



BATTLE OF THE BUILDINGS

EPA's NATIONAL BUILDING COMPETITION



2013 WRAP-UP REPORT ON TRENDS & BEST PRACTICES

EPA's 2013 ENERGY STAR® NATIONAL BUILDING COMPETITION

Building on three years of success

Based on the success of the past three battles, in 2013, EPA once again hosted the ENERGY STAR National Building Competition: Battle of the Buildings. More than 3,000 buildings battled the scale and each other as they competed to find out who would become the nation's biggest energy loser. Teams represented more than 25 different types of commercial buildings and hailed from all 50 states, two U.S. territories, and the District of Columbia, making it a truly nationwide competition.

The ground rules

As in past years, this diverse set of buildings competed to save energy, save money, and fight climate change. Competitors worked off the waste through improvements in energy efficiency with help from EPA's ENERGY STAR program. But with so many teams working hard to improve efficiency, how would a winner be picked?

All competitors tracked their monthly energy consumption using EPA's online energy tracking tool, ENERGY STAR Portfolio Manager®. At competition launch, midpoint, and end, they reported their progress. At the end, the winner was the building that demonstrated the largest percentage reduction in their "energy weight," defined as their energy use, adjusted for weather and the size of the building, during the 2013 calendar year as compared to a 2012 calendar year baseline. Energy use reductions were required to be verified by a licensed Professional Engineer or Registered Architect at the end of the competition for each competitor that received recognition from EPA.

Many were winners...but only one was the biggest energy loser

So, just how much did the biggest energy loser save? Claiborne Elementary School in Baton Rouge, La., emerged victorious by cutting its energy use by more than 45 percent in one year. But the school wasn't alone at the finish line. Nearly 50 buildings in the competition demonstrated energy use reductions of 20 percent or greater.

In 2013, for the first time, EPA expanded the competition to include partial building spaces, recognizing that tenants play a huge role in successful building energy efficiency efforts. Examples of these spaces include stores in enclosed malls and offices occupying a single floor of a multi-story building. Additionally, EPA recognized one participant who achieved the greatest energy savings as well as scored communications activities as the Most Valuable Participant (MVP)!

Altogether, competitors saved a combined total of more than 900 million kBtus of energy and an estimated \$20 million on utility bills. These energy savings have a significant, positive impact on the environment. Buildings and plants contribute 50 percent of all U.S. greenhouse gas (GHG) emissions, and these competitors demonstrate that teamwork, better practices, and new technologies can deliver real reductions. In fact, this year's competitors reduced their annual greenhouse gas emissions equal to that of the annual electricity use of more than 19,000 homes.

Learn from this talented field

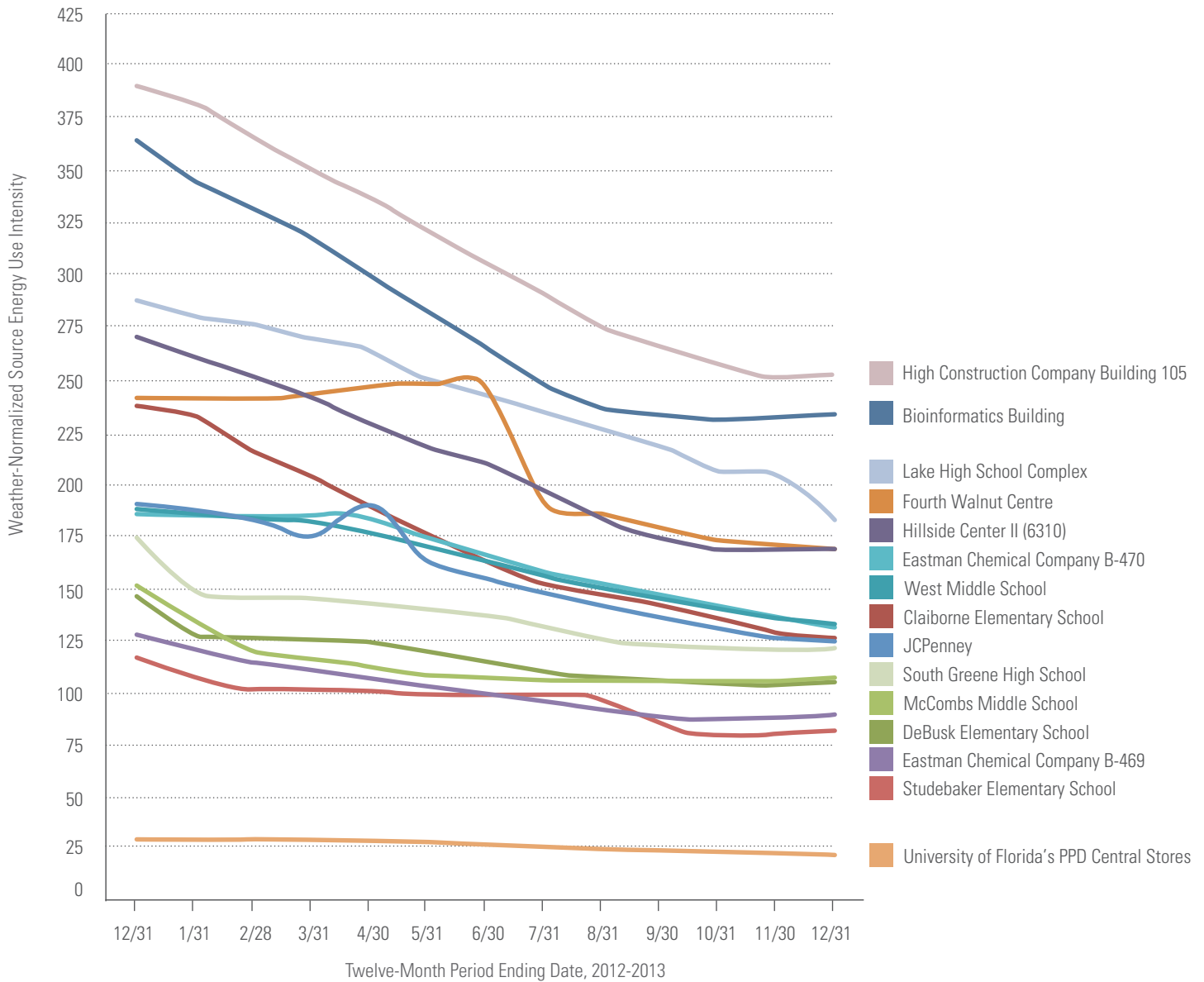
From improvements in operations and maintenance to upgrades in equipment and technology, competitors pulled out all the stops to improve efficiency. Get their best energy-saving advice and check out their successful strategies in the following pages.

