

# Portland Clean Energy Community Benefits Fund Energy Efficiency and Renewable Energy Eligible Measures and Project Guidelines

## Document Overview

This document compiles a suite of eligible measures and project guidelines for the purpose of 2026 Community Grants public comment, including the following documents:

- Eligible Measures for Multi-unit Housing
- Eligible Measures for Single-unit Housing Retrofits
- Eligible Measures for Single-unit Housing New Construction
- Eligible Measures for Commercial Retrofits
- Eligible Measures for Commercial New Construction
- Technical Guidelines for Commercial Energy Savings Analysis

After public comment completes, for the most recent versions of these documents, please refer to the PCEF [energy resources webpage](#).

Last updated February 2026.

# Portland Clean Energy Community Benefits Fund

## Guidelines & Eligible Measures

### Multi-unit Housing v2

#### Document Overview

The Portland Clean Energy Community Benefits Fund (PCEF) invests in climate action projects, in alignment with the City’s climate action goals, that support environmental justice and environmental, social, and economic benefits for all Portlanders. This document is a resource for multi-unit housing projects, outlining project requirements, quality assurance processes, and measures that are eligible for PCEF funding.

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*This document is intended for the following audiences:*

- Prospective grantees, looking to learn more about PCEF requirements and process.
- Active grantees and their contractors, looking for guidance on their projects.

If you have questions, please contact [cleanenergy@portlandoregon.gov](mailto:cleanenergy@portlandoregon.gov), or reach out to your grant manager.



# Program Framework

## Measure Requirements

### GENERAL REQUIREMENTS

- For the Unregulated Multifamily (Multi-unit Housing) (SP 2), Single Family (Single-unit Housing) (SP 3), and Small Commercial (SP 4) strategic programs, and for Community Grants in existing buildings, an expanded non-energy allowance may apply.
- If match funding is available and secured, and the total project cost (PCEF funds plus match funds) includes at least 70% of construction costs for energy improvements, then up to 50% of PCEF funds may be used for health, safety, accessibility, or enabling repairs.
- No more than 35% of PCEF-funded hard construction costs related to the energy scope may be allocated to windows and lighting. PCEF may consider exceptions to this percentage for projects that include a comprehensive energy reduction package that is estimated to achieve a minimum site-Energy Use Intensity (EUI) reduction of 30%.
- Program approval is required for installation of non-electric equipment, or conversion from a ducted to a non-ducted heating system.
- PCEF Eligible Measures are for use as one part of the PCEF process, by PCEF grantees and contractors.
- For projects that include renewable components, refer to [Appendix A](#) for additional guidance.

### RETROFIT REQUIREMENTS

- For retrofit projects, a Grantee's total energy efficiency and/or renewable energy (EE/RE) construction budget—or the annual EE/RE construction budget for multi-year grants—must maintain an overall 70% EE/RE and 30% non-energy cost split. At the individual building or unit level, within the same project, costs must not exceed 60% EE/RE and 40% non-energy split.
  - The 30% allowance must first address upgrades that enable or enhance installation or performance of EE/RE measures. Remaining non-energy funds may be used for other life, health, or safety improvements.
- EE/RE measures (70%) must either be on the eligible measures list or receive prior program approval.
- EE/RE measures must result in a minimum 10% increase in energy efficiency compared to the replaced equipment or existing conditions.

### NEW CONSTRUCTION REQUIREMENTS

- For new construction projects, 100% of PCEF-funded construction costs must be for energy measures. The 70/30 cost split allowance applies only to retrofit projects. If different requirements apply to a specific new construction measure, those requirements will be identified in the applicable measure standards.
- EE/RE measures must result in a minimum 10% increase in energy efficiency compared to the code minimum.
- New construction projects may follow one of two funding pathways:
  - Above code path: Projects must exceed minimum requirements in the energy code that the project permitted to. PCEF will pay for the installed cost of eligible measures.



- Net zero path: Projects must install solar that generates at least as much electricity as the building uses each year (net zero). Net zero projects must meet above code requirements above, as well as net zero requirements in [Appendix A](#) PCEF will pay up to 25% of the total development cost for a net zero project. PCEF will fund this 25% amount up to \$150,000 per home or unit.

## Quality Assurance Process

- 1) A PCEF-assigned quality assurance (QA) Provider will work as a partner from project initiation through completion to guide your project through the PCEF process. Include your QA Provider early and often.
- 2) Installations must comply with the PCEF Installation Checklists listed here.
- 3) For each project site, grantee and contractor will be required to submit a scope of work for PCEF-funded measures that demonstrate the proposed project will meet the requirements as outlined in the PCEF Installation Checklists. Scope of work may include (but is not limited to) the following:
  - Building description, including number of floors, units, configuration and use.
  - Bid or contractor proposal for planned clean energy upgrades including weatherization, HVAC upgrades, plumbing, venting, and electrification.
  - Material specifications including quantity, manufacturer, model numbers, etc.
- 4) QA Provider will work closely with the grantee and contractor to ensure the scope will meet PCEF requirements prior to installation. Grantees and contractors should not install clean energy measures prior to written approval of the scope of work by PCEF or the QA Provider.
- 5) QA Provider will conduct site inspections or visual or virtual inspections to ensure installation meets PCEF requirements. QA Provider will provide project team and PCEF a post-installation Quality Assurance report.

## Eligible Energy Efficiency Measures

Following are eligible measures for PCEF funding. Note that when a measure is flagged with an asterisk, PCEF may make an exception for exceeding 30% and when portfolio is balanced to maintain 70/30 split. PCEF will consider additional measures not included on this list. Please contact PCEF to discuss.

## Weatherization

All available opportunities for weatherization upgrades should be evaluated and pursued prior to proposing HVAC upgrades to ensure proper HVAC equipment sizing.



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## Attic Insulation and Air Sealing

- Complete checklist for vented attic OR unvented attic.
- Install R-49 or greater OR fill the cavity.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.
- Exhaust fan requirements can be bypassed if installing ERV system.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Carpentry for air leakage reduction (e.g., building stem walls between attic/ crawl hatch doors).</li> <li>• Insulation removal due to mold or vermin as required for installation of attic insulation.</li> <li>• Access door rebuilding or drop-down stair cover.</li> </ul>	<ul style="list-style-type: none"> <li>• Roof replacement.</li> <li>• Sealing roof leaks to address attic water intrusion*</li> <li>• Storage platform – (raised to accommodate insulation installed to code R-value).</li> <li>• Asbestos mitigation.</li> <li>• Knob and tube wiring decommissioning as required for installation of attic insulation*</li> </ul>
<b>Included in New Construction</b>	
<ul style="list-style-type: none"> <li>• Additional sheet metal/furring required to contain above code insulation.</li> </ul>	

## Floor Insulation and Air Sealing

- Complete checklist of vented crawlspace OR unvented crawlspace.
- Install R-30 or greater OR fill the cavity.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Floor register sealing where there are penetrations to unconditioned spaces.</li> <li>• Carpentry for air leakage reduction (e.g., building stem walls between a basement and crawlspace).</li> <li>• Include elements needed to meet code (e.g. install ignition barriers over foam insulation).</li> <li>• Additional vent installation in crawlspace.</li> <li>• Insulation removal due to vermin or mold.</li> <li>• Dryer or exhaust fan venting (including permit fees).</li> <li>• Radon test provided to occupant at end of project.</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestos-containing insulation removal.</li> <li>• Radon mitigation system when radon level equals 4 pCi/L or more.*</li> <li>• Water mitigation for wet crawlspace.</li> </ul>

## Slab or Foundation Insulation and Air Sealing

- Install R-16.5 or greater.
- Air seal between insulation and building envelope.

