Abington House, New York, NY
LEED NCv2009 Gold *anticipated*
24% better than ASHRAE 90.1-2007
75 kW reciprocating engine

Luke Falk
Sustainability Manager

COGENERATION IN MULTIFAMILY: THE BUSINESS CASE AND BEYOND

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Related Green Development Completed to Date

Building	Number of Resi Units	GSF	Targeted LEED Rating	# of LEED Energy pts	Energy Performance
Tribeca Green	274	361,363	v2.1 Gold	2	14.0% vs ASHRAE 90.1-1999
One Back Bay	178	531,000	v2.1 Silver	2	0.0% vs ASHRAE 90.1-1999
The Clarendon	103	405,504	v2.1 Silver	2	0.0% vs ASHRAE 90.1-1999
The Harrison	132	326,918	v2.1 Silver	0	0.0% vs ASHRAE 90.1-2004
Superior Ink	75	167,699	v2.1 Silver	2	15.0% vs ASHRAE 90.1-2004
The Century	140	505,273	v2.1 Silver	1	0.0% vs ASHRAE 90.1-1999
340 on The Park	343	1,008,000	v2.1 Silver	4	22.5% vs ASHRAE 90.1-1999
The Brompton	168	284,786	v2.1 Silver	0	0.0% vs ASHRAE 90.1-2004
MiMA	663	622,746	v2.2 Gold	4	21.0% vs ASHRAE 90.1-2004
One MiMA Tower	151	344,025	v2.2 Gold	4	21.0% vs ASHRAE 90.1-2004
Bronx Terminal Market	--	615,000	v2.1 Silver	1	0.0% vs ASHRAE 90.1-1999
SUBTOTAL	**2227**	**5,172,314**			

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Green development in design and construction

- Dozens of projects
- Multifamily, commercial, retail, mixed use
- New York, California, Chicago, Boston, and Washington DC
- +7,400 Apartments
- +21,000,000 SF of space
- +$10B in investment
- All projects pursuing LEED certification at the Silver level or higher
- Benefits of cogeneration to Related:
  - Attractive payback
  - Blackstart for enhanced backup power capacity
  - Enhanced energy performance for LEED and code

460 Washington St., New York, NY
LEED NCv2009 Gold *anticipated*
25% better than ASHRAE 90.1-2007
75 kW reciprocating engine

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Agenda

1. Cogeneration systems overview
2. Economic analysis
3. Cogeneration for resilience
4. Misc. design considerations
5. Permitting
6. Incentives

E. 92nd St., New York, NY
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27% better than ASHRAE 90.1-2007
200 kW inverter-based recip. engines

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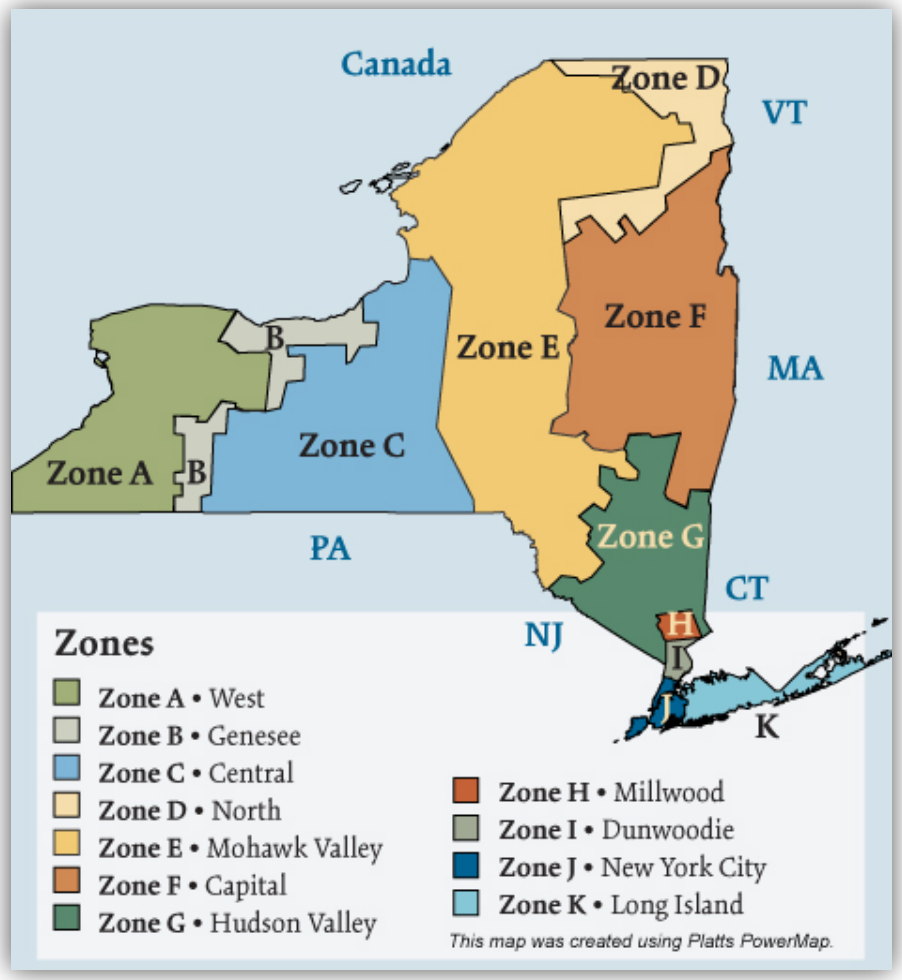
New York City is capacity constrained



