

SEDAC CASE STUDY



Huntley High School New Construction

August 2017



ASKING FOR HELP

One reason Doug is so effective is because he knows how to ask for help. Engineers and architects don't always know which designs and technologies are most efficient. And they can't always provide him with the data he needs about how much energy and money he will save if he chooses certain strategies. Without this information, it's hard to know where to start, and it's hard to persuade the school board to support his efforts. He relies on organizations like SEDAC to:



- Give him independent, expert advice on how to make his buildings more efficient
- Provide him with energy cost savings data that he can present to the school board
- Identify incentives that will cover some of the cost of energy efficiency upgrades.

SELLING ENERGY EFFICIENCY TO A SCHOOL BOARD

Doug Renkosik has lots of experience securing funding for energy upgrade projects. As the operations and maintenance director for Huntley Community School District 158, he has to make the case to school board that repairs, upgrades, and renovations are necessary. In recent years, he has asked the school board for even more money to make his buildings as energy efficient as possible.

When replacing a boiler, for instance, he recommends buying a premium efficiency boiler instead of a cheaper, less-efficient one. Though the high-efficiency boiler has a higher initial cost, Doug explains to the board that it will save energy and money in the long run. He also looks for incentives that will help him fund these projects. "If you can find a way to fund it, it's an easier sell," he explains.

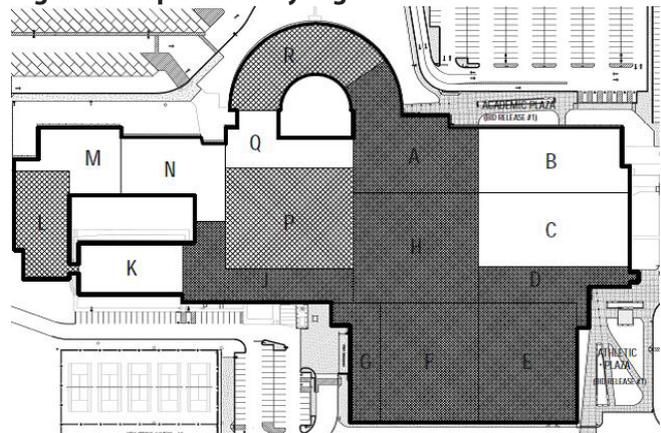
The school board has been remarkably supportive. They have agreed to lighting retrofits, chiller upgrades, HVAC control retrofits, and energy-efficient renovations and expansions at Huntley High School. These efforts have led to significant savings. Since 2007, the district's nine buildings have saved over \$660,000 in annual energy costs. This is money the school board is happy to spend in other ways. These days, *they* are the ones who encourage *Doug* to pursue energy efficiency projects.

"The savings have snowballed, which has made the board much more comfortable with further investing."--Doug Renkosik

HUNTLEY HS EXPANSION AND RENOVATION

Doug worked with SEDAC when the school district was renovating and expanding Huntley High School. In 2013, Huntley High School was planning a new addition and renovation to their 360,388 square foot high school. They planned to add a new athletic facility and entrance and renovate many of the offices, cafeteria, and classroom spaces. The additions would increase the footprint of the high school by about 25%.

Figure 1: Map of Huntley High School



Note: The highlighted areas represent the additions and renovations

Doug recognized that this was the perfect time to make sure that the new designs were as efficient as possible. It's always easier (and less expensive) to design for energy efficiency from the start instead of trying to retrofit a building for energy efficiency later. Could the school district increase the size of the building and have zero energy consumption increase or even energy savings? Doug also wanted help identifying incentives to cover the cost of the upgrades.

HOW SEDAC HELPED: DESIGN ASSISTANCE

Doug asked SEDAC to review their designs and make recommendations to improve energy efficiency. SEDAC provided this service to the school district at no cost, through state-funded energy efficiency programs.

SEDAC reviewed design development phase drawings and made recommendations to make the designs even more energy efficient. "SEDAC provided us with a wealth of information and showed us that there was a better way than the 'cookie cutter' approach," Doug explained. Some of SEDAC's recommendations included:

1. Install a high-efficiency condensing boiler;
2. Install destratification fans and an energy recovery wheel in the field house;
3. Increase roof and wall insulation and include air barrier details to reduce HVAC loads, reduce air infiltration, and increase comfort;
4. Utilize high efficiency lighting fixtures to reduce Lighting Power Density to less than code allowed maximum; and
5. Install high-performance windows and doors and shade east- and west-facing windows.



Many of these recommendations consist of going **beyond code** in equipment selection and envelope construction. Illinois mandates that all new buildings and major renovations meet current energy code, but meeting the current energy code does not translate to optimal efficiency. Going beyond code can lead to big energy savings.

An added bonus: going beyond code makes buildings eligible for energy program incentives. SEDAC estimated that by following these recommendations, the high school would be eligible for over \$200,000 in incentives.

REVISING THE DESIGNS

Armed with SEDAC's recommendations, Doug returned to the architects and engineers and decided which solutions to prioritize. Doug received new bids for energy efficient equipment and designs. New plans were developed, and Doug returned to the school board with the revised designs.

As Doug explains, "The school board immediately could see that this was a good idea and was very supportive." Huntley High School moved forward with the renovations and additions. Though some of the energy efficient upgrades would cost more initially, the school board could see that they would save the school district money in the long run.



