

High-Performance Measure Details

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Technology Summary

Refrigeration Heat Reclaim (RHR) systems recover useful thermal energy from vapor-compression equipment—most commonly commercial, industrial, and process refrigeration systems and, where applicable, qualifying air-conditioning systems—that would otherwise reject heat to the outdoors. The recovered heat is redirected to eligible onsite receiving loads such as space heating, ventilation-air preheat, domestic/service water heating, pool/spa water heating, or eligible process-water preheat, where applicable. Depending on the system design and refrigerant platform, heat reclaim may occur through desuperheating compressor discharge gas, partial- or full-condensing arrangements in subcritical systems, or gas-cooler heat recovery in transcritical CO₂ systems.

For the California Energy Design Assistance (CEDA) program, this High-Performance Measure (HPM) is most applicable to refrigeration-intensive new construction projects with long refrigeration operating hours and onsite loads that can use recovered heat when it is available. Typical project types include supermarkets and grocery stores, food processing facilities, commercial kitchens with significant refrigeration loads, convenience stores, refrigerated warehouses and cold storage facilities, ice rinks, and similar facilities where refrigeration or process-cooling loads create an opportunity to use rejected heat as a productive thermal resource.

This matters for California decarbonization and operational performance because refrigeration-intensive facilities often reject usable heat while separate systems provide space heating, service water heating, ventilation-air preheat, or process-water heating. When heat reclaim is designed to preserve refrigeration performance and avoid

unnecessary increases in compressor head pressure, condensing temperature, or gas-cooler pressure, it can reduce auxiliary heating energy, improve whole-building efficiency, and support lower-carbon building and water-heating pathways.

In practice, performance is highly sensitive to implementation details. Common real-world performance gaps this HPM is designed to address include useful refrigeration heat being rejected outdoors while separate heating equipment operates; controls that increase compressor or gas-cooler pressure without delivering enough useful recovered heat to offset the added energy use; poor matching between heat availability, recovered-heat temperature, and receiving-load needs; weak coordination among refrigeration, HVAC, hydronic, service-water, and process-water controls; added refrigerant charge, piping, valves, or leakage risk that can reduce reliability; and insufficient commissioning, metering, or trend data to confirm that recovered heat is actually delivered and used over time.

Relevant code and industry references include 2025 Title 24, Part 6 covered-process refrigeration requirements; California Title 20 Appliance Efficiency Regulations; federal equipment standards; EPA and CARB HFC regulations; AHRI 1200/1201, AHRI 1250/1251, AHRI 460, and AHRI 920 where applicable; ANSI/ASHRAE Standards 15, 34, 72, and 90.1; ASHRAE Guideline 36; and ASHRAE Handbook—Refrigeration application guidance.

Alignment with CEDA Program Goals

The CEDA program supports the implementation of energy efficiency measures that support Code Readiness' Long Term Tactical Plan (LTTP) to drive the goals of electrification, decarbonization, and load reduction.

Projects must meet the CEDA Inducement Requirements identified in the next section to receive an inducement on the equipment and will be evaluated for level of interest in metering to support Code Readiness Objectives.

This measure meets the CEDA program goals as follows:

- **Building partnerships with market stakeholders** by consulting on innovative technologies and best practices in energy efficiency which can lead to the development of more effective solutions and accelerate the adoption of new technologies. As teams adopt the measure, this increases the volume of engineers able to design the equipment, contractors capable of installing the equipment, and owners able to operate the equipment.
- **Increasing the supply of high-performance measures and all-electric buildings** by combining electrification with energy efficiency that can result in projects implementing measures to achieve greater energy savings, reduced emissions, and overall improved building performance. As more buildings specify and install refrigeration heat reclaim, this helps to increase the overall supply of refrigeration heat reclaim in the market for others to use, including beyond new construction.
- **Increasing the demand for high-performance measures and all-electric buildings** by pushing for electrification that drives the need for technological advancements, supporting economic growth opportunities through innovation, and raising awareness of the benefits of electrification to increase consumer adoption. As demand in the market increases for newer technologies, the long-term benefit is increased demand for manufacturers and suppliers to provide additional options available in the market.
- **Advancing new high-performance measure technology** by raising public awareness about new technologies and their benefits, helping build acceptance and demand through market support advocacy efforts that can influence stakeholder decisions that enable technological innovation.
- **Providing Codes & Standards with projects of interest** to collect metered data that will inform future California energy codes.

CEDA Inducement Requirements

The inducement requirements for this **Refrigeration Heat Reclaim HPM** are intended to address a persistent design, controls, and verification gap in refrigeration-intensive facilities. Refrigeration heat reclaim can reduce auxiliary heating energy by redirecting useful reject heat to onsite space-heating, ventilation-air preheat, domestic/service-water-heating, pool/spa water-heating, or eligible process-water preheat loads. However, actual performance depends on proper system integration, control sequencing, load matching, commissioning, and verification that recovered heat is delivered and used without creating avoidable refrigeration-system penalties.

This HPM is structured to encourage intentional application of heat reclaim in new construction projects where eligible vapor-compression equipment has substantial operating hours and where recovered heat can be used productively. The measure is intended to support designs that preserve refrigeration performance, coordinate refrigeration and receiving-load controls, and provide sufficient commissioning and monitoring capability to confirm real-world operation. This is especially important because the 2025 Title 24 Energy Code establishes refrigeration heat-recovery requirements for certain retail food projects, while broader commercial, industrial, cold-storage, process-refrigeration, ice-rink, pool/spa, and process-water applications may still require project-specific design judgment to demonstrate above-code value and code-readiness learning.

Inducement eligibility is determined based on the project's compliance with the applicable **System Design Requirements** and **Supporting Documentation Requirements** for the selected tier. For projects subject to 2025 Title 24, Part 6 Section 120.6(b)4A or other applicable code-minimum heat-recovery requirements, only the refrigeration heat reclaim scope that exceeds the code-required minimum may be claimed toward this HPM. Code-required heat recovery alone does not qualify. Final eligibility is verified through the CEDA review process based on the qualifying heat-reclaim source, receiving-load pathway, control sequences, commissioning approach, monitoring capability, and supporting submittals.

System Design Requirements

For projects subject to 2025 Title 24, Part 6 Section 120.6(b)4A or other applicable code-minimum heat-recovery requirements, only refrigeration heat reclaim scope that exceeds the code-required minimum may be claimed toward this HPM.

- 1. Essential level: HVAC Space Heating with Refrigeration Heat Reclaim**
 - 1.1. Design the HVAC system to provide space heating or ventilation-air preheat using mechanical heat recovery from eligible commercial refrigeration system(s).
 - 1.2. Each contributing refrigeration system must provide a minimum of 50,000 Btu/h of design heat rejection to the heat-reclaim system.
 - 1.3. Gas-fired, electric, or heat pump-based HVAC systems are eligible to meet this requirement, provided the system incorporates qualifying refrigeration heat reclaim for space heating or ventilation-air preheat.
 - 1.4. Controls must be configured to prioritize useful recovered heat when the receiving load is available without causing unnecessary increases in compressor head pressure, condensing temperature, or gas-cooler pressure.

