

EERE-PMC News

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DOE charts new horizons with building technologies



Heifer International's new office building in Little Rock, Ark., was named one of the year's top ten green buildings by the American Institute of Architects (AIA).

Credit: Timothy Hursley

America's 81 million buildings consume more energy than any other sector of the U.S. economy, including transportation and industry.

PMC-News this month explores exciting new building technologies, programs and funding opportunities.

EERE's [Building America program](#), for instance, focuses on reducing energy use by 70 percent while also increasing onsite power generation by 30 percent in residential buildings by 2020.

[On June 13, DOE Secretary Bodman announced \\$40 million in funding for efficient housing research. \(funding opportunity announcement\)](#)

The Building Technologies program, administered by the National Energy Technology Laboratory (NETL) offers numerous opportunities. It focuses on [Emerging Technologies](#) and [Technology Integration](#). ([NETL staff listing](#))

In another area, DOE this month has teamed up with the Walt Disney Company to promote energy efficiency through a fun TV spot based on the upcoming Disney–Pixar film [“Ratatouille.”](#)

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News

DOE to Provide Nearly \$60 Million for Solar Energy Research

DOE Secretary Samuel W. Bodman announced June 20 that DOE will make available nearly \$60M to increase the use of solar power across the country. The awards will include:

- Up to \$2.5 million for Solar America Cities cooperative agreements;
- Issuance of a [Funding Opportunity Announcement \(FOA\) for up to \\$30 million for universities](#) to research near-term improvements in solar products;
- Competitive selection of ten cost-shared Photovoltaic (PV) Module Incubator projects that will receive up to \$27 million in DOE funding over 18 months.

Solar Announcement

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DOE and USDA award \$8.3 million for biofuels research



Hybrid poplars planted for biofuel along the lower Columbia River in Washington state.

DOE and the U.S. Department of Agriculture (USDA) announced June 7 that they have jointly selected 11 projects to receive a total of \$8.3 million for bio based fuels research. The projects selected will focus on research in biomass genomics that will accelerate the use of woody plant tissue such as hybrid poplar, cord grass, rice, switch grass, sorghum, perennial grasses, alfalfa and wheat to develop alternative fuels. This is the second year of the program; last year, nine grants totaling \$5.7 million were awarded.

[DOE press release](#), [Genomics GTL Web site](#), and [last year's awards](#).

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DOE, Disney join forces to promote energy savings

The Walt Disney Company and DOE are cooperating in a nationwide campaign to promote energy efficiency through a TV spot based on the upcoming Disney–Pixar film “Ratatouille.”

Featuring the Ratatouille characters Remy, Emile and Skinner, the 30-second animated spot encourages viewers to switch from incandescent light bulbs to EnergyStar® compact fluorescent lighting (CFL) and offers the DOE homepage for more tips on saving energy or using renewable energy technologies in a home. While the spot points out that energy can be used in a variety of ways, it emphasizes that it can be used more efficiently by employing technologies such as CFLs.

The spot will be seen this month on cable networks nationwide and will continue through the summer months.

The spot can be viewed on the [EERE Web site](#).

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DOE releases first annual report on U.S. wind power market

DOE released its first annual report on developments and trends in the U.S. wind power market May 31. The publication, "Annual Report on U.S. Wind Power Installation, Cost, and Performance Trends: 2006," analyzes trends in the marketplace, including project costs, turbine sizes, and developer consolidation. The report concludes that wind power is competitive and has been consistently priced at or below the price of electricity produced at fossil-fueled or nuclear power plants. Wind project performance has also been increasing due to improved project siting and technological advances in wind turbines.

The report notes that U.S. wind power capacity increased by 27 percent in 2006 and that the U.S. had the fastest-growing wind power capacity in the world in 2005 and 2006.

Press releases from [GE Energy](#), [Acciona Windpower](#), [Mitsubishi Heavy Industries](#), Suzlon ([PDF 29 KB](#)), and Vestas ([PDF 21 KB](#)), and the Clipper Windpower press releases on the turbine commissioning ([PDF 36 KB](#)) and the prospective sales ([PDF 42 KB](#)).

