

ENERGY STAR

Highlights throughout the States: Case Studies of Successful Programs



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In coordination with the U.S. Environmental Protection Agency (EPA), the National Association of State Energy Officials (NASEO) has identified the following case studies throughout the nation, which aim to support and advance the ENERGY STAR program.

Created in the early 1990s, the ENERGY STAR program helps assist consumers in identifying and upgrading to ENERGY STAR labeled energy efficient products. These case studies are intended to be examined as examples of successful programs, showcasing opportunities and providing information to those interested in modeling these activities.

The following three case studies are from the states of Michigan, Oregon, and West Virginia. While each project varies, they have all utilized ENERGY STAR to achieve a more sustainable, energy efficient environment.



To learn more about ENERGY STAR rated products and programs, please visit: www.energystar.gov

Michigan: One Detroit Center/ENERGY STAR Certified Buildings ENERGY STAR Program Area: Public and Commercial Buildings

Program Summary

Since 1999, the U.S. Environmental Protection Agency (EPA) has provided ENERGY STAR certification to more than 12,500 buildings. To earn the ENERGY STAR certification, buildings must perform in the top 25 percent of buildings nationwide and use approximately 35 percent less energy than average buildings, as verified by a professionally licensed engineer or registered architect.

Program Description and Development

In 2010, Detroit, MI received certification for a total of 151 ENERGY STAR labeled buildings. This number was up from approximately 62 buildings in 2009 and approximately 60-65 in 2008; and also helped place the city onto EPA's top ten list of regions with the most energy efficient buildings. Detroit jumped up in ranks due primarily to a boost in energy-efficient state-owned buildings, energy efficiency efforts in K-12 schools, and a utility program with DTE Energy.



One Detroit Center, located in the heart of the city's Financial District.

*Top Cities with ENERGY STAR rated buildings (2010):
Detroit, MI - #9*

Number of ENERGY STAR labeled buildings: **151**

Total floor space: **27.4 million sq. ft.**

Total cost savings: **\$18.7 million**

Among the 151 ENERGY STAR labeled buildings, One Detroit Center, a 1.1 million sq. ft. Class A office building situated in the city's Financial District is Michigan's tallest building. Constructed in 1992, it received an Energy Star rating of 91 in 2010, versus scores ranging from 77-84 in previous years. It was able to receive this score and increase energy efficiency, by combining the efforts of its property management firm, Portfolio Property Management Global (www.ppm-global.com), with its local utility, DTE Energy; and their *Your Energy Savings Program*, which includes rebates and product incentives. DTE Energy also provides electric and natural gas efficiency programs, which were expanded in 2010.

One Detroit Center's management team performed re-commissioning and energy audits of various building systems that resulted in a complete building energy management system retrofit, and a restructuring of the building's major equipment operation.

One of the first steps in updating this building included the installation of a state-of-the-art web-based energy management system, which controls each piece of equipment in the HVAC system. Since it is web based, monitoring can be done from a remote location and changes can be made much more effectively. This results in greater efficiency, which captures real-time data and

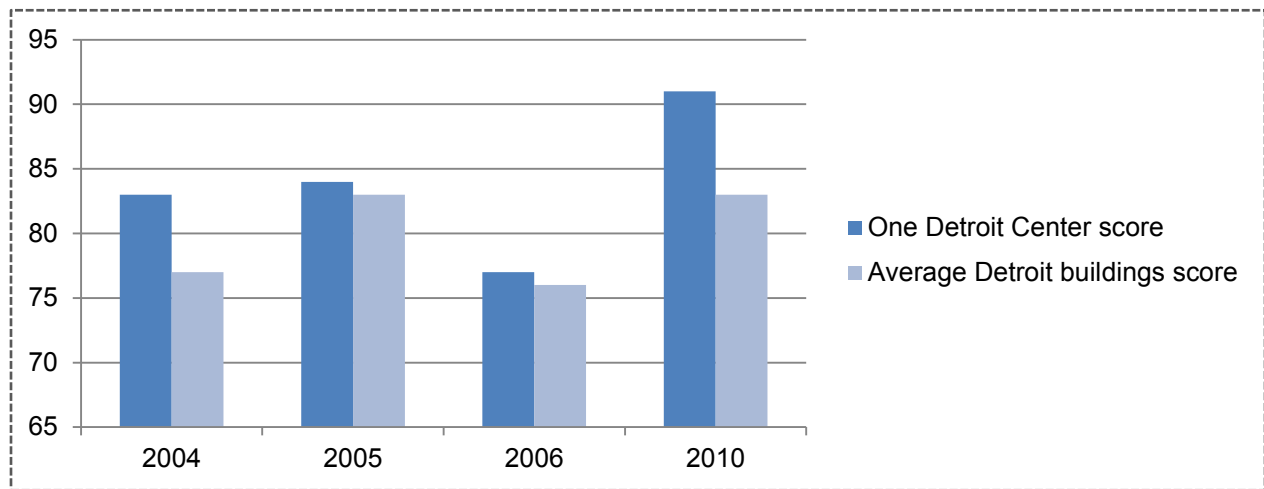
information. Next, variable frequency drives were installed on all the major air handling units, which were able to optimize the use of all systems, resulting in considerable energy savings.