2. **Advanced level: Water Heating with Refrigeration or Air-Conditioning Heat Reclaim**
 - 2.1. Provide a domestic/service water-heating, pool/spa water-heating, or eligible process-water preheat system that utilizes mechanical heat recovery from eligible refrigeration or qualifying air-conditioning system(s).
 - 2.2. Each contributing refrigeration or qualifying air-conditioning system must provide a minimum of 50,000 Btu/h of design heat rejection to the heat-reclaim system.
 - 2.3. Gas-fired, electric, or heat pump water-heating systems are eligible to meet this requirement, provided the system incorporates qualifying heat reclaim for the applicable water-heating or water-preheat load.
 - 2.4. Pool/spa water-heating applications may qualify where the heat-reclaim scope is documented as voluntary or exceeding applicable code-minimum requirements, including applicable 2025 Title 24, Part 6 Section 110.4(c)3 requirements.
 - 2.5. Process-water heating or process-water preheating applications may qualify where the recovered heat serves a water-heating or water-preheat load and is documented as voluntary or exceeding applicable code-minimum requirements.
 - 2.6. Other process heating loads, including product heating, process air, steam or boiler preheat, glycol or process-fluid loops, drying, or industrial process loads, do not qualify as standard receiving-load pathways under this HPM unless specifically approved in writing by CEDA program administrators.
 - 2.7. Controls must be configured to prioritize useful recovered heat when the receiving water-heating or water-preheat load is available and stage auxiliary heating only as needed.

3. **Premium level: Heat Pump HVAC and Heat Pump Water Heating with Heat Reclaim**
 - 3.1. Premium requires both eligible HVAC space-heating or ventilation-air preheat and eligible water-heating or water-preheat heat-reclaim applications to be installed, operational, and served by qualifying heat pump-based receiving systems.
 - 3.2. Provide a heat pump HVAC system for space heating or ventilation-air preheat that captures and utilizes recovered heat from eligible refrigeration or qualifying air-conditioning system(s).
 - 3.2.1. Each contributing refrigeration or qualifying air-conditioning system must provide no less than 50,000 Btu/h of design heat rejection to the HVAC heat-reclaim system.
 - 3.3. Provide a heat pump domestic/service water-heating, pool/spa water-heating, or eligible process-water preheat system that captures and utilizes recovered heat from eligible refrigeration or qualifying air-conditioning system(s).
 - 3.3.1. Each contributing refrigeration or qualifying air-conditioning system must provide no less than 50,000 Btu/h of design heat rejection to the water-heating or water-preheat heat-reclaim system.
 - 3.4. Only heat pump-based receiving systems are eligible to meet the Premium tier requirements. Gas-fired water heaters, gas furnaces, electric resistance water heaters, and electric resistance space-heating systems are not permitted as the qualifying Premium-tier receiving systems.
 - 3.5. Pool/spa water-heating and eligible process-water preheat applications may qualify under the Premium tier where the heat-reclaim scope is documented as voluntary or exceeding applicable code-minimum requirements.
 - 3.6. Controls must coordinate priority between HVAC and water-heating receiving loads while preserving efficient refrigeration or air-conditioning operation, including head-pressure, condensing-temperature, or gas-cooler-pressure safeguards.

Supporting Documentation Requirements

1. Construction Plans and System Diagrams

- a. Provide engineered, stamped, and permitted construction plans demonstrating that the Refrigeration Heat Reclaim system design complies with applicable state and local jurisdiction requirements and regulations.
- b. Provide heat-reclaim schematic or riser diagrams showing the refrigeration or qualifying air-conditioning source system(s), heat exchanger(s), pumps, valves, control sensors, receiving load(s), bypass or rejection equipment, and auxiliary heating equipment.
- c. For projects subject to code-minimum heat-recovery requirements, identify the code-required heat-recovery scope and the above-code heat-reclaim scope claimed under this HPM.

2. Sequence of Operations and Controls

- a. Provide a sequence of operations for the Refrigeration Heat Reclaim system.
- b. The sequence shall include enable/disable criteria, priority between heat reclaim and auxiliary heating, receiving-load priority where multiple loads are served, head-pressure or gas-cooler-pressure safeguards, bypass/rejection modes, lockouts, alarms, and failure modes.
- c. The sequence shall describe how the system avoids unnecessary increases in compressor head pressure, condensing temperature, or gas-cooler pressure when recovered heat is not useful to an eligible receiving load.

3. Equipment Submittals

- a. Provide equipment submittals stamped and approved by the responsible engineer of record.
- b. Submittals shall identify heat-recovery capacity, design total heat of rejection for each contributing system, refrigerant type, added refrigerant charge where applicable, heat-exchanger ratings, pump and valve components, control components, and receiving-load interface equipment.
- c. For pool/spa water-heating or process-water preheat applications, submittals shall identify the receiving water-heating load and document that the claimed heat-reclaim scope is voluntary or exceeds applicable code-minimum requirements.

4. Start-Up and Functional Verification

- a. Provide system start-up documentation confirming that start-up service was performed or supervised by a manufacturer-authorized representative or other qualified authorized representative, as applicable.
- b. Provide functional performance test results verifying recovered-heat flow, entering and leaving temperatures, valve operation, pump operation, control enable/disable logic, auxiliary heating staging, bypass/rejection operation, and applicable lockouts or resets.
- c. Functional testing shall verify that recovered heat is delivered to the eligible receiving load and that the system does not increase refrigeration or air-conditioning operating pressure without useful recovered heat delivery.

5. Cost Information

- a. Provide equipment-cost information for the Refrigeration Heat Reclaim system design.
- b. Cost information shall isolate the incremental heat-reclaim scope from code-required refrigeration, HVAC, water-heating, pool/spa, or process-water equipment.
- c. For projects subject to code-minimum heat-recovery requirements, cost information shall identify only the above-code heat-reclaim scope claimed under this HPM.

Incremental Measure Cost

The **Incremental Measure Cost (IMC)** presented below is intended for **CEDA program planning and inducement calibration only**. It represents a normalized incremental first cost for implementing qualifying **Refrigeration Heat Reclaim HPM** scope relative to an otherwise code-compliant baseline system under typical California new construction conditions. The IMC is not intended to serve as a project-specific cost estimate, contractor bid comparison, or reconciliation tool for actual project pricing.

Actual project costs may vary based on refrigeration system type, refrigerant platform, heat-reclaim configuration, eligible receiving load, piping distance, hydronic or airside integration scope, controls complexity, commissioning requirements, procurement timing, and the amount of heat-reclaim scope already required by code. Accordingly, the IMC values are based on representative planning anchors rather than project-specific installed-cost data.

Important IMC boundary: For projects subject to 2025 Title 24, Part 6 Section 120.6(b)4A, Section 110.4(c)3, or other applicable code-minimum heat-recovery requirements, the IMC applies only to the above-code heat-reclaim scope claimed under this HPM. Code-required heat recovery alone is not included in the HPM incremental cost basis.

