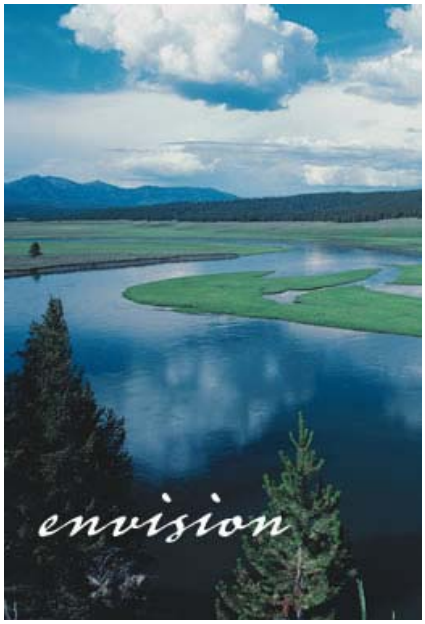
Gundersen Lutheran Health System on its way to being 'energy neutral' by 2014

Several years ago, Gundersen Lutheran Health System in La Crosse, WI, was suffering the biggest energy crisis it had ever faced.

Energy costs were climbing at alarming rates. The award-winning healthcare network, which includes a large hospital, one of the nation's largest multi-specialty group medical practices and a host of regional community clinics, watched as its total energy bill ($5 million and climbing in 2007) soared to unprecedented levels.

Gundersen Lutheran knew if it didn't take immediate steps, it was facing increases as much as $500,000 a year. And it didn't think passing those costs on to patients was the way to go.



One major health care media site has declared Gundersen Lutheran's efforts "the most ambitious eco-friendly agenda of any healthcare entity in the United States."

An extensive energy audit, combined with the keen vision of its senior leadership and building staff, led the system to an epiphany – a realization that in just a few short years, it could actually be independent of the volatilities of coal, oil and natural gas prices through conventional and unconventional means of producing energy from existing local resources. Its goal: to provide the best quality care through advanced technology and strong environmental initiatives to reduce costs and protect natural resources.

The system's over-arching plan is to be "energy neutral" in just seven years, or 2014.

That epiphany set into motion a holistic plan that combined energy management, energy efficiency, renewable energy, recycling, waste management and control, and a resolve to approach all future construction and design projects with one thing in mind: *sustainability*.

With almost lightning speed, Gundersen Lutheran has turned the corner, realizing a 10 percent reduction in energy use and more than $800,000 in annual savings in 2008 alone. It projects a 20 percent reduction by the end of 2009.

In addition to "conventional" wind and solar power, projects now on the drawing boards call for harnessing the power of the nearby Mississippi River, burning local forest and agricultural residues and bio-fuels – even waste methane discharged from a local beer brewery – to supply all of the heat and electricity the growing health care system needs.

News of Gundersen Lutheran's success has spread quickly, and prompted *HealthLeaders Media* earlier this year to declare the system's efforts "the most ambitious eco-friendly agenda of any healthcare entity in the United States."

In coordination with the U.S. Army Corps of Engineers, Gundersen Lutheran is building a hydrokinetic facility that would use moving water to rotate underwater turbines and drive a generator. All power produced at Lock and Dam No. 7 will be emissions-free, domestic, sustainable, and produce 27 million kWh per year –at least 25 percent of the entire health system's energy use.

Building an environmental mindset

Today, nearly every major business decision the system makes takes environmental impact into consideration. When it needed to replace an aging transportation fleet, it chose hybrid vehicles. Water conservation projects now capture and use storm water runoff. And when the system needed a new underground parking garage, it installed solar panels to help power the structure. The garage is also Leadership in Energy and Environmental Design (LEED) certified. (LEED employs the Green Building Rating System™, which encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria.)

Components of 'Envision' energy plan

Gundersen Lutheran spent a great deal of time developing its plan for energy and environmental stewardship, which it cleverly labels "Envision." The plan has four major components:

- **Meeting 100 percent of its energy needs for all facilities by 2014 by creating renewable energy and improving energy efficiency**, using techniques that have quick paybacks so that savings from reduced energy use can be used to support the institution's healthcare mission.
- **Committing to environmentally and economically sustainable business practices** such as LEED certification of new buildings.

- **Partnering with communities** to encourage economic growth and development as well as providing national leadership in renewable energy and energy efficiency programs.
- **Using the Envision program as a tool to reduce the cost of patient care**.

Converting high-pressure steam to low-pressure allows the health system to turn off several boilers in one of its outpatient buildings, saving nearly $64,000 annually.

Programs to optimize cooling tower fan utilization with chiller compressors have reduced costs by approximately $65,000 a year and reduced energy consumption by about 1.1 million kWh annually.

Retrocommissioning efforts on several hundred exhaust fans of various uses and sizes have been made as fans run only when needed and reduce energy consumption.

