

### GREEN ENERGY

## ROGER LIDDELL '63 HELPING TO ADVANCE THE SCHOOL'S GREEN ENERGY GOAL

By Henry McNulty

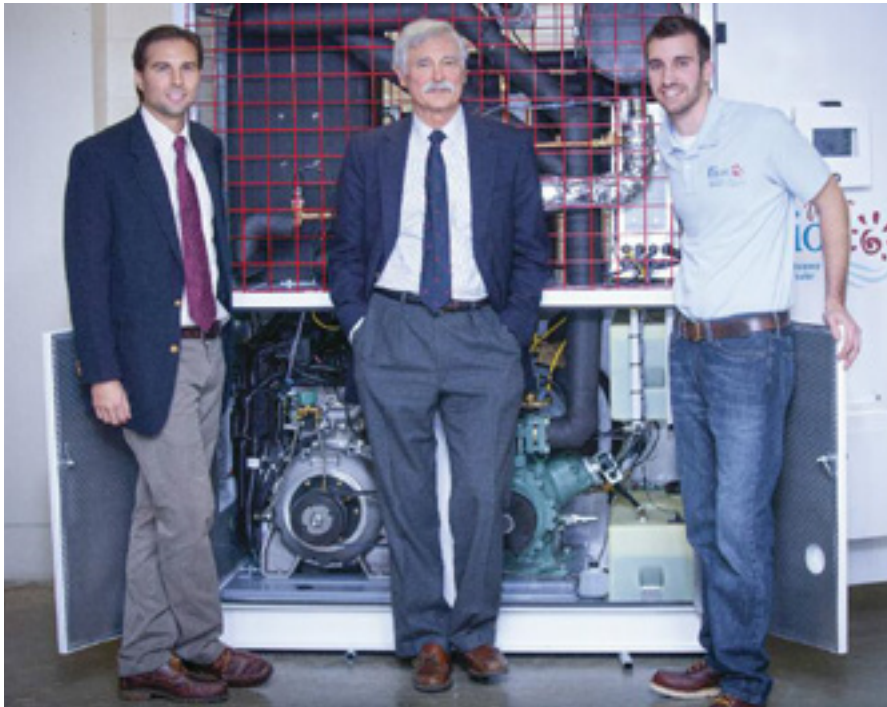


PHOTO BY JONATHAN DOSTER

**A** modest-scale, non-polluting heat pump installed in the Forrest E. Mars Jr. Athletic Center this winter will be more efficient, cleaner, and cost-effective.

“The thing about new technology adoption,” says Roger Liddell ’63, P’98, “is that everybody waits for ‘Fred down the street’ to buy it first. Then if it works for Fred, you go get one of your own. Hardly anyone wants to be the first to try it.”

Liddell, a financial analyst and money manager, knows a thing or two about new technology: His area of professional expertise is cutting-edge energy and utility investment.

He ushered Hotchkiss into a new age of lighting in 2005, when he donated 1,000 compact-fluorescent lightbulbs to replace the energy-inefficient, hence expensive, incandescent ones. Now, Liddell wants to do something on a grander scale by helping

the School heat and cool the Forrest E. Mars Jr. Athletic Center (MAC) with an environmentally responsible, virtually non-polluting heat pump that, not incidentally, will save Hotchkiss tens of thousands of dollars a year.

In doing so, he wants to ensure that the School is a technology leader. As he puts it: “I want to make Hotchkiss the Fred-down-the-street.”

When it was built nearly 15 years ago, the MAC was heated by two huge boilers fueled by # 2 heating oil. Since 2012, when the School’s internationally acclaimed biomass facility came on line, those oil boilers have been used only from mid-April to mid-October and for peak-load winter backup.

The result has been that during the warmer months, one of the huge boilers had to be fired up to supply the minimal heating needs of the MAC.

Says Hotchkiss’ Director of Facilities

John Bryant: “Originally, the boilers were sized to completely heat that entire complex on an extremely cold day. The problem these days is that they are so large that they are way oversized for the summer needs.”

It was, Liddell confirms, “an inefficient system. It wasn’t designed to be inefficient, but it became so.”

Enter the Ilios heat pump, made by Tecogen of Waltham, MA Located in a mechanical room adjacent to the ice rink, it’s a remarkable example of applied thermodynamics. Working much like a refrigerator, it moves heat from where you don’t want it to where you do.

“When your refrigerator is running,” Liddell explains, “you can feel warm air blowing out from underneath it; that’s heat being removed from inside and released into the air of your kitchen, thereby wasting it. Instead, Ilios captures that warmth and repurposes it into heating water.”

The propane energy needed to run this efficient heat pump is a fraction of both the electricity for chillers and the oil for boilers that existing equipment would have required.

