

Creating an Energy Roadmap

By Greg Spencer, Trane North America

One in five children in the United States attend schools with poor indoor air quality (IAQ), according to a U.S. Government Accountability Office (GAO) estimate. Poor IAQ can mean many things: classrooms where children

have a hard time hearing the teacher because of poor acoustics; where temperatures climb above 90 degrees because of a lack of air conditioning; or where poor filtration adversely affects a child's focus and health.

In fact, 15,000 schools across the nation are circulating unfit air, according to the GAO. To address the problem, schools need to choose heating, ventilation and air conditioning (HVAC) systems that help create quiet, comfortable classrooms. Most schools would like to do so, but are faced with constraints and priorities that make investment decisions difficult.

Deferred maintenance in aging facilities contributes to rising energy costs and inadequate building performance. Nearly three-fourths of U.S. public schools were built before 1970, and deferred maintenance costs nationally have risen to \$127 billion, according to the GAO. As deferred maintenance needs grow, equipment operates less efficiently, and this leads to high utility costs and poor IAQ.

Schools may be able to free up funds by establishing an energy roadmap. It helps schools outline strategies to improve equipment performance and efficiency. This not only saves money; but also helps provide a better environment for learning.

Why create an energy roadmap?

K-12 schools in the United States spend more than \$8 billion annually on energy. It is the second-highest operating expenditure for schools after personnel costs. By working with a partner to create an energy roadmap, schools can outline and prioritize solutions for an improved classroom environment. From better temperature and humidity control to better acoustics, HVAC technologies are available that play a role in helping schools achieve better IAQ and acoustics in the classroom. These improvements lead to consistently better scores on standardized tests, the U.S. Environmental Protection Agency says.

Upgrading to a building automation system enables remote monitoring, resolution of system alarms, and intelligent dispatching to mobile technology. Image courtesy of Trane.

But getting where you want to go requires a thorough evaluation of where you are today. That is where a roadmap is beneficial. A complete evaluation of a school's needs is an important first



step and will help establish benchmarks that can be used to set goals, determine which solutions have the greatest return on investment, and prioritize improvements.

Potential strategies

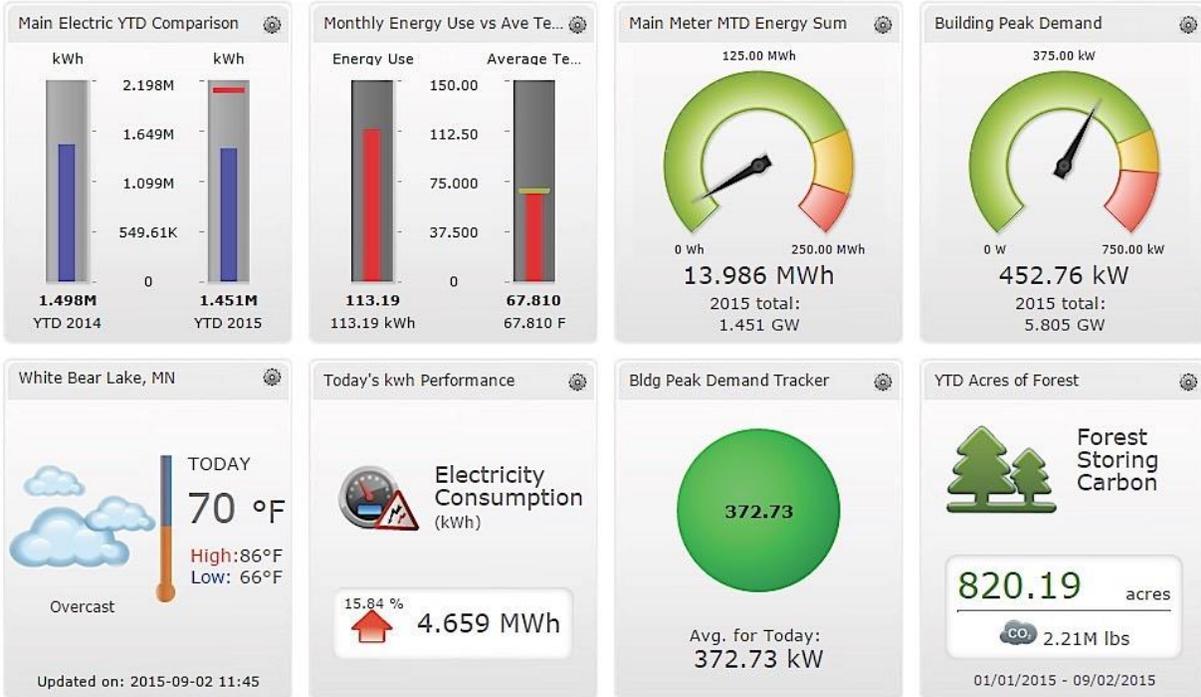
Many improvement strategies may result from an energy roadmap. It's important to keep in mind that it doesn't necessarily require large projects—or large investments of money—to make gains that improve efficiency and classroom IAQ.

Some common strategies:

- **Energy analysis and modeling.** Once benchmark data is gathered in an initial evaluation, it can be modeled against what is possible using predictive analysis. Working with a service provider that acts as a partner in the process can provide numerous benefits, including the ability to use energy modeling programs and analytics tools that measure energy usage and show how a building is actually using energy. A partner also may help uncover and sort through data, and set goals and priorities based on this analysis. Energy analysis and modeling can detail the payback of the investment and provide the rationale for improvements and upgrades.
- **Equipment upgrades.** In some cases, equipment upgrades may be needed to achieve the desired level of efficiency and performance. Because most public schools were built before 1970, HVAC equipment and other building systems may need replacement. An equipment upgrade may increase reliability and performance, reduce energy consumption and decrease the time and money spent on maintenance.
- **Installing controls.** New equipment is one potential step in an energy roadmap. Going a step further—installing controls and a building automation system (BAS) to optimize the management of the new equipment—may result in an even faster return on investment. A BAS enables facility managers to easily make scheduling and setpoint changes— even remotely—as well as allowing for remote monitoring and resolution of system alarms, and intelligent dispatching to mobile technology.
- **Predictive maintenance program.** Many schools don't have a full-time maintenance staff or may not have the resources for an effective maintenance program. Another benefit of installing a BAS is that it enables a school to establish a proactive maintenance program that can provide reminders and automated management of building and equipment maintenance.
- **Energy contracting.** Because many schools face financial constraints that make it difficult to invest in facility improvements, energy contracting may be a good solution in these applications. Energy contracting enables organizations to use future energy and operational savings to help pay for infrastructure improvements up front. Using contracting may largely offset project costs and have minimal effect on cash flow or capital investment.

Greg Spencer is strategic cooperative program leader for Trane North America. Trane products and services are available through the U.S. Communities Cooperative Purchasing Alliance.

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Energy modeling programs and analytics tools measure energy usage and show how a building is actually using energy in real time. Image courtesy of Trane.