"We really think this initiative fits well with where our current administration is trying to go," said Jeff Rich, Gundersen Lutheran's executive director, major projects and efficiency improvement. "If you listen to [President] Obama, he's been talking about three things since he took office: energy, the cost of healthcare, and jobs. [*According to the Environmental Law and Policy Center, renewable energy could bring an additional $19.4 billion dollars of growth and 209,300 jobs to the Midwest by 2020.*] We think all three of those things are being addressed or coming together in this program we have. That's something we feel is very unique and attention grabbing. People can get behind this.

"Gundersen Lutheran is committed to continuously demonstrating that we are a health system of excellence," he added. "Our environmental stewardship program allows us to do so in yet another way. By reducing energy consumption through energy efficiency improvements and investing in renewable energy sources, we can improve our environment and lower the cost of healthcare at the same time."

According to Rich, a core principal of any environmental program is to reduce the need for power, water, paper and other goods. "Envision is designed to achieve not only reduction, but also *preservation* of resources," he said. To accomplish this, Gundersen Lutheran is focusing on four primary components: recycling, waste management, energy efficiency and renewable energy.

Energy reduction goals include 30 percent demand drop; renewable energy projects

After an exhaustive process of gathering metrics about each of its facilities' energy use, Gundersen

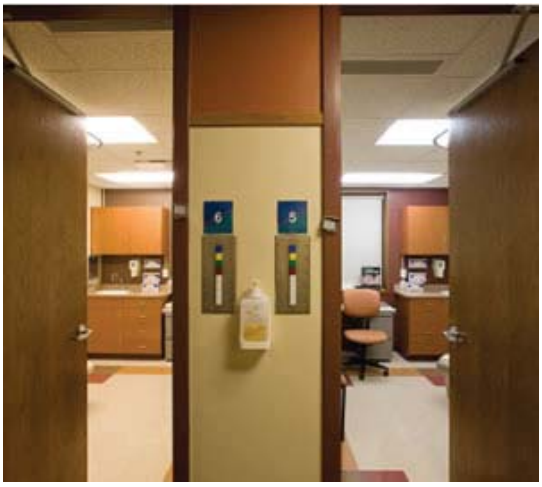
Lutheran in short order set some clear objectives: through energy efficiency projects and other methods, reduce energy demand in existing facilities by 30 percent and reduce energy needs in new construction by 50 percent. Savings from these efforts would be used to help finance renewable energy projects, which in turn, will offset the system's remaining energy use, Rich said.

"This is how we approached this: We took our top six buildings as far as energy use and decided to focus our most intensive efforts on where we could make the biggest gains," Rich said. "Obviously there are opportunities everywhere but you can't do everything at once. For now, we're trying to work on things that have the biggest impact."

Reducing energy use is now a top priority. The system is engaging in sophisticated energy efficiency programs and collaborative business strategies that include energy audits, energy efficient purchasing, replacing or upgrading to energy-efficient equipment, increased employee awareness, and a comprehensive retro-commissioning strategy for its main buildings on the La Crosse and Onalaska campuses. Retro-commissioning makes use of low-cost or no-cost measures to improve efficiency and reduce energy demand.

And to meet its goal of being 100 percent energy neutral by 2014, Gundersen Lutheran plans to produce as much renewable energy as it uses through system-owned electrical and gas generation equipment. To do so, renewable energy production must approach 200 million cubic feet of natural gas and 40 million kilowatt hours (kWh) of electricity, according to Rich.

A renewable energy combined heat and power project with City Brewery in La Crosse, Wis., is expected to generate 3 million kWh of electricity per year by using waste methane gas discharged from the brewery's waste treatment process.



This side-by-side comparison of identical rooms shows the difference in lighting between the energy efficient bulbs (right) and original lighting (left) after retrofitting light fixtures in six buildings. The more efficient fixtures produce the same intensity light with more natural color and half the energy.

Solar panels installed on the roof of Gundersen Lutheran's new underground parking ramp produce electricity to help power the structure.

To help ensure its environmental stewardship vision stays on track, all future new construction at Gundersen Lutheran will be LEED certified. So-called "smart buildings" will combine the highest efficiency equipment with environmentally friendly materials and site layout to create a safer, more peaceful healing environment. For example, Gundersen Lutheran's new critical care hospital will incorporate healing elements such as noise reduction and a system for maximizing natural light. Coupled with state-of-the-art medical technology, the facilities will be designed with energy and environmentally friendly features like low-flow plumbing fixtures and high-efficiency heating, ventilation and cooling systems.

Early successes: 25 percent energy use reduction, $1.25 million annual savings

When 2008 fiscal year came to a close, Gundersen Lutheran had implemented dozens of energy control measures, installed solar panels in the new parking structure, laid the groundwork for the brewery project, completed a host of retro-commissioning projects, performed a feasibility study on one wind turbine project and signed an agreement on another, and entered into a Department of Energy hospital energy alliance. At year's end, Gundersen Lutheran reduced its electricity use by 4 million kilowatt hours and its natural gas use by 16.5 million cubic feet, resulting in $409,000 in annualized savings.

