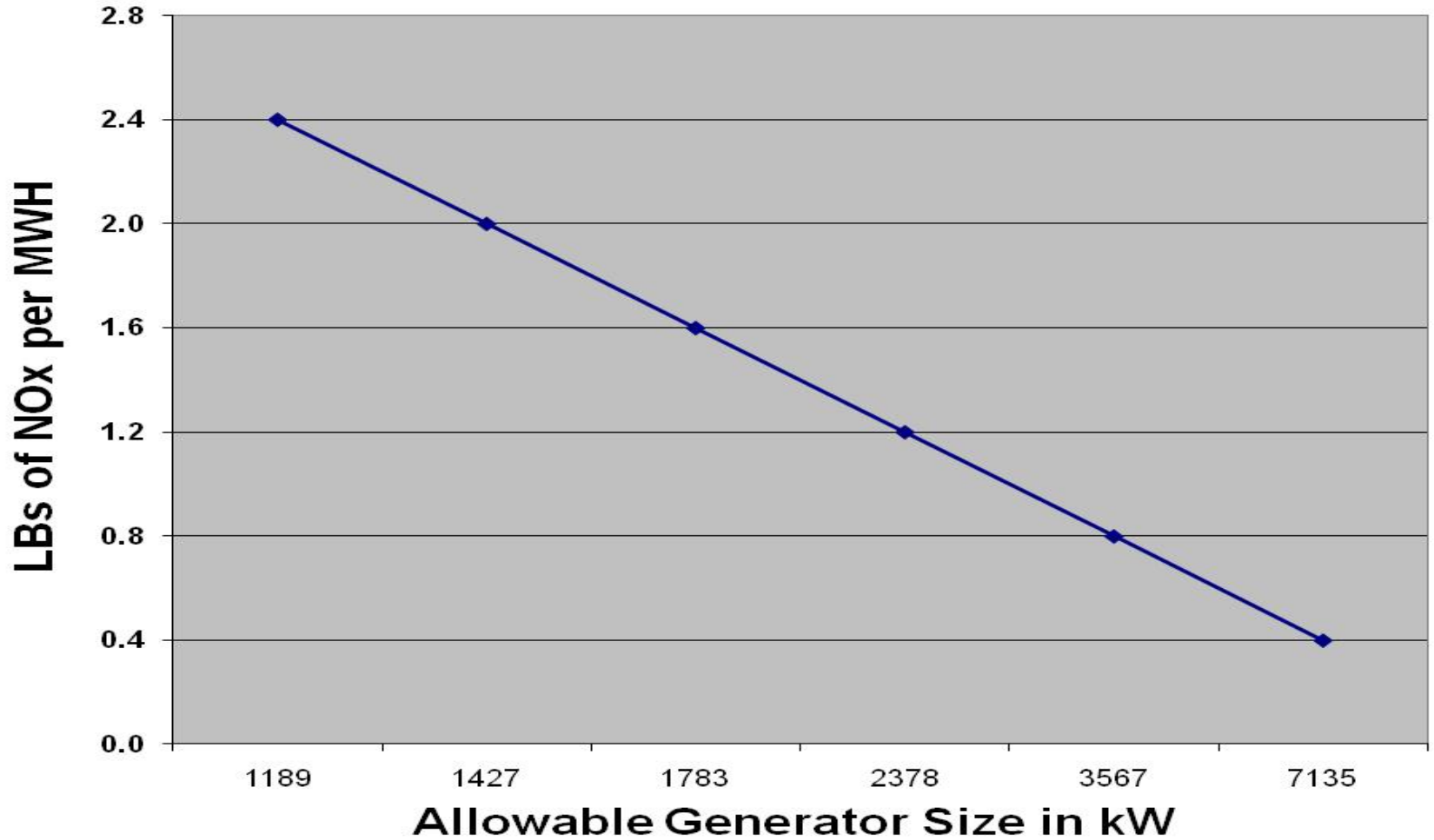
Allowable Natural Gas Recip Engine meeting 12.5 TPY Threshold at Various Engine Emission rates



Allowable MicroTurbine Size meeting 12.5 TPY Threshold at Various Engine Emission rates



Allowable Gas Combustion Turbine Size meeting 12.5 TPY Threshold at Various Engine Emission rates



MINOR FACILITY REGISTRATION

- Registration requirements are found in Subpart 201-4
[<http://www.dec.state.ny.us/website/regs/201d.htm>]
- Applicable to any stationary source with potential to emit capped-by-rule pursuant to Section 201.7.3(e)(1)
[<http://www.dec.state.ny.us/website/regs/201g.htm#201g!3>]:
- Cap by Rule Emissions Thresholds for Minor Facility Registrations:
 - (1) 50 percent of the major stationary source thresholds for regulated air pollutants,
 - (2) 5 tons of a single hazardous air pollutant,
 - (3) 12.5 tons of any combination of hazardous air pollutants
 - (4) 50 percent of any lesser threshold for a single hazardous air pollutant that the Administrator may establish by rule and upon incorporation into state regulation.
- Therefore, your geographic location within the state determines your capping thresholds as follows:
 1. Severe Non-attainment Areas: Capped at 12.5 tons per year (tpy) of Nitrogen Oxides (NO_x), or
 2. Other Non-Attainment Areas: Capped at 50 tpy of NO_x.