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California, Connecticut, and Vermont lead in energy efficiency



Low-emittance windows will help save heating and cooling energy in this new home.

California, Connecticut and Vermont led the nation in energy efficiency policies, programs, and technologies in 2006, according to the American Council for an Energy-Efficiency Economy (ACEEE). The organization's new report, "The State Energy Efficiency Scorecard for 2006," places the three states in a tie for first place because of their spending on energy efficiency programs, their efforts to set efficiency standards for buildings and appliances, and other energy efficiency programs that the states are involved in. Other leading states include Massachusetts, Minnesota, New York, New Jersey, Oregon and Washington. [ACEEE press release](#).

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NGA case studies on transforming energy markets

The National Governors Association (NGA) Center for Best Practices recently reviewed state energy programs to identify how states promote, administer, finance and implement state energy efficiency and renewable energy policies.

This Issue Brief includes [case studies of six states](#) - Minnesota, Nevada, New Mexico, New York, Pennsylvania and Washington state. Despite diverse climates, geography and energy resources, governors of these and other states use a number of common tools and approaches when implementing energy policies, including:

- setting renewable portfolio standards;
- establishing renewable fuels standards for transportation and heating fuels;
- setting standards for energy use by government (e.g., buildings and fleets);
- establishing financing mechanisms for advanced energy programs;
- measuring and monitoring energy savings and environmental benefits; and
- implementing comprehensive state energy plans that combine many of the above elements.

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State energy funding opportunity announcement

NETL is now seeking applications for State Energy Activities. The goals of this announcement are 1) to facilitate partnerships between states, public and private sector entities and other market influencers to increase energy efficiency and reduce electricity and natural gas consumption; and 2) make energy efficiency and renewable energy options the first choice in achieving air quality objectives.

Go to [EERE Innovative Market Transformation Programs](#), and [Clean Energy and Air Quality Integration](#).

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Features



The roof of the 12-story Chicago City Hall building has been retrofitted with a 22,000 square-foot rooftop garden to demonstrate that green rooftops can help reduce urban air temperature.

AIA selects top ten green buildings for 2007

Earlier this spring, the American Institute of Architects (AIA) named its top ten examples of sustainable architecture and green building design solutions for 2007. [The buildings are well worth a look.](#)

Selected buildings draw on a variety of energy-saving technologies, including daylighting, passive solar heating, natural ventilation, thermal chimneys, night ventilation, under-floor air distribution and green roofs. The selected buildings combine energy efficiency measures with innovative and attractive design.

Active systems for heating and cooling include a seawater cooling system, an evaporative cooling tower, a system exposed to the night sky for radiant cooling, a geothermal heat pump, and a radiant heating system powered by a solar thermal collector. Several of the buildings are powered by solar electric power systems.

The buildings range from a residential home to a large federal courthouse, although most are institutional buildings, including a library, two visitor centers, a middle school and a research center. The AIA's Top Ten Green Projects program is co-sponsored by DOE and the National Building Museum.

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Accelerating energy efficient building technologies

Over the years, DOE's Building Technologies Program has contributed a wide range of energy-saving technologies and construction practices that have been well integrated into the building industry. Program emphasis is now being shifted to even further accelerate movement of energy efficient technologies into the marketplace, maximizing energy savings for the nation.

Leaders of the Building Technologies Program have pulled together a new Technology Validation and Market Introduction (TVMI) team to focus on cross-cutting initiatives that encourage key end-use sectors to adopt new, proven, building technologies and practices. While official roll-out dates have yet to be established, the team is developing initiatives in the following areas:

- [K-12 schools](#)
- [Healthcare facilities](#)
- [Building codes](#)
- [Residential builders](#)
- [Pilot Building Technologies Application Centers](#)
- [Commercial lighting](#)

K-12 Schools

America's K-12 schools spend more than \$8 billion annually on energy, making energy the second-highest operating expenditure for schools, right after personnel costs. Recognizing this, DOE sponsors the EnergySmart Schools Program. Endorsed by the National School Boards Association, the program promotes building new schools that exceed energy code requirements by 50 percent or more. In addition, it promotes an energy efficiency improvement of up to 30 percent in existing schools.

