LAUSD: Heat Pump Rooftop Unit

Los Angeles Unified School District (LAUSD) is one of the largest districts in the nation with a portfolio of 13,500 buildings and 81 million square feet distributed across 6,387 acres of land in Southern California.

LAUSD's portfolio-wide climate commitments include reducing energy and water usage 20% by 2024 and greenhouse gas (GHG) emissions by 50% over the next 10 years, with a 2040 goal of 100% clean energy and elimination of all fossil fuels.

To achieve the energy and GHG emissions reduction goals, LAUSD utilizes electric heat pump rooftop and wall-hung units, and other heat pump technologies, as the primary option for space heating and cooling systems for its school and administrative facilities.

IMPACTS OF HEAT PUMP ROOFTOP UPGRADES	
▶ **Organization Name, Location**	Los Angeles Unified School District (LAUSD), Los Angeles California
▶ **Building Type, Number, Size**	School Buildings, 13,500 buildings, total of 70 million square feet of building space
▶ **Project Description**	LAUSD has replaced 65% of their decentralized HVAC units with electric heat pumps, with plans to achieve 100% by 2040 (year)
▶ **Emissions Savings**	LAUSD plans to reduce GHG emissions by 50% in 10 years (compared to a 2014 baseline).
▶ **Energy Performance and Savings**	LAUSD plans to reduce energy intensity by 20% compared to a 2014 baseline
▶ **Financial, Comfort, Maintenance, and Other Benefits**	The benefits of heat pumps include low noise, fully electric heating and cooling, and ease of maintenance

Project Overview

To meet its decarbonization goals LAUSD has been transitioning to unitary heat pumps for space heating of buildings with a capacity of 3-10 tons with plans to expand to larger spaces as larger heat pumps become commercially available. There were many considerations that lead LAUSD to pursue heat pumps.

1. Even in warmer climates, space heating is a significant load, especially during morning warm up periods before the school day starts. LAUSD determined that heating electrification, along with their renewable electricity procurement commitments, would help them reach their goals.
2. LAUSD examined different heat pump system designs to accommodate the unique spaces of their buildings and local climates, with rooftop and wall-hung heat pumps being the most common configuration. Through their analysis it was determined that small-to-medium gas-DX units of 5-10 tons could readily switch to unitary heat pumps today, whereas larger units serving large, high-volume open areas (gym, auditoriums) may transition in the future.
3. The team found there is sufficient electrical capacity for the heat pump transitions, but a more comprehensive approach will be needed for full electrification in future years with kitchen, water heating, EVs, and other loads going all-electric.

COMMERCIAL BUILDING HEAT PUMP CAMPAIGN

The Commercial Building Heat Pump Campaign aims to help small-to-medium commercial building owners and operators reduce greenhouse gas emissions and operating costs by increasing the adoption of both existing and emerging heat pump technologies.

Demonstrating Performance

Since beginning the switch to heat pumps LAUSD decreased their emissions while maintaining performance.

Performance
The electric unitary heat pumps have performed comparatively to the gas pack units.

Emissions Savings
The new electric units **reduced heating system emissions by 33% on average** compared to the existing heaters on a normalized basis over the monitoring period.

Utility Savings
Since the beginning of the project, LAUSD has saved **$139,196** per month on utility costs.

Lifecycle Costs
The lifecycle costs of each heat pump are projected to be **12%** lower than the lifecycle cost of the gas heating units at current utility rates

Overcoming Barriers

When starting the heat pump project, the initial concern was increased cost. To address cost, LAUSD relied on the sustainability goals set by their board of education to make heat pumps a priority and utilized grants and critical repair programs for funding. They have also utilized on-site solar PV systems to offset the increase in electricity operating costs from the electric unitary heat pumps. As utility rates and initial costs have shifted, capital and operating costs are now lower for the electric units.

LAUSD started by replacing the smaller gas units ranging from 5-10 tons as they reached the end of their life with electric units. Moving forward, when the options for high-capacity heat pumps become available, they will create a comprehensive plan to update electrical capacity to accommodate heat pump RTUs for larger spaces. In addition, LAUSD has started heat pump training for their engineering and maintenance staff to ensure any issues can be addressed quickly. They have equipped all of their electric units with advanced controls that allow for centralized monitoring to facilitate maintenance and ensure efficient operations.

What's Next?

LAUSD plans to continue their transition to heat pumps to achieve all electric heating and cooling within the next 17 years. LAUSD is also using this campaign to address the impacts of climate change on cooling loads and the resulting increases in required electric service capacity.

District-wide sustainability goals have played a major role in LAUSD's decision to implement heat pumps. Research your organization's sustainability goals as you consider future heat pump projects.

Learn More

Visit the Commercial Building Heat Pump Campaign site for more information and sign up forms.