“The elegance of this technology,” Liddell explains, “is that this modest-scale machine, in round numbers three feet by five feet by six feet high, will be able to supply the off-season hot water needs for the entire MAC and, as a free byproduct, will supply a considerable amount of the chilled water currently required for air conditioning.”

It needs energy to do that – in this case propane, which will run what amounts to an automobile engine, but without the noxious exhaust. “Appropriately,” says Liddell, “the heat pump is driven by a highly efficient and low-maintenance Ford engine. Given the School’s connection with the Ford family, that’s a happy thing.”

The heat pump was installed this winter.

OPPOSITE: l-r, Torrey Liddell '98, Roger Liddell '63 and Stephen LaFaille, P.E., product manager for Ilios, manufacturer of the heat pump

RIGHT: Forrest E. Mars Jr. Athletic Center



PHOTO BY WENDY CARLSON

It is intended to work during the six warmer months. The rest of the time, the MAC will be heated by the School's biomass facility.

During warmer weather, the MAC still needs hot water for showers, sinks, and the like – known as “domestic” hot water – and heated water to keep the pool's temperature stable. “Now,” says Chief Financial Officer John Tuke, “we're going to have a cleaner, more efficient way to take care of those needs during that six-month time frame.”

The benefits of the new system are many. “There is an inherent cleanliness to using propane, a gaseous rather than a liquid fuel,” Liddell says. “More important, the engineering of this system is so advanced that, as far as Tecogen has been able to determine, it has the world's cleanest exhaust. The carbon monoxide and nitrogen oxide exhaust levels are so low that the California Air Resources Board rates Tecogen equipment as having ‘zero emissions.’”

The figure Tecogen and Liddell came up with for Hotchkiss is that a quarter of a million pounds per year of carbon dioxide will no longer be put into the atmosphere.

“That's a big deal,” he notes.

Oil-burning engines and boilers also emit particulate matter; using the heat pump will eliminate that downwind pollution as well. “Getting rid of oil will not only be good for the environment,” Liddell says, “but good for people's health. With respect to the local community, Hotchkiss will be an even better neighbor.” Also, oil burners need to have soot cleaned out regularly; that's not the case with propane.

The technology “is much more efficient than it used to be,” says John Bryant. “It makes hot water efficiently, but then also uses heat from the jacket of the engine to make even more heat, and it is extracting heat from the chilled water loop, which helps that be cooler. It's amazing how efficient it is.”

The cold water created for free by the heat

pump “replaces the need for at least 12 tons of air conditioning in the MAC,” Liddell says, “and that's electricity we will no longer need. There will be savings, but we can't quantify them yet. After a year's experience, we'll have some hard numbers.”

On the financial side, the School estimates that the MAC boilers have been using about \$35,000 worth of oil per year. The estimate on the propane-fired engine is about \$10,000 yearly.

The funding of the project is a cooperative venture. Roger Liddell brought the various parties together, and will contribute significantly toward the purchase of the heat pump. Hotchkiss will pay to install it, and to hook the machine into the School's energy management system. Tecogen will contribute its ULTRA emissions-cleaning equipment. And the Propane Education & Research Council will supply some generous funding, because the engine may be used to demonstrate the superiority of propane fuel.

For Liddell, a weekend resident of the Lakeville area, demonstrating the worth of high-efficiency, environmentally responsible technology is a major goal.

“I've been dismayed by the slow adoption of a number of wonderful technologies,” he says, “whether it is individuals in their homes or governmental entities or the Hotchkisses of the world failing to take steps that have positive economic and environmental outcomes. I have no patience with that. Where there are things that can be done and should be done now with positive economic outcomes, then do them! If you can get 10 or 20 or 30 percent

return on investment with no technology risk – everybody knows this stuff works – then why not?”

Hotchkiss, he says, “is willing to be the demonstration site, and if people come to Lakeville to learn about the School's world-class biomass facility, they've got a world-class machine with world-class emissions cleanup all right here too. It's a nice tour.”

John Tuke also sees the heat pump not just as a natural part of Hotchkiss' emphasis on environmental stewardship and determination to be carbon-neutral in five years, but as an opportunity to educate tomorrow's leaders by example.

“I've been here 16 years, and I have seen the School make efforts to be sure it is living its mission,” he says. “This is a really good example. We have environmental stewardship in our mission statement. We have an opportunity to do something that would reflect and underscore that, initially at a greater expense, but over the long haul with some significant returns on investment.

“If kids really observe what, as an institution, we do, this is a good teaching opportunity. The faculty have done a great job of finding ways to integrate math classes, art classes, English classes, and others into the environmental part. Being committed to the environment also helps us attract kids who want to go to an institution that's passionate about these things.”

And Roger Liddell, says John, “loves this institution; he wants it to be a better school, a leader. This happens to be his area of expertise, so we have learned a lot from Roger. He's a good guy with a good mission.”