This program will offer tools and resources to assist planning and financing energy-efficient high-performance schools, as well as education and training for building industry professionals.



Skylights bring sunlight into a second floor of this school building in Wassau, Wisc.

Smart energy choices can have lasting benefits for students, communities and the environment. An energy-efficient school district with 4,000 students can save as much as \$160,000 per year in energy costs. Those savings translate into the ability to hire more teachers, buy more computers or upgrade instructional materials.

Energy-smart schools offer many other benefits as well. Daylighting, for example, is used in energy-efficient schools to deliver natural lighting to classrooms and to reduce electricity usage. Many studies show a positive connection between the use of daylighting in classrooms as well as improvements in student performance and attendance.

Some school districts incorporate water conservation measures into their projects as well, furthering cost savings and environmental performance. Energy-smart schools offer healthier learning environments and also serve as “living laboratories” to teach school personnel, students and the broader community about energy efficiency.

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Health Care Facilities

Hospitals are among the nation’s most energy-intensive buildings due to their round-the-clock operations, indoor environmental requirements and high-tech equipment. In fact, they consume almost three times the energy of office buildings. Many factors create a compelling case for energy-smart construction and retrofitting of the nation’s hospitals.

On May 22, DOE convened a stakeholders’ meeting to begin shaping its health care facilities initiative. Participants included executives from several hospital systems, health care organizations and consulting firms, as well as representatives from DOE, the U.S. Department of Agriculture (USDA) and the Environmental Protection Agency (EPA).

Participants discussed the current status of energy-efficient hospital design, difficulties in making the “energy-smart” case to top hospital executives, as well as funding barriers and resources. DOE’s role in this initiative will range from convening stakeholders and helping to build partnerships to gathering data and best practices. Stay tuned for next steps.

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The city of Richland, Wash. targeted its own buildings for energy efficient retrofits, beginning with this library.

Building Codes

DOE understands the importance of “raising the bar” for building and equipment standards and codes to achieve improved energy efficiency, which in turn can lead to reduced energy costs, greater comfort, improved indoor air quality, and increased building marketability. EERE works closely with the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), state and local governments and the building industry to cooperate in the improvement of building energy efficiency.

One major effort in this direction is “The 30% Initiative.” Under this initiative, ASHRAE has committed to increasing its building energy efficiency standards for the year 2010 by 30 percent over the 2004 standards, or at a rate of 5 percent per year. This is more than double the historical rate of improvements in energy efficiency, and will require significant technical and financial investments to achieve success. DOE can support this effort by providing analytical assistance through the National Labs, as well as funding and technical assistance for development of standards, guidance documents and building performance metrics.

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Residential Buildings

Thirty-one percent of the homes we will live in 2030 have not yet been built. By adopting affordable and proven, energy efficient, building technologies, we can use this to our advantage as a nation to greatly reduce energy intensity in housing. Many home buyers are signaling their interest in purchasing highly energy efficient homes, and some willingness to pay a premium for high performance.

Many home buyers see investing in energy efficiency as a hedge against volatile energy prices—others see it as their contribution to a cleaner environment and lower greenhouse gas emissions. At the same time, many

builders point out that energy efficient homes do not necessarily have to cost more to build than conventional homes.

DOE's National Building America Challenge will engage home builders in a voluntary effort to significantly expand the market for high performance homes. The initiative will challenge participating builders to construct 100,000 new homes by 2009 that meet a high threshold for efficiency, while offering all the comfort, amenities and cost competitiveness that consumers demand.

Specifically, the challenge is for builders to construct homes that, based on the Home Energy Rating System (HERS), reach a threshold level of not more than 70 points -- or 30 points below a home built to current code level of 100 points.

Participating builders will agree to rate and label their high performance homes using this index, providing prospective buyers with the equivalent of a "miles per gallon" rating for comparing homes on the market.