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BATTLE TO THE FINISH

The 12-month path to energy savings for the competition's top finishers.



How were competitors judged?

Buildings were judged on their percentage-based reduction in weather-normalized source energy use intensity. The competition period ran from January 1, 2013 – December 31, 2013.

What is energy use intensity?

EUI is calculated as annual kBtu/square footage. Generally, a low EUI signifies good energy performance, although certain building types will always use more energy than others.

AND THE WINNER IS...

Claiborne Elementary School

East Baton Rouge Parish School System
Baton Rouge, La.



RECOGNITION:

#1 Overall Winner
#1 Winner, Education Category
20% Energy Use Reduction

SAVINGS:

45.9% Energy Savings
\$114,499 Estimated Cost Savings
488 MtCO₂e Greenhouse Gas
Emissions Prevented



TOP FINISHERS

Rank	Building	Location	Type	Reduction
1	Claiborne Elementary School	Baton Rouge, La.	Education	45.9%
2	Hillside Center II (6310)	Columbia, Md.	Office	37.1%
3	Lake High School Complex	Uniontown, Ohio	Education	36.2%
4	Bioinformatics Buildings	Chapel Hill, N.C.	Other	35.8%
5	High Construction Company Building 105	Mechanicsburg, Pa.	Office	35.3%
6	JCPenney	Shawnee, Okla.	Retail	33.9%
7	Stuebaker Elementary School	Des Moines, Iowa	Education	31.9%
8	McCombs Middle School	Des Moines, Iowa	Education	29.7%
9	Eastman Chemical Company B-470	Kingsport, Tenn.	Office	29.6%
10	Eastman Chemical Company B-469	Kingsport, Tenn.	Office	29.6%
11	South Greene High School	Greeneville, Tenn.	Education	29.2%
12	Fourth Walnut Centre	Cincinnati, Ohio	Office	29.2%
13	DeBusk Elementary School	Greeneville, Tenn.	Education	29.1%
14	University of Florida's PPD Central Stores	Gainesville, Fla.	Warehouse	29.0%
15 & MVP	West Middle School	Shelbyville, Ky.	Education	28.9%
Top Tenant	Trane Commercial Systems	City of Industry, Calif.	Office	3.0%

STORIES BEHIND THE BATTLE



Claiborne Elementary School

East Baton Rouge Parish School System
Baton Rouge, La.

RECOGNITION:

#1 overall winner
#1 winner, Education category
20% energy use reduction

SAVINGS:

45.9% energy savings
\$114,499 estimated cost savings
488 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 129 kBtu/Sq. Ft.

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“Start getting all stakeholders on board with the energy program from the beginning, whether they’re your building occupants, employees, maintenance staff, contractors or visitors. Customize your communications and interactions with them for the most effective way to gain their cooperation.”

