



SIEMENS

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Mt. Edgecumbe High School

Sitka, Alaska

“We’re saving a ton of money. We have seen significant fuel savings, and maintenance costs are way down. When you consider that we completed these projects on a condensed timeline—within two years instead of four—the payback is that much faster and more attractive. By saving two years on the timeline, we’ve been able to avoid two years of inflation, fluctuating energy prices, lost fuel, and maintenance costs.”

— Stan Johnson,
Facility Manager,
Mt. Edgecumbe High School

Sitka, Alaska – Mt. Edgecumbe High School (MEHS) was initially founded in 1947 by the Bureau of Indian Affairs. Over the next 36 years, the school evolved, earning an out-standing reputation through the accomplishments of its alumni. After a temporary closure, the State of Alaska Department of Education and Early Development (DEED) reopened MEHS as a public boarding school committed to excellence in an innovative learning community.

Today, MEHS is home to approximately 400 students each year, who live onsite from more than 110 communities across Alaska. Mt. Edgecumbe, on Japonski Island, is located in the heart of the Tongass National Forest, the largest temperate rainforest in the world, an area that receives 85 inches of rain per year.

Recently, MEHS, DEED, Alaska’s Department of Transportation and Public Facilities Energy Office (DOT&PF), and Siemens Industry, Inc., worked together to implement a variety of facility improvement measures to address the school’s need for infrastructure and energy efficiency improvements.

Client Objectives

With ten buildings on campus, encompassing approximately 227,000 square feet on over 20 acres, the MEHS central heating plant was in dire need of improvements and upgrades. Although the hot water distribution system was supported by four boilers, one boiler was inoperative and replacement parts were no longer available; a second boiler was failing as well. The other two had exceeded their useful lives, and combined, the heating plant consumed approximately 150,000 gallons of fuel each year—a significant drain on MEHS resources. In addition to heating system failures as often as five times per year, the antiquated hot water distribution piping was hampered by leaks throughout the campus facilities, despite attentive maintenance and repair efforts.

Meanwhile, MEHS was burdened with unchecked escalating energy costs as well as other, unexpected operations and maintenance expenditures that arose throughout the year.

To begin working toward these objectives, MEHS consulted with DEED stakeholders as well as the DOT&PF Energy Office. The State DOT&PF Energy Office has a procurement process that would allow MEHS to take advantage of energy savings performance contracting (ESPC) with an energy services company (ESCO). MEHS recognized this program as an opportunity to address their concerns.

Energy Savings Performance Contracting

The State then worked with MEHS to issue a Request for Proposal (RFP) to Siemens and other ESCOs with established term contracts. A key consideration for the RFP was the ESCO’s ability to not only upgrade the campus facilities, but to make those upgrades while maintaining the functionality of school’s existing system. The school needed its heat and hot water distribution systems to remain “live” while the winning ESCO performed the heating plant upgrades. The State recognized that these special circumstances may not have been accommodated under typical design-bid-build contract arrangements.

Another important factor for both the State and for MEHS was the ability to complete the heating plant facility upgrades on an accelerated timeline because of the tenuous position of the existing infrastructure, which could fail during the approaching winter. After reviewing proposals from other qualified ESCOs, MEHS and the State selected Siemens based on its ability to best meet these key qualification criteria.

Siemens Solutions

Together, DOT&PF, MEHS and Siemens initiated the development through a detailed investment grade audit (IGA) and energy services proposal for the school’s upper campus heating plant. Siemens understood that the chief concern was replacing the school’s four boilers with new, high-efficiency equipment; MEHS tasked Siemens with investigating alternative heat sources for the heating plant as well as exploring opportunities for additional energy efficiency measures (EEMs) that could be implemented at a later date.

Phase 1 – Upper Campus Heating Plant Upgrades

To solve MEHS’ immediate needs in the upper campus heating plant, Siemens implemented the following EEMs as part of the first phase of the school’s ESPC:

- Replace existing boilers with three new, higher efficiency fuel oil boilers to be controlled by Siemens direct digital controls system
- Replace hydronic distribution piping system with a primary loop solution
- Upgrade the domestic hot water distribution piping

The required repairs and replacements within the heating plant presented a level of urgency to the project, and Siemens was able to complete the Phase 1 projects on an accelerated timeline. The IGA revealed other opportunities to further address MEHS’ concerns

over aging infrastructure and energy efficiency. Thus, these recommendations became Siemens foundation for the second phase of the ESPC.

