case study

Park Terrace Gardens

Holistic steam system upgrades and simple air sealing measures helped this co-op complex resolve heating imbalances and save an annual average of more than $100,000.

project overview

Project Type
One-Pipe Steam Heating System Upgrade
Location
Inwood, NY
Project Completed
2014
Base Building Completed
1939
Project Size
435,340 sf; 397 units; 5 buildings
Building Type
Multifamily Residential; Cooperative

project team

Project Owner
Park Terrace Gardens, Inc.
Property Management
Douglas Elliman Property Management
Service and Installation
Bright Power, Inc.
Marlande Heating
Goldner Plumbing
Incentive Provider
NYSERDA Multifamily Performance Program

primary energy figures

Simple Payback (without incentive)
2.6 years
Payback with Incentive
1.3 years
Annual ROI
$109,000 (40%)
Incentive Amount
50% project cost
Heating Fuel Use Savings
19%

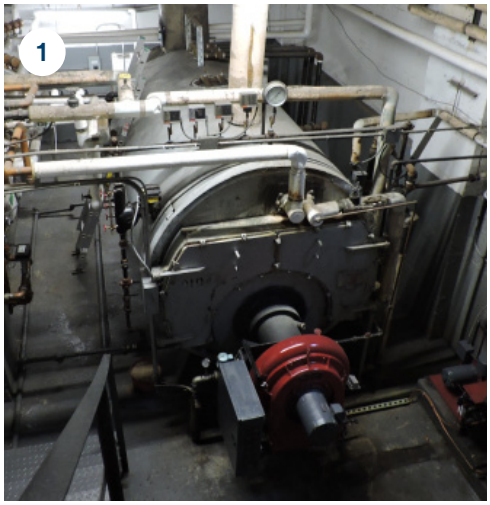
- Before
- After

be ex
building energy exchange

NYC Retrofit ACCELERATOR

strategies

Park Terrace Gardens worked with an energy management firm to identify the most effective ways to reduce the co-op's energy use and resolve chronic heating imbalances. Steam system measures included boiler, piping, venting, and control system improvements. These were supplemented with simple air sealing measures to minimize heat loss. The completed scope of work balanced building temperatures, improved comfort, and slashed heating fuel use by 19%, saving an average of $109,000 a year.



steam system measures

1 Boiler & Burner Tune-Ups
Tuned boilers, recalibrated burners, replaced gaskets, and installed back-of-boiler insulation to improve boiler performance and efficiency.

2 Master Venting
Installed high-capacity vents just before top-floor radiators (2a), and heavily vented ground-floor steam mains (2b), to allow heat to flow faster and more evenly to all apartments. Replaced select radiator valves with higher capacity valves, as needed, to balance heat and improve comfort.

3 Multi-Sensor Controls
Upgraded to internet-enabled boiler controls with wireless indoor and outdoor temperature sensors, to improve feedback and heating system responsiveness.

4 Piping Improvements
Insulated all bare piping to reduce heat loss, and performed needed maintenance and repairs on pipe mains in crawl spaces.

Additional Measures (not pictured)
Installed weatherstripping on windows and exterior doors to minimize heat loss and improve heating efficiency.

benefits

- Balanced flow of steam with more consistent and even heating to all apartments.
- Energy and fuel cost savings due to more efficient boiler and burner operation.
- Higher quality steam, with quieter pipes and radiators and improved equipment longevity.
- Greater ability to regulate boiler cycles and control building temperature.
- Increased resident comfort and satisfaction.

project description

This project made a huge difference – for years residents were resigned to being overheated. Now, we get far fewer heating complaints and are saving even more energy than expected.
— Osi Kaminer, Green Committee, Park Terrace Gardens

The Park Terrace Gardens Green Committee spearheaded the one-pipe steam system upgrades at this five-building co-op in Inwood. Working with property management and an energy management firm, the Committee won co-op board approval for the upgrades, secured incentives covering half the total project cost, and coordinated resident outreach and scheduling. The completed measures resolved the co-op's overheating problems and significantly improved steam system efficiency, reducing heating fuel use by 19% and cutting heating fuel bills by an average of $109,000 a year.

summary

Park Terrace Gardens is unique for having a "Green Committee" made up of co-op members dedicated to increasing sustainability in the co-op's five buildings. Leadership by the Committee, a generous financial incentive from NYSERDA, and a regulatory push from the City of New York were instrumental to getting this project off the ground. The completed steam system and air sealing measures resolved long-standing heating imbalances and inefficiencies, and yielded greater savings than originally projected.

In 2012, after participating in the NYC Clean Heat Program to convert the co-op's five boilers from #6 fuel oil to cleaner burning #2 oil, members of the Park Terrace Gardens Green Committee contacted the energy management firm Bright Power to explore opportunities to make the co-op even more sustainable and energy efficient.

