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### + Benchmarking

#### **Energy Benchmarking: Does Your School Get a Passing Grade?**

2006-01-25

One of the best ways to determine whether a school is using energy efficiently is to compare its performance to that of similar buildings—a process known as benchmarking. However, school districts rarely have the time, the data, or the expertise to do that kind of analysis. Analyzing energy ...

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### + Building codes & certification

#### **Achieving Zero-Net Energy Affordable Multifamily Homes**

2011-07-21

Developing affordable zero-net energy (ZNE) multifamily housing requires unique technical and financing models. Two San Diego developers have demonstrated the success of such development models in supporting California's bold ZNE goals.

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#### **Developing Energy-Efficient Communities**

2011-07-21

The potential exists to make new communities far more efficient than current codes require. This brief describes research that helped to quantify that potential and explored the technologies, strategies, and policies that would make it real.

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### **Residential Roofs: Cool Colors, Cool Gaps**

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Cool roofs cut cooling loads by up to 20 percent through the use of reflective materials that limit solar heat gain. A conventional cool roof features light-colored surfaces, but homeowners have not adopted the cool-roof approach because they typically prefer the aesthetics of darker colors.

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### **Residential Commissioning Guide Brings Home Comfort and Savings**

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Houses are complex systems of interacting components that don't always perform properly. Even when built or retrofitted using formal design procedures, houses often fail to meet health, safety, comfort, and energy-use expectations. A major reason for this generally poor performance is the lack of ...

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### **Design Guide: Big Savings on Small HVAC Systems**

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### **Underfloor Air: Better Models, Better Performance**

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### **Estimating Energy Use Early and Often**

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This Brief describes Green Building Studio, a web-based service that enables building design teams to integrate whole-building energy analysis into the early stages of the design process.

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### **SpeciFlow: A Fresh Approach to Measuring Outdoor Airflow**

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### **Commercial Buildings Breathe Right with Demand-Controlled Ventilation**

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Demand-controlled ventilation (DCV) systems save energy by using building occupancy indicators that usually measure CO2 levels to regulate the amount of outside air that is drawn in for ventilation. But DCV systems are not widely used, because their cost-effectiveness has not been clearly defined, ...

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## + C&I equipment

### **Thermally Driven Heat Pump Runs Hot, Cold for Food, Beverage Industries**

2007-11-01

The food and beverage industry uses a great deal of energy, costing plants in the U.S. an average of \$643,000 per year, mostly for heating and cooling. These plants typically use gas-fired water heaters or boilers to produce hot water and electrically driven mechanical refrigeration systems for cooling. ...

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## + Commissioning

### **Savings Persist with Monitoring-Based Commissioning**

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Monitoring-based commissioning (MBCx) is a program approach that combines permanent building-energy-system monitoring with standard retrocommissioning practices to provide substantial, persistent energy savings. It's based on the ability of permanent monitoring systems to increase the effectiveness ...

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### **Collaborating on Commissioning**

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The practices of commissioning new buildings and retrocommissioning existing facilities offer the potential to significantly reduce energy use and improve the building environment. However, commissioning is not widely practiced because building owners have had no sources that explain the benefits ...

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A study examined 40 single-family and 40 multifamily units (apartments and townhouses) that were built under the 2005 Building Energy Efficiency Standards for Residential Buildings. Data showed that the homes often didn't perform up to code.

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### **+ Design**

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#### **DC Power Distribution Cuts Data Center Energy Use**

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The Lawrence Berkeley National Laboratory led a demonstration project that showed that alternative, direct-current (DC)-based power distribution systems can reduce the total system energy use in a data center by 5 to 7 percent compared to the most efficient alternating current (AC) systems and by ...

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### **Large VAVs, Low Loads, and High Performance**

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Many large commercial buildings use variable air volume (VAV) systems to deliver the proper amount of chilled air throughout a building. VAV systems can be very efficient at full load, but large buildings typically spend most of their time operating at part load. At part load, VAV systems often operate ...

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Kitchen ventilation systems represent one of the largest uses of energy in a commercial food service facility, accounting for up to 75 percent of the HVAC load. This load itself accounts for about 30 percent of a restaurant's total energy consumption. Yet many kitchen ventilation systems are poorly ...

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### **Advanced LED Downlighting System**

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Newly designed downlights use light-emitting diodes to their full potential while maintaining the features and functionality that have made them popular.

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### **Variable Speed Comes to the (Kitchen) 'Hood**

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A new technology that reduces ventilation rates during slow periods makes it possible for restaurants and institutions to significantly reduce the amount of wasted energy. Lower fan speeds also means less noise. The concept calls for control of kitchen ventilation-fan speed based on the amount of ...

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Automated demand-response (AutoDR) systems use Internet-based electricity pricing and demand-response signals to initiate preprogrammed control strategies that provide fully automated management of building energy use. When electricity prices are high or when the grid is nearing full capacity, these ...