Using the HERS index will provide a common measuring framework for efficiency, enabling consumers to clearly distinguish among the performance levels achieved by various "green" programs – including ENERGY STAR, LEED for Homes, Environments for Living and a host of other brands and labels.

Over time, as R&D continues to drive up the performance and lower the costs of efficient and renewable technologies, the target of 70 will be further lowered. Improvements will drive the index toward zero – which will represent the purchased energy cost in a net-zero-energy home of the future.

The initiative will also include competitions for designers, award and recognition components and consumer education campaigns to encourage more home buyers to value energy efficiency and to make informed decisions about home performance.

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Pilot Building Technologies Application Centers

As announced in the [May 2007 PMC Newsletter](#), a funding opportunity through NETL is open until July 3 for pilot Energy Efficient Building Technologies Application Centers. The goal is to accelerate the widespread market adoption of energy efficient building technologies and practices, including advanced building standards, codes and net-zero energy buildings.

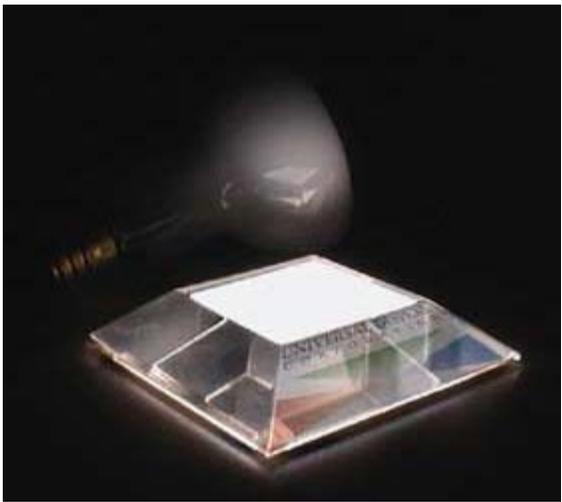
The new Application Centers will include nonprofit organizations, state and local governments, universities, regional energy efficiency partnerships and/or utilities representative of the multi-state region proposed. Each team must deliver information on technologies, processes and tools that meet DOE priorities and also align with the efficiency goals of the states, utilities and Energy Efficiency Partnership-based programs.

Approximately \$1 million is expected to be available for new awards in FY '07, with an additional \$3 million in FY '08 through FY '10. At least two geographically and climatically diverse pilot Applications Centers are expected to be established.

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Commercial Lighting

The Building Technologies Program has created a new Commercial Lighting Initiative that will spearhead a public campaign challenging commercial building owners to improve their building lighting efficiency by at least 30 percent. The initiative will be conducted over three years in three phases:



Solid state lighting offers a highly-efficient, bright, uniform white light source that is built to be ultra-thin, lightweight and inexpensive.
(courtesy Universal Display Corp.)

Develop Technical Guidelines: While there are numerous mandates, policies and financial messages encouraging building owners to gain more energy efficiency than code requires, there is a profound gap in “how to” guidance for end users who wish to achieve deep energy savings. After updating current advanced lighting guidelines, an iterative process of expert roundtables will distill the broad technical knowledge into integrated lighting systems “packages” for each of four major market sectors. Initially, the initiative will focus on retail and office buildings, schools and healthcare facilities.

Engage DOE Partners: To achieve the aggressive goals of the campaign, DOE will partner with key stakeholders in the lighting industry who can raise awareness and, ultimately, influence the decisions of lighting buyers in the commercial market. Building owners, contractors, architects, lighting designers, financial institutions, utilities, realtors, and states, municipalities and localities will all be engaged to adopt the lighting guidelines for construction or renovation of commercial buildings.

Provide an Information Resource: DOE will promote adoption of new lighting approaches and provide credible technical information on how to do it. Lighting guidelines will be deployed through program partners, including utility incentive programs, energy efficiency programs and state and local policy measures.

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Maine energy-savings program aids contractors, homeowners

The Governor’s Office of Energy Independence and Security (OEIS) in Maine has developed a pilot program for contractors to be a one-stop-shop for homeowners to improve the energy efficiency of their homes.