**Only Eligible in New Construction**



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## Wall Insulation

- Complete checklist for framed wall insulation, masonry wall insulation AND/OR basement wall insulation, as applicable.
- For Exterior Wall: R-11 or fill cavity, All heated exterior walls must be insulated
- For Knee Wall: R-15 for 2x4 cavities R-21 for 2x6 cavities
- For Rim Joist: R-15
- Homes or buildings with vinyl, aluminum, asbestos or stucco siding/exterior, wall insulation should be installed from the interior.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Lead paint testing/Lead safe practices as required for Lead RRP License.</li> <li>• Siding removal for traditional wall insulation installation.</li> <li>• Re-installation of siding/new siding if removed siding breaks. Leave primed &amp; paint ready.</li> <li>• Drywall hole patching/texturing/painting if wall installation is not feasible from exterior.</li> <li>• Carpentry needed for hatch door air sealing.</li> <li>• Insulation removal.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigating water leaks and water intrusion.</li> <li>• Dry rot repair.</li> <li>• Knob and tube decommissioning.</li> <li>• Siding replacement.</li> <li>• Knob and tube wiring decommissioning as required for installation of attic insulation*.</li> </ul>
Included in new construction	
<ul style="list-style-type: none"> <li>• Additional sheet metal and furring for above code insulation.</li> </ul>	

## Windows

- Complete checklist for windows.
- Replacement window must be [Northern Climate Energy Star](#) 0.26 U value or better.
- Replace single-pane or double-pane windows.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Dry rot repair as required for door or window replacement.</li> </ul>	<ul style="list-style-type: none"> <li>• Installing new windows that are larger than the original size.</li> </ul>

## Low E Storm Windows

## Heating, Ventilation, and Air Conditioning (HVAC)

Duct sealing must be included in all proposed HVAC upgrades involving ducted systems. PCEF will prioritize funding for duct sealing and repair above HVAC upgrades.

## Duct Sealing, Repair, and Insulation

- Complete checklist for duct sealing.
- The entire length of the duct system (e.g., in the attic, basement, or crawlspace) is inspected and damaged ducts are repaired or replaced.



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- Flexible ducts with excessive length are cut to proper length and sharp bends are corrected so bends are greater than or equal to one duct diameter radius.
- All ducts in the unconditioned space are properly sealed and insulated.

<b>Included in 70% EE/RE Cost</b> <ul style="list-style-type: none"> <li>• Seal interior register penetrations to unconditioned spaces.</li> <li>• Replacing panned returns in unconditioned crawlspaces or attics to modern ducting in unconditioned space.</li> <li>• Sealing &amp; insulating ducts in the unconditioned space.</li> </ul>	<b>Included in 30% Non-Energy Costs (Not Exhaustive)</b> <ul style="list-style-type: none"> <li>• Asbestos tape mitigation on ductwork (unconditioned space) as required for duct sealing*.</li> </ul>
<b>Included in New Construction</b>	
<ul style="list-style-type: none"> <li>• Ducts not eligible for funding as a standalone measure. PCEF will pay for duct insulation only.</li> </ul>	

## Ductless Heat Pump

- Complete checklist for ductless heat pumps.
- Choose inverter-driven, variable-speed heat pumps, sized with a heat load calculation for the area served.
- Perform and document a load calculation. Match the system capacity to the calculation as closely as possible.
- If auxiliary heat included, controls must be set with an auxiliary heat lockout setting.
- Where possible, decommission existing electric resistance or gas heating system.
- If adding heat pump coil to an existing gas furnace – contact PCEF administrator or QA provider.

<b>Included in 70% EE/RE Cost</b>	<b>Included in 30% Non-Energy Costs (Not Exhaustive)</b>
<ul style="list-style-type: none"> <li>• Electrical upgrades to the panel required for the installation, verified by PCEF QA.</li> </ul>	<ul style="list-style-type: none"> <li>• All other electrical upgrades required for the install.</li> </ul>



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## Ducted Heat Pump

- Complete checklist for ducted heat pumps.
- Choose inverter-driven, variable-speed heat pumps, sized with a heat load calculation for the area served.
- Perform and document a load calculation. Match the system capacity to the calculation as closely as possible.

<b>Included in 70% EE/RE Cost</b>	<b>Included in 30% Non-Energy Costs (Not Exhaustive)</b>
<ul style="list-style-type: none"> <li>• Electrical, including Panel/Service upgrades as required for installation of system selected when fuel switching.</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestos removal as required for HVAC replacement (e.g., material attached to components being replaced).</li> </ul>
<b>Included in New Construction</b>	
<ul style="list-style-type: none"> <li>• Ductwork</li> </ul>	

## Ground Source Heat Pump

- Project meets specifications for ground source (well or trench).
- Complete checklist for applicable heat pump installation (ducted or ductless)
- Choose inverter-driven, variable-speed heat pumps, sized with a heat load calculation for the area served.
- Perform and document a load calculation. Match the system capacity to the calculation as closely as possible.

<b>Included in 70% EE/RE Cost</b>	<b>Included in 30% Non-Energy Costs (Not Exhaustive)</b>
<ul style="list-style-type: none"> <li>• Electrical, including Panel/Service upgrades as required for installation of system selected when fuel switching.</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestos removal as required for HVAC replacement (e.g., material attached to components being replaced).</li> </ul>
<b>Included in New Construction</b>	
<ul style="list-style-type: none"> <li>• When installing a ducted system: includes ductwork.</li> </ul>	

## Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV)

- Complete checklist for ERV/HRV.
- Minimum SRE of 80%.
- Commissioning required.

<b>Included in 70% EE/RE Cost</b>	<b>Included in 30% Non-Energy Costs (Not Exhaustive)</b>
<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
<b>Included in New Construction</b>	
<ul style="list-style-type: none"> <li>• Ducting if standalone unit</li> </ul>	

## HVAC Controls or Smart Thermostat

- Use heat pump proprietary control system where appropriate.