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## TDV Improves Efficiency and Classroom Environment

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Thermal displacement ventilation (TDV) addresses problems with classroom ventilation by delivering cool air directly to the occupants of a space. The fresh air is supplied near the floor at a very low velocity, where it falls toward the floor and spreads across the room. As the air picks up heat from ...

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## The Next Stage in Evaporative Cooling

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Evaporative coolers in residential applications save energy compared with conventional vapor-compression air conditioners. The OASys cooler addresses some of the technology's problems by using both direct and indirect evaporative cooling.

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## Relocatable Classrooms: Less Energy, Better Air

2007-11-01

Researchers at the Lawrence Berkeley National Laboratory developed specifications for an improved heat pump air-conditioning system that provides a SEER performance of 13 and eliminates the noise and ventilation problems associated with the SEER 10 systems that are currently used in relocatable classrooms. ...

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## NightBreeze Cuts Peak Demand, Keeps Residents Cool

2007-04-30

New home construction in California adds significantly to peak loads, in part because it's common practice to install conventional air conditioning in new homes, even in mild climates. This Tech Brief describes how the NightBreeze system, which integrates heating, ventilation, cooling, and air conditioning, ...

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### **Duct Leakage: If You Can Measure It, You Can Cut It**

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The ductwork that distributes conditioned air throughout many large commercial buildings is often leaky, letting air out through cracks and gaps and increasing the energy consumption of supply- and return-air fans. Efforts to address this problem have been hampered by the lack of an accurate way to ...

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### **Radiant Heating and Cooling Made Easy and Inexpensive**

2005-09-22

Conventional hydronic radiant floor (HRF) heating systems offer significant comfort and efficiency benefits to homeowners, but they carry high installation and component costs. Also, homes with HRF heating usually require a forced-air system at an additional cost. Combine these issues with homebuilder ...

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## The Next Stage in Evaporative Cooling

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Evaporative coolers in residential applications save energy compared with conventional vapor-compression air conditioners. However, traditional evaporative units must move large quantities of air to achieve adequate cooling. Moving all that air generates a lot of noise and leads to the need to directly ...

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## Automatic Diagnosis for Ailing Rooftop Air Conditioners

2005-07-29

The rooftop air conditioners used extensively for small commercial and institutional buildings are often poorly maintained. Faults that are introduced during installation or that develop over time can go undetected for long periods, resulting in high energy costs, shortened equipment life, catastrophic ...

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## Guide Aids Commissioning of Air Handling Systems

2005-05-25

Air handlers, which move conditioned air throughout a building to keep occupants comfortable, often don't work as designed. Building operators, faced with the challenge of keeping these systems running well, and providers of commissioning services, charged with verifying system performance, have ...

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### **Wireless Lighting Controls Make Retrofits Practical**

2008-10-01

An innovative wireless lighting control, monitoring, and management system developed by Adura Technologies is easy to install, cost-effective, and can provide significant energy savings. It eliminates the costly and time-consuming installation of control wiring and can be easily installed by facilities ...

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### **Task/Ambient Lighting: Efficient, Stylish, and Portable**

2008-10-01

A desk lamp has been developed to provide individually controllable uplighting and downlighting. The designs incorporate improved optics and features that will enable low-cost manufacturing. The California Lighting Technology Center worked with Full Spectrum Solutions to develop the products. Full ...

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### **LED Hybrid Porch Light Cuts Energy, Maintenance Costs**

2008-09-01

A hybrid fixture featuring light-emitting diodes (LEDs) and either an incandescent lamp or a compact fluorescent lamp (CFL), and integrated with an occupancy sensor, addresses both energy and security concerns. The design features a low-wattage, high-brightness LED that runs continuously during the ...

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### **Daylight Harvesting Made Simple**

2008-08-01

Researchers at the California Lighting Technology Center (CLTC) at the University of California at Davis developed a new approach to daylighting called the Simplified Daylight Harvesting system (SDH) that is easy to install and provides automatic and continuous calibration. The system uses photosensor ...

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### **Integrated Classroom Lighting System: Light's Great, Less Billing**

2008-05-01

Typical classroom lighting is expensive to operate and does not meet the functional needs of teachers or students. The modern classroom requires a range of lighting scenarios, from full lighting for traditional teaching to various levels of dimming and light distribution for audiovisual presentations ...

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### **Integrated Office Lighting Systems: Making It Personal**

2007-11-07

A two-pronged system known as an “integrated office lighting system” (IOLS) has been developed for better workplace lighting. It combines lower levels of ambient overhead lighting with an efficient personal lighting system. The lower overhead lighting levels—achieved in retrofit applications ...

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### **High Hopes for Low-Glare Outdoor Luminaire**

2006-03-15

Wall-pack luminaires with high-pressure sodium (HPS) lamps are commonly used to provide outdoor illumination for all types of buildings and many parking lots, yet they are among the least-efficient fixtures made and provide poor glare control. The standard design approach makes a trade-off between ...