Investment, Energy Savings, and Results

Since the completion of work in 2010, One Detroit Center has experienced an overall savings of 24 percent on all major utilities. This new system provides tenant comfort while simultaneously saving energy.

ENERGY STAR Labeled Buildings

In each of the years that One Detroit Center received ENERGY STAR certification, it surpassed the city average. All city averages, however, remained at a steady score of 75 or above, adding to Detroit's rise in the number of its total ENERGY STAR labeled buildings.



Next Steps

Investments in Detroit's public and commercial buildings have paid off regarding energy savings and Michigan plans to continue its efforts towards upgrading buildings throughout the state. A number of other public and private sector buildings, which received 2010 ENERGY STAR ratings above 80, plan to expand their energy efficiency measures as well. These include:

- *American Axle World Headquarters*: 2010 ENERGY STAR rating of 90.
- *Coleman A. Young Municipal Center*: 2010 ENERGY STAR rating of 96.
- *Blue Cross/Blue Shield Detroit Service Center*: 2010 ENERGY STAR rating of 82.
- *Blue Cross/Blue Shield Jefferson Building*: 2010 ENERGY STAR rating of 86.
- *Piedmont Office Realty Trust*: 2010 ENERGY STAR rating of 91.

Contact Information

Chris Detjen
Manager, Public Policy Programs
NextEnergy
313.833.0100
chrisd@nextenergy.org

Oregon: Sage Green Development ENERGY STAR Program Area: New Homes

Program Summary

Sage Green is a new homes development site which will consist of 18 units built in Beaverton, Oregon, which concentrate on providing net zero energy to homeowners. Built by Green One Construction Services, these homes establish a new standard for performance and sustainability, by producing a substantial amount of energy, rather than simply consuming it. A Sage Green home is designed to serve as a model for how homeowners can meet growing housing and energy demands in ways that improve their communities.

Program Description and Development

Sage Green homes are built on an ENERGY STAR verification platform, which functions as the basis for Oregon's High Performance Home certification. They incorporate a number of ENERGY STAR appliances and other cost effective measures to ensure a more energy efficient home. Each home has its own photovoltaic array to collect and disperse energy; this not only powers the home, but any excess energy produced can, in turn, be fed back into the grid and other homes. These homes also include triple-glazed windows, high-efficiency mechanical units, patent-pending walls (which increase thermal performance), and are built using recycled and local materials.

Sage Green is exceeding requirements of the Oregon Business Energy Tax Credit, High Performance Home program, which utilizes the Northwest ENERGY STAR Homes program to deliver homes that exceed ENERGY STAR performance specifications. By doing so, these homes significantly reduce energy bills, while also meeting the 50% whole house energy savings compared to that of the Business Analyst Benchmark.



Sage Green homes development site

Additionally, all Sage Green homes had independent third-party verification of construction practices. In Oregon, all High-Performance Homes and 5-10 percent of all ENERGY STAR Homes undergo a second level of quality assurance by a third party, which ensures potential homeowners that all of the work throughout has been installed properly and is functioning to the standards specified.

Investment, Energy Savings, and Results

This project is financed with conventional commercial construction loans. Additionally, many of the above-code measures qualified for a combination of local, state, and federal incentives. The Oregon Department of Energy (ODOE) is a subcontractor for this project as well.

Energy savings generated in Sage Green homes aim to offset the expense of implementing energy saving measures. In addition to utilizing innovative construction practices, each home qualifies for \$3,000 in state tax credits and \$2,900 in utility incentives for energy conservation measures. An additional \$25,000 in state and utility incentives is available for the installation of



An interior view of one of the units available with Sage Green homes

7kW photovoltaic systems on each unit. Total costs of photovoltaic systems vary from \$35,000 to under \$50,000.

Homes vary and begin at approximately \$225,000.

Annual utility bill savings per year (with a Sage Green unit): on average, over \$800.

Lastly, the exterior walls of these homes are built to be more than twice as energy efficient as average walls built to code

standards. This is achieved through a thin layer of foam board between the sheathing and the framing. The foam layer alone increases the thermal performance of the walls by up to 40 percent, creating energy savings that could pay for this installation in approximately ten years. Tests performed by the wood science lab at Oregon State University demonstrated the capacity of these walls to withstand more than twice the stress levels at which average code walls did not.

Next Steps

The development stage of Sage Green homes is completed and has now moved onto the construction phase. Currently, five units have been constructed and one has sold. The expansion of future projects is prepared to deal with challenges that might come from a tight lending market. It may also be that future projects will experience fewer problems obtaining such loans as the housing and financial crises are resolved.