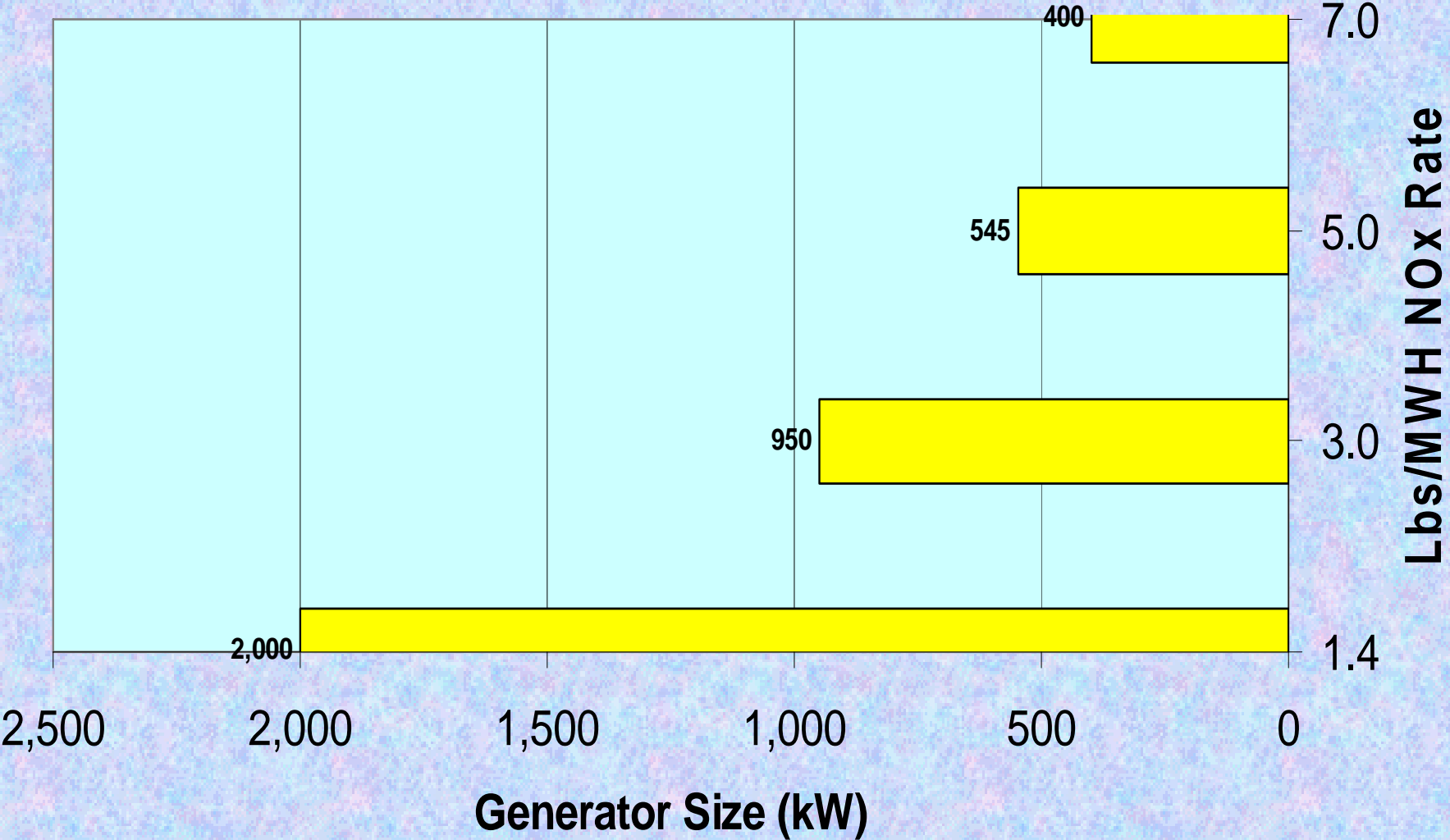
More on Registrations

- Valid registrations last forever, and they need no renewal absent a facility modification or sufficient increase in emissions.

- Minor Facilities must annually certify to DEC that the facility's emission rates, even for exempt or permitted activities, remain below the 50% cap.
- [<http://www.dec.state.ny.us/website/regs/201d.htm#201d!5>]
- Registration application content specifications found in Subpart 201-4.4
[<http://www.dec.state.ny.us/website/regs/201d.htm#201d!5>]
- DEC must respond within 30 days of receipt of your completed application
- Call your DEC Regional Air Pollution Control Engineer (RAPCE) of the Small Business Environmental Ombudsman at 800-782-8369 for assistance and to check on the status.



Minor Facility Registration As A Function of Emissions Rate



EPA NAAQS Regulations

- Criteria pollutants are common pollutants that pose risks to human health and the environment
- EPA “regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels” → NAAQS
- EPA’s NAAQS regulations may be found at 40 CFR part 50

Source: Environmental Protection Agency, “What are the Six Common Air Pollutants?,”
<http://www.epa.gov/air/urbanair/>

Other Policies

- State Environmental Quality Review Act
- Certificate of Environmental Compatibility and Public Need
- Clean Air Interstate Rule (CAIR) tied into RGGI under 6 NYCRR parts 243 – 245, the NO_x and SO₂ cap & trade rules
- Output Based Emission Limits

New York CHP Incentives

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NY Incentives: Current and Potential