Base Case

The **Base Case** represents an otherwise code-compliant refrigeration-intensive new construction project of the same general application, without incremental heat-reclaim scope credited to this HPM. The Base Case includes:

- Commercial refrigeration systems and, where applicable, qualifying air-conditioning systems that reject heat conventionally to outdoors through condensers or gas coolers, except for any heat-recovery scope already required by applicable code.
- Code-compliant HVAC space-heating, ventilation-air preheat, domestic/service-water-heating, pool/spa water-heating, or process-water-preheat systems of the same general type and scale as the project, but without incremental heat-reclaim equipment credited to this HPM.
- Standard manufacturer controls, installation, and startup for baseline refrigeration, air-conditioning, HVAC, water-heating, pool/spa, or process-water systems.
- For projects subject to 2025 Title 24, Part 6 Section 120.6(b)4A, any refrigeration heat-recovery scope already required by code for HVAC space heating.
- For pool/spa water-heating applications subject to 2025 Title 24, Part 6 Section 110.4(c)3 or similar applicable requirements, any recovered-energy scope already required to satisfy code minimum.

The Base Case does **not** include above-code reclaim heat exchangers, reclaim pumps, reclaim piping loops, reclaim storage or buffer tanks, reclaim coils, reclaim-specific BAS visibility, enhanced controls integration, or enhanced functional testing intended to verify ongoing useful heat delivery under this HPM.

Measure Case

The **Measure Case** represents the same general project application as the Base Case but is modified to meet the **Refrigeration Heat Reclaim HPM System Design Requirements**. The Measure Case includes the heat-reclaim equipment, controls, integration, commissioning, and documentation needed to deliver useful recovered heat to eligible onsite receiving loads.

Essential level: HVAC Space Heating with Refrigeration Heat Reclaim

- **Qualifying application:** Refrigeration heat reclaim equipment serving HVAC space-heating or ventilation-air preheat loads.
- **Source-side heat-reclaim equipment:** Reclaim condenser, discharge-line heat exchanger, desuperheater, gas-cooler heat-reclaim interface, refrigerant-side valves, safeties, and associated piping, as applicable.
- **HVAC receiving-side equipment:** HVAC system interface, receiving-side air coil or hydronic coil, secondary-loop pump package where used, piping, valves, and related equipment needed to deliver recovered heat to HVAC space-heating or ventilation-air preheat loads.
- **Controls and integration:** Controls that prioritize useful recovered heat when the receiving load is available without unnecessary increases in compressor head pressure, condensing temperature, or gas-cooler pressure, including BAS points where applicable.
- **Startup and verification:** Startup, functional testing, and documentation showing recovered heat delivery to the HVAC space-heating or ventilation-air preheat system.
- **Code baseline treatment:** For projects subject to 2025 Title 24, Part 6 Section 120.6(b)4A, only the above-code HVAC space-heating or ventilation-air preheat heat-reclaim portion is incremental.

Advanced level: Water Heating with Refrigeration or Air-Conditioning Heat Reclaim

- **Qualifying application:** Refrigeration or qualifying air-conditioning heat reclaim equipment serving domestic/service water-heating, pool/spa water-heating, or eligible process-water preheat loads.
- **Source-side heat-reclaim equipment:** Refrigerant-to-water heat exchanger, desuperheater, reclaim heat exchanger package, gas-cooler heat-reclaim interface, refrigerant-side valves, safeties, and associated piping, as applicable.
- **Water-heating receiving-side equipment:** Domestic/service-water-heating, pool/spa water-heating, or eligible process-water-preheat system interface; preheat tank; storage or buffer volume where needed; pumps; water-side piping; valves; controls; and related equipment needed to deliver recovered heat to the applicable water-heating or water-preheat load.
- **Controls and integration:** Controls that prioritize useful recovered heat when the receiving water-heating or water-preheat load is available and stage auxiliary heating only as needed, including BAS points where applicable.
- **Startup and verification:** Startup, functional testing, and documentation showing recovered heat delivery to the water-heating or water-preheat system.
- **Incremental scope limit:** The incremental scope does not include the full cost of the primary water-heating, pool/spa heating, or process-water heating plant itself. It includes only the heat-reclaim-related premium needed to use recovered heat for the eligible receiving load.
- **Code baseline treatment:** For pool/spa water-heating or process-water-preheat applications, only heat-reclaim scope documented as voluntary or exceeding applicable code-minimum requirements is incremental.

Premium level: Heat Pump HVAC and Heat Pump Water Heating with Heat Reclaim

- **Qualifying application:** Both eligible HVAC space-heating or ventilation-air preheat, and eligible water-heating or water-preheat heat-reclaim applications are installed, operational, and served by qualifying heat pump-based receiving systems.
- **Source-side heat-reclaim equipment:** Shared source-side heat-reclaim hardware counted once, including reclaim condenser, discharge-line heat exchanger, desuperheater, refrigerant-to-water heat exchanger, gas-cooler heat-reclaim interface, refrigerant-side valves, safeties, and associated piping, as applicable.

- **HVAC receiving-side equipment:** Heat pump HVAC system interface, receiving-side air coil or hydronic coil, secondary-loop pump package where used, piping, valves, and related equipment needed to deliver recovered heat to HVAC space-heating or ventilation-air preheat loads.
- **Water-heating receiving-side equipment:** Heat pump domestic/service-water-heating, pool/spa water-heating, or eligible process-water-preheat system interface; preheat tank; storage or buffer volume where needed; pumps; water-side piping; valves; controls; and related equipment needed to deliver recovered heat to the applicable water-heating or water-preheat load.
- **Controls and integration:** Controls that coordinate priority between HVAC and water-heating receiving loads while preserving efficient refrigeration or air-conditioning operation, including head-pressure, condensing-temperature, or gas-cooler-pressure safeguards, BAS visibility, and trend points where applicable.
- **Startup and verification:** Startup, functional testing, and documentation showing both heat-reclaim applications are installed, operational, and capable of delivering useful recovered heat.
- **Code baseline treatment:** For projects subject to applicable code-minimum heat-recovery requirements, only the above-code HVAC heat-reclaim scope and eligible above-code water-heating or water-preheat heat-reclaim scope are incremental.

Incremental cost is driven primarily by reclaim interface hardware, receiving-side load integration, controls programming, BAS visibility, startup, and functional verification. Water-heating heat reclaim is generally a more direct receiving-load pathway because it is typically served through water-side heat exchangers, preheat or buffer volume, pumps, valves, and controls. HVAC space-heating or ventilation-air preheat reclaim typically requires more airside or hydronic receiving-side integration, such as coils, secondary-loop components, additional control coordination, and verification of useful heat delivery to space-heating loads. Premium projects have the highest IMC because they include both HVAC and water-heating or water-preheat heat-reclaim applications, with shared source-side heat-reclaim equipment counted once but additional receiving-side interfaces, BAS visibility, startup, and functional verification required for both load pathways.