Using effective management

The most effective tool in saving energy was managing and scheduling the HVAC and lighting systems, which was achieved by working closely with the school principal and staff throughout the year. Computerized building automation system (BAS) control and scheduling software was used to fine-tune and continually adjust system settings to accommodate the specific comfort needs of the school, while using the least amount of energy to do so.

Some examples of steps Claiborne’s energy team took include setting back cooling, heating, and lighting levels when rooms are unoccupied; determining how many chillers and hot water boilers are needed to meet the temperature and humidity needs of the school; and automatically adjusting the amount of fresh air being brought into the building to meet the occupancy and ventilation requirements during any given part of the day.

Creating a culture of energy conservation

Claiborne created a culture of energy conservation by involving everyone in its mission. Frequent energy conservation awareness presentations to students and teachers explained specific steps they could take to save energy, as well as the importance of conserving the earth’s resources. Students learned about simple actions they could take to make a difference, including adjusting thermostats, keeping doors and windows closed when cooling or heating systems are operating, and making sure all electronic devices in their classrooms are shut off at the end of the day. During the year, aspects of energy conservation were integrated into activities outside the classroom—such as the school’s “Spooky Math & Science Night” on Halloween—supporting the school’s efforts to develop the next generation of energy conservation leaders!

STORIES BEHIND THE BATTLE



Hillside Center II (6310)

First Potomac Realty Trust
Columbia, Md.

RECOGNITION:

#2 overall winner
#1 winner, Office category
20% energy use reduction

SAVINGS:

37.1% energy savings
\$30,428 estimated cost savings
185 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Office
Ending EUI: 171 kBtu/Sq. Ft.

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“Start simple. There are a surprising number of options available in most buildings to improve energy efficiency and realize cost savings without breaking the bank or requiring complex solutions.”

VAV system saves

The top efficiency project for Hillside Center was the installation of variable air volume (VAV) boxes for the HVAC system. In many buildings, the heating and cooling system uses more energy than any other system. Installing a VAV system controls the amount of constant-temperature air that is in a room to meet the varying conditions of the space. This allowed Hillside to substantially reduce energy use by not having to continuously heat or cool the air.

Small changes bring big savings

Hillside's team also focused on making small changes to save big. In one example, more than 25 400-watt parking lot pole heads were replaced with 96-watt LED lights, while an additional six 250-watt wall-packs were replaced with 20-watt LEDs. This project has an anticipated payback period of just over three years.

STORIES BEHIND THE BATTLE



Lake High School Complex

CCG Energy Solutions, Inc.
Uniontown, Ohio

RECOGNITION:

#3 overall winner
20% energy use reduction

SAVINGS:

36.2% energy savings
\$263,428 estimated cost savings
1,514 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 184 kBtu/Sq. Ft.

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"Do your homework! First, understand your energy consumption, review usage per building system, and query occupants about realistic space needs. Next, research and select vendors based on proven results ... Lastly, understand which M&V [Measurement and Verification] process to use to measure project performance."

Providing a high quality learning environment

Lake High School completed a full-scale energy conservation project with CCG Energy Solutions that included lighting retrofits, transformer upgrades, mechanical design improvements, and an upgrade to the building automation system (BAS). Of these, the BAS had the biggest impact on energy savings. Lake High School is now continuously monitored remotely through the BAS by CCG's performance improvement specialists who focus on identifying energy savings opportunities.

Redesigning to save

The team also focused on upgrades to mechanical systems, a transformer, and lighting fixtures. Previous lighting did not meet the required design standards. Now the lighting not only exceeds these standards, but also provides a better work environment while reducing the electric demand throughout the building.

Upgrades were completed on the building's electrical distribution system to reduce electrical transformer losses. This upgrade moved the building into a lower utility rate class, resulting in huge cost savings.

Lastly, the mechanical system was redesigned to take advantage of the existing oversized condensing boilers. The packaged rooftop units that were heating much of the building were only rated at 80-percent efficiency, but now new piping helps to utilize them at 98-percent efficiency.

There was also a focus on training the staff of Lake High School to provide them with additional ideas on how they can operate the buildings more efficiently and continue the savings trend into the future.

STORIES BEHIND THE BATTLE



Bioinformatics Buildings

University of North Carolina at Chapel Hill
Chapel Hill, N.C.

RECOGNITION:

#4 overall winner
#1 winner, Other category
20% energy use reduction

SAVINGS:

35.8% energy savings
\$317,307 estimated cost savings
1,204 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 234 kBtu/Sq. Ft.

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“Ensure your organization has the expertise and resources to properly operate and maintain your existing system, before you consider adding more complexity.”

The University of North Carolina (UNC) at Chapel Hill won the first-ever ENERGY STAR National Building Competition in 2010, when Morrison Hall, a student dormitory, reduced its energy use by 35 percent. The Energy Management team has participated in the competition every year since and has continued to reap significant energy savings. How did they do it this time?

