DOCKETED	
Docket Number:	24-BSTD-01
Project Title:	2025 Energy Code Rulemaking
TN #:	256308
Document Title:	R.F. MacDonald Co. Comments - CEC's proposed updates to Section 1404(a)3 of Title 24
Description:	N/A
Filer:	System
Organization:	R.F. MacDonald Co.
Submitter Role:	Other Interested Person
Submission Date:	5/13/2024 11:01:10 AM
Docketed Date:	5/13/2024

Comment Received From: R.F. MacDonald Co.
Submitted On: 5/13/2024
Docket Number: 24-BSTD-01

CEC's proposed updates to Section 1404(a)3 of Title 24

Additional submitted attachment is included below.

R.F. MacDonald Co.
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May 13, 2024

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: California Energy Commission's proposed updates to Section 140.4(a)3 of Title 24

To Whom It May Concern:

R.F. MacDonald Co. writes regarding the California Energy Commission's ("CEC") proposed updates to Section 140.4(a)3 of Title 24 addressing multi-zone space conditioning systems for schools and offices and prescribing four-pipe fan coils supplied by an air to water heat pump space-heating hot water loop. R.F. MacDonald is a manufacturer's representative that sells and services hydronic and steam equipment, and offers gas-fired boilers, electric resistance boilers, and air-to-water heat pumps, among other types of equipment.

As written, this update would unduly limit methods for supplying hot water for building heat, such as gas-fired boilers. We disagree with the CEC's proposed approach for the following reasons: (1) heat pumps are 5-10 times the cost of a gas-fired boiler and in many instances will not be economically feasible to use on a project; (2) the output of air-to-water heat pumps is dependent on ambient air temperatures and declines during periods of cold ambient air temperatures (when building heating load is at its peak); thus additional backup sources of heat, such as electric resistance boilers or gas-fired boilers, should be incorporated into such systems to supply hot water during periods of cold ambient air temperature when the heat pump cannot meet the required building load. We believe in many instances an optimal solution for building heat will be a hybrid system, that incorporates both a heat pump and either a gas-fired or electric resistance boiler; (3) heat pumps are 4-5 times the footprint of gas-fired boilers, and often the required space is not available on a given project, especially an existing building; (4) existing systems for heating buildings often utilize heating coils designed around 180F supply temperature and 30F delta-T; air-to-water heat pumps are limited with respect to both the supply temperature and delta T they are able to provide (typically around 140F-149F supply temperature and 14F-20F delta-T); thus incorporation of air-to-water heat pumps into existing buildings will require resizing and replacement of heating coils in air handlers and fan coil units, which will add significant cost beyond installing a heat pump; (5) many buildings utilize gas-fired boilers in indoor equipment rooms, often

with limited available footprint; air-to-water heat pumps require either outdoor installation or ducted outdoor air which likely will not be possible on existing buildings or at the least will require a major overhaul of the building; (6) transitioning from a gas-fired boiler to a four-pipe heat pump system will add controls complexity and require BMS capabilities that many buildings (K-12 schools for example) may not be equipped to handle; and (7) air-to-water heat pumps require significant electrical infrastructure to operate which in many instances will not be available.

Additionally, California's grid is already stretched thin and according to a recent white paper by Southern California Edison, the state's decarbonization goals will require an additional approximately 90 GW of utility scale clean generation, 25 GW of utility-scale energy storage and more than 15 GW each of behind the meter solar and storage. It is questionable whether California will be able to provide this level of clean energy to its grid so as to meet its decarbonization goals. The latest CEC data also shows that 36% of the state's electricity generation comes from fossil fuel. Using heat derived from natural gas to produce electricity and then converting the electricity back to heat is terribly inefficient—approximately 35% efficient for an electric resistance boiler when accounting for transmission line losses. While a heat pump is more efficient than an electric resistance boiler, if fossil fuel is the source of electricity generation, overall heat pump efficiency will be in the range of a gas-fired condensing boiler (assuming a COP of 3 for the heat pump and up to 99% efficiency for a condensing boiler). As noted above, the heat pump system carries with it much more cost, complexity and challenges as compared to a gas-fired boiler. Without clean electricity generation (massive amounts of which will be required to meet the state's decarbonization goals), over-reliance on electricity for heating could in fact only shift (and potentially increase) emissions to the site of power production rather than provide a true reduction in emissions.

For the reasons above, we request that the CEC remove the proposed heat pump baselines in 140.4(a)3.

Thank you for consideration of the above comment. If you have any questions, please don't hesitate to contact me.

Sincerely,

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