

Energy savings add up to success for Efficiency Forward

Massachusetts Institute of Technology

This article appears in the Spring 2013 issue of [Energy Futures](#) [1], the magazine of the MIT Energy Initiative. [Subscribe](#) [2] today.

The NSTAR-MIT collaboration known as Efficiency Forward has transformed the energy landscape on campus in just three years, reducing the Institute's energy footprint by 34 million kilowatt-hours (kWh) per year, producing an estimated lifetime savings of \$50 million, and preventing more than 20,000 metric tons of greenhouse gas emissions from entering the atmosphere annually.

Light sensors, smart thermostats, LED bulbs, energy-saving refrigerators — as well as the construction of super-energy-efficient LEED-certified buildings—have all helped the Institute meet this ambitious goal.

“Energy doesn't just go to lighting, so it's really wonderful that [MIT has] the richness of the diversity of savings.... I see that as a trend that's going to continue,” says John Kibbee, NSTAR's program manager for Efficiency Forward.

“The team implementing Efficiency Forward has been tireless in its pursuit of smart, efficient measures all across our campus,” says Israel Ruiz, MIT's executive vice president and treasurer. “We are appreciative of our collaboration with NSTAR and the valuable contributions from our faculty, students, and staff to make the program such a success.”

Designed to build on MIT's strengths to create a model program that would meet state greenhouse gas reduction goals, Efficiency Forward is the single largest energy-efficiency project that gas and electric utility NSTAR has ever developed with a customer. Together NSTAR and MIT invested more than \$13 million in energy conservation over the program's three-year period to meet their targeted goal of reducing the Institute's energy consumption by 34 million kWh per year (approximately 15 percent).

“[Efficiency Forward is] important to us because it was groundbreaking in its creativity in terms of creating a streamlined way to work with customers,” says Kibbee, noting that MIT and NSTAR have been jointly managing 35-50 projects a year, with NSTAR providing incentives and expertise to support MIT's own energy-saving initiatives. “Naturally, we wanted that first example to be a shining example, and MIT has been all of that.”

The program has also been extremely valuable to MIT, according to Megan Kefalis, project manager in the Department of Facilities' Systems Engineering Group. “The importance of this type of program is it helps us to think about ways to operate our buildings better,” she says. “It's been a great thing for MIT.”

“We are thrilled to have been able to make such a contribution to moving the dial on energy efficiency — both on campus and in the region,” says Ruiz, who also serves as co-chair of the MIT Energy Initiative’s Campus Energy Task Force.

Projects run the gamut

Efficiency Forward was able to meet its energy-reduction goals in large part due to the efficiency embedded into new buildings, including the Sloan School of Management and the Koch Institute for Integrative Cancer Research, which both earned Leadership in Energy and Environmental Design (LEED) Gold certification. “[During construction is] the best time to invest in efficiency. You can put in better windows and insulation in walls; that’s hard to do as retrofits,” says Peter Cooper, MIT’s manager of sustainable engineering and utility planning.

Approximately 40 percent of the program’s overall goal was met through new building features. Another 40 percent came from upgraded lighting and associated controls, while 20 percent of the goal was met by improving the efficiency of mechanical systems and systems for heating, ventilation, and air conditioning (HVAC).

No new buildings came online in 2012, so MIT had to dig a little deeper to find energy savings. Two new initiatives that helped the program achieve its goals last year included replacing 653 refrigerators in residence halls with new, energy-efficient models, and distributing 10,000 LED light bulbs on campus to replace less-efficient incandescent or compact fluorescent bulbs.

NSTAR supplied the full-size refrigerators and provided the new bulbs at a deep discount. MIT handled the work both of moving the refrigerators and of distributing the bulbs to students and staff. The refrigerator program alone is expected to save 300,000 kWh per year. The light bulb initiative, which replaces 60-watt bulbs with new lamps that use just 12.5 watts, has the potential to save 1 million kWh annually, according to Kefalis.

The bulb distribution effort works by encouraging individuals to trade in old bulbs for new ones, thereby serving as an informational campaign for the MIT community. “I think [Efficiency Forward] is really spreading the word of energy efficiency and showing that it’s not as hard or as expensive as it may originally appear,” Kefalis says.

If there’s one message the community can learn from the program, it’s that small efficiencies do add up. That’s why MIT uses sensors to continuously monitor building control systems, enabling Facilities staff to flag potential problems, such as a leaking heat valve or the simultaneous operation of heating and cooling systems. “The monitor-based commissioning program has been working for a few years, but we rolled it out to many more buildings last year,” Kefalis says, providing 1.8 million kWh’s worth of energy savings.

New energy-saving efforts

To draw even more savings from MIT buildings, in 2012 MIT installed smart thermostats for the first time in a pilot program under way in the Sidney-Pacific graduate student residence hall (NW86). These thermostats are controlled by occupancy sensors that detect when someone enters the room and adjusts the temperature accordingly. "Say you like the room at 72 degrees," Kefalis says. "When you leave, it senses that you're gone and within a half-hour period it will drop the temperature, saving energy while you're not there." MIT is still assessing the value of the smart thermostats, but Kibbee says the pilot program has the potential for "big, big, big savings."

MIT's expanded portfolio of energy projects also included installing variable frequency drives on water booster pumps, which allow the pumps to speed up or slow down based on demand. In addition, Facilities has made improvements to the compressed air system on campus, which is used for certain lab activities as well as for HVAC. "We created a central distribution system for compressed air to replace many satellite compressors," says Kefalis. This work is saving the Institute 900,000 kWh per year.

Looking forward, Cooper says the Institute is committed to another three years of Efficiency Forward, although NSTAR and MIT are still working out what the new energy savings goal should be.

"We're looking at what we can do and what commitment we can make," Cooper says. "We don't have any energy-intensive lab buildings coming on in the next three years, and we've done almost the whole campus in terms of lighting, so the projects may be in the form of more refrigerators, but mostly they will be mechanical and HVAC. Our experience is that these take more than a year and they're more complicated to do."

Kibbee says, "It's just a matter of getting all the details right....I think the future bodes very well."

Source URL (retrieved on 04/25/2015 - 12:56am):

<http://www.ecnmag.com/news/2013/08/energy-savings-add-success-efficiency-forward>

Links:

[1] <http://mitei.mit.edu/publications/energy-futures-magazine>

[2] <http://mitei.mit.edu/publications/energy-futures-magazine/subscribe-energy-futures>