

Energy Efficiency Case Studies

NYSERDA'S Multifamily Performance Program



ASSOCIATION FOR
ENERGY AFFORDABILITY, INC.

MEASURES

OIL TO GAS
CONVERSION

COGENERATION
SYSTEM

HIGH EFFICIENCY
HOT WATER
BOILERS

NEW ABSORPTION
CHILLER

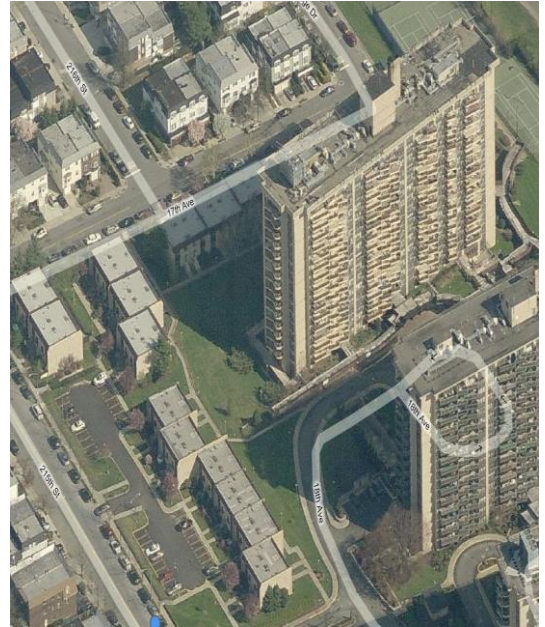
140 T-8 LAMPS
INSTALLED IN
GARAGE

The management and co-op board of 17-85 215th Street (Americana) wanted assistance in selecting the most efficient replacement for its original heating and cooling system. Using the NYSERDA Multifamily Performance Program tools and funding, the team recommended the installation of a cogeneration system, new gas boilers and chillers to reduce heating, cooling and electricity costs. Replacement of 140 garage lamps with more efficient super T-8's was also recommended.

The building is one of three complexes on a 17.28 acres site. The building lot consists of one 16-story structure with 270 units and 20 townhouses configured in 3 structures: 4 units in one structure and eight each in the other two structures. All building envelopes are in good condition. The buildings are located on an irregular 5.76 acre lot with part of the underground garage, parking and recreational areas. For modeling purposes, we have included 1/3 of the garage area as heated space for the Americana.

The original heating system consisted of 2 steam boilers supplying steam to a hot water converter that provided hot water to heat the building. In the summer, the steam was delivered to an absorption chiller to cool the complex. This system was replaced by 3 Telecogen Inv-100 natural gas fired cogeneration units that generate electricity with the waste heat supplied for hot water and to the heating system. Seven Patterson-Kelley natural gas fired high efficiency hot water boilers were installed as a supplemental backup to the system. A new absorption chiller was installed.

The project was funded by the MPP



USES AND SOURCES OF FUNDS

Eligible Uses	
Total costs of improvements	\$3,611,136
Sources	
Anticipated NYSERDA Grants	406,900
NYSERDA Energy Smart Loan	1,450,000
Building Reserves	1,754,236
Total Sources	\$3,611,136

incentives (11%), Energy Smart Loan (40%) and building reserves 48%).

The initial audit projected a 29% savings; a conservative estimate to be sure the payback was feasible for the coop. The post inspection utility analysis revealed that the cogeneration, new boiler and chiller system along with the garage lighting saved the building over 2 million kilowatt hours of electricity and 4,778 therms of fuel. This is a total energy consumption reduction of 38% or over \$400,000 per year. The payback period for the investment is 10 years.

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MEASURES

50 KW OF
PHOTOVOLTAICS

SUBMETERING OF
ELECTRICITY

COGENERATION
SYSTEM

BOILER CONTROLS
UPGRADE

DHW AND HEATING
PIPE INSULATION

THERMOSTATIC
RADIATOR VALVES

INTERIOR LIGHTING

In early 2007, the innovative Board of this 217 unit, upper Manhattan co-op decided to explore all possibilities to reduce energy consumption and the carbon footprint of their building. An energy audit showed that energy consumption could be reduced 26% by the following measures:

1. Change direct metered electric system to sub-metered system
2. Insulate DHW and heating pipes
3. Install thermostatic radiator valves (TRV)
4. Adjust burner, upgrade boiler controls
5. Install CHP system (cogeneration)
6. Upgrade common/exterior lighting
7. Install 50 kW grid connected photovoltaic system.