IMC Values and Normalization

IMCs for this measure are presented as representative normalized values by size class and HPM tier. For this HPM, IMCs are normalized on a **\$/MBH of claimable useful reclaim heating capacity** basis, where **MBH = 1,000 Btu/h**. This unit is used because the incremental cost of refrigeration heat reclaim is driven primarily by the useful heat-reclaim interface serving eligible receiving loads, including heat exchangers, coils, pumps, valves, piping, controls, BAS integration, startup, functional testing, and documentation. It also aligns with the HPM's Btu/h-based eligibility and documentation requirements while avoiding the readability issues associated with raw \$/Btu/h values.

For purposes of this HPM, **claimable useful reclaim heating capacity** means the design heating capacity delivered by the heat-reclaim system to eligible onsite receiving loads. It does **not** mean total refrigeration or air-conditioning heat rejection. The 50,000 Btu/h design heat-rejection threshold is used to establish tier eligibility for each contributing system; the IMC is normalized based on the useful reclaim heating capacity delivered to eligible receiving loads.

Where one heat-reclaim source serves multiple eligible receiving loads, shared source-side heat-reclaim equipment shall be counted once. Useful reclaim heating capacity may not be double counted across tiers, receiving loads, or other CEDA HPMs. For projects subject to applicable code-minimum heat-recovery requirements, only the above-code heat-reclaim scope may be counted toward the IMC.

Claimable Useful Reclaim Heating Capacity	Essential IMC	Advanced IMC	Premium IMC	What drives the delta
50 – 199 MBH	\$160/MBH	\$125/MBH	\$180/MBH	Higher fixed-cost burden from controls, BAS points, startup, and functional testing spread over smaller reclaim capacity
200 – 499 MBH	\$125/MBH	\$95/MBH	\$135/MBH	Representative mid-size heat-reclaim scope; balanced equipment, controls, and commissioning costs
500+ MBH	\$95/MBH	\$75/MBH	\$105/MBH	Larger systems spread fixed integration and commissioning costs over more useful reclaim capacity

The **Essential tier** is higher than the **Advanced tier** because HVAC space-heating or ventilation-air preheat reclaim typically requires more airside or hydronic receiving-side integration, such as coils, secondary-loop components, control coordination, and verification of useful heat delivery to space-heating or ventilation-air loads. The **Advanced tier** is lower because domestic/service-water-heating, pool/spa water-heating, and eligible process-water preheat applications are generally more direct receiving-load pathways using water-side heat exchangers, preheat or buffer volume, pumps, valves, and controls. The **Premium tier** is highest because it includes both HVAC and water-heating or water-preheat reclaim applications, with shared source-side heat-reclaim equipment counted once but additional receiving-side interfaces, BAS visibility, startup, and functional testing required for both load pathways.

These IMC values are representative planning values for CEDA program calibration and measure review. Actual project costs may vary based on refrigeration system type, refrigerant platform, heat-reclaim configuration, receiving-load type, piping distance, controls complexity, commissioning requirements, and procurement timing. The values are not intended to serve as project-specific cost estimates, contractor bid comparisons, or reconciliation values for actual project pricing.

Sources

IMC values are informed by a combination of publicly available market pricing, industry cost references, technical guidance, and program experience. They are intended to reflect typical market conditions rather than project-specific pricing, including:

- [2025 California Building Energy Efficiency Standards \(Title 24, Part 6\)](#), including covered-process refrigeration heat-recovery requirements, pool/spa equipment requirements, and related receiving-load provisions.
- [NREL, Refrigeration Playbook: Heat Reclaim](#), for application types, implementation difficulty, operations and maintenance considerations, and measurement and verification context.
- [ORNL, Waste Heat Recapture from Supermarket Refrigeration Systems](#), for representative supermarket refrigeration waste-heat recovery approaches and useful-recovery sizing context.
- [Copeland, Design Considerations for Heat Reclaim Systems](#), for head-pressure control, refrigerant charge, pressure-drop, and reliability safeguards.
- [Danfoss, Heat Reclaim in Transcritical CO₂ Systems](#), for reclaim modes, temperature levels, hot-water applications, and pressure-management implications for CO₂ systems.
- [Walmart, Heat Reclaim Evolution](#), for practical space-heating reclaim hardware, glycol heat recovery unit architecture, refrigerant-piping considerations, and refrigerant-charge reduction strategies.

- [Steuer, Arias, and Sawalha, Techno-economic Evaluation of Heat Recovery from Supermarket Refrigeration Systems](#), for real-world investment and operating-savings context from supermarket CO₂ heat-recovery installations.
- Public market pricing sampled from **SupplyHouse**, **State Supply**, **WaterHeatersOnline**, and **Grainger** for representative plate heat exchangers, pumps, valves, actuators, storage tanks, hydronic coils, and related receiving-side components.
- Public controls-cost and labor references, including NREL controls-cost literature and California wage references, for labor and controls-integration context.

Code Readiness Objectives

This measure supports CEDA's Code Readiness efforts by collecting performance, controls, cost, and market data for future Title 24 improvements related to **Refrigeration Heat Reclaim** systems in commercial, industrial, cold-storage, process-refrigeration, and similar refrigeration-intensive applications. The data will help determine when recovered heat from eligible vapor-compression equipment can provide reliable and measurable reductions in heating energy without creating avoidable refrigeration-system penalties.

Because refrigeration heat reclaim opportunities vary by project type, refrigerant platform, climate zone, operating schedule, receiving-load profile, and applicable code baseline, this section focuses on the operating conditions, control strategies, system configurations, commissioning practices, and market factors needed to evaluate future code pathways. The objectives include the following:

- **Quantify useful recovered heat delivered to eligible onsite loads.** Track annual recovered heat delivered to space heating, ventilation-air preheat, domestic/service water heating, pool/spa water heating, and/or eligible process-water preheat loads, and compare delivered heat to the available refrigeration or air-conditioning heat-rejection opportunity.
- **Evaluate avoided heating energy by system type and tier.** Document avoided therms where recovered heat offsets gas-fired heating equipment and avoided kWh where recovered heat offsets electric heating equipment, including differences between the Essential, Advanced, and Premium pathways.
- **Differentiate code-required and above-code heat-reclaim performance.** For projects subject to applicable code-minimum heat-recovery requirements, identify the portion of recovered heat and avoided heating energy associated with the above-code scope claimed under this HPM.
- **Assess net system performance impacts.** Determine whether heat reclaim reduces total building energy use without creating avoidable refrigeration or air-conditioning penalties, such as increased compressor head pressure, elevated gas-cooler pressure, excessive condensing temperature, or unnecessary auxiliary equipment operation.
- **Evaluate controls behavior and sequence effectiveness.** Compare design intent to actual operation, including heat-reclaim enable/disable logic, prioritization among eligible receiving loads, coordination with condenser or gas-cooler controls, auxiliary-heating staging, bypass/rejection operation, and lockout conditions when heat reclaim does not provide a net benefit.
- **Characterize load matching across climate zones and facility types.** Identify how climate zone, facility type, operating schedule, refrigeration load profile, receiving-load temperature, and seasonal load variation affect the number of hours when recoverable heat is available and useful.
- **Compare heat-reclaim configurations and refrigerant platforms.** Collect performance information for desuperheat-only, partial-condensing, full-condensing, refrigerant-to-water, airside, hydronic, and transcritical CO₂ gas-cooler heat-recovery configurations to understand which approaches are most practical and repeatable for future code pathways.