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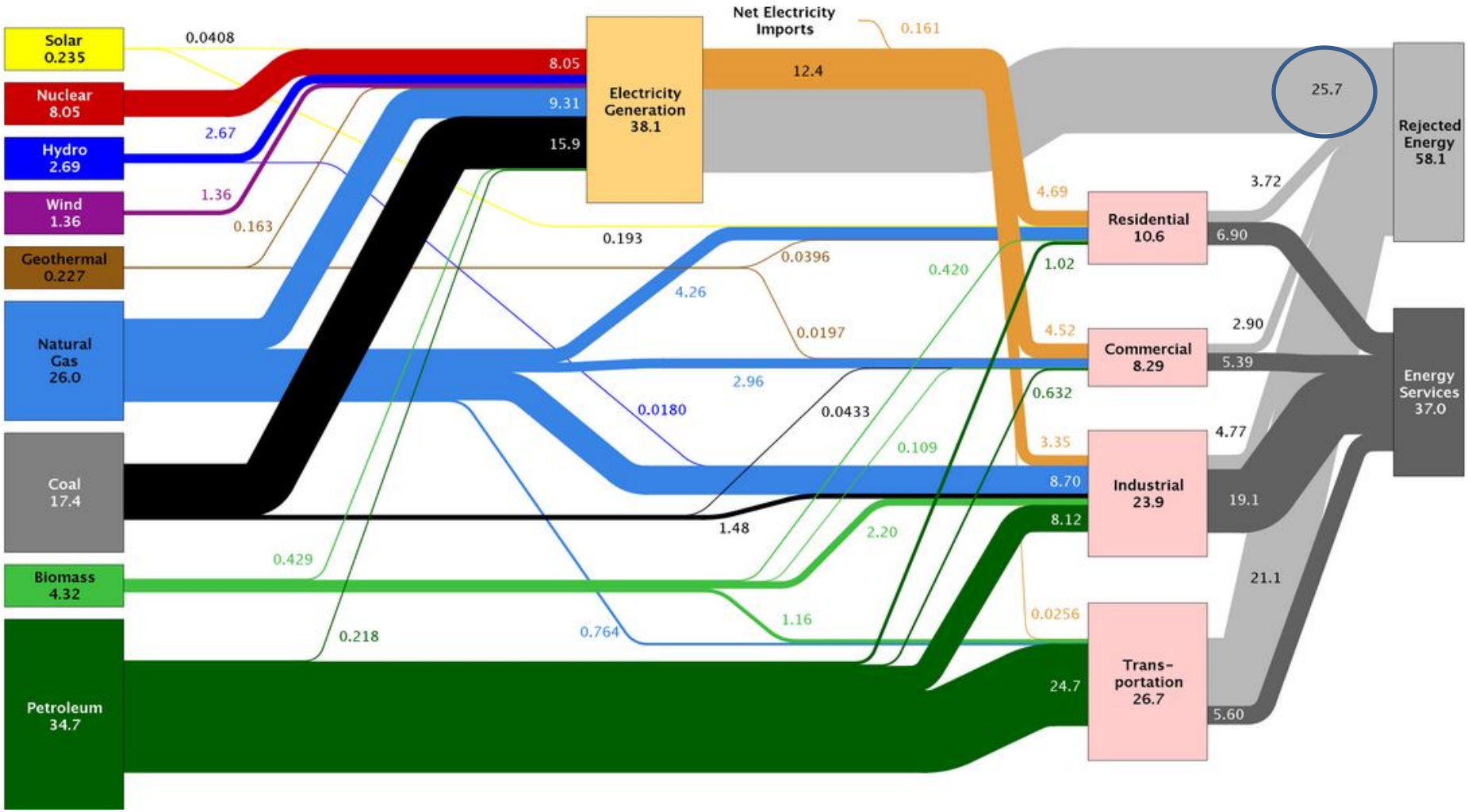
Electric grid is only 32% efficient



Source: Lawrence Livermore National Laboratory and the Department of Energy
https://flowcharts.llnl.gov/