Major savings will be realized through installation of the combined heat and power system with reciprocating engine driven system design. This system also reduces sulfur and nitrous oxides emissions by over 80% from current levels, carbon emissions by 50%, and net fuel consumption by 40%.

The 50 kW grid-connected photovoltaic system is a non-penetrating ballasted system that lies flat on the roof to maximize the kW and avoid wind uplift. The system works in concert with the CHP to reduce the building's electrical load.

The previously direct metered electricity had to be sub-metered for the CHP and photovoltaic systems and provided significant cost savings in switching to wholesale rates. The installation of TRVs in overheated lower floor units (approx. 40% of all units) will



Uses and Sources of Funds

Eligible Uses	
Total costs of improvements	\$1,130,943
Sources	
Anticipated NYSERDA Grant	256,370
NYSERDA Energy Smart Loan	546,573
NYSERDA Sub-metering funds	64,000
NYSERDA Photovoltaic funds	200,000
State tax incentives	64,000
Total Sources	\$1,130,943

allow residents to regulate heat and reduce fuel use.

Other savings are derived from better pipe insulation, upgrading /adjusting boiler controls and lighting upgrades.

As indicated above, more than 50% of the improvements' cost was funded by grants from the New York State Energy Research and Development Authority (NYSERDA) or tax incentives. The rest was financed with a low interest NYSERDA Energy Smart Loan. The monthly energy savings more than pays for the monthly loan payments.

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NYSERDA'S Multifamily Performance Program



ASSOCIATION FOR
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MEASURES

NEW WINDOWS

UPGRADE HEAT
TIMER WITH IN
UNIT SENSORS

SCOTCH MARINE
BOILER

NEW BOILER
CONTROLS

UPGRADE LIGHTING

PIPE INSULATION

ENERGY STAR ACs

WHITE ROOF

This 77 unit condominium was built in the mid 1980's using light weight steel construction with brick and stucco facing. Built as 4 story townhouses, the building has a 20,000sqft roof and covers half a city block. After 20 years, the building envelope and heating system required upgrading to increase heat production, decrease heat loss and improve resident comfort. An MPP energy audit showed that energy consumption could be reduced 25% by the following measures:

1. Replace atmospheric boilers with Scotch Marine boiler
2. Insulate DHW and heating pipes
3. Upgrade heat timer, add apt. sensors
4. Install DHW Demand Controller
5. Lower aqua stat on recirculation control
6. Upgrade common area/apartment lighting
7. Install new windows (80% of building)
8. Install Energy Star air conditioners (25%)
9. Install a white roof coating.

This comprehensive strategy addresses all three potential areas of energy savings: heating, ventilation and air conditioning; building envelope; and lighting and appliances.

The original atmospheric boilers were inefficient and undersized for the building. Replacing them with the more efficient Scotch Marine, upgrading heating controls and installing pipe insulation provide approximately 50% of the energy savings.



USES AND SOURCES OF FUNDS

Eligible Uses	
Total costs of improvements	\$604,792
Sources	
Anticipated NYSERDA Grant	51,200
NYSERDA Energy Smart Loan	385,000
Building Reserves	168,592
Total Sources	\$ 604,792

The condominium took advantage of NYSERDA's "Be Cool Program" with Owners replacing 25% of all air conditioners with Energy Star models.

The heat loss and cooling issues were addressed with new windows (80% of the building windows) and roof resurfacing. Additional savings are derived from common area lighting upgrades as well as an initiative to encourage owners to replace 6 incandescent bulbs with CFL's per unit.

As indicated above, more than 8% of the improvements costs were funded by grants from the New York State Energy Research and Development Agency (NYSERDA). 64% is financed with a low interest NYSERDA Energy Smart Loan. The monthly energy savings more than pays for the monthly loan payments. A post construction fuel use analysis confirmed electric savings of 27% and gas savings of 32%.