FACT SHEET

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Bundle-Based Energy Efficiency Technology Solutions (BEETS) for California

Demonstrating pre-commercial technologies in commercial buildings and those with laboratories or critical environments utilizing innovative technology bundles at SCAQMD's headquarters facility in Diamond Bar, California.

THE ISSUE: California Senate Bill (SB) 350 established an **aggressive goal of doubling the energy efficiency of existing buildings while reducing the greenhouse gas (GHG) emissions of refrigerants by 2030[1].** An estimated 50% of the state's existing buildings were built before California's Building Energy Efficiency Standards went into effect in 1978[2] and 37% of the state's electricity is consumed by commercial facilities[3]. These older buildings have antiquated, inefficient, energy-related infrastructure, including central plants, heating, ventilation, and air conditioning (HVAC) systems, lighting, and building controls. New and developing technologies can replace the aging infrastructure and improve energy efficiency with increased reliability and more climate-friendly products. However, the following market barriers often inhibit adoption: stakeholders' lack of knowledge and unfamiliarity with new technologies and associated benefits, fear of early adoption due to concerns of availability of replacement parts and/or technical support, and the high cost of emerging technologies due to the lack of economies of scale.

PROJECT INNOVATION + ADVANTAGES: This project will demonstrate **three innovative bundles of pre-commercial technologies** in commercial buildings and further offer solutions for buildings with critical environments such as laboratories or hospitals. The SCAQMD headquarters facility in Diamond Bar, California will be the demonstration site for this project. Demonstration projects are often focused on a singular building function (e.g. office space); however, laboratories in the United States on average use more energy per square foot than office buildings and other facilities because functional activities are energy-intensive due to more stringent[4] ventilation and health and safety requirements. The technology bundles include:

Chilled Water Plants – Optimized all-variable-speed chilled-water plants utilizing alternative refrigerant chillers. ***Benefits:*** Eliminates ozone depleting potential and reduces global warming impacts 300+ times[5]; reduces electricity and associated costs by 15%[6]; improves facility managers' abilities to optimally control equipment; and reporting compound usage and recovery of refrigerant will not be required under U.S. EPA and air district regulations.

Office and Exterior Space – LED fixtures with integrated advanced controls, advanced building management system (BMS) to optimize and integrate all HVAC zones, integrate wirelessly with plug-load controls and provide a comprehensive platform capable of demand response (DR), and off-grid exterior parking lot LED lighting. ***Benefits:*** Improves occupant comfort and control; enhances safety from the improved exterior lighting; improves reliability; and reduces electricity and associated costs by 10%[6].

Laboratory and Critical Environments – Advanced laboratory ventilation and fume hood exhaust and direct current lighting systems. ***Benefits:*** Improving resiliency and reliability while maintaining safety compliance, and reduces electricity and associated costs by 6%[6].

[1] *Short Lived Climate Pollutant Plan Strategy https://www.arb.ca.gov/cc/shortlived/shortlived.htm*

[2] *California Energy Commission, 2011 IEPR, document CEC-100-2011-001-CMF, page 63.*

[3] *California Energy Commission, Integrated Energy Policy Report, 2008.*

[4] *https://energy.gov/eere/femp/energy-efficiency-laboratories*

[5] *Versus R-134a refrigerant; could be higher if existing chiller is using a stratospheric ozone depletion compound as R-12 or R-22*

[6] *Compared to SCAQMD's baseline usage*

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Demonstrating the pre-commercial technologies through a bundled approach easily allows the project to be replicated and scaled to a variety of building types (e.g. large and small offices, hospitals, hotels, schools, universities, and office buildings). A detailed public-facing Roadmap will be developed to provide a step-by-step guide for bundle selection and implementation, as well as lessons learned and recommendations for future adopters. With increased adoption rates of these bundles, California will be able to accelerate energy efficiency and GHG emission reductions toward meeting its goals. Replication and adoption of the technologies throughout California will deliver more than 136,000 megawatt hours (MWh) annually in savings and avoided GHG emissions of more than 44,900 metric tons of CO_2.

Amount: $6,376,481

Co-funded Amount: $2,382,225

Project Location(s): Diamond Bar, CA

Project Term: October 2017 - March 2021

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The demonstration site for this project is ideal because SCAQMD is a public agency with proven leadership in GHG reductions and new technology adoption. Numerous meetings are held each month at the campus, allowing interested parties to tour the facility and learn about the demonstration project, increasing awareness and potential adoption.

ANTICIPATED BENEFITS FOR CALIFORNIA

The demonstration project offers an innovative approach in that at least one of the three pre-commercial technology bundles are adaptable to virtually any commercial building. This strategy will accelerate adoption and therefore contribute to reaching the state's energy efficiency and GHG reduction goals cost-effectively.

Lower Costs

Energy savings achieved through implementation of the technologies will generate cost savings for building owners and operators. Further, future adopters will benefit from lower costs associated with economies of scale as production of the technologies increases.

Improved Reliability

Market adoption of the proposed bundles will reduce California's dependency on (and need for additional) peaker power plants. This also will contribute to prevention of environmental incidents (such as the major Aliso Canyon leak in 2015) which have the potential to significantly interrupt electric grid distribution and operations.

Economic Development

Large-scale adoption of these technologies will promote industry growth through increased manufacturing and construction, spurring new growth and leading to further investment in research and development of additional new technologies.

Environmental Benefits

In addition to GHG emission (CO_2) reductions associated with the energy savings of the project, the project includes chillers that utilize low global warming potential (GWP) "alternative refrigerant" that have no stratospheric ozone depletion compound and therefore have unprecedented ozone depletion qualities. This aligns with the recent amendment to the Montreal Protocol (Kigali Agreement) to phase out high GWP refrigerants[7], and the state's target to reduce short lived climate pollutants, and helps set the path toward the 2030 GHG emission targets, set under SB32[8].

[7] *http://www.cnn.com/2016/10/15/africa/montreal-climate-change-hfc-kigali, http://www.energy.ca.gov/sb350*
[8] *https://www.arb.ca.gov/cc/shortlived/shortlived.htm*