Improved controls

UNC at Chapel Hill's Energy Management team upgraded the variable air volume controls from pneumatic to direct digital controls, and also reprogrammed the air handler unit control systems.

Upgrade and retrocommissioning

UNC's team also upgraded the building's thermostats and zone-level heating, and the HVAC systems to take full advantage of computer control and remote connectivity. Going further, UNC re-commissioned the whole building HVAC system, which included repairing/replacing faulty equipment, tuning and calibrating, and reprogramming how the system works to meet current building needs. An in-house facility engineer led the project, with the support of the HVAC maintenance staff, building occupants, a data analyst, and a building controls contractor.

STORIES BEHIND THE BATTLE



High Construction Company Building 105

High Construction Company
Mechanicsburg, Pa.

RECOGNITION:

#5 overall winner
20% energy use reduction

SAVINGS:

35.3% energy savings
\$32,960 estimated cost savings
221 MtCO₂e greenhouse gas emissions
prevented

BUILDING STATS:

Type: Office
Ending EUI: 253 kBtu/gpd

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“Quantify the value of energy reduction opportunities and the cost to implement changes. Value can be monetary, but it may also include safety, maintenance, or publicity.”

Improving efficiency and aesthetics

By retrofitting 20-year-old lamps, the team not only improved energy efficiency, but also the aesthetic appeal of the building. The tenants were happy with the new look and the improvement in light quality! This simple change also resulted in a 60-percent reduction in lighting energy use. Because the new, more efficient lighting wasn't putting off as much heat, the reduction in lighting also reduced the load on the cooling system in the summer. On top of this, the team used strategic placing of occupancy sensors to automatically turn off lights!

Replace and reduce

The energy team also retrofitted the outdated HVAC system. The project included replacing rooftop units and the building automation system, and adding variable air volume zones. The lower plug loads and the 60-percent reduction in lighting energy allowed the rooftop units to be right-sized. The new building automation system reduced the use of electric reheat coils in the variable air volume boxes by increasing the use of gas preheat in the new rooftop units. These projects resulted in approximately a 35-percent reduction in energy use!

STORIES BEHIND THE BATTLE



JCPenney

Shawnee, Okla.

RECOGNITION:

#6 overall winner

#1 winner, Retail category

20% energy use reduction

SAVINGS:

33.9% energy savings

\$21,100 estimated cost savings

221 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Retail

Ending EUI: 127 kBtu/Sq. Ft.

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“Operational habits and behaviors make up a large part of the operating expense and need to be streamlined to yield maximum results.”

Right-sizing with new equipment

By replacing existing oversized and outdated rooftop air conditioning units with more efficient units, the Shawnee, Okla., JCPenney team was able to reduce the amount of cooling necessary while still maintaining the comfort level inside the store. This one change reduced the energy demand load by more than 30 percent!

Schedule for savings

A scheduling program was implemented to reduce the total amount of time the building was occupied without changing the open hours of the store. Aligning housekeeping functions with inventory-replenishment functions enabled the team to reduce occupancy time by nearly 10 percent and adjust the operation of the building systems accordingly.

STORIES BEHIND THE BATTLE



Studebaker Elementary School

Des Moines Public Schools
Des Moines, Iowa

RECOGNITION:

#7 overall winner
20% energy use reduction

SAVINGS:

31.9% energy savings
\$14,274 estimated cost savings
77 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 81 kBtu/Sq. Ft.

“Subscribe to the old adage that a journey of a thousand miles begins with the first step. Assemble an energy team of committed individuals, identify your strengths and weaknesses and recognize that even the smallest of improvements saves important public dollars which can be redirected to student needs.”

Updating the strategies

The installation of a geothermal heating and cooling system contributed most to the energy-saving successes at Studebaker Elementary School – which is in the same school district as fellow top finisher McCombs Middle School. The building is now both heated and cooled by a ground-loop water-to-water heat pump system. Prior to the installation of the geothermal system, the building was heated by means of a gas-fired boiler. The building had historically not been cooled. Building ventilation is provided by an energy recovery ventilator (ERV). All of the building’s heating and cooling needs are now controlled by a building automation system (BAS). The BAS allows the district to accurately control when the building’s mechanical systems operate, manage occupant comfort, and evaluate energy usage. The team also routinely monitors humidity and carbon dioxide levels, and fresh outside air is filtered and circulated as needed to ensure suitable indoor air quality and occupant comfort.

Adding space and saving money

In addition to installing a geothermal heating and cooling system, energy-saving improvements at Studebaker have included: high-efficiency windows and exterior doors, low-wattage fluorescent interior lighting and associated occupancy controls, improved building envelope insulation, and a well-insulated replacement roof. All of these improvements were made during the addition of approximately 3,200 square feet of additional classroom and office space to the building.

