



# SPEED TECHNOLOGIES

*Part of California's commitment to a clean energy future*



The State Partnership for Energy Efficient Demonstrations (SPEED) program drives the market adoption of energy efficient technologies. Managed through the California Institute for Energy and Environment (CIEE), SPEED has conducted more than 100 demonstrations and other technology-transfer projects across the state, showcasing the benefits of best practices and state-of-the-art solutions.

The innovations developed through the SPEED program are commercially available through a number of manufacturers. Many of these strategies will be required under California's 2013 Title 24 Energy Efficiency Standards. Details, including case studies and product information, are available at the SPEED website.

» For more information, visit [partnershipdemonstrations.org](http://partnershipdemonstrations.org)

## CUMULATIVE ANNUAL TARGETS IN CALIFORNIA

**100 million**  
kWh of electricity

**\$20 million**  
cost savings

**7 million**  
thm of natural gas

**100,000 tons**  
CO<sub>2</sub>e reduction



## LIGHTING TECHNOLOGIES

### INSTITUTIONAL-LEVEL ADAPTIVE CONTROL SYSTEM FOR EXTERIOR LIGHTING

*Intelligent lighting with centralized, wireless control*

The system uses a radio frequency (RF) network and fixture-integrated, networked sensors to accurately determine an occupant's path of travel and adjust light output in response. The system maximizes energy savings and safety while allowing facility staff to monitor, manage and maintain a variety of fixtures (streetlights, wall packs, post-top, and parking area fixtures) via one smart system. Savings on the UC Davis campus total more than 1 million kWh annually, including source retrofits to LED.



### INTEGRATED OFFICE LIGHTING SYSTEM (IOLS)

*More attractive, ergonomic office lighting at a lower lighting power density*

By combining high-quality, energy-efficient LED task lighting with reduced ambient lighting, the IOLS provides more comfortable office lighting at a lower lighting power density (LPD)—as low as 0.6 W/ft<sup>2</sup>. The task light component, called the Personal Lighting System (PLS), offers a suite of low-wattage luminaires to meet individual needs. The IOLS can be combined with other lighting control strategies, such as occupancy sensors, to further maximize energy savings.



### ADAPTIVE CORRIDOR LIGHTING

*Optimized efficiency in transitional spaces*

Adaptive corridor lighting systems tailor lighting to occupants' actual needs, reducing lighting energy use by up to 76%. Systems make use of occupancy sensors, dimmable ballasts, and various control platforms, which allow anything from zonal high/low switching to granular network control. The result is a smart lighting solution that eliminates waste in areas characterized by low occupancy rates.



### ADAPTIVE STAIRWELL LUMINAIRE

*Safe, energy-efficient lighting for low-occupancy areas*

This bi-level luminaire was designed for stairwells, corridors, storage areas, bathrooms, and other secondary spaces characterized by low occupancy rates. It maintains a low light level when the space is unoccupied and quickly switches to full light output when sensors detect occupants. Energy savings of 40–90% can be expected in typical applications. This solution is available with either LED or fluorescent sources, minimizing maintenance costs as well.



### ADAPTIVE LED POST TOP LUMINAIRE

*Deep energy savings and better visibility with easy installation*

Long-life LED light sources consume about half as much energy as HPS lamps, the traditional source for post tops, and they deliver broad-spectrum white light. When paired with adaptive controls, a mounting collar with 360-degree occupancy sensor coverage enables post tops to deliver bi-level lighting (50% power when spaces are vacant and 100% when occupied). This adaptive feature typically yields energy savings of about 70%. These luminaires can also be incorporated into a networked control system for greater controllability and energy savings. Whole-head replacement or retrofit options both allow for relatively easy installation.



### **ADAPTIVE EXTERIOR WALL PACKS**

*Energy savings through occupancy sensing*

These “smart” wall packs automatically reduce light output when areas are vacant and provide full light output for wayfinding and perimeter illumination when needed. Energy savings range from 40–89%. These luminaires can also be incorporated into a networked control system for greater controllability and energy savings.

### **ADAPTIVE STREET AND PARKING AREA LUMINAIRES**

*High-wattage energy savings and improved light quality*

Long-life induction or LED luminaires with integrated controls dim to low light levels during unoccupied periods and deliver full output when sensors register automotive or pedestrian traffic. Energy savings average 30–75%. A networked control system can enable even greater controllability and energy savings for this group of products.