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# Water Heating

## Heat Pump Water Heaters

- Complete checklist for heat pump water heaters (HPWHs).
- Heat pump water heater should be Energy Star certified.
- Unit must replace existing electric resistance or natural gas water heater.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical outlets or circuits, as needed for HPWH installation.</li> <li>• HPWH cold exhaust ducting in conditioned space.</li> <li>• Electrical panel replacement if replacing gas water heating.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
<b>Include in New Construction</b>	
<ul style="list-style-type: none"> <li>• Recirculation pumps</li> <li>• HPWH cold exhaust ducting in conditioned space.</li> </ul>	

## Low Flow Fixtures

- Replace/install hot water fixtures (e.g., faucets, showerheads) that meet WaterSense standards.

# Lighting and Appliances

## Lighting (Common Area or Exterior Only)

- Replace existing light fixtures with LEDs.
- Must include occupancy sensors or control system.
- Must replace existing HID lighting.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>
Not eligible for New Construction	

## Commercial Clothes Washers

- Replace existing common area washers with MEF of 2.2 or greater and IWF of 4.0 or less.
- Must be frontloading and used in common area only.

## Clothes Washers and Dryers

- Replace existing in-unit clothes washers or dryers with ENERGY STAR certified in-unit clothes washers.

## Refrigerators

- Replace existing in-unit refrigerator with model on the ENERGY STAR 5.0 certified list.



## Dishwashers

- Replace existing in-unit dishwasher with Energy Star model.

## Induction Cooktops

- Replace existing stove with high efficiency, Energy Star induction cooktop.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"><li>• If fuel switching includes necessary panel upgrades, verified by PCEF QA.</li></ul>	<ul style="list-style-type: none"><li>• All other electrical upgrades.</li></ul>

## Ventilation Hoods

- Install a high efficiency, Energy Star rated model.
- Must exhaust to outside using smooth ductwork, must be positively connected to outside.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"><li>• If fuel switching includes necessary panel upgrades, verified by PCEF QA.</li></ul>	<ul style="list-style-type: none"><li>• All other electrical upgrades.</li></ul>

## Bath Fans

- Install a high efficiency, Energy Star rated model.
- Exhausting to outside, must be positively connected to outside.



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# Other Eligible Measures

## Renewables and Electric Vehicle Chargers

### Rooftop Solar, with or without Battery Storage

- Renewables system purchases must be predominantly manufactured in the United States unless such a product is unavailable, or the cost is prohibitive.
- System design and installation must comply with [Energy Trust of Oregon Solar + Storage Design and Installation Requirements V21.0](#), excluding requirements for systems to be grid-tied and for projects to submit through the PowerClerk system. To receive funds from PCEF, projects do not need to participate in Energy Trust programs.
- Grantees should plan for other needed improvements (e.g., electrical panel upgrades, security measures, and/or fire containment walls) and propose these in their scope.
- Projects must secure building and electrical permits as required and obtain final approvals for these permits.
- If adding battery storage, projects must complete analysis to identify critical building loads to be served, the site areas the battery system will back up, and the capacity of the battery system.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical, including panel/service upgrades as required for installation of system selected.</li> </ul>	<ul style="list-style-type: none"> <li>• Security measures to protect system from vandalism.</li> <li>• Structural upgrades as needed for a solar installation.</li> <li>• Roof replacement.</li> </ul>

### Level II Electric Vehicle Battery Charger

- New charger must be on one of the following lists:
- ENERGY STAR Electric Vehicle Service Equipment (EVSE) [Version 1.2](#) or newer.
- Portland General Electric qualified products list ([residential](#) | [commercial](#))
- PCEF encourages but does not require charger to be equipped with networking capabilities.
- PCEF encourages projects to incorporate ADA accessibility considerations for at least a portion of installed EVSEs.
- Charger must be 240V designed for electric vehicle charging.
- For EVSE in publicly accessible locations, PCEF encourages grantees to consider the following security measures: retractable cords, lights, cameras, fencing.
- EVSE must be fully installed and operational.



# Appendix A: Renewables Guidelines

This appendix is a companion resource to the [Rooftop Solar, with or without Battery Storage](#) eligible measure section above. To be eligible for PCEF funding for renewables, grantee projects must follow PCEF process below. The process varies based on the project scope or approach.

## Rooftop Solar with or without Battery Storage

PCEF strongly encourages prospective grantees to obtain a bid from a solar installer to inform their grant application. If you don't already have a connection with a solar contractor, you can request a bid through Energy Trust of Oregon's [solar bid request form](#).

For active projects that PCEF is funding, the participation process is typically as-follows.

Step	Responsible	Activities
<b>1. Develop scope of work</b>	Grantee	Assesses purpose of system (e.g., energy bill reduction, resilience), where systems are likely to be housed, and anticipates potential challenges (e.g., electric panel, rooftop space, roof age). Engages renewables installer to provide a bid.
	Solar installer	May conduct site visit to inform scope. Develops bid based on grantee needs.
<b>2. Complete scope review prior to starting construction</b>	PCEF grant manager	Convenes PCEF kickoff meeting, including Grantee, renewables installer, and PCEF QA Provider to discuss scope of work and PCEF process. If project includes efficiency measures, this discussion may occur as part of a larger QA meeting.
	PCEF QA Provider	Reviews scope of work and provides feedback within 10 business days. QA Provider requests scope adjustments, if needed.
<b>3. Complete construction</b>	Solar installer	Installs system according to PCEF requirements and receives sign-off from City and utility.
	Grantee	<i>If participating in Energy Trust program:</i> Submits to PCEF the Energy Trust sign-off incentive payment confirmation letter, confirming that project completed quality assurance sign-off from Energy Trust.  <i>If not participating in Energy Trust program:</i> Notifies PCEF when installation is complete.
	PCEF grant manager	<i>If participating in Energy Trust program:</i> Confirms project as complete.  <i>If not participating in Energy Trust program:</i> Schedules QA Provider site visit. After successful inspection, confirms project as complete.



# Net Zero

Projects that install solar may be able to achieve net zero energy status. For the purposes of PCEF, net zero means that projects install solar that generates at least as much electricity as the building uses each year. Net zero buildings have ultra-low electric bills, typically only paying for utility service fees. As with other solar projects, PCEF encourages projects to first maximize energy efficiency and then size their solar system appropriately.

To leverage the PCEF net zero funding option, projects must be new construction, all electric, and complete one of the following pathways:

- Complete a whole building energy model (e.g., (e.g., REM/Rate, Treat, EnergyPlus, Equest) to predict whole building electric use. Size solar system to generate electricity that matches the predicted modeled use.
- Use ENERGY STAR Portfolio Manager to complete utility bill analysis for an entire year. If conducting energy efficiency improvements, this analysis must begin after completing efficiency upgrades. Size solar system to generate electricity to align with the actual annual energy use.
- Certify as Earth Advantage Zero Energy or Living Building Challenge Zero Energy.
- Complete participation in Energy Trust of Oregon program focused on net zero: Path to Net Zero for new buildings or EPS New Construction net zero for new homes.

## Funding for Net Zero

PCEF will pay up to 25% of the total development cost for a net zero project. Eligible costs are 25% of total net zero development costs including: Design and engineering; site and systems development; total construction costs (such as building materials, labor, finishes; mechanical equipment and rooftop solar), site acquisition and realtor fees, and project management fees.