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STORIES BEHIND THE BATTLE



McCombs Middle School

Des Moines Public Schools
Des Moines, Iowa

RECOGNITION:

#8 overall winner
20% energy use reduction

SAVINGS:

29.7% energy savings
\$46,694 estimated cost savings
138 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 108 kBtu/Sq. Ft.

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“Communicating the positive benefits of an energy management program to your target audiences is a critical first step. Treating the program as an organizational priority and having the support and commitment of all levels of the organization is imperative. Once you have people on board, you’ve cleared a significant hurdle.”

Switching systems for savings

The single most significant factor that contributed to energy savings at McCombs Middle School during the competition period was a transition to a geothermal heating and cooling system. Heating and cooling had historically been provided by two large gas-fired boilers and roof-top electric conditioning units, respectively. The building is now heated and cooled by water-to-water heat pumps and ventilated by means of energy-efficient energy recovery ventilators (ERVs).

The upgraded heating and cooling system is controlled by means of a building automation system (BAS). Heating and cooling set points are controlled from a central location and coincide with scheduled building activities and usage. The BAS also allows the identification of potential system problems and the evaluation of energy-usage trends. In addition, the team uses information about humidity and carbon dioxide levels to adjust the introduction of fresh outside air to the building, which is filtered and circulated as needed to ensure indoor air quality, maximize occupant comfort, and maintain appropriate humidity levels.

Expanding while increasing efficiency

Other energy efficiency improvements that were implemented at McCombs Middle School include the installation of new energy-efficient thermal-paned windows, improved building and thermal system insulation and the installation of low-wattage T-8 fluorescent lamps. Light fixtures throughout the building are equipped with occupancy sensors, and computers are programmed to power down in the evening. A significant item to note is that the energy savings seen at McCombs Middle School have been realized even with the addition of approximately 8,500 square feet of additional classroom space.

STORIES BEHIND THE BATTLE



South Greene High School

Greene County Schools
Greeneville, Tenn.

RECOGNITION:

#11 overall winner
20% energy use reduction

SAVINGS:

29.2% energy savings
\$11,950 estimated cost savings
108 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 123 kBtu/Sq. Ft.

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“The Greene County School System implemented an energy program and began a culture shift toward conservation among the employees of the district.”

Creating a culture shift toward conservation

Savings at South Greene High School—in the same school district as fellow top finisher DeBusk Elementary School—resulted from building-system and behavioral changes. The Greene County School System partnered with the energy conservation company Cenergistic to implement a program and begin a culture shift toward conservation among the employees of the district. The most significant savings resulted from nighttime, weekend, and holiday setbacks—made successful and consistent with the cooperation of all the faculty and staff working in the facility. To help maintain a quality learning environment while implementing these setbacks, the team also uses information about humidity to adjust ventilation as needed.

Auditing for unnecessary energy usage

To aid in consistency of setbacks, programmable thermostats were installed in the South Greene High School gymnasium. These thermostats allowed an adequate nighttime setback along with morning recovery before classes began. Routine building audits to document unnecessary energy usage also help identify and address areas needing improvement. Implementing a preventive maintenance and cleaning program for HVAC units also improved efficiency and resulted in additional savings.

STORIES BEHIND THE BATTLE



DeBusk Elementary School

Greene County Schools

Greeneville, Tenn.

RECOGNITION:

#13 overall winner

20% energy use reduction

SAVINGS:

29.1% energy savings

\$5,819 estimated cost savings

50 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education

Ending EUI: 106 kBtu/Sq. Ft.

“Three things imperative to a successful energy conservation program are supportive leadership, effective communication, and having a person responsible for monitoring consumption and maintaining conservation measures.”

Savings result from behavior changes

During the 2013 ENERGY STAR National Building Competition, the savings at DeBusk Elementary School were the result of behavior and building-system changes. The Greene County School System partnered with Cenergistic, an energy conservation company, to implement their program and begin a culture shift toward conservation among the employees of the school district.

Without a doubt, the greatest savings resulted from nighttime, weekend, and holiday setbacks. There were absolutely no upgrades in equipment or fixtures; however, the scheduled run times of existing HVAC units, lights, computers, and other electronic devices were matched to the occupancy schedule of the school. And successful, consistent setbacks are only possible with the cooperation of all the faculty and staff working in the facility. While implementing these setbacks, the team routinely monitors humidity and adjusts ventilation appropriately to help maintain a good learning environment.

Routine building audits to document unnecessary energy usage also helped identify and address areas needing improvement. A key step was then communicating the results of these audits to building administrators and occupants, so that the needed changes could take place. Although most of the savings at DeBusk Elementary School were achieved through setbacks/shutdowns during unoccupied times, the implementation of a preventive maintenance program for HVAC units also helped improve efficiency.