In addition to ongoing retro-commissioning efforts, 2009 projects include plans to begin energy reclamation at the brewery, begin construction of a wind turbine, order a biomass boiler, and complete permitting on a hydropower plant site on the Mississippi River.

By the end of 2009, Rich hopes to offset Gundersen Lutheran's energy use by 25 percent, saving the institution $1.25 million annually.

Project snapshots

Most healthcare facilities can realize substantial energy savings by going after the so-called "low-hanging fruit" like switching to energy efficient lighting and equipment and simple conservation measures such as powering down. Rich said Gundersen Lutheran's energy use will drop by more than 20 percent alone through such measures as retro-commissioning and conservation efforts.

But two pending projects may offset as much as 70 percent of the health system's energy use – the hydrokinetic plant on the Mississippi River and a unique boiler that burns agricultural and forestry waste and converts the energy to steam.

Hydrokinetic power plant could meet 25 percent of system energy needs

Harnessing the natural power of moving water to generate electricity is nothing new, but for Gundersen Lutheran's main La Crosse campus, which sits on the banks of the Mississippi River dividing Minnesota and Wisconsin, it could dramatically reduce or even eliminate the health system's reliance on conventional sources in the near future.

Gundersen Lutheran's hydrokinetic project is being developed in coordination with the U.S. Army Corps of Engineers, which controls a nearby lock and dam on the river. The facility would operate differently than a traditional hydropower plant, using moving water to rotate underwater turbines and drive a generator. All power produced at Lock and Dam No. 7 will be emissions-free, domestic and sustainable, which will help Wisconsin and Minnesota meet their energy and environmental goals. On average, the system will produce 27 million kWh per year –at least 25 percent of the entire health system's energy use, Rich said. Permitting and licensing are currently underway for the project.

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Major projects and efficiency improvement

Biomass boiler to convert forestry, agricultural waste into energy

"Most people think of electricity when they think of energy," Rich said. "While electricity represents about 60 percent of our costs, it's only about 40 percent of our total energy use. About 60 percent of our energy right now is used for steam production, which is used for our laundry, sterilizers and of course, heating."

And so, the system's biomass boiler project is designed to go after another major energy component – natural gas and fuel oil. "As we looked at our renewable energy strategy, we realized that we didn't have a lot of natural sunlight compared to Arizona or Colorado, so solar-power wasn't the way to get where we needed to go," said Rich. "But what we do have a lot of in this part of the country is biomass."

The boiler would ultimately serve Gundersen Lutheran's 325 bed tertiary hospital and clinic in LaCrosse – two structures that account for about 60 percent of the health system's entire natural gas use. Rich said the boiler is expected to be operational by the fall of 2010.

Other energy projects include:

- **Through a partnership with La Crosse-based City Brewery, Gundersen Lutheran plans to convert waste methane gas discharged from the brewery's waste treatment process into heat and electricity**. When complete, the project is expected to generate 3 million kWh per year, or approximately 8 percent of the

electricity used on Gundersen Lutheran's La Crosse campus. That's equivalent to planting 1,487 acres of forest or removing 1,048 cars from the road.

- **Heating fuel would be generated from bio-gas reclaimed from area landfills**, under a project being considered.
- **Scheduling air handlers, which blow warm or cool air through the buildings, to run only when needed**. The health system completed zone air handler scheduling in three buildings in 2008. In those buildings alone, the zone scheduling led to a more than $78,000 reduction in energy costs and saved more than 1.2 million kilowatt hours a year. Three more buildings in the health system are scheduled for zone scheduling in 2009.
- **A process called chiller/tower optimization led to quick paybacks for the health system.** When Gundersen Lutheran reprogrammed the chiller/tower in one building, they immediately saw approximately $13,500 in annual savings and reduced their energy use by about 225,000 kWh. Once Gundersen Lutheran determined chiller/tower optimization worked, the system was replicated in all Gundersen Lutheran campus buildings with chilled water systems. The change reduced electricity consumption for cooling the campus by about 1.1 million kWh per year, reducing costs by approximately $65,000 annually.
- **Gundersen Lutheran found they could use what are called reducing stations on the high-pressure boilers.** The steam from the "back-up" boiler is sent through a valve that reduces the steam pressure so it can be used in the areas typically serviced by the low-pressure boilers. The change allows the health system to turn off two or more of the four low-pressure boilers most of the year, and led to energy savings of just over 74,000 therms a year – a cost savings of nearly $64,000 annually.
- **Retrofitting the light fixtures** in six buildings on two of its campuses resulted in energy cost savings of approximately $245,000 a year.

Lessons learned

Gundersen Lutheran has learned three major things along its journey to be energy neutral by 2014. Among them are a willingness to pursue partnerships and an openness to collaboration. The third is *flexibility*. As new rapidly evolving technologies with faster paybacks are discovered, plans need to be adjusted. "Our 'Envision' initiative has been morphing over time, but each time we learn new information, we make adjustments to the plan," said Rich. "We may decide to another little project here and there. But by and large, we know this is what we plan to do going forward."

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