On occasion, a PCEF applicant applies with the intent of their project achieving net zero, only to realize that net zero isn't possible. Following are examples of constraints that PCEF grantees have encountered:

- Building electric use is higher than can be reasonably offset by solar, even with major efficiency upgrades.
- Rooftop doesn't provide adequate solar resource, due to shading, obstructions like vent or chimney protrusions, or building equipment taking up space on the roof.
- Rooftop isn't structurally able to support weight of solar array.
- Project doesn't have adequate budget to achieve net zero scope.

PCEF encourages thorough project planning in advance of applying for the net zero funding option. If a project encounters challenges and can't resolve them, PCEF is not able to accommodate a change in scope.

Because of this additional funding, net zero projects are subject to additional reporting expectations. Grantees must provide invoices for the total project expenses paid. PCEF will reimburse 25% of the total of each invoice. For example, in the following project, the grantee submitted an invoice for \$200,000 and highlighted the \$50,000 or 25% portion for which they are requesting PCEF reimbursement.



They documented this request as follows:

Sample Net Zero Invoice		
Developer Name 1234 NE Halsey St Portland OR 97232 Invoice Date: March 1, 2024		
February 2024 Expenses	Total Project Fees	PCEF 25%
Gonzales Architecture	\$25,000.00	\$6,250.00
Permitting	\$20,000.00	\$5,000.00
Engineering services	\$ 5,000.00	\$1,250.00
Superb Contracting – Draw #1	\$150,000.00	\$37,500.00
<b>Invoice Total</b>	<b>\$200,000.00</b>	<b>\$50,000.00</b>
Paid in Full 3/15/2024		

- Net zero contractor reporting:** In quarterly contractor reporting, Grantees must include the amount of PCEF funds paid to each contractor. For net zero projects, enter 25% of the amount paid to each contractor. To help PCEF verify that the amount reported was adjusted correctly, please enter the calculation used to determine the PCEF portion in the "Amount billed this reporting period" cell in your report. Please see example below:

<a href="#">Contractor or Subcontractor:</a> <a href="#">Enter organization name in Workforce and Contractor Detail tab first so they will appear in the dropdown</a>	Superb Contractor
<b>Amount billed this reporting period:</b> Please include amounts going to subcontractors	=150,000*.25

- Net zero workforce reporting:** Grantees must report the number of hours worked and hourly rate paid to workers in quarterly workforce reports. For net zero projects, enter 25% of the number of hours worked. Please enter the calculation used to determine the PCEF portion in the 'Number of hours worked this reporting period' cell in your report. Please see example below:

<a href="#">Staff name or unique ID:</a> <a href="#">Enter Staff name in Workforce and Contractor Detail tab first so they will appear in the dropdown</a>	Joey
<b>Apprentice or journey:</b>	Apprentice
<b>Number of hours worked during reporting period:</b>	=55*0.25
<b>Hourly wage:</b>	\$30.00
<b>Benefits:</b>	\$5.75



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# Portland Clean Energy Community Benefits Fund

## Guidelines & Eligible Measures

### Single-unit Housing Retrofits v3

#### Document Overview

The Portland Clean Energy Community Benefits Fund (PCEF) invests in climate action projects, in alignment with the City’s climate action goals, that support environmental justice and environmental, social, and economic benefits for all Portlanders. This document is a resource for home energy upgrade or new construction projects, outlining project requirements, quality assurance processes, and measures that are eligible for PCEF funding. For new construction projects, refer to the new construction eligible measures document on the [PCEF energy resources page](#).

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*This document is intended for the following audiences:*

- Prospective grantees, looking to learn more about PCEF requirements and process.
- Active grantees and their contractors, looking for guidance on their projects.

For questions, contact [cleanenergy@portlandoregon.gov](mailto:cleanenergy@portlandoregon.gov), or reach out to your PCEF project manager.



# Summary of Changes in V3

- Updated QA process, credentials and testing requirements
- Clarification of whole home air sealing requirement
- New ducted heat pump requirements, diagnostic tests
- Heat pump water heater required product list
- Included costs for pre-paid heat pump maintenance plans and home energy assessments
- Clarification on venting requirement
- Revised carbon monoxide and smoke detector requirements in line with code

## Program Framework

PCEF-funded projects must meet requirements in the following documents, available on the [PCEF energy resources page](#).

- Single-Unit Housing Guidelines and Eligible Measures document
- PCEF Installation Specifications Checklists
- PCEF Snugg Pro Guide

## Measure Requirements

- **Eligible measures:** All PCEF-funded measures must be listed as eligible or receive program approval.
- **Measure prioritization:** Project Scope of Work shall be designed to prioritize the measures that will produce the greatest utility bill and energy savings.
- **Minimum savings:** PCEF-funded projects achieve a minimum 10% modeled energy savings. Scope of work (SOW) for whole home energy retrofits must prioritize measures that produce high utility bill savings. Projects must obtain PCEF pre-approval for SOWs that include any measures with negative modeled utility bill savings.
- **Critical repair allowance:** For energy efficiency (EE) or renewable energy (RE) retrofit projects:
  - Up to 30% of PCEF funds for clean energy projects can be used for any life, health, and safety upgrades necessary to enable energy efficiency (EE) improvements.
  - Up to 40% of an individual project's total construction budget may be used for critical repairs; however, across a grantee's annual portfolio, at least 70% of total construction spending must apply to energy-saving measures.
- **Match energy incentives critical repair allowance:** When approved incentives, rebates, or other energy-related contributions are included in the project budget, PCEF funds may be used to cover enabling repairs or health and safety improvements in an amount up to 30% of the additional energy funds, provided that:
  - At least 70% of the total construction budget (PCEF funds + matching funds) is applied to energy improvements.
  - No more than 50% of the total PCEF-funded construction budget is used for non-energy improvements.