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STORIES BEHIND THE BATTLE



University of Florida's PPD Central Stores

University of Florida
Gainesville, Fla.

RECOGNITION:

#14 overall winner
#1 winner, Warehouse category
20% energy use reduction

SAVINGS:

29.0% energy savings
\$1,802 estimated cost savings
10 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Warehouse
Ending EUI: 22 kBtu/Sq. Ft.

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"Look for that low-hanging fruit; it's usually easy to find by just walking around your building and observing what's using energy. Every project that you undertake doesn't have to turn into a big event or involve building automation; sometimes it's as easy as changing operational policies to shut off all of the lights at the end of the day."

Ensuring sustainability of the projects

The University of Florida's Parking Garage C won EPA's 2011 National Building Competition. The team continues to be fierce competitors, as proven by their high performance again in 2013. As in most buildings, the lighting and HVAC systems were the highest energy users in University of Florida's PPD Central Stores. The building has no building automation system, so it was important that all of the projects implemented could be sustained through manual manipulation. The team tackled lighting first. They installed occupancy sensors throughout the warehouse, office areas, and restrooms, replaced the T8 lighting fixtures with LEDs, and discontinued exterior lighting by taking advantage of lighting from a newly constructed building next door.

Cleaning the skylight for increased efficiency

The warehouse staff also implemented some new processes, such as a building shutdown policy. At 5 PM, the last employee in the building is responsible for completely shutting down all lighting, as well as many other electrical appliances and services. The team also installed plastic curtains on three rollup doors, allowing the doors to remain open for longer timeframes during the winter. Finally, cleaning sky lights allowed for an easy increase in lighting efficiency!

Some other simple projects included eliminating four printers and a copier by implementing common print stations, replacing a window AC unit with a more efficient split-system, and piggybacking off of an HVAC recommissioning project on campus. The team also replaced a "dinosaur" of a break room refrigerator with an ENERGY STAR certified unit!

STORIES BEHIND THE BATTLE



West Middle School

Shelby County Public Schools
Shelbyville, Ky

RECOGNITION:

#15 overall winner
Most Valuable Participant (MVP)
20% energy use reduction

SAVINGS:

28.9% energy savings
\$35,275 estimated cost savings
307 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Education
Ending EUI: 135 kBtu/Sq. Ft.

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“You need to know how you’re doing; knowing how much energy your facilities use compared to other organizations is very important when considering an energy management program. Using ENERGY STAR Portfolio Manager allows me to see how my buildings are ranked nationally and on what facilities I need to focus my efforts.”

Investing in energy-saving projects

By updating the control system in West Middle School, the school’s team was able to enjoy immediate energy savings. Although the existing building controls were installed in 2000, they weren’t user-friendly and didn’t allow the building to operate at maximum efficiency. The new controls allow the team to remotely control the facility and operate only the occupied areas, which greatly reduces energy usage. Sensors are used to routinely monitor humidity and carbon dioxide levels, and systems are adjusted accordingly to ensure a good learning environment. The updated controls system could be perceived as an expensive investment, but once the controls were fully functional, the project paid for itself in just over three months!

Super-star staff members

Once the new control system was installed in the school, the rest of the energy savings came thanks to the total staff effort in reducing wasted energy. The maintenance staff inspected and adjusted mechanical equipment to ensure maximum efficiency, and replaced all of the older inefficient lighting with more efficient bulbs which also offered higher quality lighting.

Most Valuable Participant

In addition to saving energy, West Middle School earned EPA’s Most Valuable Participant award for exemplary performance in communicating its energy-saving efforts and participation in the competition to students, staff, and the broader public. The school got the word out through a press release, email blasts, the school’s website, social media posts on Twitter and Flickr, posters, and in-person events.

STORIES BEHIND THE BATTLE



Trane Commercial Systems

Trane Company
City of Industry, Calif.

RECOGNITION:

Top Tenant

SAVINGS:

3.0% energy savings
\$1,493 estimated cost savings
5 MtCO₂e greenhouse gas emissions prevented

BUILDING STATS:

Type: Office
Ending EUI: 121 kBtu/Sq. Ft.

“Continuous monitoring and verification is the key to energy savings.”

Making smarter, more cost-effective decisions

By installing Trane Energy Manager software, the energy managers at Trane Commercial Systems could see what was happening energy-wise in their building at all times. Energy managers at Trane were able to remotely access the variety of software features—energy dashboards, key performance indicator reports, data trending, and fault detection and analytics—to help them make quick and well-informed decisions about managing energy use throughout the year.