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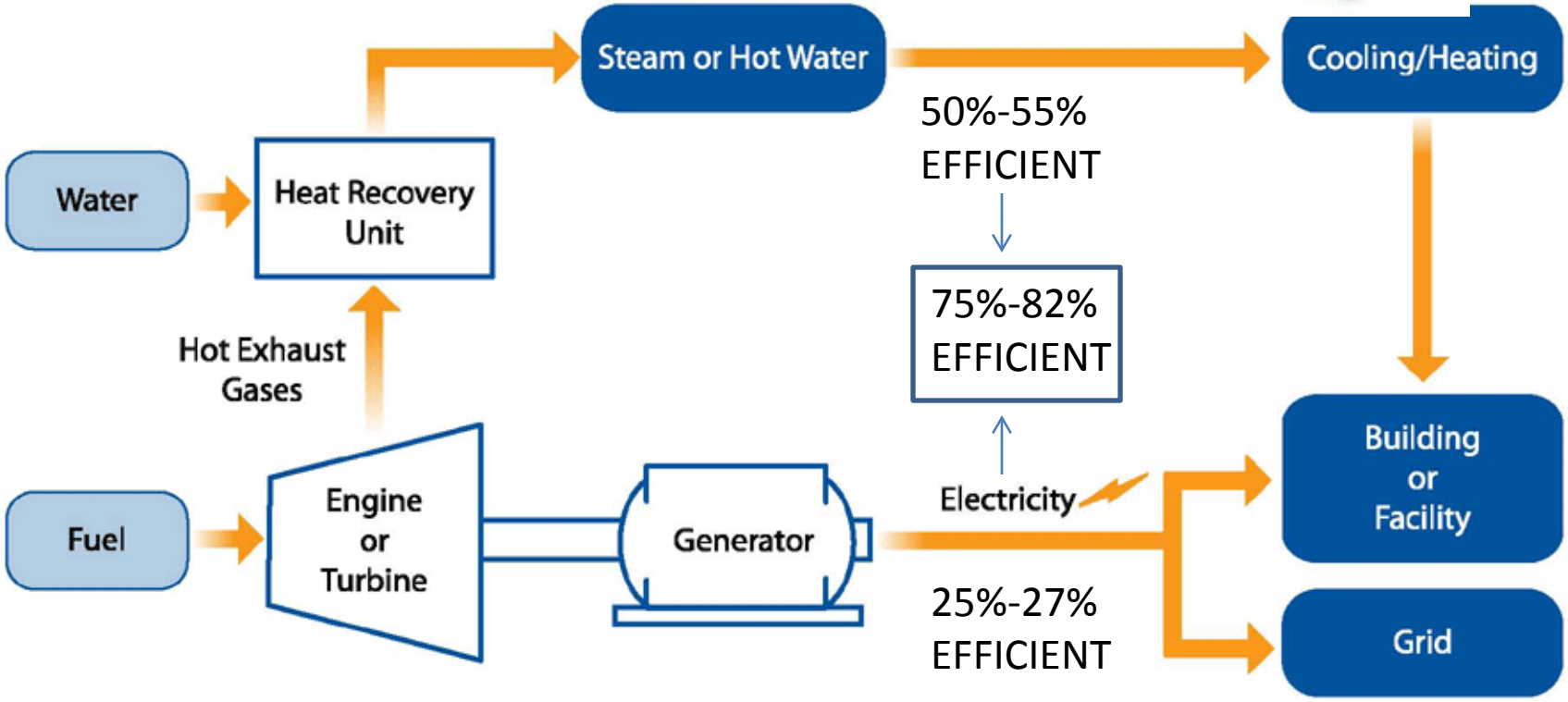
Basic components of a CHP system