Bright Power's engineers analyzed the co-op's five buildings and worked with residents and the on-site supers to create a scope of work designed to enhance comfort, improve steam system performance, and reduce overall energy use by 15% (thereby qualifying the co-op for a NYSERDA incentive covering 50% of the total project cost).

Despite this hefty incentive, the co-op board was initially reluctant to approve the project. Over the next year, the Green Committee led a campaign to educate co-op members on the reasons for and benefits of the proposed upgrades. The Committee's efforts paid off in 2013, when the co-op was required (per NYC local law) to retro-commission the buildings' systems, which included steam system balancing. With the Green Committee's encouragement, the board decided to complete a more comprehensive scope of work than required by the law, allowing them to tap the available incentive, maximize life-cycle savings, and enhance resident comfort. The completed project reduced the co-op's heating fuel use by 19%, saving an average of $109,000 per year. With the incentive, the project paid back in just 1.3 years (and only 2.6 years without the incentive).

existing conditions

Park Terrace Gardens' one-pipe steam system was severely imbalanced, causing chronic overheating and eliciting regular complaints from residents.

The co-op's five buildings are nine stories tall – about the height limit for a one-pipe steam system (taller buildings typically have two-pipe systems). Because air also was not venting out of the distribution pipes efficiently, steam was struggling to reach the tops of the tall vertical riser lines. As a result, lower floors were being drastically overheated to allow steam to reach upper levels. Many residents reported leaving their windows open and radiator valves closed all winter to counteract overheating, while others complained of erratic heating that fluctuated from too hot to too cold.

Water accumulation in the steam pipes also caused pipes to clang loudly and radiator vents to occasionally spit hot water.

details of the retrofit

Once underway, the steam system and air sealing upgrades were completed within one year – a requirement for NYSERDA funding. Fine-tuning took place over an additional two heating seasons.

Boiler and Burner Tune-Ups: To improve boiler efficiency, reduce run-times, and cut down on costly fuel use, the co-op's heating service firm cleaned and tuned the five boilers, recalibrated the burners, insulated the backs of the boilers, and properly installed boiler gaskets.

Piping Improvements: The bulk of the co-op's steam mains are located in crawl spaces – dark, cramped areas that make work difficult and unpleasant. As a result, the pipes were overdue for needed maintenance. The engineers and plumbers worked together to insulate all bare piping and repair sections that were accumulating water (which can impede the flow of steam and cause pipes to clang and spit water).

Master Venting: To help steam travel up the tall vertical riser lines and heat all apartments quickly and evenly, high-capacity vents were installed at the tops of risers and at the ends of horizontal steam mains. This is known as 'Master Venting.'

To vent the risers, contractors raised all top-floor radiators up a few inches and installed small T-pipes with vents just below them. Contractors also replaced radiator valves with higher-capacity vents in many upper-level apartments and in those with a history of heating complaints, to further improve heat flow across the co-op.

Multi-Sensor Controls: To improve heating system responsiveness and reduce overheating, the boiler control system was upgraded to an internet-enabled model with wireless indoor temperature sensors that trigger boiler cycles based on average ambient temperature. The heating service firm monitors control system data via a web app to detect heating imbalances and fine-tune settings.

Additional Measures: To minimize heat loss and further improve steam system efficiency, the co-op installed weatherstripping around all windows and exterior doors.

Challenges and lessons

Without the dedication of the Green Committee, this project never would have happened.
— Project Engineer, Bright Power

Project Approval: Winning co-op board approval was a major challenge. Many board members have lived at the property for over 30 years, and were skeptical that the steam system could be improved. To allay these concerns, the Green Committee (with technical guidance from the contractors and engineers) led a campaign to educate the board on the process and benefits of the upgrades. The Committee presented at meetings, created informational flyers, and conducted a survey to identify residents' heating complaints and pinpoint needed improvements.

Resident Outreach: Assisted by the Green Committee, the co-op's management team and supers worked with contractors to schedule in-unit work and arrange access to residents' apartments. The co-op worked with contractors known and trusted by residents, which made scheduling easier. The Green Committee also called residents and sent thank-you notes after work was finished – personal touches that made the process smoother.

For two years after the project was completed, the Green Committee continued their education campaign to help residents understand the upgrades and adjust expectations about temperature (i.e. that temperatures would be more even, but cooler than before, so windows should be kept closed and radiator valves open in winter).

Technical Challenges: Contractors had difficulty accessing certain steam system components. In addition to pipes that were tucked away in tight crawl spaces, some radiators had irregularly shaped radiator cabinets or had furniture built over them, making them hard to reach. In a few cases, there was insufficient space to raise the radiator as needed for riser venting. Contractors had to devise alternative approaches, which slightly increased installation times and costs.

After balancing the steam system, it became apparent that a few radiators were also blocked or missing (issues that had previously been masked by overheating), which required follow-up work.