# Project and Quality Assurance Process

Step	Responsible	Process
<b>BPI Home Energy Assessment</b>	Contractor or Grantee	For each multi-measure project site, a Building Performance Institute (BPI) Building Analyst Professional will conduct test-in and test-out BPI home energy assessments (including combustion safety, blower door, duct air leakage and other required tests), developing the scope of work (SOW), and creating a Snugg Pro model. <ul style="list-style-type: none"> <li>Home assessment and BPI Building Analyst Professional certification are not required for single measure or some other approved projects.</li> </ul>
<b>Scope of Work (SOW) Development</b>	Contractor or Grantee	The contractor or grantee will develop and submit a SOW that demonstrates how the proposed project will meet PCEF requirements. They will enter audit findings into Snugg Pro to create the proposal and model energy savings. (See <a href="#">Snugg Pro Guide</a> ). The SOW should prioritize measures that deliver the highest utility bill and energy savings as modeled in Snugg Pro. <p><b>The SOW will include at minimum:</b></p> <ul style="list-style-type: none"> <li>Results from blower door testing, duct leakage testing, air handler flow, external static pressure test, exhaust fan flow measurement, and combustion safety testing if required.</li> <li>Proposed energy efficiency upgrades and costs by measure, and additional documentation as requested.</li> <li>Equipment specifications including manufacturer, model numbers, size (capacity, in BTU/hr) and relevant efficiency ratings (e.g., SEER2, AFUE, UEF) and AHRI number for heat pumps.</li> <li>Description of critical repair measures, costs, and whether these will be funded by PCEF or through other resources.</li> <li>Details of any co-funding for energy savings measures including Energy Trust of Oregon incentives.</li> <li>SOW must meet all other measure and cost requirements.</li> </ul>
<b>Scope of Work Approval</b>	QA Provider	The contractor or grantee will submit the SOW in Snugg Pro. The QA Provider will review within <b>5 business days</b> and work closely with the contractor or grantee to ensure the scope meets PCEF requirements prior to installation and will request scope adjustments, if needed. <p>Contractors should not install clean energy measures prior to written approval of the SOW by the QA Provider.</p>
<b>Installation and Changes to SOW</b>	Contractor or grantee	The contractor will complete the installation and will notify the QA Provider when the project is ready for QA inspection. <ul style="list-style-type: none"> <li>All installations must follow the guidelines outlined in the Eligible Measures and <a href="#">PCEF Installation Specifications Checklist(s)</a>.</li> <li>The BPI certified professional will be responsible for the BPI, program and scope compliance of all installers, including subcontractors.</li> <li>The contractor or grantee will communicate change orders with the QA Provider prior to completion of the work.</li> <li>The contractor or grantee will enter the home's post-retrofit conditions in Snugg Pro and submit the final QA inspection request.</li> </ul>
<b>QA Inspection and Issue Resolution</b>	QA Provider	The QA provider will conduct an inspection to ensure the installation meets all PCEF requirements and request corrections, if needed. The participating contractor shall complete any corrections requested by QA Provider within <b>30 days</b> of notification.

For projects that include renewable energy components, please refer to Appendix A: Renewables Guidelines for additional QA considerations.



# Eligible Energy Efficiency Measures

Following are eligible measures for PCEF funding. PCEF will consider additional measures not included on this list. Please contact PCEF to discuss.

## Weatherization

All available opportunities for weatherization upgrades should be evaluated and pursued prior to proposing windows, or appliances.

### Air Sealing

- Provide whole home air sealing on all multi-measure projects. Contact PCEF to discuss exceptions.
- Follow PCEF Air Sealing Installation Checklist.
- Perform pre- and post- blower door tests.
- Conduct combustion safety testing, as required by BPI.
- Air seal all significant and accessible air leaks between conditioned and unconditioned space of all areas of the home. Blower door guided air sealing is recommended.
- Conduct radon testing at end of project. Test during initial home energy assessment, when possible.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Carpentry required for air leakage reduction (e.g., building stem walls between attic/ crawl, access doors or drop-down stair covers).</li> <li>• Radon test.</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestos mitigation.</li> <li>• Radon mitigation system when radon level equals 4 pCi/L or more.</li> </ul>

### Floor / Crawlspace Insulation

- Follow PCEF Crawlspace Installation Checklist for vented OR unvented crawlspaces.
- Install R-30 or greater OR fill the cavity.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Floor register sealing to conditioned spaces.</li> <li>• Stem wall carpentry, including human contact, ignition or wind wash prevention barrier material.</li> <li>• Floor by-pass cavity (e.g., above pony walls) blocking and sealing.</li> <li>• Foundation vent installation.</li> <li>• Insulation removal.</li> <li>• Dryer or exhaust fan venting (including permit fees).</li> <li>• Radon test at end of project.</li> <li>• 6 mil vapor barriers.</li> </ul>	<ul style="list-style-type: none"> <li>• Water mitigation for wet crawlspace.</li> <li>• Pest mitigation.</li> <li>• Radon mitigation system when radon level equals 4 pCi/L or more.</li> </ul>



## Flat Attic Insulation

- Follow PCEF Attic Installation Checklist for vented OR unvented attics.
- Install R-49 or greater OR fill the cavity.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.
- Seal and insulate exhaust ducting.
- Perform minimum NFA calculation for roof venting. If high and low venting is present, a 1:300 ratio shall be used. If only high venting is present, a 1:150 ratio shall be used. If existing venting is not adequate, install vents to meet minimum ratios.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Insulation removal when required for installation of attic insulation.</li> <li>• Carpentry required for air leakage reduction.</li> <li>• Access door rebuilding, drop-down stair cover, access hatch dams, soffit or non-IC rated fixture baffles.</li> <li>• Attic ventilation.</li> <li>• Exhaust fan venting.</li> </ul>	<ul style="list-style-type: none"> <li>• Roof replacement.</li> <li>• Sealing roof leaks as needed to address attic water intrusion.</li> <li>• Storage platform (raised to accommodate insulation installed to code R-value).</li> <li>• Asbestos mitigation.</li> <li>• Knob and tube wiring decommissioning as required for installation of attic insulation.</li> </ul>

## Wall Insulation

- Follow PCEF Wall Installation Checklist for framed, masonry or basement walls.
- For Exterior Wall: R-13 or fill cavity. All heated exterior walls must be insulated
- For Knee Wall: R-15 for 2x4 cavities R-21 for 2x6 cavities
- For Rim Joist: Minimum R-15
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Lead safe practices as required for EPA RRP compliance.</li> <li>• Siding removal and re-installation, including replacement of sections broken in the process. Leave primed &amp; paint ready.</li> <li>• Drywall hole patching.</li> <li>• Carpentry needed for hatch door air sealing.</li> <li>• Batt insulation removal.</li> <li>• House wrap or other permeable material to prevent wind washing of kneewall or pony wall batt insulation.</li> <li>• Floor by-pass cavity (e.g., under kneewalls) blocking and sealing.</li> <li>• Ignition barriers over foam insulation or other measures needed to meet code (e.g., at rim joists).</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigating water leaks or intrusion.</li> <li>• Dry rot repair.</li> <li>• Knob and tube decommissioning.</li> <li>• Siding replacement.</li> </ul>



# Heating, Ventilation and Air Conditioning (HVAC)

## Duct Sealing, Repair, and Insulation

- For all projects with HVAC updates, and whenever possible, prioritize sealing for ducts in unconditioned areas.
- Follow PCEF Duct Sealing Checklist.
- Provide pre- and post- duct sealing test measurements.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Replacing panned returns in unconditioned crawlspaces or attics with modern ducting.</li> <li>• Sealing &amp; insulating ducts in unconditioned spaces.</li> <li>• Removal of old insulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Asbestos tape mitigation on ductwork as required for duct sealing.</li> </ul>

