

ENERGY TO CARE *SUCCESS STORY*

Starting Small: An Excela Health Case Study

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Excelsa Health

Nonprofit health system

Location: Westmoreland County, Pa.

Square footage: 2,000,000

Licensed beds: 373

Hospitals: 3

Facility Overview

Excelsa Health is a nonprofit health care system in Westmoreland County, Pa., located about 30 miles outside of Pittsburgh. The area features a mix of rural farmland, as well as small towns and municipalities.

Excelsa is the leading health care system in the region. Founded in 2004, Excelsa has three full-service acute care hospitals, two stand-alone outpatient surgery centers and a multitude of other outpatient and home health care services. Excelsa's hospitals include:

- Frick Hospital, a 67-bed facility in Mount Pleasant
- Latrobe Hospital, a 172-bed facility in Latrobe
- Westmoreland Hospital, a 373-bed facility in Greensburg, the county seat

Both Latrobe and Westmoreland have operated for a century or more. Like many East Coast hospitals, these facilities have an aging physical plant. Over the years, they have incorporated the latest technology and standards of patient care.

This is Excelsa Health's sustainability success story.

The Energy Audit: Finding a Strategic Starting Point

Dan Robison is Excelsa Health's director of real estate, construction and facilities management. He has worked in health care his entire career, starting as a clinical engineer 35 years ago, and in 2011 he received a promotion to his current director position from a similar role at Westmoreland. Excelsa's Westmoreland and Latrobe hospitals had already won ASHE's Energy to Care award, and Robison was eager to do the same for Excelsa as a whole.

With tight budgets and margins, Excelsa's executives charged its hospital directors with finding cost-cutting opportunities. At the time, Excelsa's energy spending represented a full 50% of its facilities operating budget. This is typical for comparable hospitals, but still high. There was an opportunity for savings.

Robison approached consulting engineering firm Envinity Building Energy Solutions, intending to hire them for a walk-through energy audit to see where the health system could increase efficiency. Envinity recommended a more robust, strategic-level energy study to optimize impact. Unfortunately, the price tag went up with the increased scope of work.

The State Rebate Program: Finding Matching Funds to Create a Plan

To make the work affordable, Envinity suggested a matching grant program. The West Penn Sustainable Energy Fund supports energy efficiency initiatives. Incentive programs exist in most other states, as well, often configured as utility rebate programs. “With the added funds, Excela was able to buy up the effort from Envinity to create an energy master plan,” says Kevin Gombotz, Envinity’s vice president of building energy solutions.

The study took eight months. It examined all three hospitals in the Excela system and resulted in a list of recommended efficiency upgrades with anywhere from a one- to five-year payback time.

But there was a problem. With tight margins and the economy just emerging from recession, Excela’s officers could not approve up-front investment to support efficiency upgrades, even when the upgrades would return their initial investment in less than a year. Nor did they have direct experience with the energy cost savings that inevitably accrue once efficiency measures yield results.

Objectives: Finding a Financial Starting Point When Funds Are Tight

With money unavailable for capital outlay, Robison had to find a different starting point to plan and pay for energy efficiency upgrades. He decided to use the fiscal year to his advantage.

His game plan was as follows:

- Pay for initial studies and energy upgrades with funds from the operating and maintenance budget.
- Plan early in the fiscal year to ensure there is still money in the consultant and repair budget line items.
- Tackle easy, low- to no-cost upgrades by the end of first quarter that pay back within a single fiscal year, so energy savings accrue noticeably and reimburse the consultancy outlay.
- Work with outside energy consultants as team members to enhance the capacity and expertise of on-the-ground facilities and maintenance staff.
- Leverage opportunities to “buy up” efficiency upgrades when equipment needed to be otherwise replaced or repaired.
- Use budget variance reports to document that the operating budget ends the year in the black, with energy savings outpacing project costs.
- Attract positive attention from the C-suite, once energy savings become noticeable and consistent.

Solutions and Successes

Robison knew he had to be creative. He decided to take advantage of opportunities to assess and optimize his buildings when systems malfunctioned or when he received comfort complaints from patients and staff.

Between 2013 and 2015, there were a few key opportunities for Robison to partner with Gombotz's team at Envinity to upgrade Excelsa's facilities:

Increasing Chilled Water System Efficiency to Avoid Cooling Towers Replacement

In the spring of 2014, a renovation at Westmoreland Hospital increased the chilled water system workload, and the cooling tower temperatures ran high. Before investing \$425,000 in a new cooling tower to meet the high demands of the upcoming summer months, Robison asked Envinity to take a closer look.

"We needed to get our house in order, to do self-analysis, to dig deep into our existing systems...to make sure they were operating at peak performance before we started going out looking at more capital-type investment projects," says Robison.

In fact, Envinity found ways to increase the efficiency of the existing cooling towers enough that they used less energy to meet more demand compared to when the temperature problems first appeared.

Envinity implemented the following upgrades:

- Improved control sequence programming to incorporate parallel staging. This optimized the way the cooling towers worked in tandem and enabled each tower to operate with maximum cooling efficiency.
- Changed the set points of the cooling tower water and chilled water temperatures and minimized the difference between the two, which reduced the amount of cooling required by the water chillers.
- Reduced simultaneous heating and cooling of water by correcting air handler preheat and subcool logic and repairing leaking hot water valves.
- Repaired malfunctioning variable air volume (VAV) boxes and inoperable dampers to achieve greater airflow modulation.
- Turned off redundant pumps.

Adding Incremental Efficiency Upgrades When Repairing Water Damage in the Cafeteria

In the fall of 2014, the cafeterias at Westmoreland flooded and needed restoration. Robison knew that he could add cost-saving efficiency measures during construction for a relatively low incremental up-front outlay. Once again he consulted with Gombotz's team at Envinity.