- NYSERDA Program Opportunity Notices (PON)
- Investment Tax Credits (ITC)
- DG Gas Rates
- Net Metering (limited eligibility)
 - Payments for “excess” production
- Carbon Tax
 - may provide a future market incentive
- Geographic Balancing (discussions underway)
 - RPS reallocation

NYSERDA Accomplishments

- 158 projects at 170 sites about 70 operational
- \$100M NYSERDA, \$547M Total
- 276 MW fully built

Source: Ed Kear, NYSERDA November 17, 2009 presentation



NYSERDA Challenges

- **BUT....**
- **2002 study showed:**
 - “Technical Potential” of 8,500 MW of new CHP at 26,000 sites (mostly < 5MW each)
 - Predicted 764 MW of CHP by 2012 for the “base case” and
 - 2,200 MW for the “accelerated case”
- **How are we doing?**
 - NYSERDA has 276 MW under contract with about 70 MW installed

Source: Ed Kear, NYSERDA November 17, 2009 presentation



NYSERDA CHP Incentives

- **Existing Facilities Program**
 - **Upstate**
 - \$0.10/kWh + \$600/kW
 - **Con Edison**
 - \$0.10/kWh + \$750/kW
- \$2,000,000 cap for each project
- **Eligibility**
- 60% annual fuel conversion efficiency
- Use at least 75% of generated electricity onsite
- NOx emission rate < 1.6 lbs./MWhr
- http://www.nyserda.org/programs/Existing_facilities/chp.html



NYSERDA CHP Programs

DG as CHP PON

- Late Spring, early summer 2010
- Competitive selection
- Total cap amount not final
- 30-50% of project cost
- Project cost includes thermal systems
- Award based on total project cost
- All fuels (except ADG)
- All technologies (except some FC)
- No size limits
- 4 year data reporting

Source: Ed Kear, NYSERDA, Nov. 17, 2009

Existing Facilities Program

- First come – first served
- Up to \$2M
- Up to 50% of project cost
- Project cost does not include thermal systems
- Incentive based on peak reduction and electric generation
- Natural Gas only
- ICE and large gas turbines only
- Systems \geq 250 kW only
- 2 year reporting
- Performance based payments



NYSERDA CHP Programs

- Flex Tech Program
 - Cost Shared feasibility studies
 - 75% of produced electricity must be onsite
 - Project size limited to up to 50 MW
 - Annual fuel conversion efficiency of at least 60%

Source: <http://www.nyserda.org/programs/flextech.asp>

Federal Incentives

- Modified Accelerated Cost Recovery System (MACRS)
- Qualifies for a five-year depreciation method.
- 50% may be depreciated in the first year.
- Projects must be installed by 2010.
- Recovery period must be within 20 years.
- Source: EPA <http://www.epa.gov/chp/incentives/index.html>

Federal Policy

- DOE Report from Oak Ridge National Labs
12/2008

Proposed 20% of U.S. electricity by CHP in
2030

Significant emission reduction, energy saving
and productivity benefits

- A 2009 \$156 Million FOA, generated over \$9.0
Bil. in private investment proposals (new job
creation)

Federal Incentives

- Provided a 10% investment tax credit (ITC) for the first 15 MW of CHP property. Systems <50 MW
- Be 60% efficient
- Be placed in service before January 1, 2017

http://www.epa.gov/chp/documents/meeting_100209_hedman.pdf

Other Policies affecting CHP

- **Standby Rates**
- **Net Metering**
 - Micro-CHP up to 10 kW effective Feb. 2010.
 - Agricultural waste up to 500 kW

Source: NYS PSC <http://documents.dps.state.ny.us/public/Common/ViewDoc.aspx?DocRefId={72054067-55DE-444D-A554-130F9C7EA25F}>–



Programs likely to benefit CHP

- **DG Gas Rates**

- As of 3/10/2010, 35 C&I customers are taking service under new DG rates, while 217 customers are taking service under the old DG rate. In total 428 MW and 12.4 million dth

- **Geographic Balancing**

- \$30 million reallocated downstate from RPS for fuel cell projects

Future Policy Decisions affecting CHP

- SBC IV
 - Current funding for SBC III expires June 30, 2011.
- Climate Action Plan
 - Governor Patterson's Executive Order 24
 - Initiative to reduce GHG emissions 80% by 2020.
 - NYC Technical potential 2,000 MW.

STAC

- **2010 Pace Energy and Climate Center report on using CHP to replace the oldest, least efficient equipment burning the most polluting fossil fuels (oil and coal)***
- **Focused on Connecticut, Massachusetts, New Jersey and New York**
- **Examined how CHP developers could enhance revenue by selling Emissions Reduction Credits (ERCs), Emissions Allowances (EAs) and Carbon Credits**

* Commissioned by NYSERDA on behalf of the U.S. Department of Energy



- **Heavy grades of fuel oil (#6 or #4) contribute disproportionately to local air pollution, especially when burned in old and inefficient boilers**
- **New York and New England are among the largest consumers of fuel oil**
- **In the Northeastern states, these six sectors have the greatest potential to replace #6 and #4 fuel oil with clean-burning CHP systems:**
 - **Hospitals**
 - **Multi-family Buildings**
 - **Colleges/Universities**
 - **Pulp and Paper Production**
 - **Chemicals Manufacturing**



Report Highlights

- CHP developers can claim Emissions Reduction Credits (ERCs) for onsite reductions of air pollutants such as nitrogen oxides (NO_x), fine particles (PM), volatile organic compounds (VOCs) and carbon monoxide (CO)
- In some states, CHP developers can claim Emissions Allowances (EAs) for offsite reductions in NO_x and sulfur dioxide (SO₂)
- Eligible sites can obtain payment for *both* ERCs & EAs
- CHP operators may also be able to obtain payments for reductions in carbon dioxide (CO₂) emissions

How much pollution could be reduced?