### **ADAPTIVE PARKING GARAGE LUMINAIRES**

*Energy savings during low-occupancy nighttime hours*

Advanced LED, fluorescent and induction products deliver high-quality light and feature glare-free optics. Occupancy-based dimming controls cut energy waste during vacant periods and restore full light output for occupants. Adaptive garage luminaires reduce lighting energy use 40–70% compared to typical HID sources without controls.

### **INTEGRATED CLASSROOM LIGHTING SYSTEM (ICLS)**

*Energy savings with improved light quality and controllability*

The ICLS allows instructors to dynamically adjust light levels for different classroom activities, including multimedia lessons. A complete system, the ICLS simplifies the procurement and warranty process for schools trying to meet high efficiency standards. It features a unique combination of direct-indirect pendant or recessed fixtures (fluorescent or LED), occupancy and daylight sensors, and plug-and-play controls and provides 30–50% energy savings.

## **HVAC TECHNOLOGIES**

### **WIRELESS CONTROLS FOR DATA CENTER HVAC SYSTEM RETROFITS**

*Cost-effective automation of data center air conditioning systems*

Data centers have complex air conditioning requirements. Intelligent control requires monitoring temperature at many points and using sophisticated algorithms to optimize cooling. Wireless mesh networking technology makes retrofitting data centers affordable and practical. Total data center energy use can be reduced up to 20% (cooling energy use is typically reduced 15% and fan energy use by 60%). Vigilent’s Datacenter Automation Software and Hardware (DASH™) follows this strategy.

### **DEMAND CONTROL KITCHEN VENTILATION**

*Improved energy efficiency for HVAC in commercial kitchens*

Exhaust hood controls use sensors and a microprocessor to decrease kitchen hood air flow when little or no cooking is occurring. The controller then restores full fan speed when heat or smoke is detected in the hood. Typically, fan energy use is reduced by 60% and energy use for heating and cooling make-up air is reduced by 25%.



## WIRELESS CONTROLS FOR BUILDING HVAC SYSTEM RETROFITS

*Improved energy efficiency at a lower retrofit cost*

Applications include conversion of constant volume (CV) systems to variable air volume (VAV) or application of more sophisticated control schemes to existing VAV systems. Technology developed by Vigilent has been demonstrated as the Discharge Air Regulation Technique (DART™) and SAV with InCITE™.

## AUTOMATED FAULT DETECTION AND DIAGNOSTICS (AFDD) FOR ROOFTOP HVAC UNITS

*Preventing energy waste with automatic early fault detection*

AFDD provides continuous monitoring and diagnostics for rooftop units and issues alerts before major repairs are needed. Tests reveal that early fault detection can achieve annualized energy use savings of up to 66%. AFDD is now a mandatory measure for rooftop unitary and variable refrigerant flow (VRF) systems, under California's Title 24 Energy Efficiency Standards.

## RTU EFFICIENCY MEASURES

*Using fan controls and integrated economizers to save energy*

Rooftop units (RTUs) have become ubiquitous in modern construction because they are modular, relatively inexpensive, and easy to integrate into modern building designs. The most advanced RTUs include variable speed demand control ventilation, advanced economizer controls, and fault detection diagnostics. Advanced controls such as these will now be required on RTUs with capacities greater than 6 tons. New units can be purchased that conform to 2013 Title 24 Energy Efficiency Standards, or aftermarket RTU efficiency controllers can be retrofit onto existing units.

## VAV FOR LABORATORY AREAS

*Intelligent airflow control that improves efficiency without compromising safety*

In laboratories, the fresh air supply to ventilated spaces is especially critical for occupant safety. Older systems have relied on constant volume, 100% fresh air ventilation systems. California's 2013 Title 24 Energy Efficiency Standards require a more precise approach. Laboratories that require less than 10 ACH of ventilation must be able to adjust zone exhaust to maintain the minimum required ventilation.

## DEMAND CONTROL VENTILATION FOR ENCLOSED PARKING GARAGES

*An intelligent approach to ventilation that delivers deep energy savings*

Parking garages can have highly variable usage. Peaks often coincide with scheduled events or the beginning and end of workdays. Demand control ventilation pairs variable-speed exhaust fans with sensors that detect automobile pollutants, enabling exhaust fans to operate when they are needed and conserve energy at other times, reducing energy use by 80% – 90%. The use of demand control ventilation for enclosed parking garages with design ventilation over 10,000 CFM is now mandatory under California's 2013 Title 24 Energy Efficiency Standards.



Any questions about this project, including technology costs, can be directed to:

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