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### **Bathroom Lights Save Energy and Boost Safety**

2006-03-13

Lights in the bathrooms of hotels, senior living centers, and nursing homes are frequently left on for extended periods—either due to forgetfulness or deliberately so that they can serve as night-lights. The night-light function is especially critical in senior housing, where tripping and falling ...

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### **Up with CFL Downlights**

2005-04-18

The use of downlights in the residential market is increasing, yet energy-efficient compact fluorescent lamp (CFL) downlights have not been widely accepted or adopted by residential builders and homeowners. That’s because residential CFL downlights are costly, difficult to install, and not widely ...

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### **Hybrid Fixture Lights up the Night**

2005-04-18

Many exterior entry and walkway lights in residential and commercial locations use incandescent lamps, because they are small and inexpensive. However, these lights tend to burn all night long, and their inefficiency leads to high energy use. The lights also burn out quickly, which compromises security ...

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An innovative wireless lighting control, monitoring, and management system developed by Adura Technologies is easy to install, cost-effective, and can provide significant energy savings. It eliminates the costly and time-consuming installation of control wiring and can be easily installed by facilities ...

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## + Load management

### **Lighting the Way to Demand Response**

2011-04-21

Commercially available advanced lighting-control systems can be used today in demand-response programs. This Tech Brief examines the cost, the potential savings, and the best way to implement these systems.

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### **Automated Demand Response Cuts Commercial Building Energy Use and Peak Demand**

2008-12-03

Automated demand-response (AutoDR) systems use Internet-based electricity pricing and demand-response signals to initiate preprogrammed control strategies that provide fully automated management of building energy use. When electricity prices are high or when the grid is nearing full capacity, these ...

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## Wireless Lighting Controls Make Retrofits Practical

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### + Operations & maintenance

## Builder's Guide: Reducing Mold Risk

2008-11-30

To better understand the problem of mold occurrence, the California Energy Commission sponsored an investigation, led by the Gas Technology Institute, into the causes of moisture intrusion. This research consisted of laboratory and field studies of structures that are designed to keep building materials ...

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### + Plug loads

## Energy Use of Household Electronics

[Taming the Wild Growth](#)

2008-08-01

On behalf of the California Energy Commission, researchers from Ecos Consulting, EPRI Solutions, and RLW Analytics have performed field measurements to document the use patterns, energy consumption, and load profiles for electronic devices in homes. This study, which included 50 California homes, ...

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## Electronic Products

[Making Battery Chargers More Efficient](#)

2008-08-01

Ecos Consulting and EPRI Solutions (the Electric Power Research Institute) formed a team of researchers to come up with candidate efficiency standards for battery chargers. The first step was to create an efficiency-testing procedure that all stakeholders can agree on. The project team consulted extensively ...

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## What Lies Within

[Improving the Efficiency of Internal Power Supplies](#)

2008-08-01

Researchers from Ecos Consulting and the Electric Power Research Institute (EPRI) worked with industry leaders and other stakeholders to develop test procedures and measure the efficiency of a sampling of internal power supplies used in today's electronic products. The researchers also presented their ...

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## Electronic Products: Making Power Supplies More Efficient

2006-03-13

Most office equipment and consumer electronic devices use external power supplies to convert high-voltage alternating current into the low-voltage direct current that they need to operate. The majority of these power supplies are far less efficient than they could be—their efficiency is on the ...

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## + Power quality & reliability

### DC Power Distribution Cuts Data Center Energy Use

2008-11-01

The Lawrence Berkeley National Laboratory led a demonstration project that showed that alternative, direct-current (DC)-based power distribution systems can reduce the total system energy use in a data center by 5 to 7 percent compared to the most efficient alternating current (AC) systems and by ...

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### Uninterruptible Power Supplies

[A Data Center Efficiency Opportunity](#)

2008-08-01

A detailed study characterized the efficiencies of various types of uninterruptible power supplies (UPSs) for data centers under a variety of operating conditions, proposed an efficiency label for UPSs, and estimated the current energy use of the existing stock of UPSs and the potential savings if ...

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## + Solar

### Achieving Zero-Net Energy Affordable Multifamily Homes

2011-07-21

Developing affordable zero-net energy (ZNE) multifamily housing requires unique technical and financing models. Two San Diego developers have demonstrated the success of such development models in supporting California's bold ZNE goals.

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## + Technology standards & labeling

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## + Water

### **Thermally Driven Heat Pump Runs Hot, Cold for Food, Beverage Industries**

2007-11-01

The food and beverage industry uses a great deal of energy, costing plants in the U.S. an average of \$643,000 per year, mostly for heating and cooling. These plants typically use gas-fired water heaters or boilers to produce hot water and electrically driven mechanical refrigeration systems for cooling. ...

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