- In the four states studied → 2,870 megawatts of CHP systems could displace existing oil-burning boilers in the six sectors of greatest potential
- These systems are high efficiency, low emissions and technically feasible
- If this potential were realized, the following environmental benefits would result in the four-state region:

Total NO_x reduction potential = 38,991 tons

Total SO₂ reduction potential = 162,419 tons

Total CO₂ reduction potential = 22,715,217 tons



Market-Based Programs That Could Benefit CHP:

- Emission Reduction Credits (ERCs)
- Emission Allowances (EAs)
- Regional Greenhouse Gas Initiative (RGGI) Allowances
- New emerging carbon markets

Emission Reduction Credits (ERCs):

- A permanent emission reduction of one ton per year of a non-attainment pollutant such as NO_x, VOCs, and PM
- Created by installing a CHP system that replaces old, more polluting equipment
- May be sold to new facilities that emit the same pollutants and require offsets

Emission Allowances (EAs):

- Grants the holder the right to emit one ton of NO_x or SO_2
- CHP developers may qualify to receive allowances
- Can be sold to regulated generators, such as power stations
- Connecticut, Massachusetts, and New Jersey set aside allowances for CHP developers; New York sells a percentage of allowances directly to regulated facilities, with the proceeds going to fund EE and RE projects such as CHP

Regional Greenhouse Gas Initiative (RGGI) Allowances:

- RGGI is a cooperative effort by participating Northeastern and Mid-Atlantic states to reduce CO₂ emissions by capping emissions from electric power generators larger than 25 MW
- Connecticut and Maine have established specific allowance set-asides that will be used to support CHP projects
- New Jersey has established regulations that will explicitly promote the development of CHP



New, emerging carbon markets:



How Much Can A CHP Project Benefit From Emissions Trading Programs?

Current prices for ERCs and EAs have fallen dramatically, and demand is very low.

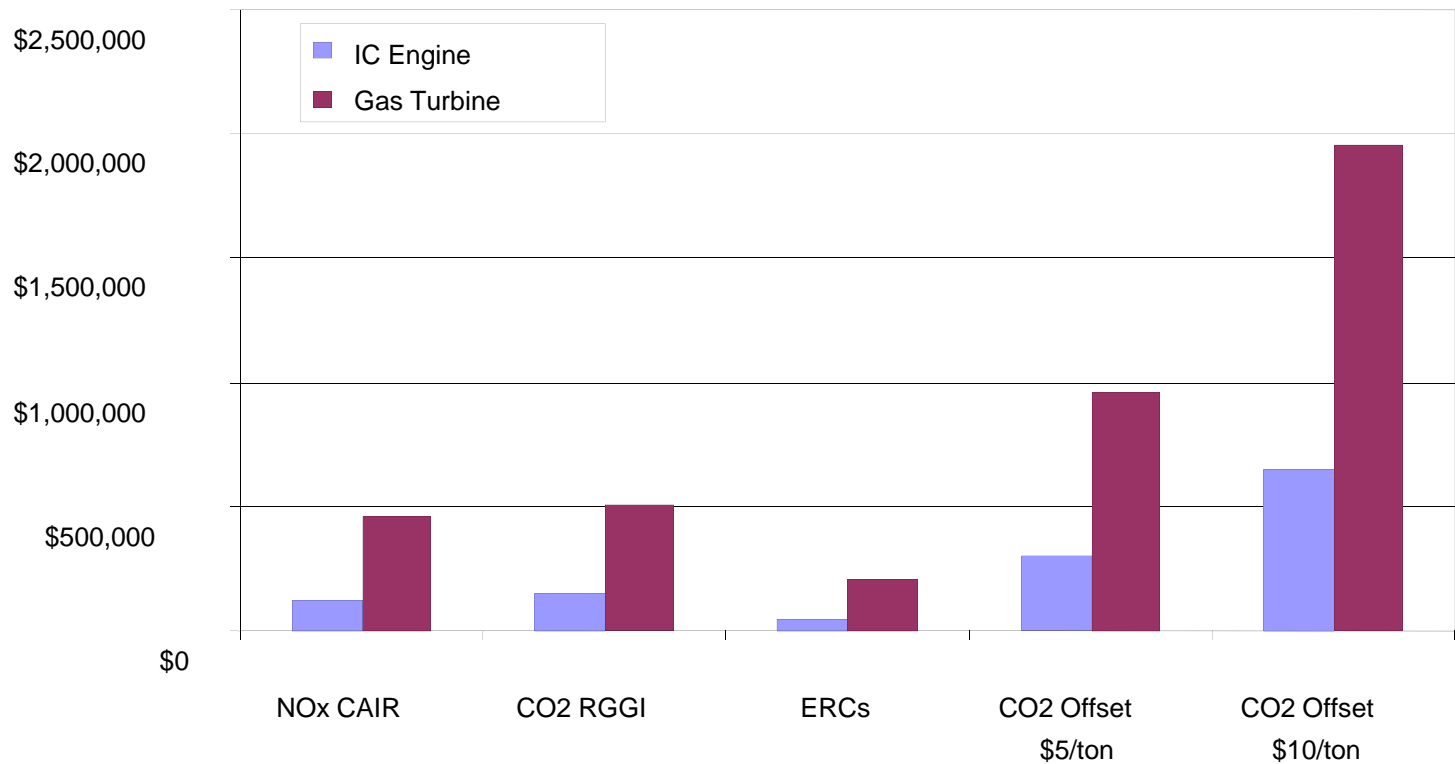
However, prices have exhibited great volatility over the last decade. In the recent past, ERCs in New York have traded as high as \$29,000/ton, and EAs have traded at nearly \$4,000/ton.