## Heat Pump

- Follow PCEF Heat Pump Installation Checklist for ducted heat pumps or ductless heat pumps.
- Duct sealing must be included in all proposed HVAC upgrades, when ducts are in unconditioned spaces.
- Minimum 10-year equipment warranty.
- Complete a load calculation that reflects post-weatherization building characteristics of the home (required).
- Prioritize inverter-driven, variable-speed heat pumps, sized to match the load calculation.
- Complete Static Pressure and Tru Flo tests for all ducted heat pump installations.
- Program pre-approval is required for the unique situations when the following might be allowed to:
  - Change from a ducted to a non-ducted heating system.
  - Add a heat pump coil to an existing gas furnace.
  - Add a ductless heat pump to serve a portion of the home when the existing primary heating system is left in place.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical, including Panel/Service replacement as required for installation of selected system when fuel switching and upgrading the home’s primary heating system.</li> <li>• HVAC Sizing Tool: Login (<a href="http://betterbuiltnw.com">betterbuiltnw.com</a>)</li> <li>• Up to 5-year pre-paid maintenance plans including 4 filters per year.</li> </ul>	<ul style="list-style-type: none"> <li>• Oil tank decommissioning.</li> <li>• Asbestos removal as required for HVAC replacement (for example material that is attached to components being replaced).</li> </ul>



## Exhaust Fan

- Follow PCEF Ventilation Installation Checklist for bathroom or kitchen exhaust fans.
- Complete checklist for exhaust bathroom fan OR exhaust kitchen fan.
- New exhaust fans must be Energy Star rated.
- Insulate ducting to a minimum of R-8.
- Automated controls such as timers, and humidistats shall be installed with the fan.
- Program fans per ASHRAE 62/2-2016 guidelines.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical to the exhaust fan.</li> <li>• Radon test at end of project.</li> <li>• Mechanical permit fee (required for new fans).</li> <li>• Timers, humidistats, continuous flow and other controls.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV)

- Pre-approval required for retrofit projects and must replace a less efficient ventilation system.
- Follow PCEF ERV/HRV Installation Checklist.
- Commissioning required.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical to ERV/HRV</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## HVAC Controls or Smart Thermostat

- When installing a new heat pump, use the manufacturer’s proprietary control system for optimal operation.
- Must be compatible with installed equipment and not impact functionality or reduce efficiency.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Smart thermostats, including Nest &amp; Ecobee.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>



# Water Heating and Appliances

## Heat Pump Water Heaters (HPWH)

- Follow PCEF HPWH Installation checklist.
- HPWH must meet minimum criteria in [NEEA Advanced Water Heater specifications v8.1](#).
- Model must appear on the current [Residential HPWH Qualified Product List](#).

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical outlets or circuits, as needed for water heater installation.</li> <li>• HPWH cold exhaust ducting.</li> <li>• Venting for make-up air.</li> <li>• Condensate pump.</li> </ul>	<ul style="list-style-type: none"> <li>• Electrical Panel/Service replacement.</li> </ul>

## Low Flow Fixtures

- Replace/install hot water fixtures (e.g., faucets, showerheads) that meet [WaterSense](#) standards.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Cost of fixtures.</li> <li>• Labor to install fixtures.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## Refrigerators, Dishwashers, Clothes Washers and Dryers, and Induction Cooktops

- Must be ENERGY STAR rated and installed with other energy saving upgrades.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
N/A	<ul style="list-style-type: none"> <li>• Electrical upgrades required for installation.</li> </ul>



# Windows and Doors

## Windows and Doors

- Follow PCEF Window Replacement checklist.
- Replacement windows and doors must be [Northern Climate Energy Star](#) 0.26 U value or better.
- Prior to proposing windows, evaluate and pursue all available opportunities for weatherization upgrades.
- Windows and doors cannot be installed as stand-alone measures.
- Prioritize windows and doors with the highest energy and utility saving benefits.
- Windows and doors will require program pre-approval to ensure the entire scope prioritizes measures that will produce the greatest utility bill and energy savings.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• <a href="#">Windows, Doors, and Skylights Climate Zone Finder   ENERGY STAR</a></li> <li>• Dry rot repair as required for door or window replacement.</li> <li>• Energy Star low-e storm windows (includes Indow Windows or equivalent interior storm windows).</li> </ul>	<ul style="list-style-type: none"> <li>• New windows or doors larger than the original size.</li> <li>• New less efficient doors (e.g. replacing solid door with a full-lite door).</li> </ul>

# Other Eligible Measures

## Critical Repair and Other Measures

The following list is not exhaustive.

### Asbestos

- Asbestos shall be handled and mitigated according to Oregon DEQ asbestos rules.
- Asbestos testing shall be conducted by qualified third-party as required by Oregon statute.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation as required to perform EE measures.</li> </ul>

### Radon

- Radon testing required in projects that include air sealing or exhaust ventilation.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Radon testing.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation when 'end of project' test results are 4 pCi/L (picocuries per liter) or more.</li> </ul>



## Mold Mitigation

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>Mold mitigation as required to perform EE measures.</li> </ul>

## Pest Mitigation

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>One-time extermination and mitigation when insulation has evidence of vermin intrusion.</li> </ul>	<ul style="list-style-type: none"> <li>Pest mitigation (year contract).</li> </ul>

## Smoke & Carbon Monoxide Detectors

- Install smoke and carbon monoxide detectors according to code.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>Smoke and carbon monoxide detectors and installation.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

## Renewables and Electric Vehicle Chargers

PCEF invests in solar and battery storage projects that provide community benefit, usually in the following forms:

- Reduced household or non-profit organization energy bills, as a result of net metering or community solar.
- Resilience for community spaces, made possible by battery storage that enables buildings to operate critical loads during utility outage events.

The table below shows which renewables PCEF does and does not fund. Note that alternate forms of renewable energy require pre-approval from PCEF.

Renewable type	PCEF will fund	PCEF will not fund
<b>Solar</b>	Rooftop solar on single-unit homes, multi-unit housing, and commercial buildings. "Offsite" and ground-mounted solar for sites without sufficient roof space or solar resource. Community solar.	Offsite solar outside of Portland, OR.
<b>Battery storage</b>	On-site critical load backup for single-unit homes, multi-unit housing, and commercial buildings.	Battery storage without solar.

Please review



[Appendix A: Renewables Guidelines](#) for process consideration for renewables projects.

## Rooftop Solar, with or without Battery Storage

- Renewables system purchases must be predominantly manufactured in the United States unless such a product is unavailable, or the cost is prohibitive.
  - If you are unsure whether a product meets domestic manufacturing requirements, please contact your renewables installer, which may need to contact the equipment manufacturer.
- System design and installation must comply with [Energy Trust of Oregon Solar + Storage Design and Installation Requirements V21.0](#), excluding requirements for systems to be grid-tied and for projects to submit through the PowerClerk system. To receive funds from PCEF, projects do not need to participate in Energy Trust programs.
- Grantees should plan for other needed improvements (e.g., electrical panel upgrades, security measures, and/or fire containment walls) and propose these in their scope.
- Projects must secure building and electrical permits as required and obtain final approvals for these permits.
- If adding battery storage, projects must complete analysis to identify critical building loads to be served, the site areas the battery system will back up, and the capacity of the battery system.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Electrical, including panel/service upgrades as required for installation of system selected.</li> <li>• Security measures to protect system from vandalism.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## Level II Electric Vehicle Battery Charger

- New charger must be on one of the following lists:
  - ENERGY STAR Electric Vehicle Service Equipment (EVSE) [Version 1.2](#) or newer.
  - Portland General Electric qualified products list ([residential](#) | [commercial](#))
- PCEF encourages, but does not require, the charger to be equipped with networking capabilities.
- PCEF encourages projects to incorporate ADA accessibility considerations for at least a portion of installed EVSEs.
- Charger must be 240V designed for electric vehicle charging.
- For EVSE in publicly accessible locations, PCEF encourages grantees to consider the following security measures: retractable cords, lights, cameras, fencing.
- EVSE must be fully installed and operational.