Capstone Microturbine



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Source: www.epa.gov

Reciprocating engines vs. microturbines

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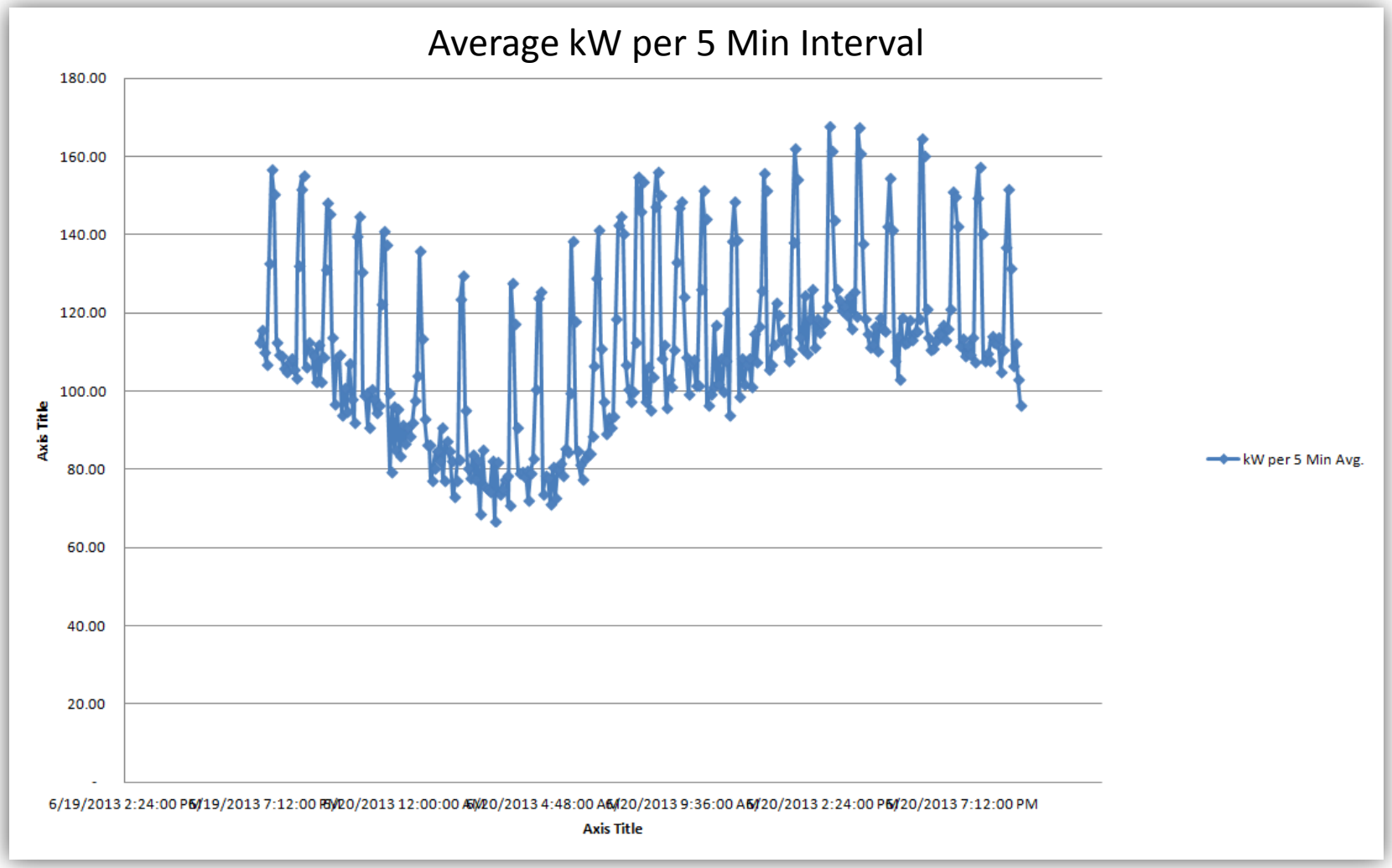
Design challenge #1: electrically baseloaded system