- **Identify commissioning, metering, and verification needs.** Determine which trend points, meters, sensor locations, and start-up checks are necessary to verify that recovered heat is delivered and used over time, rather than only installed as a design feature.
- **Assess market readiness and cost drivers.** Document equipment availability, contractor familiarity, engineering effort, added piping or refrigerant-side complexity, commissioning effort, manufacturer support needs, and installed-cost drivers to inform future cost-effectiveness, compliance feasibility, and code-readiness analysis.

Code Readiness Site Monitoring

If selected for Code Readiness monitoring, equipment energy consumption and mechanical system performance may be monitored on-site for a period of up to 24 months. To support performance evaluation and data collection, projects shall provide reasonable access for the installation and operation of metering, sensors, and communication equipment.

Projects equipped with a Building Automation System (BAS), Energy Management System (EMS), or equivalent platform should enable integration of advanced metering devices through the existing system to facilitate data collection and remote access. For projects without a BAS or EMS, the Code Readiness team may install temporary stand-alone data loggers, sensors, and communication equipment as needed to monitor system performance for the duration of the monitoring period.

Instrumentation may be installed or supplemented, where necessary, to measure key system and equipment parameters sufficient to evaluate system performance and operational characteristics. All monitoring equipment will be temporary and installed in a manner that minimizes disruption to normal building operations.

Data Benefits

Collected data will help support the following:

- Confirm actual heat-reclaim operation compared to design intent.
- Quantify useful recovered heat delivered to eligible onsite loads.
- Estimate avoided heating energy, associated cost savings, and total site energy impacts by system type.
- Compare seasonal, climate-zone, facility-type, and receiving-load variation in heat-reclaim performance.
- Assess control effectiveness in maximizing useful heat recovery while avoiding unnecessary refrigeration or air-conditioning penalties.
- Identify practical system configurations that support reliable, cost-effective heat reclaim.
- Refine assumptions for future energy savings, cost, CO₂e, and code-readiness analysis.
- Inform commissioning, metering, and trend-point needs for future code pathways.
- Identify maintenance needs and failure modes that affect long-term system reliability.
- Document cost drivers, contractor readiness, and manufacturer support needs.
- Support future Title 24 applicability criteria, including project type, system size, refrigerant platform, and receiving-load suitability.

Sample Data Points

A sample set of data points that would ideally be collected is provided below for reference. This list will be re-developed for each project based on the infrastructure and needs of the monitoring effort.

Data Points to Meter or Trend	Unit	Additional Specifications
Refrigeration or air-conditioning system power	kW	Total power for contributing source system(s), where practical
Auxiliary heating system power or fuel use	kW / therms	Heating equipment offset by recovered heat
Recovered heat transfer	Btu/h	Average, peak, and annualized recovered heat delivered to eligible receiving load(s)
Receiving-load flow rate	GPM / CFM	Water-side or airside flow serving the heat-reclaim load
Receiving-load supply temperature	°F	Leaving temperature from heat-reclaim heat exchanger, coil, or loop
Receiving-load return temperature	°F	Entering temperature to heat-reclaim heat exchanger, coil, or loop
Receiving-load heat delivered	Btu/h	Calculated from flow and temperature difference, where available
Heat-reclaim enable status	On/Off	Commanded and/or actual heat-reclaim operation
Heat-reclaim valve, pump, or bypass status	% / On-Off	Valve position, pump status, bypass status, or rejection mode
Auxiliary heating status	On/Off / %	Staging or modulation of backup or supplemental heating
Compressor head pressure, condensing temperature, or gas-cooler pressure	psig / °F	Used to evaluate refrigeration or air-conditioning operating penalty
Refrigerant platform or system mode	Text / Flag	Subcritical, transcritical CO ₂ , desuperheat, partial-condensing, full-condensing, or other applicable mode
Outdoor air temperature	°F	Measured at the unit or site
Outdoor air humidity	% RH	Measured at the unit or site, where relevant
Indoor or receiving-zone temperature	°F	Average or representative zone/space temperature, where relevant
Building operating mode	Flag	Occupied, unoccupied, production, defrost, pull-down, peak service-water load, or other relevant operating mode

Code Reference

For this high-performance measure, the applicable code-minimum baseline is defined primarily by the governing Title 24, Part 6 covered-process refrigeration heat-recovery requirements, with related Title 20, federal equipment-efficiency, CARB/EPA refrigerant, and AHRI/ASHRAE rating, safety, and design standards applied where they regulate the contributing refrigeration equipment, receiving loads, refrigerant platform, or system integration.

Measure Type	Code / Standard	Applicable Code Reference	Effective Date / Applicability Notes
Refrigeration Heat Reclaim (Core)	CA Building Energy Efficiency Standards – Title 24, Part 6 (2025)	Section 120.6(b) – Mandatory Requirements for Commercial Refrigeration Section 120.6(b)4 – Refrigeration Heat Recovery Section 100.1 – Definition of Total Heat of Rejection (THR) Section 110.0 and 110.1 – State/federal appliance and equipment standards Section 120.3 – Pipe insulation	Effective January 1, 2026. Core code baseline for retail food or beverage stores ≥8,000 ft ² CFA with display cases or walk-ins.
Refrigeration Heat Reclaim (Adjacent)	CA Building Energy Efficiency Standards – Title 24, Part 6 (2025)	Section 120.6(a) – Refrigerated Warehouses Tables 120.6-A-1, 120.6-A-2, 120.6-B, 120.6-C Section 120.6(a)7 – Refrigerated warehouse acceptance Section 120.6(a)8 – Transcritical CO ₂ gas coolers	Effective January 1, 2026. Relevant to refrigerated warehouses/cold storage. No direct warehouse heat-reclaim mandate identified in 120.6(a); use as system-performance and acceptance baseline.
Refrigeration Heat Reclaim (CO ₂)	CA Building Energy Efficiency Standards – Title 24, Part 6 (2025)	Section 120.6(b)5 – Transcritical CO ₂ Gas Coolers Table 120.6-E – Transcritical CO ₂ fan-powered gas cooler minimum efficiency requirements Section 120.6(b)6 – Commercial refrigeration acceptance	Effective January 1, 2026. Highly relevant where heat reclaim is implemented on transcritical CO ₂ systems and must not compromise floating head / gas cooler efficiency.
Heat Recovery / Receiving Loads (Secondary)	CA Building Energy Efficiency Standards – Title 24, Part 6 (2025)	Section 140.4(s) – Mechanical heat recovery Section 140.5(c) – High-capacity service water-heating systems; Exception 1 for site-solar or site-recovered energy [when recovered heat serves SHW]	Effective January 1, 2026. Secondary reference only; Section 140.4(s) is not the same as commercial refrigeration heat reclaim but may affect projects with large simultaneous heating/cooling or service-water loads.
Acceptance / Verification	2025 Reference Appendices for Title 24, Part 6	Joint Appendix JA1 – Definitions Appendix NA7.10 – Refrigerated warehouse acceptance tests Appendix NA7.20.1 – Transcritical CO ₂ gas cooler and gas cooler fan motor variable speed control acceptance	Effective January 1, 2026.
Equipment Efficiency	CA Appliance Efficiency Regulations – Title 20	Sections 1601–1609 generally Section 1605.1(a)(2) – Commercial refrigerators/freezers; Section 1605.1(a)(4)-(5) – Walk-in coolers/freezers; Section 1606 – MAEDbS certification/listing	Current; effective dates vary by equipment class. Relevant to regulated refrigeration equipment used in retail food, commercial kitchens, and walk-ins.