# Appendix A: Renewables Guidelines

This appendix is a companion resource to the [Rooftop Solar, with or without Battery Storage](#) eligible measure section above. To be eligible for PCEF funding for renewables, grantee projects must follow PCEF process below. The process varies based on the project scope or approach.

In retrofit projects, PCEF will pay for the installed cost of eligible measures. In this approach, at least 70% of the renewable installation costs must be for renewable measures. Up to 30% of total renewable installation costs may be for necessary life, health or safety upgrades which enable the renewable install.

## Rooftop Solar with or without Battery Storage

PCEF strongly encourages prospective grantees to obtain a bid from a solar installer to inform their grant application. If you don't already have a connection with a solar contractor, you can request a bid through Energy Trust of Oregon's [solar bid request form](#).

For active projects that PCEF is funding, the participation process is typically as-follows.

Step	Responsible	Activities
<b>1. Develop scope of work</b>	Grantee	Assesses purpose of system (e.g., energy bill reduction, resilience), where systems are likely to be housed, and anticipates potential challenges (e.g., electric panel, rooftop space, roof age). Engages renewables installer to provide a bid.
	Solar installer	May conduct site visit to inform scope. Develops bid based on grantee needs.
<b>2. Complete scope review prior to starting construction.</b>	PCEF grant manager	Convenes PCEF kickoff meeting, including Grantee, renewables installer, and PCEF QA Provider to discuss scope of work and PCEF process. If project includes efficiency measures, this discussion may occur as part of a larger QA meeting.
	PCEF QA Provider	Reviews scope of work and provides feedback within 10 business days. QA Provider requests scope adjustments, if needed.
<b>3. Complete construction</b>	Solar installer	Installs system according to PCEF requirements and receives sign-off from City and utility.
	Grantee	<i>If participating in Energy Trust program:</i> Submits to PCEF the Energy Trust sign-off incentive payment confirmation letter, confirming that project completed quality assurance sign-off from Energy Trust.  <i>If not participating in Energy Trust program:</i> Notifies PCEF when installation is complete.
	PCEF grant manager	<i>If participating in Energy Trust program:</i> Confirms project as complete.  <i>If not participating in Energy Trust program:</i> Schedules QA Provider site visit. After successful inspection, confirms project as complete.



# Portland Clean Energy Community Benefits Fund

## Guidelines & Eligible Measures

### Single-unit Housing New Construction v1

#### Document Overview

The Portland Clean Energy Community Benefits Fund (PCEF) invests in climate action projects, in alignment with the City’s climate action goals, that support environmental justice and environmental, social, and economic benefits for all Portlanders. This document is a resource for new home projects (e.g., single unit homes, townhomes, plexes, and accessory dwelling units), outlining project requirements, quality assurance processes, and measures that are eligible for PCEF funding.

<b>Program Framework</b>	<b>2</b>
<b>Eligible Energy Efficiency Measures</b>	<b>4</b>
Air Sealing and Insulation	4
Duct Sealing and Insulation	4
Heat Pumps	5
<b>Other Eligible Measures</b>	<b>6</b>
<b>Appendix A: Renewables Guidelines</b>	<b>7</b>

*This document is intended for the following audiences:*

- Prospective grantees, looking to learn more about PCEF requirements and process.
- Active grantees and their contractors, looking for guidance on their projects.

For questions, contact [cleanenergy@portlandoregon.gov](mailto:cleanenergy@portlandoregon.gov), or reach out to your PCEF project manager.



# Program Framework

## Single-Unit New Construction Project Requirements

New home projects are eligible for funding through PCEF. Following are high level requirements for new homes to be eligible for funds:

- Projects must participate and demonstrate completion/approval with an above-code energy efficiency program or propose an alternate approach to demonstrate above-code performance. Options to demonstrate compliance include the following.
  - Participate in the state reach code
  - Participate in an above code utility program (e.g., Energy Trust of Oregon EPS New Construction)
  - Participate in an above code or energy-centered certification program (e.g., ENERGY STAR, Earth Advantage, Passive House, LEED, National Green Building Standard, Zero Energy Ready Home, Living Building Challenge).
  - Install individual measures that exceed code requirements and provide calculations or modeling that demonstrates energy savings. Methodology must receive pre-approval from PCEF.
- New construction projects must exceed energy efficiency code requirements, referencing the version of the Oregon Residential Specialty Code that is in place at time of permitting.
- For homes that participate, PCEF will fund the cost of energy-related measures, outlined in the Eligible Measures section below.
- Projects must follow a quality assurance process, defined below.
- Projects must be all-electric and may not use natural gas for any purpose.
- PCEF funds up to the full cost for energy measures, after any other leverage funds or incentives.

New construction projects may follow one of two funding pathways:

- **Above code path:** Projects must exceed minimum requirements in the energy code that the project permitted to. PCEF will pay for the installed cost of eligible measures.
- **Net zero path:** Projects must install solar that generates at least as much electricity as the building uses each year (net zero). Net zero projects must meet above code requirements above, as well as net zero requirements in Appendix A: Renewables Guidelines. PCEF will pay up to 25% of the total development cost for a net zero project. PCEF will fund this 25% amount up to \$150,000 per home or unit.



# Project and Quality Assurance Process

For each project site, a PCEF assigned quality assurance provider (QA Provider) will work closely with the project team to ensure the scope will meet PCEF requirements prior to installation.

