

Chappaqua Performing Arts Center Case Study: Replacement of End-of-Life Oil-Fired Boiler System at CPAC



Overview

The Chappaqua Performing Arts Center (CPAC) previously relied on an aging oil-fired water boiler that had exceeded its service life. Over time the system's deteriorating heat exchanger and failing components led to persistent water leakage, excessive fuel consumption, and unreliable heating performance. To address these issues, CPAC undertook a project to remove the failing boiler and replace it with a modern, efficient, and scalable heating solution.

Problem Statement

The existing oil-fired boiler presented multiple mechanical and operational concerns:

- Persistent water leaks from the boiler vessel and surrounding piping
- Declining efficiency, resulting in higher fuel usage and operating costs
- Frequent breakdowns, requiring routine service calls
- Aging and corroded components with limited replacement part availability
- Inconsistent heating output, impacting building comfort and system reliability

Given the boiler's age and condition, continued repair was no longer feasible or cost-effective.

Project Objective

The objective was to install a modern heating system that would:

- Reduce energy and operational costs
- Improve reliability and safety
- Provide scalable heating capacity
- Better match heating output to building load
- Decrease maintenance frequency and downtime
- Transition from oil to a cleaner, more efficient natural gas system



Case Study:

Replacement of End-of-Life Oil-Fired Boiler System at CPAC (continued)

Approach and Implementation

1. System Evaluation & Load Analysis: An assessment confirmed the boiler had reached end-of-life. A heat loss and system load study determined that a modular boiler plant would offer improved efficiency and better operational control.

2. Equipment Selection – Two Lochinvar High-Efficiency Gas Condensing Boilers: We selected two smaller natural gas-fired Lochinvar condensing boilers to replace the single large oil-fired unit. This approach offered multiple advantages:

- Higher efficiency through condensing technology
- Modular redundancy – if one boiler is offline, the other can maintain heating
- Load-matching capability, allowing the system to fire only at the rate required by actual building heat loss
- Reduced fuel costs compared to heating oil
- Cleaner combustion, lowering emissions and improving sustainability

3. Removal of Existing System: The failing oil boiler and associated components were safely removed. Corroded valves, pumps, and piping were replaced to ensure compatibility and long-term reliability.

4. Installation & Commissioning: The two Lochinvar boilers were installed with updated venting, controls, and high-efficiency pumps. The system underwent full startup, performance tuning, and safety verification.

Results

- **Reduced Operating Costs:** The switch to efficient natural gas condensing boilers lowered fuel consumption and day-to-day energy costs.
- **Lower Maintenance Requirements:** New components and modular boilers reduce service needs and eliminate emergency repair visits.
- **Better Heating Performance:** The system now adjusts firing rate in real time, matching output to the building's heat loss.
- **Improved Reliability and Redundancy:** Two smaller boilers ensure continuity of service even if one unit requires maintenance.
- **Environmental Benefits:** Natural gas combustion results in lower emissions, while condensing technology captures additional usable heat.

Conclusion

Replacing the failing oil-fired boiler with two high-efficiency Lochinvar natural gas condensing boilers delivered significant operational, economic, and performance benefits for CPAC. The new modular system provides superior reliability, reduces energy and maintenance costs, and ensures heating output aligns precisely with the building's demand. This upgrade modernizes CPAC's mechanical infrastructure and supports long-term sustainability.