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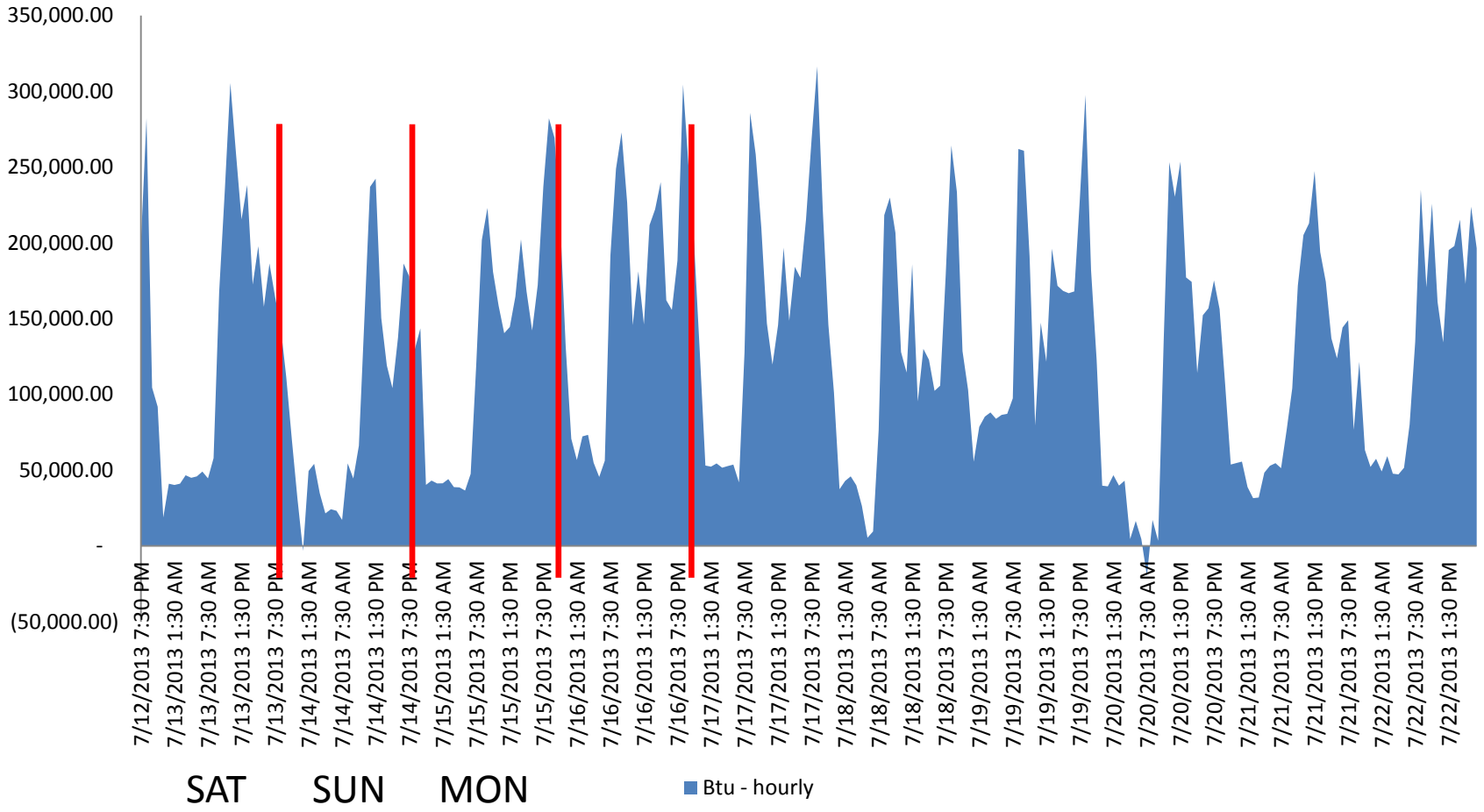
Design challenge #2: thermally baseloaded system



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Approximate economics of cogeneration in NYC

Cogen Type / Size	75 kW reciprocating engine	65 kW microturbine
Annual useable kWh output	547,354	466,536
Annual useable thermal output(MMBTU)	3,534	2,940
Annual useable thermal Recovered(MMBTU)	3,484	2,940
Annual thermal rejection(MMBTU)	50	0
Annual gas use to run system(CCF)	64,108	54,885
Annual maintenance cost	$12,645	$14,300
Percent of thermal output used (not dumped)	98.59%	100.00%
INSTALLED COST	-$325,000	-$400,000
ANNUAL SAVINGS (NET OF MAINTENANCE)	$60,820	$50,720
SIMPLE PAYBACK	5.3	7.9
ROI	18.7%	12.6%

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Resilience

- Blackstart enabled cogeneration can run during a blackout
  - Typically beckwith relay protector typically required to prevent exporting to grid
- Design to augment or supplant emergency generator?
  - Does local code require generator?
    - Sizing for emergency loads vs. electric baseload is different
    - UL2200 and NFPA 110 typically required
      - Only Capstone is UL2200 compliant
  - Is there a voluntary code?
    - If voluntary code exists, may require installation of a generator in addition to cogeneration

Hunter's Point South, New York, New York
LEED NCv2009 Silver *anticipated*
195 kW of black start microturbines for resilience