Huntley CUSD 158 Board of Education

HOW SEDAC HELPED: INCENTIVE REVIEW

Doug reached out again to the SEDAC team to find out how much money would be saved with his revised design plans and to receive updated incentive information. SEDAC provided comprehensive economic analysis on what his return on investment would be. Doug also wanted to know how much money the school district would need to budget for utilities for the upcoming year. SEDAC was happy to help, and within a day, they provided him with the information he needed.

SEDAC's estimation of cost savings are summarized in Table 1. Most of the electric savings would come from lighting measures and HVAC measures, while the natural gas savings would mostly come from HVAC measures.

Table 1: Annual Energy Cost Savings

	Electricity	Natural Gas	Energy Cost Savings
Energy Savings	442,000 kWh	23,000 therms	\$53,000

Note: The costs of energy (\$0.086/kWh and \$0.66/therm) are based on the average costs for the region.



SEDAC identified incentives totaling \$237,227 (see Table 2). About half of the incentives came from envelope measures; HVAC and lighting measures accounted for another 47% of the total incentives.

Table 2: Calculated Incentives

Measures	Recommended Incentives
Lighting Measures	\$22,912
Envelope Measures	\$123,279
HVAC Measures	\$89,286
Water Heater Measures	\$1,750
Total Incentives	\$237,227

REWARDS AND RECOGNITION

The renovations and additions were completed in 2016, and users are enjoying the newly renovated facility. Doug has found that there was no net increase in utility costs, even with a 25% footprint increase.

In addition, energy improvements have made the place more comfortable. The new field house, for instance, is not air conditioned, and Doug was worried that it might be too uncomfortable on hot days. The destratification fans that SEDAC recommended have helped to balance the temperature between the ground and ceiling, and the air movement of the fans has made the place more comfortable. Doug has received no comfort complaints.



Huntley High School has received recognition for its energy-efficient design. It now has an ENERGY STAR rating of 86 (up from 39 back in 2010). Energy Star ratings are out of 100, and higher scores are awarded to more efficient buildings. Local newspapers have featured the renovated high school and Huntley school district's commitment to energy efficiency.

LOOKING TO THE FUTURE

Doug recognizes that energy efficiency technologies and best practices are likely to evolve, and he wants to stay current. He plans to continue to get help from organizations like SEDAC as he makes plans to replace old equipment and update systems, and as he looks for ways to fund more energy efficiency projects. The school board is currently considering plans to install solar panels.

Doug and the Huntley CUSD board of education are committed to energy efficiency. "Our board is very proactive and regularly reminds me that I need to continue to pursue additional energy savings measures," Doug explains. They are excited to continue working with SEDAC on future projects.

"SEDAC has been very easy to work with--I can't say that in enough different ways. Their support has been helping me sell continued investment in energy efficiency for our board, leading to significant energy savings"--Doug Renkosik



TOP 10 RECOMMENDATIONS FOR NEW CONSTRUCTION

- 1. Orientation and Form.** Orient building on east-west axis, minimize west glazing and shade south glazing.
- 2. Insulation.** Insulate beyond code: min. assembly R-14 for mass wall, min. assembly R-22 for steel-framed wall, min. assembly R-35 for roof above deck. Use low-E gas-filled insulated glazing with max. assembly U-0.35 including frame.
- 3. Air Sealing.** Add air sealing standards as a part of the specification. Require performance testing at completion of construction. Consider envelope commissioning.
- 4. Lighting.** Target lower lighting power density (LPD: W/sf) than code allowed maximum, while meeting IESNA lighting level recommendations. Choose high efficacy (lumen/W), long lasting lamps with good Color Rendering Index (CRI). Implement effective lighting control strategies based on schedule (timers), occupancy (occupancy sensors), and available daylight (photocells).
- 5. Reduce loads.** Use ventilation heat recovery. Modulate ventilation rates based on occupancy with demand control ventilation. Shade glazed surfaces.
- 6. Heating.** Use high efficiency boilers and furnaces of 92% efficiency or better. Consider using a geothermal heat pump. Consider a hydronic system with a dedicated outdoor air system.
- 7. Cooling.** Use high efficiency (SEER 14+, EER 11.5+) air conditioning equipment with an outdoor air economizer. A geothermal heat pump is also recommended.
- 8. Commissioning.** Commission HVAC and mechanical systems to de-bug and ensure systems operate according to design.
- 9. Motors and Pump.** Use variable frequency drives on electric motors with variable loads. Use premium efficiency equipment.
- 10. Building automation.** Use automatic controls to adjust temperature settings, ventilation, and system operation according to time of day and building loads. Use BAS trend logs to assess system performance.

After implementing all of these, consider renewables such as solar and wind.



Huntley High School Learning Resource Center

SAVE ENERGY AND MONEY WITH SEDAC

DESIGN ASSISTANCE

SEDAC design assistance or energy assessments for new construction, major renovation, and existing buildings is available through public sector energy efficiency programs, funded by utilities in Illinois, in compliance with Illinois law.

ENERGY INCENTIVE GUIDANCE

SEDAC helps facilities identify financial incentives to facilitate implementation of cost-effective energy efficiency improvements for new construction, major renovation, and existing buildings. This program is currently available through public sector energy efficiency programs, funded by utilities in Illinois, in compliance with Illinois law.

OTHER SERVICES

- Quick Advice
- Energy Assessments
- Benchmarking
- Implementation Assistance
- Retro-commissioning

WHO WE ARE

The Smart Energy Design Assistance Center assists buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable. SEDAC is an applied research program at the University of Illinois at Urbana-Champaign working in collaboration with the 360 Energy Group.

