

Proposal Summary



2022 California Energy Code (Title 24, Part 6)

Nonresidential Drain Water Heat Recovery

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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 Thursday, 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 Thursday, October 17, 2019.

Measure Description

This measure would prescriptively require drain water heat recovery (DWHR) in nonresidential buildings types that are found to be cost-effective, as well as add DWHR as a compliance option for all nonresidential buildings. This CASE topic builds on a DWHR measure for low-rise residential in Title 24 2019 as a compliance credit and an alternative prescriptive path for gas storage water heaters, heat pump water heaters, and solar water-heating systems.

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 makeup water supplied to the cold-water side of a water heater 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 fixture) or an unequal flow configuration (preheated water directed to either the water heater or fixture). DWHR devices are available in horizontal and vertical configurations, and both are included in this measure.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions).

Standards

SECTION 100.1 – DEFINITIONS AND RULES OF CONSTRUCTION

DRAIN WATER HEAT RECOVERY (DWHR) consists of a double wall heat exchanger that recovers heat from the effluent in waste piping and uses it to preheat water in a domestic or service water-heating system in order to reduce water heating and energy usage.



SUBCHAPTER 2 ALL OCCUPANCIES – MANDATORY REQUIREMENTS FOR THE MANUFACTURE, CONSTRUCTION AND INSTALLATION OF SYSTEMS, EQUIPMENT AND BUILDING COMPONENTS

SECTION 110.3 – MANDATORY REQUIREMENTS FOR SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT

5. Service water heaters in state buildings. Any newly constructed building constructed by the State shall derive its service water heating from a system that provides at least 60 percent of the energy needed for service water heating from site solar energy or recovered energy, per the statutory requirement of California Public Resources Code Section 25498. Recovered energy includes, but is not limited to, drain water heat recovery (DWHR) devices installed on service water heating systems.

SUBCHAPTER 5 NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR ACHIEVING ENERGY EFFICIENCY

SECTION 140.5 – PRESCRIPTIVE REQUIREMENTS FOR SERVICE WATER HEATING SYSTEMS

(a) Nonresidential Occupancies. A service water heating system installed in a nonresidential building complies with this section if it complies with the applicable requirements of Sections 110.1, 110.3, and 120.3. [Cost-effective building types] Occupancies shall also include a drain water heat recovery device on the service hot water distribution system.

(b) High-Rise Residential and Hotel/Motel Occupancies. A service water heating system installed in a high-rise residential or hotel/motel building complies with this section if it meets the requirements of Section 150.1(c)8.

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 have a drain water heat recovery system that is field verified as specified in the Reference Appendix RA3.6.9 and meet the requirement of either i, ii, iii, iv, or v...

Reference Appendices

2.1.1 Manufacturer Certification for Equipment, Products, and Devices

In nonresidential buildings, the following are examples of products that must be certified by the manufacturer:

- Air economizers
- Airflow measurement apparatus – forced air systems
- Airflow measurement apparatus – ventilation systems
- Air-to-air heat pump systems

- Economizer fault detection and diagnostics
- Intermittent mechanical ventilation systems
- Low-leakage air-handling unit
- Occupant-controlled smart thermostats
- Demand-responsive control systems
- [Drain water heat recovery devices](#)

4.7 Water Heating Requirements

All of the requirements for service hot water that apply to nonresidential occupancies are mandatory measures. There are additional requirements for high-rise residential buildings, hotels and motels, [\[and cost-effective building types\]](#). [High-rise residential buildings, hotels and motels](#) must also comply with the Residential Energy Standards §150.1(c)8, described below as well as in the Residential Compliance Manual. [\[Cost-effective building types\] must also comply with the prescriptive requirements described in §4.7.5.](#)

[4.7.5 Prescriptive Requirements Applicable to \[Cost-effective building types\]](#)

[Service hot water systems serving \[cost-effective building types\] occupancies, shall include a drain water heat recovery device on the hot water distribution system.](#)

Non-Residential ACM Reference Manual

5. Building Descriptors Reference

5.9.1.4 Water Heating Auxiliaries

| Water Heating System Configuration | |
|------------------------------------|--|
| <i>Applicability</i> | All water heating systems |
| <i>Definition</i> | The configuration and layout of the water heating system including the number of water heaters; the size, location, length and insulation of distribution pipes; drain water heat recovery systems and pumps ; recirculation systems and pumps; and any other details about the system that would affect the energy model. |
| <i>Units</i> | Data structure |
| <i>Input Restrictions</i> | None |

| | |
|------------------------|---|
| <i>Standard Design</i> | <p>For healthcare facility spaces, the same as Proposed. For high-rise residential buildings, the rules in the Residential ACM Reference Manual shall be followed.</p> <p>For all other spaces, the standard design shall have one gas storage water heater if any of the spaces have a Space Water Heating Fuel Type of Gas (from Appendix 5.4A), and the standard design building will have on <u>an</u> electric water heater if the any of the spaces have a Space Water Heating Fuel Type of Electric.</p> |
|------------------------|---|

| <u>Drain Water Heat Recovery Type</u> | |
|--|--|
| <i>Applicability</i> | <u>Water heating systems with a drain water heat recovery (DWHR) system</u> |
| <i>Definition</i> | <u>A DWHR system consists of a double wall heat exchanger that recovers heat from the effluent in waste piping and uses it to preheat water in a domestic or service water-heating system in order to reduce water heating and energy usage.</u> |
| <i>Units</i> | <u>List On-demand Equal Flow, On-demand Unequal Flow, Tank, or None</u> |
| <i>Input Restrictions</i> | <u>None</u> |
| <i>Standard Design</i> | <u>The Standard Design for [non-cost-effective building types] has no DWHR system. The Standard Design for [cost-effective building types] has an On-demand Equal Flow DWHR system.</u> |

| <u>Drain Water Heat Recovery Effectiveness</u> | |
|---|--|
| <i>Applicability</i> | <u>Water heating systems with a drain water heat recovery (DWHR) system</u> |
| <i>Definition</i> | <u>The DWHR effectiveness is the ratio between the actual heat transfer rate and the maximum possible heat transfer rate. Equal to the CSA rated efficiency.</u> |
| <i>Units</i> | <u>Unitless</u> |
| <i>Input Restrictions</i> | <u>As designed</u> |
| <i>Standard Design</i> | <u>The Standard Design has no DWHR system.</u> |