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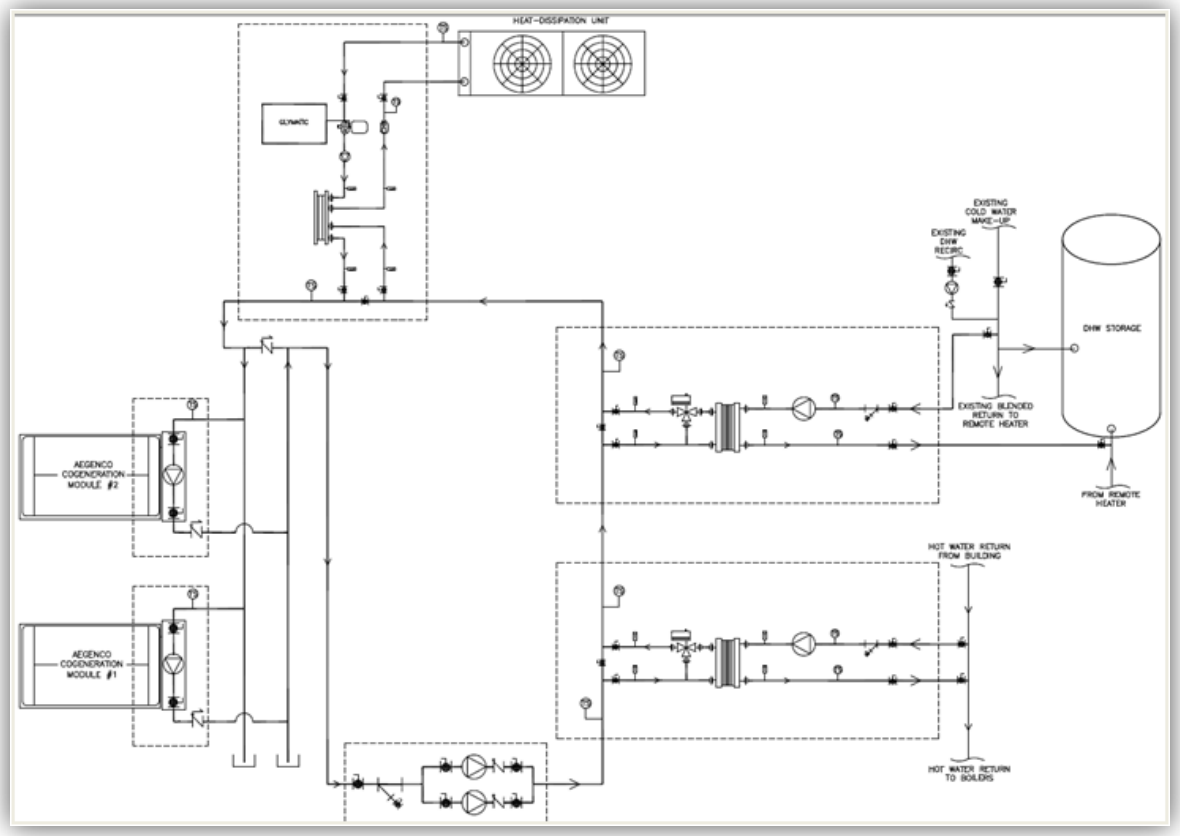
Thermal Rejection Requirements

- Recips require dump radiators
- Microturbines are air cooled:
  - require 2,500 CFM supply
  - require 1,000 CFM exhaust



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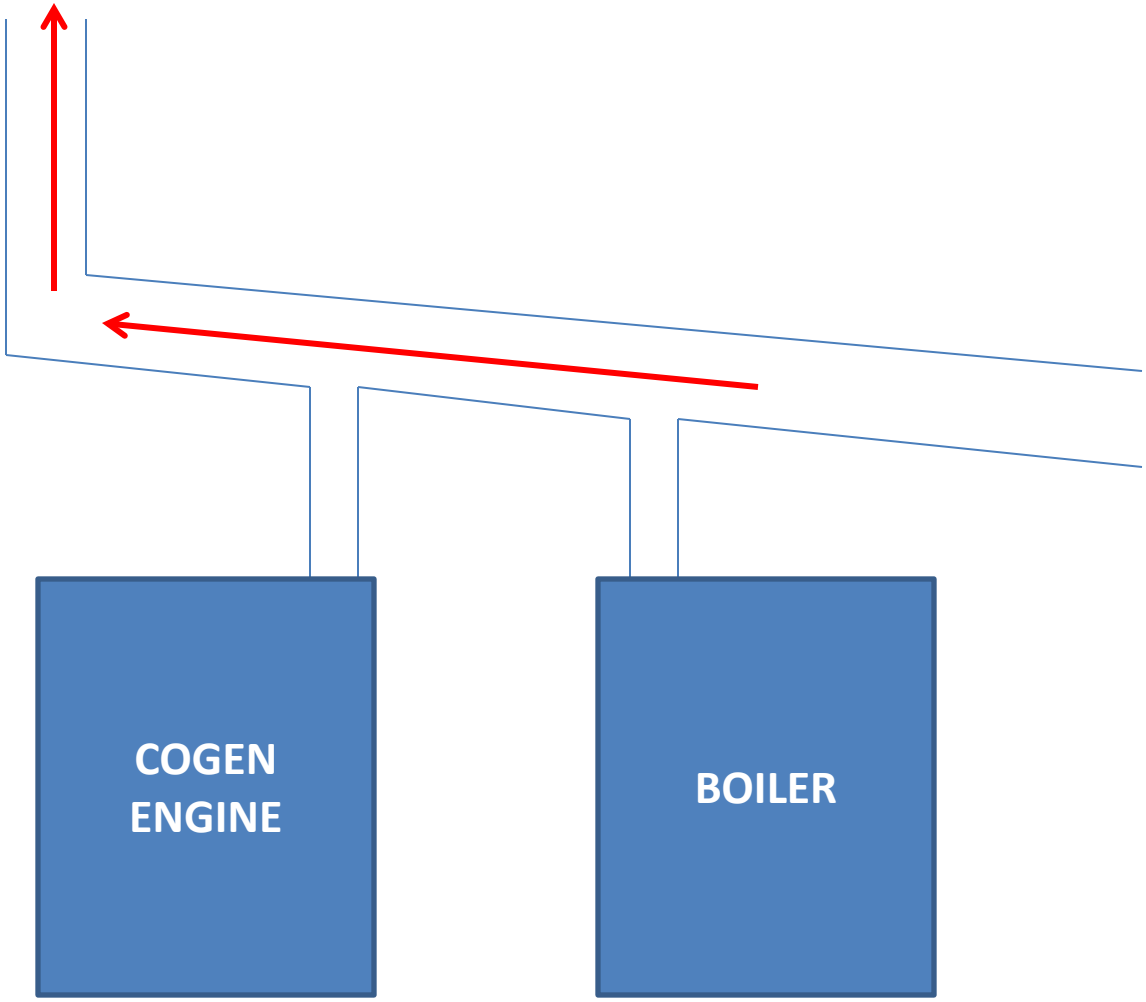
Source: Lee Vardakas, Aegis Energy General Manager