OEIS teamed up with Energy Star ® to launch the [Maine Home Performance Program \(MHP\)](#), started in the most populated three counties in Maine to provide homeowners access to certified contractors who not only can facilitate a state of the art home performance assessment, but also can make necessary recommended improvements and provide easy access to financing.

“A contractor can go into a home, conduct an energy savings assessment, educate the homeowner about the entire audit process, and, in some cases, offer them a loan over the kitchen table,” said Betsy Elder of OEIS. “Improvements can be made by one entity.”

According to OEIS, the home improvements will reduce energy bills, improve comfort, reduce maintenance costs and improve the health of buildings. It’s also projected they can lower energy bills up to 50 percent.



This traditional Maine home incorporates energy efficiency and solar panels while still fitting into local architectural style.

MHP benefits contractors by helping them become certified in building science and efficient technologies. With an expanded range of skills, the contractors receive leads for work and promotional support for their services. All this helps the state in meeting its goals of reducing residential energy use.

“The program recruits motivated contractors who want to make the investment and adopt this as a business model to add value to what they already do,” Elder said. “We’re excited about it, particularly because it is a moderately funded program. It’s also something that could be very replicable for other states to do that don’t receive a lot of funding.”

Any homeowner can request the services, and in some instances, some can qualify for a low interest loan depending on income threshold factors.

“This is a free market program that’s open to anyone who wants a performance assessment done in their home,” said Heather Rae of Performance Systems Development, which helps oversee the program.

Additionally, MHP has successfully been marketed with innovative outreach strategies, including a Home Performance Makeover Contest and a 30 minute Whole House television program which aired on the CW Portland, Maine network more than 145 times and reached 25,000 viewers.

The show excerpts featuring building science and ENERGY STAR ® messaging were used to create a DVD that can be handed out for educational purposes.

“The program has incredible momentum and is working because there is definitely a need for it,” Elder said. “We’re recruiting contractors, and at the same time, building awareness for efficiency improvements among consumers. Once the pilot program ends in three years, hopefully we’ll have an organization in place that can take over the program.”

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Solid state lighting leads the way to energy efficiency



Developing an energy efficient, white light Solid State Light is a DOE research priority

Lighting drains more than 20 percent of the electricity used in buildings today. DOE has set out to help reduce

this energy expenditure through its Solid-State Lighting (SSL) Initiatives.

By 2025, a national switch to solid state lighting could save enough energy each year to light an additional 20 million homes. Or, to put it another way, the U.S. could save about \$25 billion in annual energy costs by switching to solid state lighting.

The energy-saving potential of solid state lighting is huge. Breakthroughs in light emitting diode (LED) and organic light emitting diode (OLED) technologies have already moved SSL into applications such as automobile brake lights, traffic signals, exit signs and flashlights. Now we need to develop energy efficient, solid state, white-light sources to replace incandescent and fluorescent lamps in households and businesses.

Doing this will require a number of significant research and development (R&D) breakthroughs. DOE has taken up this challenge by funding selected R&D projects to improve energy efficiency of SSL technology and to then help speed these new technologies into the marketplace.

Currently, DOE has funded about \$80 million in SSL Core Technology Research and Product Development projects active in FY07. In May, the Department announced [another round of SSL funding opportunities](#), fourth in a series expected to span a decade.

DOE continues to work closely with the solid state lighting industry, energy efficiency organizations, utilities and standards organizations to help guide the market introduction of these new lighting products.

Earlier this year, the Department co-hosted a workshop with Southern California Edison to explore ways federal, state and private sector organizations can work together to shape markets for solid state lighting products. In July, the Northeast Energy Efficiency Partnerships (NEEP) and DOE will co-host a similar [SSL workshop in Boston](#).

Final Energy Star criteria for SSL products should be issued soon, with an effective implementation date of March, 2008, contingent on standards and test procedure finalization.

DOE will also initiate the SSL Technical Information Network this summer, designed to increase awareness of SSL technology, performance and appropriate applications.

