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NEEA comments - 2025 CA Energy Code Rulemaking - DOAS

Additional submitted attachment is included below.

May 13, 2024
Submitted Electronically

California Energy Commission
715 P Street
Sacramento, CA 95814



Re: 2025 Energy Code Rulemaking – Dedicated Outdoor Air Systems (DOAS)
Docket Number: 24-BSTD-01

Dear Commissioners and CEC Staff,

The Northwest Energy Efficiency Alliance (NEEA) submits the following comments in response to the [Notice of Proposed Action – 2025 Building Energy Efficiency Standards](#). Specifically, the [2025 Energy Code Express Terms](#) proposes that DOAS will be prescriptively required in medium to large offices and large schools using central space heating systems. These provisions remain consistent with those introduced in the [2025 Energy Code – Pre-Rulemaking Workshop Presentation](#) and proposed in Section 140.4(a) of the [Draft 2025 Energy Code Express Terms](#).

NEEA is a non-profit organization working to encourage the development and adoption of energy-efficient products, practices, and services. Funded by regional utilities, NEEA is a collaboration of 140 utilities and efficiency organizations working together to advance energy efficiency in the Northwest on behalf of more than 13 million consumers. This unique partnership has helped make the Northwest region a national leader in energy efficiency.

NEEA's High-Performance HVAC Program has conducted several years of research, market analysis, and demonstration projects to support increased adoption of Very High Efficiency (VHE) DOAS, which pairs high performance HVAC equipment with key design principles to provide cleaner and safer indoor air, enhance indoor comfort, and reduce commercial building HVAC energy use. The data collected by this program was foundational to the incorporation of DOAS requirements in the Washington State Energy Code (WSEC).

Comments

1. Case Studies Demonstrate the Cost-Effectiveness of DOAS in Relevant Climactic Conditions

Testing and demonstrating the significant potential for increased energy savings of DOAS has been a focal point of NEEA's High Efficiency HVAC program team since 2015:

- Between 2016 and 2019, the NEEA team tested 8 pilot project sites, demonstrating proof of concept and achieving an average of 65% HVAC energy savings compared to code minimum at that time.
- Between 2019 and 2021, the NEEA team participated in 20 additional technology demonstration projects to further evaluate cost effectiveness and savings opportunities.

- Between 2021 and 2022, the NEEA team studied 4 field demonstration projects, further validated the benefits of DOAS as a design strategy, and demonstrated how VHE DOAS can achieve 45% to 61% HVAC energy savings beyond the latest energy code while less efficient DOAS configurations achieve 20% to 30% HVAC energy savings.

Many of these demonstration project sites were located in Oregon and Washington coastal regions similar to California climate zones. While most systems primarily demonstrated heating savings, two offices in Portland, Oregon saw extreme heat waves in 2022; both demonstrated an ability to maintain comfort and a net reduction in cooling energy using an HRV-DOAS configuration with VRF heat pumps and ventilation-economizing¹. The site built to the full VHE DOAS standard saw a cooling savings of 54% compared to a code minimum system, and the site with a market-average DOAS unit saw a 2% cooling savings to code minimum.

Extensive study of the parameters critical to energy savings and resulting in cost effective DOAS system configurations was undertaken in 2022². This analysis found that standard efficiency DOAS packages reach average payback periods of 2 to 12 years and higher efficiency DOAS packages achieve payback in 8 to 15 years. Several examples of packages were assessed for ASHRAE Climate Zone 4C, which represents portions of California as well.

2. DOAS Maintain High Indoor Air Quality and Efficiency

In the 8 pilot sites studied from 2016 to 2019 mentioned above, the improvement most reported by building occupants was vastly enhanced indoor-air quality³. Each pilot site gathered at least 13 months of post-conversion HVAC and whole-building energy use data, as well as indoor-air quality and temperature data.

In late 2021, NEEA investigated the energy impacts of increased ventilation to mitigate and reduce the risk of viral transmission of COVID-19⁴. The study evaluated a theoretical classroom building, working with the University of Oregon's ESBL viral risk estimation model to study the aerosol transmission of the virus through modified operation of building HVAC systems. By increasing ventilation to 217%, pushing most VHE DOAS systems to their maximum, the in-room viral risk rate is reduced to 32% compared to 49% at code minimum ventilation levels. The analysis also found that in Pacific Northwest climates, a VHE DOAS system was the lowest cost system to operate under such acute airflow conditions of the three systems evaluated, with 35% and 37% lower energy costs than the two other mixed-air systems. While there are many strategies now available for use in reducing indoor viral risk, including in-room filtration units, this study articulates the benefits which DOAS can provide as one solution.

¹ betterbricks.com/case-studies/portland-firm-engineers-thermal-comfort-and-hvac-efficiency

² betterbricks.com/resources/analysis-of-expanded-efficiency-parameters-for-very-high-efficiency-does

³ betterbricks.com/resources/vhe-does-pilot-project-summary-report

⁴ betterbricks.com/resources/covid-19-hvac-risk-reduction-strategies

3. Washington Has Required DOAS for Additional Building Types Since 2017

If California seeks to widen the scope of this DOAS provision in future rulemaking, Washington provides a potential example to follow. The 2015 WSEC introduced a DOAS requirement for office, retail, education, libraries, and fire stations following the prescriptive path starting in 2017. Since then, the 2018 WSEC expanded this DOAS requirement to additional Assembly occupancy types, and this scope was maintained in the present 2021 WSEC. Washington has demonstrated that DOAS code provisions can extend beyond offices and schools.

Summary

Analysis conducted by NEEA supports the cost-effectiveness of DOAS and demonstrates performance in climactic conditions relevant to California. NEEA research also indicates that DOAS can maintain high indoor air quality efficiently and cost-effectively. Washington has required DOAS for building types beyond those proposed by California since 2017.

Thank you for considering our comments, which are based on a substantial volume of research, market analysis, demonstration projects, and other data collected over several years. Please contact us if you need any further information on this topic.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kevin Rose', with a long horizontal flourish extending to the right.

Kevin Rose
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