The team implemented the following upgrades:

- Changed lighting to LED bulbs.
- Changed exit signs to LED lights.
- Installed VAV boxes with efficient turndown ratios, so the system reduces airflow when the cafeteria is not fully occupied. This was an upgrade from constant air volume (CAV) handlers, which waste energy pushing more air than necessary through the system.
- Improved control sequence and scheduling. For example, the upgrade allows lower airflows when the cafeteria is unoccupied and allows enhanced economizing when temperatures exceed 50 degrees outdoors.

As a result of these upgrades, the hospital began to see immediate monthly savings in gas and electricity costs ranging from 2% to 27%. Overall, yearly energy savings totaled \$158,000, which paid back the initial project outlays in only six months. Plus, the hospital avoided buying a new \$425,000 cooling tower. The current tower is projected to last 10 to 15 years.

Gaining Approval for \$150,000 to Upgrade the CAV Air Handler at Latrobe Hospital

Robison reported his energy spend and variances to Excela's executives monthly. Once the mounting energy savings and efficiency gains of these early projects attracted their attention, they became more receptive to requests for capital investment in other energy efficiency measures.

In the spring of 2016, Excela's executives asked proactively what other improvements Robinson and Gombtoz might suggest, particularly at Latrobe hospital, which had the lowest Energy to Care benchmark score of the system's three hospitals. "My leadership was asking why one hospital had the same electric spend as a second that was larger," recalls Robison.

This was the perfect opportunity to revisit the energy master plan, which had noted key opportunities to upgrade an aging air handler with outdated controls at Latrobe Hospital. It was a 120,000 cubic feet per minute (CFM) unit serving 30% of the hospital, but running at constant volume, which wastes energy whenever flows can be lower.

The project required a \$150,000 capital outlay to:

- Add variable frequency drives (VFDs) to the fans, so the volume of air flowing through the handler can be modified, depending on the need.
- Reduce the airflow by 40%. The system had been oversized to meet the needs of an emergency department, which had since been removed from the unit. The higher level of airflow was not needed for the rest of the hospital. Pushing less air requires less energy, but the reduction also enabled the air handler to operate more efficiently, since it was not straining at the edge of its capacity to meet demand.
- Change from three-way to two-way valves, to eliminate bypass and wasted pumping energy.
- Repair the economizer, which provides the system with outdoor cool air when it's available and frees up the cooling capacity of the chiller.
- Repair and upgrade the dampers, one of which had been propped open by a two-by-four to maintain outdoor airflow.

- Reprogram control sequences to increase efficiency within the air handling system. For example, they reset the discharge air temperature to produce the coldest air only when it was needed.
- Optimize the fan pressure set-point, so the dampers in the farthest zone were kept nearly fully open, meaning there is not more air flowing through the system than necessary.

To date, the upgrades have been completed, and the new handler is commissioned and ready to go online. It is projected to save the hospital \$100,000 per year, quickly paying back the initial investment and then going on to accrue savings every year thereafter.

Enlisting Consultants to Provide Staff Education on Project Impacts and Savings

The collaboration between the in-house facilities team and the outside engineers has been so successful that Excela has increased its contract with Envinity to include one day per month at each hospital. The consulting engineers start by joining the daily “huddle” with the Excela facilities staff.

To keep the team informed and motivated, Envinity maintains an issues list in the form of a scorecard. The scorecard keeps everyone informed about concerns and opportunities that have come up and where the team is in solving them.

In addition, Envinity has installed sophisticated wireless sub-metering software at all three hospitals, so the team can understand in detail where energy savings are achieved and where there’s room for fine-tuning. Excela paid for the sub-metering software by leveraging their utilities buying power. The sub-metering software enables the team to see how even incremental changes can have a significant impact on energy use, which keeps the staff motivated and empowered.

“I think education and awareness were a key part of it. We could see the impact of changes in sequences and operations. And, we could lay out for our facilities guys to see that, yes, they are indeed making an impact by changing LED lights, by changing exit signs, by how you operate your air handlers,” says Robison.

Results and Next Steps

The facility upgrades at Excela have resulted in:

- 5% per year reduction in energy use
- 28% reduction in energy use intensity (EUI) between 2011 (398) and 2016 (288)

From the outset, Robison’s intention has been to do the right thing. The Energy to Care Awards have motivated him to keep focused, even when he faces obstacles. Plus, his energy savings have earned important recognition from the executives at Excela.

“They [leadership] see the real change on the variance reports, so they know it’s not smoke and mirrors,” says Gombotz. “And now, we’re getting to do more exciting projects that actually cost some money, in part because of the recognition.”

So what's next? The team is continuing to leverage ongoing capital spending to increase efficiency. One of the ICUs is slated for renovation; there are new medical office buildings going in and the operating rooms need to be upgraded to meet changing medical codes. They are also continuing to optimize existing buildings and systems.

It has been a team effort. That's part of the secret to Excelsa's success. Early on, Robison recognized that he needed extra boots on the ground because his team works at maximum capacity simply maintaining the health system's facilities.

His advice to others who want to get started is simple: "If you want to be successful with your energy reduction efforts, it requires focus. Our folks work 10-hour days now. So we needed help to keep on task, to keep focused...You need some type of energy partner in your stable to be successful."

The Energy to Care program, sponsored by Johnson Controls, encourages hospitals across the country to reduce their energy consumption by 10 percent or more over their baseline energy consumption. Since 2009, hospitals participating in the Energy to Care program have tracked more than \$67 million in energy savings. This free program includes a robust energy-benchmarking tool in addition to the awards. ASHE congratulates these hospitals for their leadership in reducing energy consumption.



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