For more details about SSL funding opportunities, press releases, and what's coming next, see the [National Energy Technologies Laboratory \(NETL\) solid state lighting Web site](#).

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National Labs offer variety of building assistance

DOE's national laboratories are well versed in extensive scientific and technical R&D expertise for new building technologies and improved building practices. While each lab has its priorities, all test, measure, analyze and qualify advanced technologies and products, leading to energy use standards and ratings for buildings and building components.

OAK RIDGE NATIONAL LABORATORY: ORNL's Building Technology Center (BTC) is the premier U.S. research facility devoted to developing technologies that improve the energy efficiency and environmental compatibility of residential and commercial buildings. Research efforts focus on field research and design, testing of cooling, heating and power systems, thermal engineering, envelope systems and materials and building design and performance and sustainable development approaches.

NATIONAL RENEWABLE ENERGY LABORATORY: NREL focuses on advanced materials research in switchable window technologies, research in building heat transfer, thermodynamics and systems engineering, and facilitation of strategic planning with stakeholders. Major priorities are improvements in residential and commercial buildings, in building equipment and components, building energy analysis tools, manufacturing and in lighting and appliance standards.

LAWRENCE BERKELEY NATIONAL LABORATORY: LBNL focuses on windows, day lighting, advanced lighting systems and indoor air quality. During research stages, the lab develops improvements in windows, lighting and glazing technologies that save energy and improve visual and thermal comfort of building occupants.

PACIFIC NORTHWEST NATIONAL LABORATORY:

PNNL research focuses in areas of automated building diagnostics and control, energy codes and standards, market transformation and energy program design and implementation. The lab helps devise improved national model energy codes and works with government agencies, state and local jurisdictions, national code

organizations and industry to promote stronger building codes and help states adopt, implement and enforce those codes.

BROOKHAVEN NATIONAL LABORATORY: BNL performs basic research and technology transfer related to combustion space heating and thermal distribution systems in residential and small commercial buildings.

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Connecticut energy training program builds expertise

Although Connecticut has long had a building operator certification training program to help reduce energy costs, the annual energy bill for state facilities has persisted at about \$100 million per year.

The Connecticut Office of Policy and Management's Energy Unit (OPM) struggled to improve the certification training program's results because funds were limited, the costs to attend were high and attendance was low.

"Our goal was to offer training to state employees, hoping to reduce energy costs in hundreds of facilities – a goal recommended in the Connecticut Climate Change Action Plan," said John Ruckes of OPM. "We knew it made sense, but paying for it was difficult."

With the help of an EERE grant, OPM started an invigorated, eight-day certification course this year by partnering with the Connecticut Conference of Municipalities (CCM) and the Connecticut Business and Industries Association (CBIA). The goal is to expand interest beyond attracting just state employees.

Each organization also made the training possible with no extra costs by providing facilities, equipment and ways to market the program.

"We made the training free," Ruckes said, "In exchange, OPM, CCM and CBIA each require attendees to commit to attending all eight course classes. An equally important commitment is that the highest level person in the attendee's organization must also sign off on that commitment."

The training administered by the [Northeast Energy Efficiency Partnership \(NEEP\)](#) focuses on several areas of improving energy use in buildings, including indoor air quality, HVAC, lighting, electrical, motion sensors, window upgrades and several other energy efficient techniques.

The first two courses (one for state facility managers and the other for municipal facility managers) are filled to capacity of 30 participants and will be completed this month. A third course for small commercial facility managers is scheduled for completion in August. More are planned in 2008.

A 2005 evaluation by NEEP found for each person certified as a building operator subsequently saved 0.35 kilowatt hours of electricity per square foot, 0.4 MBtus of oil per square foot, 0.34 MBtus of natural gas per square foot and 0.14 gallons of water per square foot. Based on the evaluation, OPM is collecting the square footage of buildings from students in order to calculate a reasonable estimate of energy and water savings.

"Primary focus is on state facilities from an operation and maintenance standard," Ruckes said. "This kind of training really provides building facility managers across the state with expertise to make improvements on their end, helping save significant amounts of energy in buildings."



SSL saves energy.

