Proposal Summary

CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

2022 California Energy Code (Title 24, Part 6)

Multifamily Drain Water Heat Recovery

Updated: Wednesday, August 22, 2019

Prepared by: Jingjuan Dove Feng, TRC

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on October 3, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by October 17, 2019

Measure Description

This measure would prescriptively require drain water heat recovery (DWHR) in all multifamily buildings for all hot water system types. This CASE topic builds on a DWHR measure for low-rise residential in 2019-Title 24 as a compliance credit and a prescriptive alternative path for gas storage water heaters, heat pump water heaters, and solar water-heating systems.[1]

DWHR is an energy-saving technology used to reduce the amount of energy needed by a water heater or fixture to heat incoming water to the required temperature. The technology utilizes a heat exchanger in the drain line to pre-heat cold water supplied to the cold-water side of a water heater and/or fixture. The device can be installed in either an equal flow configuration (with preheated water being routed to both the water heater and the shower) or an unequal flow configuration (with preheated water directed to either the water heater or shower). DWHR comes in horizontal and vertical configurations, and both are included in this measure.

The 2019 CASE Report introducing DWHR as a compliance credit and prescriptive alternative path found that DWHR was cost-effective for low-rise multifamily buildings in all climate zones, assuming four residential units share one DWHR unit (and not accounting for access panels or water meters), and would likely be cost-effective for high-rise multifamily buildings with a similar configuration. The

[1] http://title24stakeholders.com/wp-content/uploads/2017/09/2019-T24-CASE-Report_DWHR_Final_September-2017.pdf

unequal flow configuration is more common in multifamily buildings with central water heaters to reduce pipe lengths.

Key costs that were not considered in the 2019 CASE measure include:

- Access panels that comply with California Plumbing Code (CPC) Appendix L and facilitate alterations.
- Additional water meters necessary per Senate Bill (SB) 7[2] which subsequently led to 2019 CPC 601.2.1.

Prescriptive requirements for DWHR may be dependent on hot water distribution type (central or by unit), heat recovery installation (equal or unequal flow), and DWHR location (in drain line serving multiple dwelling units or in drain line serving one dwelling unit). The measure may allow for exceptions for dwelling units that are slab-on-grade and may also allow for tradeoffs with other hot water compliance credits, such as compact hot water distribution.

Draft Code Language

The Energy Commission plans to create a multifamily chapter for inclusion in 2022 Title 24, Part 6. The multifamily chapter will draw from the appropriate sections of the 2019 residential and nonresidential Standards. The Statewide CASE Team uses the language and section numbering from residential and nonresidential Standards and Reference Appendices to show the proposed changes below. Changes to the 2019 documents are marked with red underlining (new language)and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in yellow. These changes are specific to multifamily buildings and not indicative of changes that apply to residential or nonresidential buildings.

Standards

2019 Title 24 SECTION 150.1(c)

8. Domestic Water-Heating Systems. Water-heating systems shall meet the requirements of either A B or C. For recirculation distribution systems serving individual dwelling unit, only Demand Recirculation Systems with manual on/off control as specified in the Reference Appendix RA4.4.9 shall be used:

A. For systems serving individual dwelling units, the water heating system shall meet the requirement of either i, ii, iii, iv, or v:

i. One or more gas or propane instantaneous water heater with an input of 200,000 Btu per hour or less and no storage tank.

ii. A single gas or propane storage type water heater with an input of 75,000 Btu per hour or less, rated volume less than or equal to 55 gallons and that meets the requirements of Sections 110.1 and 110.3. The dwelling unit shall have installed fenestration products with a weighted average U-factor no greater than 0.24, and in addition one of the following shall be installed:

[2] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB7.

a. A compact hot water distribution system that is field verified as specified in the Reference Appendix RA4.4.16; or

b. A drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9.

iii. A single gas or propane storage type water heater with an input of 75,000 Btu per hour or less, rated volume of more than 55 gallons.

iv. A single heat pump water heater. The storage tank shall be located in the garage or conditioned space. In addition, one of the following:

a. A compact hot water distribution system as specified in the Reference Appendix RA4.4.6 and a drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9; or

b. For Climate Zones 2 through 15, a photovoltaic system capacity of 0.3 kWdc larger than the requirement specified in Section 150.1(c)14; or

c. For Climate Zones 1 and 16, a photovoltaic system capacity of 1.1 kWdc larger than the requirement specified in Section 150.1(c)14.

v. A single heat pump water heater that meets the requirements of NEEA Advanced Water Heater Specification Tier 3 or higher. The storage tank shall be located in the garage or conditioned space. In addition, for Climate Zones 1 and 16, a photovoltaic system capacity of 0.3 kWdc larger than the requirement specified in Section 150.1(c)14 or a compact hot water distribution system as specified in the Reference Appendix RA4.4.6.