Contact Information

Ben Walsh
Green One Construction Services
503.719.4560
ben@greenoneco.com

Additional Resources

Sage Green Website:

<http://sagegreenliving.com/>

Sage Green on Facebook:

<http://www.facebook.com/pages/Sage-Green-Living/102423136474546>

West Virginia: Wyoming County Schools/ENERGY STAR Top Performer ENERGY STAR Program Area: K-12 School Districts

Program Summary

In 2010, Wyoming County Schools, through a series of energy efficiency upgrades to its schools, achieved an average portfolio rating of 87 in eight out of ten ENERGY STAR schools in West Virginia. Wyoming County Schools has been working in energy management since 1982. In November 2003, the district implemented a formal policy requiring every employee and student to be an energy saver as well as energy consumer. Since then, upgrades in this school district have continued to advance.

Program Description and Development

For Wyoming County Schools, the Energy Services Group (ESG), which can be visited at <http://www.energyservicesgroup.net/>, was asked to perform a comprehensive energy audit throughout the district. Within this assessment, ESG discovered that the district could make a number of upgrades, including replacing a vintage 1940s heating system with ENERGY STAR-rated heat pumps, as well as upgrading a total of 4,500 light fixtures county-wide.

As their efforts continued, the district was also able to replace a 1960s steam boiler with individualized room heat pumps that indicate temperature, humidity, and CO2 emissions. In one school, new insulation was added to the roof, as well as the ceilings; and in another, new windows were installed to replace older units.

Through these and many other upgrades, Wyoming County Schools was able to implement their goal of a more energy efficient school district, while also being recognized as an ENERGY STAR Leaders Top Performer. Terry Tilley, Wyoming County Schools' energy manager, provided one of the district's best examples of energy savings, Pineville Middle School. This school, which used to cost approximately \$110,000 per year to heat and cool, now only cost \$35,000 per year.

Other county-wide improvements include energy-saving fluorescent lights; motion detector heat pumps; and UV lights on condensing coils.

Investment, Energy Savings and Results

The Wyoming County school district has utilized energy management since 1986, beginning with a cost savings sharing plan, in which it shared savings with an industrial electric company.



Pineville Middle School in Pineville, WV is one example of the many schools to benefit from energy efficiency upgrades throughout the county.

Over time, it progressed to an energy management system (EMS), followed by performance contracting.

Industrial Electric, a local utility, then began a technical support contract with Wyoming County, which was eventually converted to what is called a care account, allowing Wyoming County to continue to receive technical support, as well as software upgrades. Through working in energy management since 2003, the price per kWh has gone from \$.04 to \$.08 and the district has achieved nearly \$2 million in savings. Further funding is kept as a budget for smaller energy control projects.



Sid Bradford (left), principal of Mullens Middle School and Terry Tilley. Mullens Middle School is another example of one of the schools to receive ENERGY STAR recognition.

Additionally, Wyoming County schools participate in a PJM Interconnection, LLC program, which calls for voluntary demand reduction. By participating in this, six schools have reduced energy demand by 15 percent from 4-6pm. As a final method, telemeters are installed on 8 of the largest gas accounts; this way, gas is purchased on the open market when it is at the lowest price of the year, saving approximately \$2.65 per Mcf on 17,000 pre-purchased Mcfs.

On average, buildings in Wyoming County Schools cost 94 cents per square foot to heat and cool for a year, versus the national average, which ranges from \$1.65-2.00.

Additionally, many of these schools utilize ENERGY STAR benchmarking tools, to better assist them in recognizing energy costs and potential areas of energy savings.

Upgrades in Wyoming County Schools helped the district realize a significant amount of savings on energy costs.

From January to April 2010, the school district saved approximately \$150,000 in heating and cooling costs and by the end of the year, it saved over \$325,000. Since the program was implemented in January 2004, the district has saved over \$1,650,000.

Next Steps

One project, based out of the Wyoming County Career and Technical Center (WCCTC), has been in the works since the spring of 2010, and offers solar panel installation and energy management courses. This effort includes a green team leader selected from each facility in the county, as well as a photovoltaic (PV) system, which includes a utility management tool allowing students, teachers, and administrators to track consumption through real-time data.

For tracking and benchmarking purposes, the district utilizes energy software such as Energy CAP (<http://www.energycap.com/>) and EPA's portfolio manager (http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager). It is also interested in incorporating a program to its automated logic system called energy reports, which examines savings vs. comfort.

2011 Plans and Activities for the Wyoming County School District:

- Funding for a new elementary school; due to a number of floods, the current location has proven to be an inadequate and costly operation to run per sq. ft.
- Asking for HVAC upgrades, through state or local funding, for Oceana Middle school; built in 1949, it has the same foot print as another school which is now saving 67 percent through heating and cooling upgrades.
- Installing humidity sensors at Herndon School; ideally, these would be in each room.
- Installing individual heat pumps with sensors; controlling rooms on an occupied, as-needed basis would add to energy savings throughout an entire school.

Contact Information

Terry Tilley
Energy Manager
Wyoming County Schools
304.732.6262
tilley@access.k12.wv.us