If prices were to rise again, ERCs and EAs could provide a significant revenue stream for CHP developers.

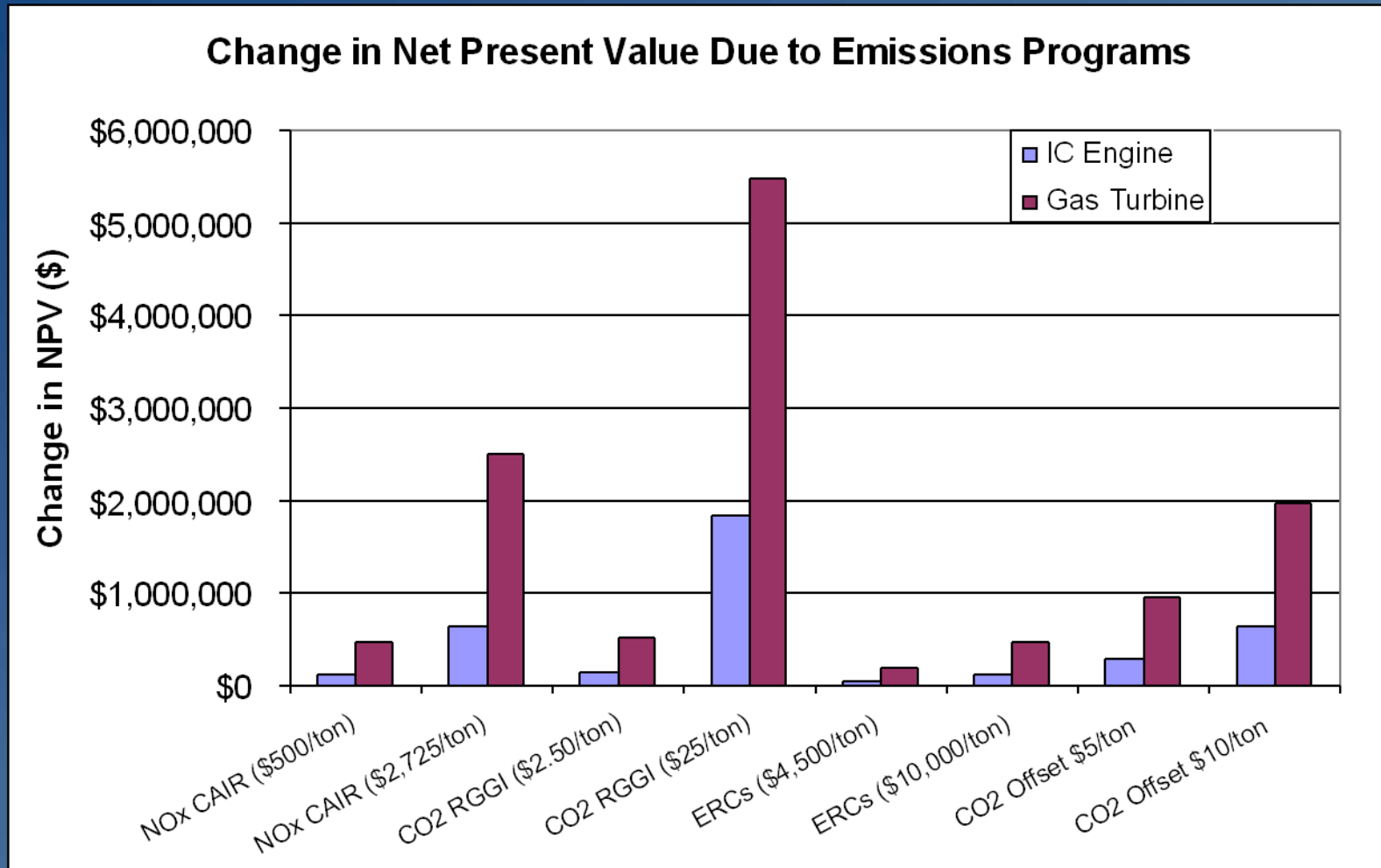
New markets being developed for carbon trading could provide substantial new revenue opportunities to CHP projects.



