

MAINE MIDDLE SCHOOL SAVES WITH NEW PROPANE-POWERED BOILER SYSTEM

A PROPANE CASE STUDY

RELIABLE, HIGH-EFFICIENCY PROPANE BOILERS SLASHED WINTER HEATING BILLS BY \$9,000; WILL PAY FOR THEMSELVES IN JUST 5-7 YEARS



Maine School District 35 — also known as the Marshwood District — consists of five schools that serve a combined enrollment of 2,300 students and employ 400 people in the Southern Maine communities of Eliot and South Berwick. The district has always used heating oil to fuel its schools' space-heating systems. In 2013, staff at the district's 86,953-square-foot Marshwood Middle School discovered that one of the 23-year-old, heating-oil-fired boilers it used for space heating had developed a potentially serious crack.

CHALLENGE

The Marshwood District's school board was faced with the decision to repair the cracked boiler or replace the aging system altogether. Randy Stewart, the district's business manager, consulted with Specialty Services, Inc., a heating, ventilation, and cooling contractor based in Greene, Maine. Specialty Services priced out the necessary repairs and estimated how many years of useful life the district could expect out of the

boiler if the school board chose to repair the crack. The contractor also provided a comparison of various alternative heating systems and how long each would take to pay for itself in fuel savings.

"It became clear that even if we repaired the old boiler, we couldn't guarantee how long it would hold out," Stewart said.

Because the school board was concerned about the volatility of heating oil prices, its members saw replacing the old boiler system not only as an opportunity to upgrade to a new solution with better value and performance, but also as a way to reduce the school's carbon footprint.

The environmental risk associated with the current system's 10,000-gallon underground heating-oil tank also supported the choice to replace both boilers. "If there's a leak in an underground heating-oil tank, the leaking fuel can quickly contaminate the surrounding groundwater," Stewart said. "Furthermore, you need a special permit to have an underground oil tank, and the tanks must be inspected on a regular basis."

The district considered switching to a natural gas heating system because a natural gas pipeline lies about a quarter mile from the school. However, the pipeline company quoted an approximate cost of \$1 million to connect the school to the natural gas grid with no rebates or incentives available. An electrically powered heating system was not feasible due to the historically high costs of electricity in the Northeastern United States.

ORGANIZATION

Maine School District 35's
Marshwood Middle School
Eliot, Maine

CHALLENGE & SOLUTION

Faced with the decision to repair or replace a damaged, heating-oil-fired, cast iron boiler, Maine School District 35 consulted with a local HVAC contractor to find a reliable, cost-efficient solution that would meet Marshwood Middle School's space-heating and water-heating demands. The school installed a propane-powered boiler and four 1,000-gallon underground propane storage tanks.

RESULT

Despite an unusually harsh winter, the new high-efficiency propane boiler system delivered energy-cost savings of approximately \$9,000 while also reducing the school's carbon footprint. The system should pay for itself in just 5-7 years.

SOLUTION

Taking into consideration initial costs, fuel costs, efficiency, and emissions, the school board approved replacing Marshwood Middle School's old heating oil boiler system with two high-efficiency, propane-powered Viessmann Condensation Boilers in January 2013.

The price difference between propane and heating oil, combined with the propane system's greater efficiency and lower emissions, made a compelling case for the new propane-powered heating system. Furthermore, Specialty Services estimated a 5-7 year payback period with a new propane-powered system versus 10-12 years for new heating-oil-fired boilers.

The school board also decided to remove the old 10,000-gallon heating oil storage tank and replace it with four 1,000-gallon underground propane tanks. "We were pleasantly surprised to discover groundwater contamination, permits, and inspections would not be issues with our underground propane tanks," Stewart said. "Because propane vaporizes at atmospheric pressure, it's virtually impossible to spill, minimizing the possibility of soil contamination."

RESULTS

The new system was in place by September 2013 — just in time for the new school year. To further enhance savings and efficiency, the school also installed propane-powered water heaters. The school's kitchen has always cooked with propane, using a small separate tank. "Now, we've been able to remove that tank and hook up the kitchen to our new underground tanks, which is far more convenient," Stewart said.

The middle school saved \$9,000 on its heating bill during the first winter that the new propane-powered boilers were in use [CHART 1]. That figure was quite impressive considering higher-than-normal propane costs and below-normal temperatures during the winter of 2013-2014.

The new boilers also make a significant environmental impact, saving 75 metric tons of CO₂ emissions every year compared with the old heating oil system — a nearly 40 percent reduction [CHART 2]. The environmental benefit is roughly the same as removing 16 passenger vehicles from the road annually.

"We've been happy with the cost savings, and we really enjoy the peace of mind we have knowing that our new heating system won't fail us when we need it," Stewart said. "From an operational perspective, the whole process has been seamless."

CHART 1 ANNUAL FUEL COST

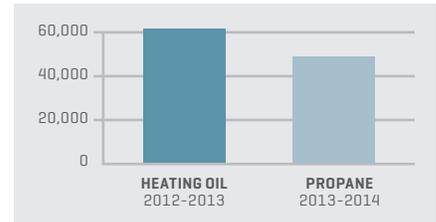
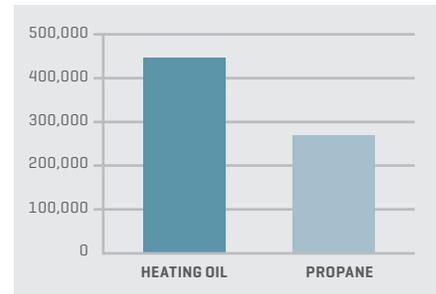


CHART 2 CO₂ EMISSIONS (LBS)



The school board was so pleased with the results of its propane upgrade at the Marshwood Middle School, that it approved installation of a second propane-powered Viessmann Condensation Boiler system at its "Great Works" school for fourth and fifth graders in South Berwick. Installation of this system took place during the summer of 2014.

FOR MORE INFORMATION

To learn more about propane heating, building with propane, or the Propane Education & Research Council, visit buildwithpropane.com.

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