Measure Type	Code / Standard	Applicable Code Reference	Effective Date / Applicability Notes
Federal Equipment Standards	U.S. DOE Energy Conservation Standards – 10 CFR Part 431	Subpart C – Commercial refrigerators, freezers, and refrigerator-freezers Subpart R – Walk-in coolers and walk-in freezers Subpart F – Commercial air conditioners and heat pumps [if heat reclaim source/receiving equipment includes AC/HP] Subpart G – Commercial water heaters Subpart H – Automatic commercial ice makers	Federal equipment baseline. Current; compliance dates vary.
Federal HFC / Refrigerant Platform	EPA HFC Technology Transitions – 40 CFR Part 84, Subpart B	Section 84.54 and EPA sector/subsector tables for refrigeration, AC/heat pumps, chillers, cold storage warehouses, industrial process refrigeration, retail food systems, and ice rinks	Restrictions phase in beginning January 1, 2025, with additional 2026-2028 dates by subsector.
California HFC / Refrigerant Platform	CARB HFC Regulation and Refrigerant Management Program	17 CCR Sections 95371–95379; Section 95374 Tables 1, 3, and 4; Section 95375; CARB Retail Food Refrigeration / Retail Food Facility pages; CARB Refrigerant Management Program for systems with >50 lb high-GWP refrigerant.	Effective dates and applicability vary by end use, equipment type, refrigerant charge, and refrigerant GWP. Included as a refrigerant-platform and refrigerant-management reference only; it does not establish HPM heat-reclaim capacity or eligibility.
Rating / Test Standards	AHRI Standards and Certification References	AHRI 1200/1201 – Commercial refrigerated display merchandisers and storage cabinets AHRI 1250/1251 – Walk-in coolers/freezers AHRI 460 – Remote mechanical-draft air-cooled refrigerant condensers AHRI 920 – DX-DOAS	Use current edition required by applicable code/equipment program.
Safety / Engineering Practice	ASHRAE Standards, Guidelines, and Handbooks	ASHRAE Standard 15 – Safety Standard for Refrigeration Systems ASHRAE Standard 34 – Designation and Safety Classification of Refrigerants ASHRAE Standard 72 – Method of Testing Open and Closed Commercial Refrigerators and Freezers ASHRAE Standard 90.1 – National model energy standard benchmark ASHRAE Guideline 36 – High-performance sequences of operation ASHRAE Handbook – Refrigeration, Ch. 3: Transcritical or subcritical CO ₂ equipment; Ch. 16: Food-service and general commercial refrigeration applications; Ch. 44: Ice rinks	Design, safety, controls, and technical background.

Eligible Climate Zones, Building Types, and Project Scopes

Eligible Climate Zones

This high-performance measure applies statewide in **California Climate Zones 1–16**. Applicants must identify the project's applicable Title 24 climate zone in the submittal.

Eligible Building Types

This high-performance measure applies to eligible **nonresidential, public, agricultural, industrial, and high-rise multifamily common-area** projects with qualifying vapor-compression equipment and eligible onsite heating or preheating loads that can use recovered heat when available.

Eligible applications are expected to be refrigeration-intensive or process-cooling-intensive facilities where rejected heat from refrigeration or qualifying air-conditioning systems can be productively redirected to onsite space-heating, ventilation-air preheat, domestic/service-water-heating, pool/spa water-heating, or eligible process-water preheat loads.

Eligible building types may include, but are not limited to:

- **Supermarkets, grocery stores, and retail food facilities** with centralized commercial refrigeration systems, display cases, walk-ins, or transcritical CO₂ refrigeration systems.
- **Convenience stores and small-format food retail facilities** with qualifying refrigeration systems and eligible receiving loads.
- **Commercial kitchens, food service facilities, commissaries, and institutional kitchens** with significant refrigeration and service-water-heating loads.
- **Food processing, beverage processing, and agricultural processing facilities** with qualifying refrigeration or process-cooling systems and eligible water-heating or water-preheat loads.
- **Refrigerated warehouses, cold storage facilities, and distribution facilities** with qualifying refrigeration systems and onsite heating or water-heating loads.
- **Ice rinks and similar recreation facilities** with qualifying refrigeration systems and eligible space-heating, pool/spa water-heating, resurfacing-water, melt-pit, or other eligible process-water preheat loads.
- **Hotels, lodging, aquatic centers, recreation centers, and similar facilities** where qualifying refrigeration or air-conditioning heat reclaim serves eligible domestic/service-water-heating or pool/spa water-heating loads.
- **Laboratory, healthcare, industrial, or public facilities** with qualifying refrigeration, process-cooling, or air-conditioning systems and eligible onsite heating or water-preheat loads.
- **High-rise multifamily common areas and central plant/common-load systems**, where qualifying refrigeration or air-conditioning heat reclaim serves eligible common-area HVAC, service-water, pool/spa, or process-water preheat loads.

Eligibility is not based on building type alone. The project must include a qualifying heat-reclaim source, an eligible receiving load, controls that deliver useful recovered heat without creating avoidable refrigeration or air-conditioning penalties and supporting documentation demonstrating compliance with the applicable HPM tier requirements.

Eligible Project Scopes

This high-performance measure applies to the following project scopes:

- **New construction projects** that include qualifying refrigeration or qualifying air-conditioning systems and eligible onsite receiving loads.
- **Additions** where the added scope includes qualifying vapor-compression equipment, eligible receiving loads, and heat-reclaim system integration.
- **Major alterations or major system retrofits** that materially modify refrigeration, air-conditioning, HVAC, water-heating, pool/spa, or process-water systems to incorporate qualifying heat reclaim.
- **Refrigeration system replacements or expansions** where the project adds a qualifying heat-reclaim system that delivers useful recovered heat to eligible onsite receiving loads.
- **Water-heating, pool/spa water-heating, or eligible process-water preheat upgrades** where qualifying refrigeration or air-conditioning heat reclaim is added as part of the receiving-load design.
- **HVAC space-heating or ventilation-air preheat upgrades** where qualifying refrigeration heat reclaim is added and coordinated with the receiving HVAC system.
- **Integrated heat-reclaim projects** that serve more than one eligible receiving load, provided shared heat-reclaim source-side equipment is counted only once and useful reclaim capacity is not double counted across tiers or other CEDA HPMs.