The Trane team customized their building-level energy dashboard to monitor real-time energy consumption, system equipment operating parameters, and cost—and leverage this information to continuously optimize and reduce energy consumption. Occupant-focused dashboards were also used to monitor energy usage and carbon emissions to help individuals see the impacts of their energy usage in a quantitative way.

Real-time monitoring of equipment operation

Trane took a continuous commissioning approach through real-time equipment monitoring, equipment-specific fault detection and analytics, and alarm notification to reveal operational anomalies and associated cost and savings. The energy team at Trane realized that you can't change what you can't measure, and is now prepared to continue making big energy savings into the future!

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TOP OVERALL FINISHERS

These buildings were verified to have reduced their “energy weight” the most, on a percentage basis, over the course of the year-long competition.

	Competitor	Location	Category	Energy Reduction	Estimated Cost Savings	GHG Reduction (MtCO ₂ e)
1	Claiborne Elemenatry School	Baton Rouge, La.	Education	45.9%	\$114,499	488
2	Hillside Center II (6310)	Columbia, Md..	Office	37.1%	\$30,428	185
3	Lake High School Complex	Uniontown, Ohio	Education	36.2%	\$263,428	1,514
4	Bioinformatics Buildings	Chapel Hill, N.C.	Other	35.8%	\$317,307	1,204
5	High Construction Company Building 105	Mechanicsburg, Pa.	Office	35.3%	\$32,960	221
6	JCPenney	Shawnee, Okla.	Retail	33.9%	\$21,100	241
7	Studebaker Elementary School	Des Moines, Iowa	Education	31.9%	\$14,274	77
8	McCombs Middle School	Des Moines, Iowa	Education	29.7%	\$46,694	138
9	Eastman Chemical Company B-470	Kingsport, Tenn.	Office	29.6%	\$5,745	56
10	Eastman Chemical Company B-469	Kingsport, Tenn.	Office	29.6%	\$3,721	36
11	South Green High School	Greeneville, Tenn.	Education	29.2%	\$11,950	108
12	Fourth Walnut Centre	Cincinnati, Ohio	Office	29.2%	\$474,251	1,745
13	DeBusk Elementary School	Greeneville, Tenn.	Education	29.1%	\$5,819	50
14	University of Florida’s PPD Central Stores	Gainesville, Fla.	Warehouse	29.0%	\$1,802	10
15 & MVP	West Middle School	Shelbyville, Ky.	Education	28.9%	\$35,275	307
Top Tenant	Trane Commercial Systems	City of Industry, Calif.	Office	3.0%	\$1,493	5

TOP CATEGORY FINISHERS

These buildings were verified to have reduced their “energy weight” more than any other building in their respective categories, on a percentage basis, over the course of the year-long competition.

Category	Competitor	Location	Energy Reduction	Estimated Cost Savings	GHG Reduction (MtCO ₂ e)
Education	Claiborne Elementary School	Baton Rouge, La.	45.9%	\$114,499	488
Office	Hillside Center II (6310)	Columbia, Md.	37.1%	\$30,428	185
Other	Bioinformatics Building	Chapel Hill, N.C.	35.8%	\$317,307	1,204
Retail	JCPenney	Shawnee, Okla.	33.9%	\$21,100	241
Warehouse	University of Florida’s PPD Central Stores	Gainesville, Fla.	29.0%	\$1,802	10
Bank	Union Bank 065 Sunny Hills	Fullerton, Calif.	22.4%	\$1,103	5
Senior Care	Sunrise of Bloomfield at Bluemont PK	Arlington, Va.	19.5%	\$82,695	314
House of Worship	First Presbyterian Church	Athens, Ohio	15.6%	\$1,088	9
Hospital	Metroplex Adventist Hospital	Killeen, Texas	14.7%	\$239,360	1,271
Medical Office	Memorial Hermann The Woodlands Medical Plaza 1	The Woodlands, Texas	13.5%	\$9,085	169
Courthouse	The US GSA - Union Station Tacoma	Tacoma, Wash.	10.9%	\$82,346	131
Supermarket	Kroger 70500804 Capitol Hill	Seattle, Wash.	8.0%	\$19,358	53

REDUCTIONS OF 20 PERCENT OR MORE

These buildings were verified to have reduced their “energy weight” by 20 percent or more over the course of the year-long competition.