Change in net present value due to emissions programs – current prices



Change in net present value due to emissions programs – historic and future prices



Regulatory Policies Promoting CHP

CHP/ District Energy Systems are often the “Step-child” of Energy Efficiency measures

...omitted from Energy Efficiency policies, and left out of renewable energy initiatives

Favorable Policy Developments in the States

- State Standardized Interconnections Requirements
- Fair tariff structures for standby power from the utility
- Capital grants; e.g CT’s \$450 to \$500/kW incentive
- Utility incentives; e.g. CT’s \$200/kW incentive
- Revenue decoupling mechanisms
- Special CHP gas rates
- Ability to sell exchange heat and power with neighboring businesses (i.e., limited microgrids in NY, NJ, CT)

Goal \ Technology	PV	Wind	Fuel Cells (bio)	CHP (bio)	Fuel Cells (gas)	CHP (gas)
Energy	*	**	***	***	***	***
Capacity	*	*	***	***	***	***
Reduce criteria pollutants (NO _x , SO _x , Hg, PM)	***	***	**	*	**	**
Reduced GHG emissions	***	***	***	***	**	**
Economic (jobs)	?	*	?	**	*	**
Economic (new industry)	***	**	*	--	*	--
Economic (growth/competitiveness/)	---	-	--	?	-	**
Economic (energy cost benefits)	---	--	--	*	--	**
Reliability	-	-	**	*	**	*
Energy supply diversity	***	***	***	***	-	-
Reduced reliance on imported fossil fuels	***	***	***	***	*	*
Security / disaster response	?	?	***	***	**	**

Potential Additional CHP in Northeast

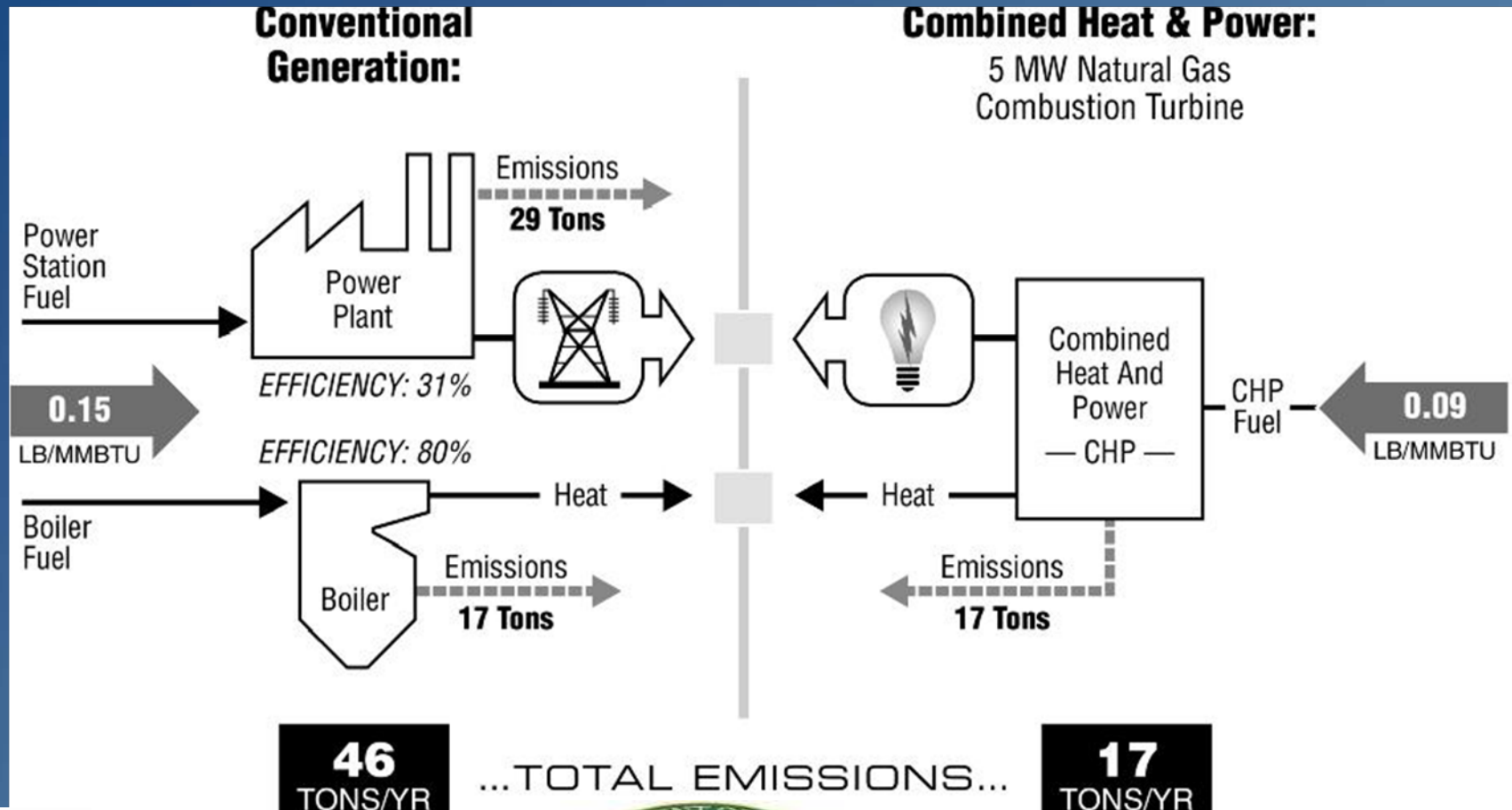
(Technical potential; not economically viable potential)

	Commercial (MW)	Industry (MW)	Total (MW)
Connecticut	1,303	676	1,979
Massachusetts	2,608	1,105	3,713
Maine	411	232	643
New Hampshire	388	164	552
New York	7,643	1,982	9,625
Rhode Island	414	128	542
Vermont	238	82	320
Total Region	13,005	4,369	17,374

Source: Bruce Hedman, Energy and Environmental Analysis, Inc. November 2003



Environmental Benefits of CHP (NO_x)