For projects subject to applicable code-minimum heat-recovery requirements, including 2025 Title 24, Part 6 Section 120.6(b)4A, Section 110.4(c)3, or other applicable requirements, only the heat-reclaim scope that exceeds the code-required minimum may be claimed under this HPM. Code-required heat recovery alone does not qualify.

This high-performance measure does not apply to:

- **Low-rise residential buildings**, including single-family buildings and multifamily buildings with three or fewer habitable stories above grade.
- Projects that do not include qualifying vapor-compression equipment.
- Projects that do not include an eligible onsite receiving load.
- Routine maintenance, controls tuning, or like-for-like equipment replacement that does not add qualifying heat-reclaim functionality.
- Projects where the heat-reclaim system is installed only to satisfy code-minimum requirements and does not include an above-code scope claimed under this HPM.

Measure Exclusions

This High-Performance Measure (HPM) applies only to qualifying **Refrigeration Heat Reclaim** systems that recover useful heat from eligible vapor-compression equipment and deliver that heat to an eligible onsite receiving load in accordance with the selected tier requirements. This HPM excludes the following system types, applications, equipment cases, and inducement overlaps:

Out-of-Scope System Types and Applications

- **Code-minimum heat recovery only.** Refrigeration heat recovery installed solely to comply with applicable code-minimum requirements does not qualify. For projects subject to 2025 Title 24, Part 6 Section 120.6(b)4A, Section 110.4(c)3, or other applicable code-minimum heat-recovery requirements, only the above-code heat-reclaim scope may be claimed.
- **Air-conditioning heat reclaim under the Essential tier.** Air-conditioning heat reclaim does not qualify for the Essential tier. The Essential tier is limited to heat recovery from eligible commercial refrigeration system(s).
- **Systems without an eligible receiving load.** Systems installed only for condenser control, gas-cooler control, heat rejection, or internal refrigeration operation do not qualify unless useful recovered heat is delivered to an eligible onsite receiving load.
- **Heat recovery chillers and comfort-cooling chilled-water heat recovery systems.** Heat recovery chillers and other chilled-water heat-recovery systems whose primary function is to produce chilled water for comfort cooling are not eligible under this HPM. These systems may be addressed under the Heat Recovery Chiller HPM, where applicable.
- **Non-vapor-compression waste-heat sources.** Boiler flue gas, drain or wastewater, dryer exhaust, process exhaust, compressed air, combustion exhaust, and similar non-refrigeration waste-heat sources are not eligible under this HPM.
- **Non-water process heating loads.** Product heating, process air, steam or boiler preheat, glycol or process-fluid loops, drying, industrial process loads, or similar non-water process-heating applications do not qualify as standard receiving-load pathways unless specifically approved in writing by CEDA program administrators.
- **Systems below the required heat-rejection threshold.** Systems below the required design heat-rejection threshold for the selected tier do not qualify.

Non-Qualifying Efficiency, Certification, and Documentation Cases

- **Refrigerant recovery or refrigerant-only measures.** Refrigerant recovery, recycling, reclamation, refrigerant conversion, refrigerant charge reduction, or leak-reduction measures do not qualify unless the project also installs a qualifying heat-reclaim system that delivers useful recovered heat to an eligible receiving load.
- **Standalone equipment efficiency upgrades.** Compressor, condenser, gas-cooler, display-case, walk-in, control, or refrigeration equipment efficiency upgrades do not qualify unless they are part of a qualifying heat-reclaim design.
- **Self-contained refrigeration appliances.** Self-contained commercial refrigeration appliances do not qualify unless they are part of an engineered heat-reclaim system that meets the applicable HPM tier requirements.
- **Internal refrigeration-cycle functions only.** Hot-gas defrost, anti-sweat heat, subcooling, oil management, crankcase heat, internal reheat, or similar internal refrigeration-cycle functions do not qualify unless recovered heat is delivered to an eligible onsite receiving load.
- **Low-GWP refrigerant selection alone.** Low-GWP refrigerant selection, including CO₂, does not qualify by itself. Refrigerant platform may affect heat-reclaim design, but this HPM requires useful recovered heat delivered to an eligible onsite receiving load.

- **Heat-reclaim-ready equipment only.** Heat-reclaim-ready equipment, capped connections, future provisions, or unconnected coils do not qualify unless the heat-reclaim system is installed, operational, commissioned, and connected to an eligible receiving load.
- **Systems that create avoidable refrigeration or air-conditioning penalties.** Systems that increase compressor head pressure, condensing temperature, or gas-cooler pressure without delivering useful recovered heat to an eligible receiving load do not qualify.
- **Noncompliant or undocumented equipment.** Equipment that does not meet applicable state, federal, local, Title 24, Title 20, safety, listing, rating, certification, or manufacturer documentation requirements does not qualify.
- **Incomplete documentation.** Projects without required design documentation, sequence of operations, equipment submittals, start-up documentation, functional verification, and cost information do not qualify.
- **Costs that cannot isolate eligible HPM scope.** Costs that cannot isolate the incremental heat-reclaim scope from code-required refrigeration, HVAC, water-heating, pool/spa, process-water, or other base project equipment are not eligible for inducement.
- **Non-qualifying Premium-tier receiving systems.** Premium-tier projects using gas-fired or electric-resistance receiving systems as the qualifying heat-reclaim heating system do not qualify for the Premium tier.

Anti-Double-Dip Provision

To prevent overlapping inducements, the same source system, heat exchanger, recovered-heat loop, controls package, receiving load, monitoring scope, cost, or avoided heating energy may not receive overlapping inducements under this HPM and another CEDA HPM for the same claimed function or performance attribute.

Projects may implement multiple CEDA HPMs within the same building only where each inducement applies to physically distinct systems or clearly separable, non-overlapping equipment, controls, costs, monitoring scope, and savings. If overlap exists for a given heat source, receiving load, controls package, monitoring package, cost, or avoided heating-energy claim, the project must select one HPM inducement path for that scope.

CEDA program administrators reserve the right to determine whether claimed measures constitute overlapping scope for the same equipment, controls integration, monitoring infrastructure, cost basis, or avoided heating-energy claim.

Reviewer Checklist

HPM Reviewer Checklist: LM646 – Refrigeration Heat Reclaim – V1.2

Checklist Description: This checklist captures the elements that must be present in the project design to be eligible for the high-performance measure inducement or consideration for additional site monitoring.

Project Name: _____ **Review Date:** _____

Assessment: _____ **Notes:** _____

- Approved
- Not approved

Reviewer: _____ **Signature:** _____

High-Performance Measure Requirements	Comments
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Code Baseline Screen

- For projects subject to applicable code-minimum heat-recovery requirements, including 2025 Title 24, Part 6 Section 120.6(b)4A, Section 110.4(c)3, or other applicable requirements, only the above-code heat-reclaim scope is claimed toward this HPM.
- Code-required heat recovery alone is not claimed toward this HPM.
- Claimed heat-reclaim scope is clearly tied to the selected HPM tier and eligible receiving load(s).