Flue requirements



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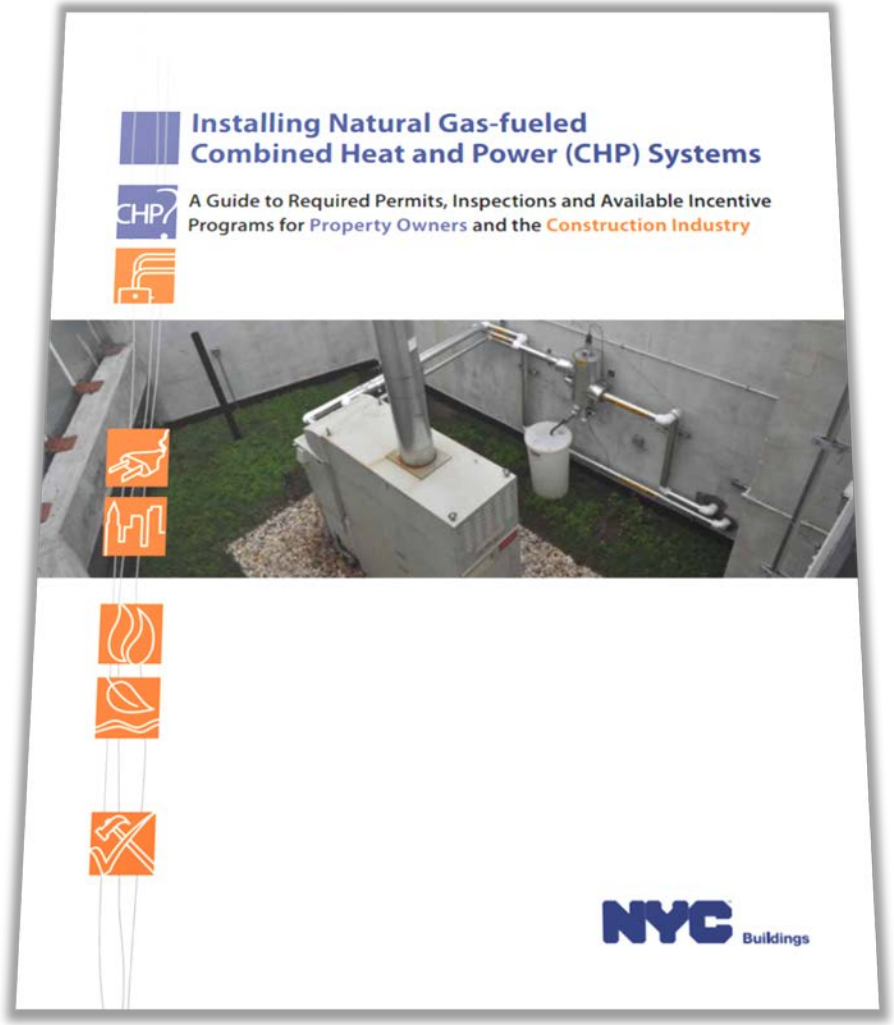
Utility interconnection and Dept. of Buildings