Phase 2 – Campus-Wide Improvements

Following the implementation for Phase 1, Siemens began working on a variety of campus-wide EEMs for MEHS, including:

- Hydronic heat piping replacement in the gymnasium
- Piping extensions from two additional buildings to the upper campus heating plant
- Campus wide direct digital controls system upgrades including an annual service agreement
- Digital energy meters
- Variable volume pumping and piping upgrades in individual buildings

In addition, Siemens provided a complete lighting survey, which concluded that the MEHS campus would benefit from a lighting system upgrade. These improvements, however, fell outside of the funding amount budgeted for the ESPC. Inspired by savings identified by the Siemens IGA, MEHS facilities staff felt they were equipped to implement these lighting improvements using their own manpower. They proceeded based on Siemens recommendations with excellent results.

Customer Results

Today, MEHS is enjoying reliable and more energy efficient campus heating thanks to the completion of Phase 1 improvements to the upper heating plant. MEHS and the State of Alaska estimate that using the typical procurement and contracting process to execute this work would have required several years to complete. But by working with Siemens through the state-established ESPC process, MEHS was able to break ground on Phase 1 just six months after the RFP was issued; construction was complete approximately six months later.

In addition, the Phase 2 improvements are expected to deliver significant energy cost savings while reducing MEHS’ carbon footprint. The campus wide construction is expected to be completed in September 2014.

During Phase 1, the State’s primary concern was installing the new equipment within the heating plant while maintaining the functionality of the existing system. Fortunately, the mechanical room was large enough that Siemens was able to leave the older system online and in place during the construction phase. Instead of demolishing and replacing each boiler one by one,



Siemens took the time to reconfigure the mechanical space layout, which increased the facilities team’s available shop workspace, once the old system was removed.

Through the IGA process, Siemens estimated that the Phase 1 Upper Campus Heating Plant improvement measures would combine to reduce MEHS’ energy and operational costs by more than \$131,000 every year, including electricity, fuel oil, and associated maintenance savings. Siemens further calculated that MEHS would also reduce its greenhouse gas emissions by approximately 484,000 pounds—the equivalent of removing 46 passenger vehicles from the road every year.

Post-implementation measurement and verification found that MEHS’ actual savings exceeded initial expectations. The EEMs generated more than \$155,000 in annual energy savings, and greenhouse gases were reduced by 620,000 pounds. Another substantial benefit to MEHS is the ability to reorganize the facilities staff’s workday to so they are able to focus on more important campus facilities projects, instead of frequent “fire fighting” efforts to maintain the outdated heating system.

Siemens has estimated that the campus-wide improvements made during Phase 2 of this ESPC will generate the following additional annual savings for MEHS:

- Electricity savings of approximately \$17,400, equal to 153,000kWh
- Fuel oil savings of more than \$157,000, equal to 39,000 gallons
- Operational and repair savings of approximately \$60,000
- Greenhouse gas emissions (CO₂) of 1.1 million pounds—the equivalent of about 180 tons of waste from a landfill

On top of these savings that directly result from the work Siemens has completed, MEHS also reports a 45% electrical savings. These savings stem from the lighting system upgrades their facilities team implemented based on the lighting survey Siemens provided as part of their comprehensive energy efficiency plan.

“Working with Siemens in this way allowed us to achieve the best possible scope of work for both MEHS and the State of Alaska. The Siemens team worked closely with us to maximize the budget the Department of Education had available in order to address the school’s urgent deferred maintenance concerns, followed by energy efficiency improvements to the campus as a whole. Siemens was very patient in exploring a wide variety of options and scenarios so we could implement the most solutions within our capacity.”

— Christopher Hodgin,
Lead Project Manager,
State of Alaska Department
of Transportation & Public
Facilities Energy Office