CO₂ Emissions Reductions from CHP

Conventional Generation

Combined Heat & Power: Taurus 65 Gas Turbine

Efficiency: 31%

Efficiency: 82.5%

Power Plant

CO₂ Emissions

52k Tons/yr

Efficiency: 82.5%

Power Station Fuel (U.S. Fossil Mix)

186

Lb/MMBtu

6.0 MWe

CHP Fuel (Gas)

117

Lb/MMBtu

Efficiency: 80%

Boiler Fuel (Gas)

117

Lb/MMBtu

Boiler

Steam

70,000 pph

Steam

CO₂ Emissions

43k Tons/yr

CO₂ Emissions

56k Tons/yr

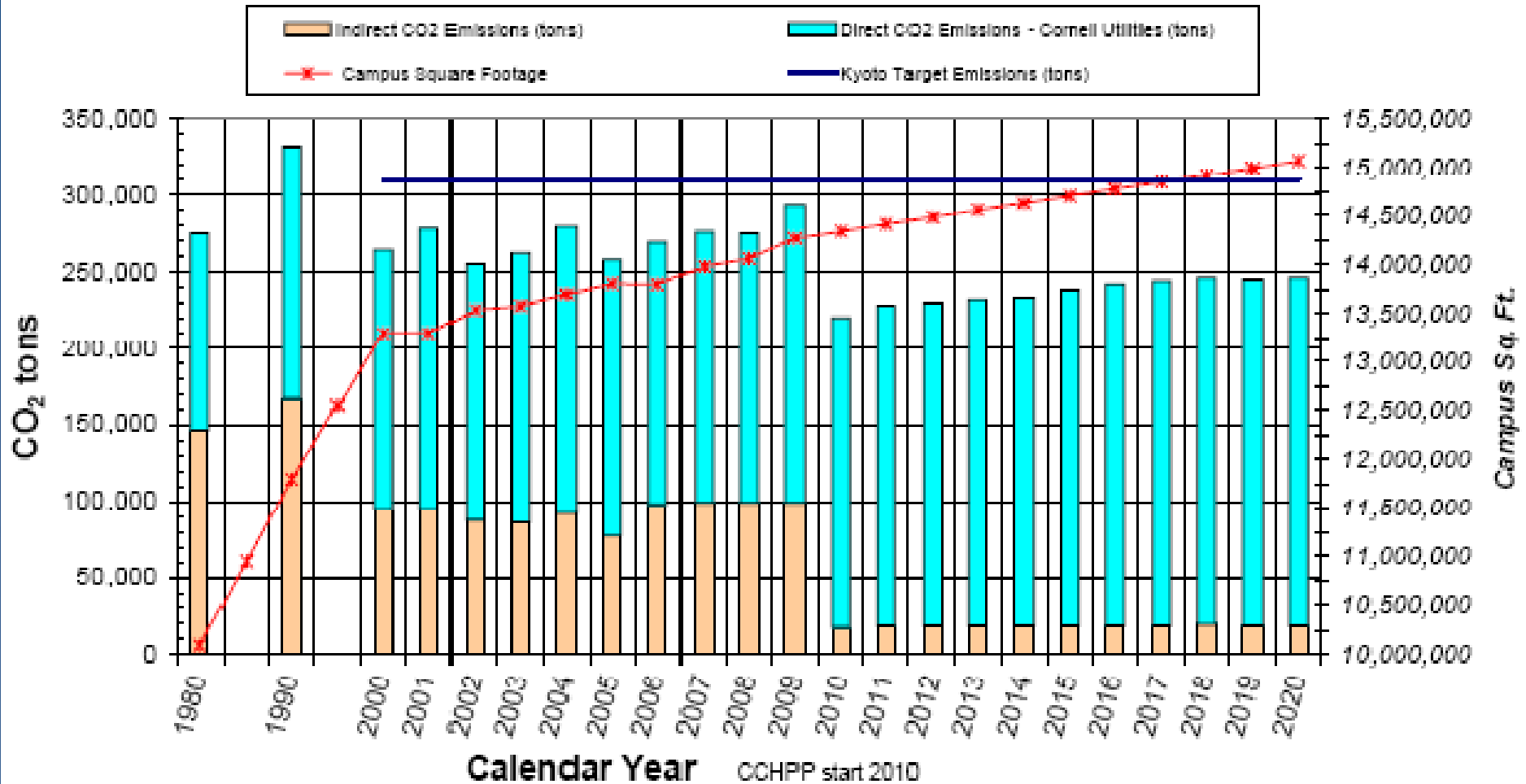
95k Tons

...TOTAL ANNUAL CO₂ EMISSIONS...