B. For systems serving multiple dwelling units, a central water-heating system that includes the following components shall be installed:

i. Gas or propane water heating system; and

ii. A recirculation system that meets the requirements of Sections 110.3(c)2 and 110.3(c)5, includes two or more separate recirculation loops serving separate dwelling units, and is capable of automatically controlling the recirculation pump operation based on measurement of hot water demand and hot water return temperature; and

EXCEPTION to Section 150.1(c)8Bii: Buildings with eight or fewer dwelling units may use a single recirculation loop.

iii. A solar water-heating system meeting the installation criteria specified in Reference Residential Appendix RA4 and with a minimum solar savings fraction of either a or b below:

a. A minimum solar savings fraction of 0.20 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.35 in Climate Zones 10 through 16; or

b. A minimum solar savings fraction of 0.15 in Climate Zones 1 through 9 or a minimum solar savings fraction of 0.30 in Climate Zones 10 through 16. In addition, a drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9.

C. A water-heating system serving multiple dwelling units determined by the Executive Director to use no more energy than the one specified in subsection B above.

Reference Appendices

RA 3.6.9 HERS-Verified Drain Water Heat Recovery System (DWHR-H)

A HERS inspection is required to obtain this credit. All DWHR unit(s) shall be certified to the Energy Commission according to the following requirements:

(a) Vertical DWHR unit(s) shall be compliant with CSA B55.2, and tested and labeled in accordance with CSA B55.1 or IAPMO IGC 346-2017. Sloped DWHR unit(s) shall be compliant with IAPMO PS 92, and tested and labeled with IAPMO IGC 346-2017.

(b) The DWHR unit(s) shall have a minimum rated effectiveness of 42 percent.

The HERS inspector shall verify that:

(a) The make, model, and CSA B55.1 or IAPMO IGC 346-2017 rated effectiveness of the DWHR unit(s) shall match the compliance documents. The DWHR unit(s) shall also be verified as a model certified to the Energy Commission as qualified for credit as a DWHR unit(s).

(b) The installation configuration (e.g. equal flow, unequal flow to the water heater, or unequal flow to the showers) and the percent of served shower fixtures shall match the compliance documents.

(c) For water heating system serving a single dwelling, the DWHR system shall, at the minimum, recover heat from the master bathroom shower and must at least transfer that heat either back to all the respective showers or the water heater.

(d) For central water heating system serving multiple dwellings, the DWHR system shall, at the minimum, recover heat from half the showers located above the first floor and must at least transfer that heat either back to all the respective showers or the water heater.

(e) The DWHR unit(s) shall be installed within 1 degrees of the rated slope. Sloped DWHR shall have a minimum lengthwise slope of 1 degree. The lateral level tolerance shall be within plus or minus 1 degree.

(f) The installation shall comply with any applicable California Plumbing Code requirements.

RA4.4.21 HERS-Verified Drain Water Heat Recovery System (DWHR-H)

A HERS inspection is required to obtain this credit. All DWHR unit(s) shall be certified to the Energy Commission according to the following requirements:

(a) Vertical DWHR unit(s) shall be compliant with CSA B55.2, and tested and labeled in accordance with CSA B55.1 or IAPMO IGC 346-2017. Sloped DWHR unit(s) shall be compliant with IAPMO PS 92, and tested and labeled with IAPMO IGC 346-2017.

(b) The DWHR unit(s) shall have a minimum rated effectiveness of 42 percent.

The HERS inspector shall verify that:

(a) The make, model, and CSA B55.1 or IAPMO IGC 346-2017 rated effectiveness of the DWHR unit(s) shall match the compliance documents. The DWHR unit(s) shall also be verified as a model certified to the Energy Commission as qualified for credit as a DWHR unit(s).

(b) The installation configuration (e.g. equal flow, unequal flow to the water heater, or unequal flow to the showers) and the percent of served shower fixtures shall match the compliance documents.

(c) For water heating system serving a single dwelling, the DWHR system shall, at the minimum, recover heat from the master bathroom shower and must at least transfer that heat either back to all the respective showers or the water heater.

(d) For central water heating system serving multiple dwellings, the DWHR system shall, at the minimum, recover heat from half the showers located above the first floor and must at least transfer that heat either back to all the respective showers or the water heater.

(e) The DWHR unit(s) shall be installed within 1 degrees of the rated slope. Sloped DWHR shall have a minimum lengthwise slope of 1 degree. The lateral level tolerance shall be within plus or minus 1 degree.

(f) The installation shall comply with any applicable California Plumbing Code requirements.