System Design Requirements – All Tiers

- Design heat rejection: Each contributing refrigeration or qualifying air-conditioning system provides a minimum of 50,000 Btu/h of design heat rejection to the heat-reclaim system, as applicable to the selected tier. (§1.2, §2.2, §3.2.1, §3.3.1)
- Controls are configured to prioritize useful recovered heat when the receiving load is available. (§1.4, §2.7, §3.6)
- Controls avoid unnecessary increases in compressor head pressure, condensing temperature, or gas-cooler pressure when recovered heat is not useful to an eligible receiving load. (§1.4, §2.7, §3.6)
- Heat-reclaim system is installed, operational, and connected to an eligible onsite receiving load. (§1.1, §2.1, §3.1)

Essential Tier: HVAC Space Heating with Refrigeration Heat Reclaim

- Heat-reclaim application: HVAC system provides space heating or ventilation-air preheat using mechanical heat recovery from eligible commercial refrigeration system(s). (§1.1)
- Heat-reclaim source type: Eligible commercial refrigeration system(s). (§1.1)
- Receiving system/load type: Gas-fired, electric, or heat pump-based HVAC system serving space heating or ventilation-air preheat. (§1.3)

Advanced Tier: Water Heating with Refrigeration or Air-Conditioning Heat Reclaim

- Heat-reclaim application: Domestic/service water-heating, pool/spa water-heating, or eligible process-water preheat system utilizes mechanical heat recovery from eligible refrigeration or qualifying air-conditioning system(s). (§2.1)
- Heat-reclaim source type: Eligible refrigeration or qualifying air-conditioning system(s). (§2.1)

- Receiving system/load type: Gas-fired, electric, or heat pump water-heating system serving the applicable water-heating or water-preheat load. (§2.3)
- Pool/spa water-heating applications, if applicable, are documented as voluntary or exceeding applicable code-minimum requirements, including applicable 2025 Title 24, Part 6 Section 110.4(c)3 requirements. (§2.4)
- Process-water heating or process-water preheating applications, if applicable, are documented as voluntary or exceeding applicable code-minimum requirements. (§2.5)
- Non-water process heating loads are not claimed unless specifically approved in writing by CEDA program administrators. (§2.6)

Premium Tier: Heat Pump HVAC and Heat Pump Water Heating with Heat Reclaim

- Premium tier includes both eligible HVAC space-heating or ventilation-air preheat and eligible water-heating or water-preheat heat-reclaim applications. (§3.1)
- HVAC receiving system is heat pump-based and captures/utilizes recovered heat from eligible refrigeration or qualifying air-conditioning system(s). (§3.2)
- Water-heating or water-preheat receiving system is heat pump-based and captures/utilizes recovered heat from eligible refrigeration or qualifying air-conditioning system(s). (§3.3)
- Premium-tier receiving systems are not gas-fired or electric resistance as the qualifying Premium-tier receiving systems. (§3.4)
- Pool/spa water-heating or eligible process-water preheat applications, if applicable, are documented as voluntary or exceeding applicable code-minimum requirements. (§3.5)
- Controls coordinate priority between HVAC and water-heating receiving loads while preserving efficient refrigeration or air-conditioning operation. (§3.6)

Supporting Documents

Construction Plans and System Diagrams

- Engineered, stamped, and permitted construction plans are provided. (§1.a)
- Construction plans demonstrate that the Refrigeration Heat Reclaim system design complies with applicable state and local jurisdiction requirements and regulations. (§1.a)
- Heat-reclaim schematic or riser diagrams show refrigeration or qualifying air-conditioning source system(s), heat exchanger(s), pumps, valves, control sensors, receiving load(s), bypass or rejection equipment, and auxiliary heating equipment. (§1.b)
- For projects subject to code-minimum heat-recovery requirements, the code-required heat-recovery scope and above-code HPM-claimed scope are identified. (§1.c)

Sequence of Operations and Controls

- Sequence of operations for the Refrigeration Heat Reclaim system is provided. (§2.a)
- Sequence includes enable/disable criteria, priority between heat reclaim and auxiliary heating, receiving-load priority where multiple loads are served, head-pressure or gas-cooler-pressure safeguards, bypass/rejection modes, lockouts, alarms, and failure modes. (§2.b)

- Sequence describes how the system avoids unnecessary increases in compressor head pressure, condensing temperature, or gas-cooler pressure when recovered heat is not useful to an eligible receiving load. (§2.c)

Equipment Submittals

- Equipment submittals are stamped and approved by the responsible engineer of record. (§3.a)
- Submittals identify heat-recovery capacity, design total heat of rejection for each contributing system, refrigerant type, added refrigerant charge where applicable, heat-exchanger ratings, pump and valve components, control components, and receiving-load interface equipment. (§3.b)
- For pool/spa water-heating or process-water preheat applications, submittals identify the receiving water-heating load and document that the claimed heat-reclaim scope is voluntary or exceeds applicable code-minimum requirements. (§3.c)

Start-Up and Functional Verification

- System start-up documentation confirms that start-up service was performed or supervised by a manufacturer-authorized representative or other qualified authorized representative, as applicable. (§4.a)
- Functional performance test results verify recovered-heat flow, entering and leaving temperatures, valve operation, pump operation, control enable/disable logic, auxiliary heating staging, bypass/rejection operation, and applicable lockouts or resets. (§4.b)
- Functional testing verifies that recovered heat is delivered to the eligible receiving load and that the system does not increase refrigeration or air-conditioning operating pressure without useful recovered heat delivery. (§4.c)

Cost Information

- Equipment-cost information for the Refrigeration Heat Reclaim system design is provided. (§5.a)
- Cost information isolates the incremental heat-reclaim scope from code-required refrigeration, HVAC, water-heating, pool/spa, or process-water equipment. (§5.b)
- For projects subject to code-minimum heat-recovery requirements, cost information identifies only the above-code heat-reclaim scope claimed under this HPM. (§5.c)

Measure Exclusions and Anti-Double-Dip Screen

- Claimed scope does not consist only of refrigerant recovery, refrigerant reclamation, refrigerant conversion, refrigerant charge reduction, or leak-reduction work.
- Claimed scope does not consist only of heat-reclaim-ready equipment, capped connections, future provisions, or unconnected coils.
- Claimed scope does not consist only of internal refrigeration-cycle functions such as hot-gas defrost, anti-sweat heat, subcooling, oil management, crankcase heat, or internal reheat.
- Claimed source system, heat exchanger, recovered-heat loop, controls package, receiving load, monitoring scope, cost, or avoided heating energy is not double counted under another CEDA HPM.

Version History Log

Version	Effective Date	End Date	Change Description
1	June 15, 2025	June 07, 2026	N/A
1.2	June 08, 2026	Active	Updated measure to current CEDA HPM format; clarified Refrigeration Heat Reclaim eligibility, tier requirements, IMC basis, Code Readiness objectives, code references, measure exclusions, and reviewer checklist.

The version identified as 'Active' is the current published version and remains in effect until superseded by a subsequent published version. CEDA may update, replace, or retire High-Performance Measures without prior notice. End dates are assigned to prior versions once superseded.