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New requirements in 1404(a)3

As a licensed engineer and the Chief Engineer for our company, we urge the CEC to remove the proposed new requirements in 140.4(a)3 for multizone school and office systems. The proposed changes significantly and unduly restrict compliance options for HVAC systems in offices and schools. FPFC + DOAS + AWHP is a very uncommon HVAC system type and extremely unlikely to have lower lifecycle costs than other system types for offices and schools, such as VAV reheat or VVT.

Forcing more buildings to go VRF and DOAS is troubling for several reasons. On the energy side, numerous studies have shown that AHRI ratings of VRF equipment are overstated (PG&E, Guidehouse, and DOE). In particular, the VRF ASRAC working group found that AHRI efficiencies were roughly 2X higher than measured performance. Other comparison studies have shown code-compliant VAV reheat to have lower energy performance than VRF in Bay Area climates. In coastal California climates, the mild weather conditions are ideal for air economizing. Accordingly, decades of Title 24 updates have increasingly made economizer requirements more stringent. Yet, each of the prescriptive baselines mandate that ventilation is provided via DOAS, which effectively eliminates air economizers and reduces the overall outdoor air provided to occupied zones. This change will reduce indoor air quality compared to systems with economizers. Increased global warming from VRF is another issue. Most VRF uses R-410A, which has a global warming potential (GWP) of 2,090. Senate Bill 1206 bans the sale of refrigerants greater than 1,500 GWP starting 1/1/2030. Packaged rooftop units also typically use R-410A but they have several options for new refrigerants like R-454B (GWP = 467) and R-32 (GWP=675). But R-454B and R-32 are not viable options for VRF because they are A2L (flammable) refrigerants which is highly problematic for VRF given the volumes of refrigerant that can enter occupied spaces. There are no viable low GWP and low ODP options for VRF at this time. Not only is VRF stuck with higher GWP/ODP refrigerants, but VRF has much higher refrigerant volumes and much higher refrigerant leakage rates than packaged rooftops. The higher volumes are unavoidable because refrigerant must be piped throughout the building to every zone. Per ASHRAE Standard 228, VRF will typically leak 10% of its mass charge per year, compared to 6% for rooftop units. Higher GWP + Higher Volume + Higher Leakage Rates = MUCH more global warming.

If the CEC is looking for a way to ban gas heating, this is not the way. A far less restrictive way to ban gas heating would be to simply replace all of 140.4(a)3 with the following: "The heating system serving offices and schools shall be an electric heat pump. Acceptable options include VRF heat pumps and air-source heat pumps."