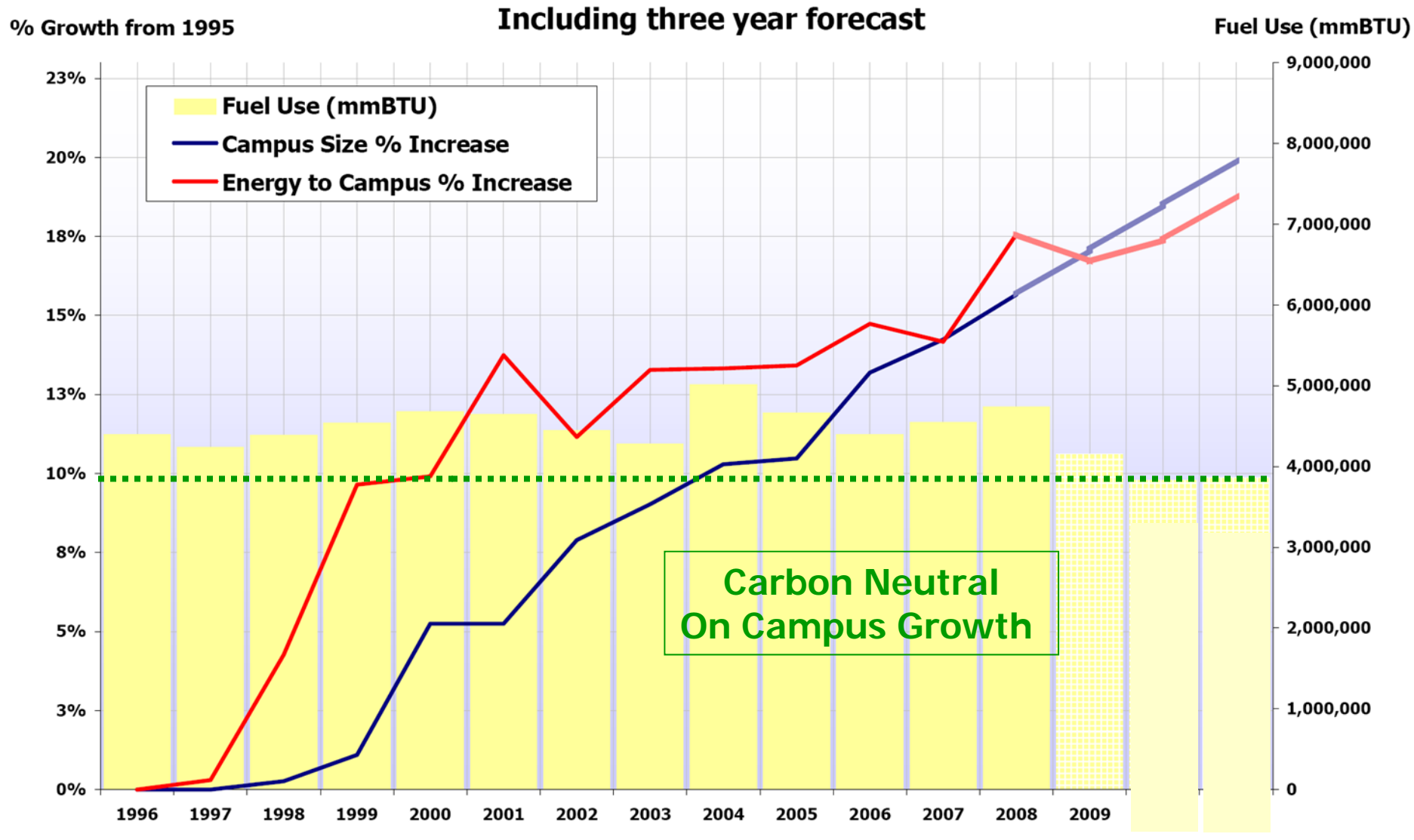
56k Tons

39,000 Tons CO₂ Saved/Year

Cornell's Carbon Footprint



Campus Growth vs. Gas Consumption



CHP and Critical Infrastructure

Combined Heat & Power (CHP) can Keep Critical Facilities Up & Operating During Outages

For Example, CHP can Restore Power and Avoid:

- Loss of lights & critical air handling
- Failure of water supply
- Closure of healthcare facilities
- Closure of key businesses



CHP on a Brownfield Site

- CHP Can Play a Role in GHG Reduction, Campus and Building Sustainability Initiatives (Mayor's Challenge)
- Case Study: Dell Children's Hospital
- 4.5 megawatt natural gas-fired CHP
- Encompasses a brownfield site
- >75% total system efficiency
- First LEED Platinum Hospital in North America, Awarded January 2009



Opportunities at Brownfield Sites/ Industrial Parks

CHP + Brownfields + Industrial Parks = MICROGRIDS?

In many states, unrelated businesses can share power, heat and steam within an industrial park WITHOUT breaching the distribution utilities franchise service territory rights

MICROGRIDS, or District Systems, can allow for MUCH GREATER economies of scale

- e.g. a manufacturer who has large electric power needs, but minor heat/steam needs located next to a site that has high steam needs but minor electric power needs provides greater complementarity, much higher efficiencies, much lower system costs!!

A New Commitment to CHP

Introducing the U.S. DOE Northeast Clean Energy Application Center



Activities

- Education and Outreach
- Identification of High Impact Projects and Implementation Assistance
- Strategic Market Analysis and Support for Decision-makers
- Sub-core Activities

NE-CEAC

- Provide useful information to support our clients in their decision-making process
- Create a more robust market for the Combined Heat & Power, District Energy Systems, Waste Heat Recovery industries
- Educate policymakers, key end-user groups and other stakeholders on the energy efficiency, environmental and economic benefits of well designed systems
- Insure that CHP, DES, WHR and other CETs are well integrated with state energy plans



UMASS



NE-CHPI

- **Volunteer based organization dedicated to accelerating CHP deployment.**
- **Members include CHP project developers, electric and gas utilities, state government agency representatives, universities.**
- **Convenes 6 times a year throughout the Northeast.**
- **Past topics have focused on Hospitals, Commercial and Multifamily buildings, Biomass based CHP.**



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