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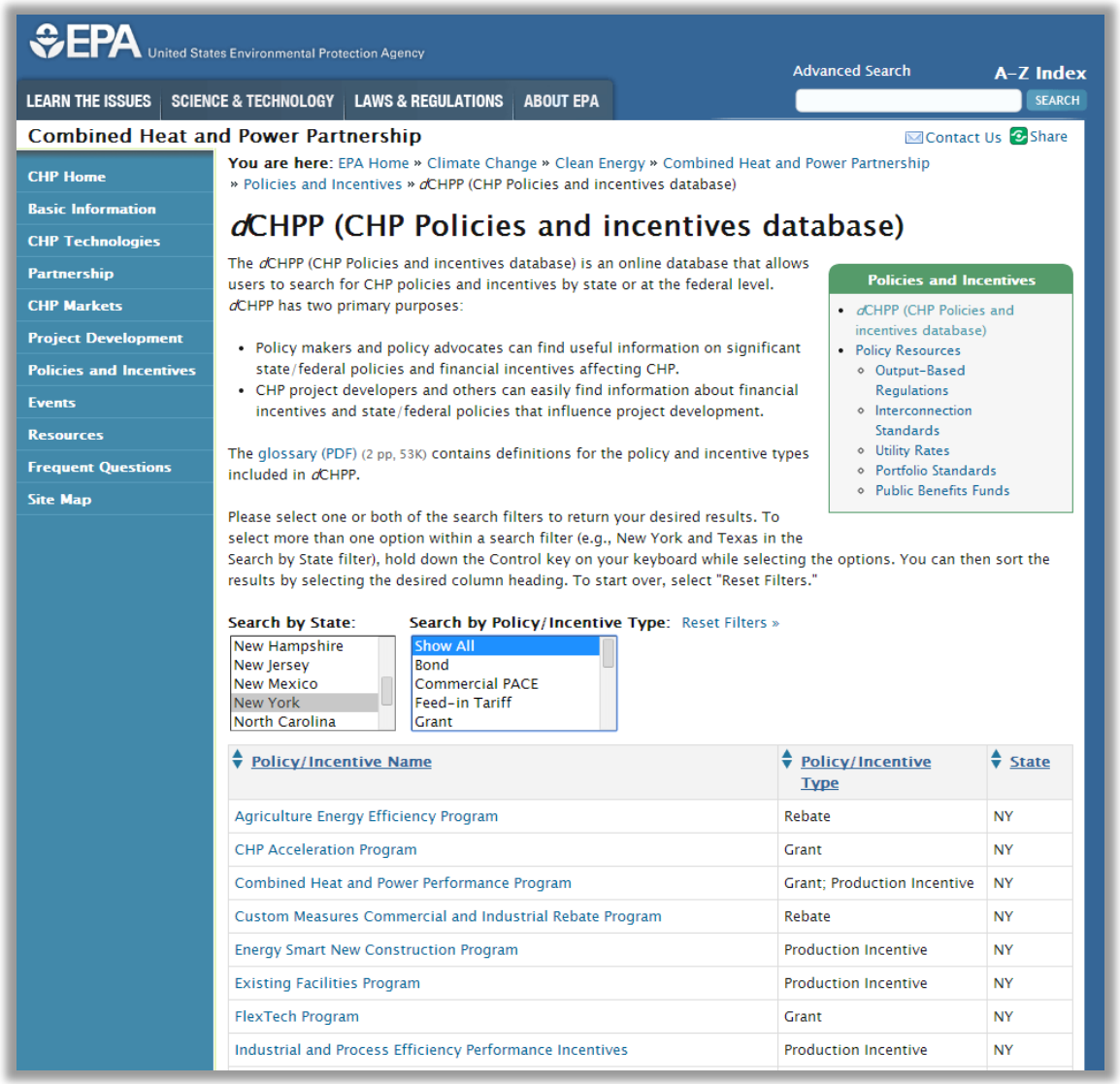
Resources:

http://epa.gov/chp/policies/database.html



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Combined Heat and Power Partnership

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*d*CHPP (CHP Policies and incentives database)

The *d*CHPP (CHP Policies and incentives database) is an online database that allows users to search for CHP policies and incentives by state or at the federal level. *d*CHPP has two primary purposes:

- Policy makers and policy advocates can find useful information on significant state/federal policies and financial incentives affecting CHP.
- CHP project developers and others can easily find information about financial incentives and state/federal policies that influence project development.

The glossary (PDF) (2 pp, 53K) contains definitions for the policy and incentive types included in *d*CHPP.

Policies and Incentives

- *d*CHPP (CHP Policies and incentives database)
- Policy Resources
  - Output-Based Regulations
  - Interconnection Standards
  - Utility Rates
  - Portfolio Standards
  - Public Benefits Funds

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Search by State: New Hampshire, New Jersey, New Mexico, New York, North Carolina

Search by Policy/Incentive Type: Reset Filters »

Show All, Bond, Commercial PACE, Feed-in Tariff, Grant

Policy/Incentive Name	Policy/Incentive Type	State
Agriculture Energy Efficiency Program	Rebate	NY
CHP Acceleration Program	Grant	NY
Combined Heat and Power Performance Program	Grant; Production Incentive	NY
Custom Measures Commercial and Industrial Rebate Program	Rebate	NY
Energy Smart New Construction Program	Production Incentive	NY
Existing Facilities Program	Production Incentive	NY
FlexTech Program	Grant	NY
Industrial and Process Efficiency Performance Incentives	Production Incentive	NY

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