Competitor	Category	Location	Energy Reduction	Estimated Cost Savings	GHG Reduction (MtCO ₂ e)
Claiborne Elementary School	Education	Baton Rouge, La.	45.9%	\$114,499	488
Hillside Center II (6310)	Office	Columbia, Md.	37.1%	\$30,428	185
Lake High School Complex	Education	Uniontown, Ohio	36.2%	\$263,428	1,514
Bioinformatics Building	Other	Chapel Hill, N.C.	35.8%	\$317,307	1,204
Building 105	Office	Mechanicsburg, Pa.	35.3%	\$32,960	221
JCPenney SHAWNEE, OK-2279	Retail	Shawnee, Okla.	33.9%	\$21,100	241
Studebaker Elementary School	Education	Des Moines, Iowa	31.9%	\$14,274	77
McCombs Middle School	Education	Des Moines, Iowa	29.7%	\$46,694	138
Eastman Chemical Company B-470	Office	Kingsport, Tenn.	29.6%	\$5,745	56
Eastman Chemical Company B-469	Office	Kingsport, Tenn.	29.6%	\$3,721	36
South Greene High School	Education	Greeneville, Tenn.	29.2%	\$11,950	108
Fourth Walnut Centre	Office	Cincinnati, Ohio	29.2%	\$474,251	1,745
DeBusk Elementary School	Education	Greeneville, Tenn.	29.1%	\$5,819	50
University of Florida's PPD Central Stores	Warehouse	Gainesville, Fla.	29.0%	\$1,802	10
West Middle School	Education	Shelbyville, Ky.	28.9%	\$35,275	307
Bayshore Tech Park - 2200 Bridge Parkway	Office	Redwood City, Calif.	28.2%	\$32,680	118
Kmart - 3967	Retail	Dublin, Ga.	27.6%	\$18,797	160
Cloverleaf 20440	Office	Germantown, Md.	27.1%	\$31,435	191
JCPenney EL DORADO, AR-0965	Retail	El Dorado, Ark.	26.6%	\$12,175	66
Eastman Chemical Company B-471	Office	Kingsport, Tenn.	25.5%	\$4,659	45
Kmart - 3839	Retail	Corvallis, Ore.	25.4%	\$17,267	94
3110 Fairview Park Drive	Office	Falls Church, Va.	25.2%	\$125,232	839
North Green High School	Education	Greeneville, Tenn.	24.9%	\$6,511	45
Kmart - 3925	Retail	Thomasville, N.C.	24.9%	\$24,758	169
Baileyton Elementary School	Education	Greeneville, Tenn.	23.5%	\$3,677	32
Moulton Extended Learning Center	Education	Des Moines, Iowa	23.3%	\$23,645	162
Lucketts Elementary School	Education	Leesburg, Va.	23.1%	\$10,538	63
Kmart - 9737	Retail	Cedar Bluff, Va.	22.7%	\$18,344	179
Chuckey-Doak Middle School	Education	Afton, Tenn.	22.7%	\$9,015	79
Union Bank 065 Sunny Hills	Bank	Fullerton, Calif.	22.4%	\$1,103	5
Terraces at Copley Point	Office	San Diego, Calif.	22.3%	\$92,117	326
Union Bank 118 Fremont	Bank	Fremont, Calif.	22.1%	\$1,383	7
Bayshore Tech Park - 1800 Bridge Parkway	Office	Redwood City, Calif.	21.9%	\$29,851	112

REDUCTIONS OF 20 PERCENT OR MORE (continued)

Competitor	Category	Location	Energy Reduction	Estimated Cost Savings	GHG Reduction (MtCO ₂ e)
Union Bank 021 Encinitas	Bank	Encinitas, Calif.	21.8%	\$3,703	14
Hodges Bend Middle School	Education	Houston, Texas	21.7%	\$17,985	155
Cassidy Turley Parking Garage	Other	Cincinnati, Ohio	21.5%	\$7,073	67
JCPenney LITTLE ROCK, AR-2914	Retail	Little Rock, Ark.	21.4%	\$29,018	211
Union Bank - 073 Palos Verdes	Bank	Rolling Hills Estates, Calif.	21.3%	\$4,713	14
Cassidy Turley Office Building 3	Office	Cincinnati, Ohio	21.3%	\$11,461	150
Sears - 1555	Retail	Sanford, Fla.	21.2%	\$17,612	131
JCPenney GLEN ALLEN, VA-2619	Retail	Glen Allen, Va.	21.1%	\$21,606	170
1776 Eye Street	Office	Washington, D.C.	21.1%	\$72,724	442
JCPenney DOVER, DE-0951	Retail	Dover, Del.	21.0%	\$34,166	189
Kmart - 9563	Retail	Reidsville, N.C.	20.7%	\$18,335	122
Chuckey-Doak High School	Education	Afton, Tenn.	20.7%	\$14,333	133
Sears - 1525	Retail	Columbia, S.C.	20.5%	\$34,925	232
800 East Colorado	Office	Pasadena, Calif.	20.2%	\$53,207	223
Burton Elementary School	Education	Fresno, Texas	20.2%	\$23,787	163
The US GSA - LJ Ryan Fed Records Cntr	Warehouse	San Bruno, Calif.	20.0%	\$33,107	99