CEPI-228-21

# IECC®: C503.3.2 (New)

**Proponents:**

Sean Denniston, representing New Buildings Institute (sean@newbuildings.org)

**2021 International Energy Conservation Code**

# Add new text as follows:

C503.3.2 System sizing.

New heating and cooling equipment that is part of an *alteration* shall be sized in accordance with Section C403.1.1 based on the existing *building* features as modified by the *alteration.*

**Exception:** Where is has been demonstrated to the *code official* that compliance with this section would result in heating or cooling equipment that is incompatible with the rest of the heating or cooling system.

# Reason Statement:

Historically, HVAC equipment has been routinely oversized. Studies have found very high rates of equipment oversizing; for example, 60% of RTU units in CA were found to be oversized.[1] Oversized equipment results in increased energy use, decreased occupant comfort and increased wear-and-tear on equipment.[2] Oversized equipment is also less effective at dehumidification. Like-for-like equipment replacement are particularly vulnerable to oversizing. The original equipment may have been installed when code requirements for "right-sizing" equipment did not exist or was not enforced. The materials markups that are common practice among contractors disincentivize them to install smaller, right-sized equipment. Changes to building use could have occurred since the original equipment was installed, creating a mismatch between current design loads and the original equipment. The building may have modified, particularly by energy efficiency programs, altering the design loads of the building. Lighting especially stands out here. Fluorescent and LED lighting is ubiquitous, but many HVAC systems were designed to account for incandescent lamps that convert over 75% of the energy they consume into heat.

With all of these considerations, it is reasonable to assume that the existing equipment sizing is more likely to be wrong than right, yet many equipment replacements use existing system sizing to size new equipment. This proposal explicitly requires that new equipment installed as part of an alteration be sized based on current building characteristics and loads, using current sizing standards. The resulting installations will be more efficient and more effective and many will be less costly to install as owners stop paying for more equipment than they need.

Savings will vary based on the amount that existing equipment is oversized. "Right-sizing" has been found to result in about 0.2% energy savings for every 1% reduction in oversizing.[3]

1. D.R. Felts, P. Bailey, The State of Affairs - Packaged Cooling Equipment in California, 2000.
2. Ery Djunaedy, Kevin van den Wymelenberg, Brad Acker, Harshana Thimmana, *Oversizing of HVAC system: Signatures and penalties.* "Energy and Buildings," Volume 43, Issues 2-3, 2011,
3. H.McLain,D.Goldberg. "Beneits of Replacing Residential Central Air Conditioning Systems." American Council for an Energy- Eficient Economy, WashingtonDC, USA, 1984.

# Bibliography:

D.R. Felts, P. Bailey, The State of Affairs - Packaged Cooling Equipment in California, 2000.

Ery Djunaedy, Kevin van den Wymelenberg, Brad Acker, Harshana Thimmana. *Oversizing of HVAC system: Signatures and penalties.* "Energy and Buildings," Volume 43, Issues 2-3, 2011,

H.McLain,D.Goldberg, Beneits of Replacing Residential Central Air Conditioning Systems, American Council for an Energy-Eficient Economy, Washington DC, USA, 1984, pp. E226-E227.

# Cost Impact:

The code change proposal will decrease the cost of construction.

As "wrong-sized" equipment is generally oversized, this proposal will generally decrease the cost of installation. Smaller, right-sized equipment will generally be less costly to install.

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