Step	Responsible	Process
<b>Early project review</b>	Contractor, Grantee and/ or Energy Consultant	Project Team will meet early with QA Provider to review project to ensure the plan will meet PCEF requirements. The grantee must contract with a RESNET Home Energy Rating System (HERS) Rater or equivalent to create energy models, determine energy savings and to conduct rough and final inspections.
<b>Scope of work (SOW) development</b>	Contractor or Grantee	For each site, grantee or contractor shall submit a scope of work that demonstrates how the proposed project will meet PCEF requirements. Scope of work will include (but is not limited to) the following: <ul style="list-style-type: none"> <li>• A proposal for planned energy efficiency and/or renewable energy work including detailed costs and additional incentives by measure or total project costs spreadsheet for net zero projects.</li> <li>• Equipment specifications including manufacturer, model numbers, size and efficiency rating.</li> <li>• Additional documentation, if requested by QA Provider.</li> </ul>
<b>Scope of work approval prior to starting construction</b>	QA Provider	The QA Provider who will review and provide feedback within <b>five (5) business</b> days. The QA Provider will work closely with the contractor or grantee to ensure the scope meets PCEF requirements prior to installation and will request scope adjustments, if needed. Contractors should not install clean energy measures prior to written approval of the SOW by the QA Provider.
<b>Installation and changes to SOW</b>	Contractor or grantee	The contractor will complete the installation and will notify the QA Provider when the project is ready for QA inspection. <ul style="list-style-type: none"> <li>• All installations must follow the guidelines outlined in the <b>PCEF New Homes Guidelines &amp; Eligible Measures</b> and <a href="#">PCEF Installation Specifications Checklist(s)</a>.</li> <li>• The contractor or grantee will communicate change orders with the QA Provider prior to completion of the work.</li> <li>• The contractor or grantee will submit final QA inspection request to the QA Provider.</li> </ul>
<b>QA inspection approval &amp; QA issue resolution</b>	QA Provider	The QA provider will conduct an inspection to ensure the installation meets all PCEF requirements and request corrections, if needed. <ul style="list-style-type: none"> <li>• The participating contractor shall complete any corrections requested by QA Provider within <b>30 days</b> of notification.</li> </ul>

For projects that include renewable energy components, please refer to Appendix A: Renewables Guidelines for additional QA considerations.



# Eligible Energy Efficiency Measures

Following are eligible measures for PCEF funding. PCEF will consider additional measures not included on this list. Please contact PCEF to discuss.

## Building Envelope

### Air Sealing and Insulation

- To ensure proper HVAC equipment sizing, evaluate and pursue all available weatherization upgrades prior to proposing HVAC upgrades.
- Install insulation and windows that exceed code minimum envelope requirements listed in the Oregon Residential Energy Efficiency Specialty Code that the project permitted to.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Carpentry for air leakage reduction (e.g., building stem walls between roof and plenum space)</li> <li>• Carpentry required for framing modifications necessary for higher R-value insulation</li> </ul>	<ul style="list-style-type: none"> <li>• Roofing</li> <li>• Code minimum framing</li> <li>• Siding</li> </ul>

### Windows

- Windows may not exceed 35% of PCEF-funded hard construction costs due to their high cost relative to the energy they save.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Above code minimum windows</li> </ul>	<ul style="list-style-type: none"> <li>• Code minimum windows</li> <li>• Window framing and weatherization</li> </ul>

## Heating, Ventilation and Air Conditioning (HVAC)

### Duct Sealing and Insulation

- For all projects with HVAC updates, and whenever possible, prioritize sealing for ducts in unconditioned areas.
- Follow PCEF Duct Sealing Installation Specifications.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Replacing panned returns in unconditioned crawlspaces or attics with modern ducting.</li> <li>• Sealing &amp; insulating ducts in unconditioned spaces.</li> <li>• Removal of old insulation.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>



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## Heat Pumps

- Follow all PCEF Installation and equipment specifications for ducted heat pumps OR ductless heat pumps.
- Minimum 10-year equipment warranty.
- Complete required load calculation, using the [HVAC sizing tool](#).
- Choose inverter-driven, variable-speed heat pumps, sized to match the load calculation.
- Complete Static Pressure and Tru Flo tests for all ducted heat pump installations.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Outdoor Unit equipment.</li> <li>• Indoor Unit equipment.</li> <li>• Ductwork.</li> <li>• Refrigerant and piping.</li> <li>• Electrical and control wiring for heat pump.</li> <li>• Thermostats and/or controllers.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV)

- Minimum sensible heat recovery effectiveness (SRE) of 68%.
- Commissioning required.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• ERV/HRV Units and associated curb/mounting.</li> <li>• Ductwork and associated diffusers.</li> <li>• Testing and balancing.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## Water Heating and Appliances

### Heat Pump Water Heaters (HPWH)

- Heat pump water heater must meet minimum criteria in [NEEA Advanced Water Heater specifications v8.1](#).
- Model must appear on the current [Residential HPWH Qualified Product List](#).

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Electrical outlets or circuits, as needed for water heater installation.</li> <li>• HPWH cold exhaust ducting.</li> <li>• Condensate pump.</li> <li>• Thermostatic mixing valve.</li> <li>• Thermostatically controlled heat trace cable for outdoor water lines.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>



## Refrigerators, Dishwashers, Clothes Washers and Dryers, and Induction Cooktops

- Must be [ENERGY STAR v1.0](#) rated and installed with other energy saving upgrades

## Other Eligible Measures

### Renewables and Electric Vehicle Chargers

#### Rooftop Solar, with or without Battery Storage

- Renewables system purchases must be predominantly manufactured in the United States unless such a product is unavailable, or the cost is prohibitive.
- System design and installation must comply with [Energy Trust of Oregon Solar + Storage Design and Installation Requirements V21.0](#), excluding requirements for systems to be grid-tied and for projects to submit through the PowerClerk system. To receive funds from PCEF, projects do not need to participate in Energy Trust programs.
- Grantees should plan for other needed improvements (e.g., electrical panel upgrades, security measures, and/or fire containment walls) and propose these in their scope.
- Projects must secure building and electrical permits as required and obtain final approvals for these permits.
- If adding battery storage, projects must complete analysis to identify critical building loads to be served, the site areas the battery system will back up, and the capacity of the battery system.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Electrical, including panel/service upgrades as required for installation of system selected.</li> <li>• Security measures to protect system from vandalism.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

#### Level II Electric Vehicle Battery Charger

- New charger must be on one of the following lists:
- ENERGY STAR Electric Vehicle Service Equipment (EVSE) [Version 1.2](#) or newer.
- Portland General Electric qualified products list ([residential](#) | [commercial](#))
- Pacific Power vetted products list ([residential](#) | [multifamily](#) | [commercial](#))
- PCEF encourages but does not require charger to be equipped with networking capabilities.
- PCEF encourages projects to incorporate ADA accessibility considerations for at least a portion of installed EVSEs.
- Charger must be 240V designed for electric vehicle charging and include a retractable cord.
- For EVSE in publicly accessible locations, PCEF encourages grantees to consider the following security measures: retractable cords, lights, cameras, fencing.
- EVSE must be fully installed and operational.



# Appendix A: Renewables Guidelines

This appendix is a companion resource to the [Rooftop Solar, with or without Battery Storage](#) eligible measure section above. To be eligible for PCEF funding for renewables, grantee projects must follow PCEF process below. The process varies based on the project scope or approach.

## Rooftop Solar with or without Battery Storage

PCEF strongly encourages prospective grantees to obtain a bid from a solar installer to inform their grant application. If you don't already have a connection with a solar contractor, you can request a bid through Energy Trust of Oregon's [solar bid request form](#).

For active projects that PCEF is funding, the participation process is typically as-follows.

Step	Responsible	Activities
<b>1. Develop scope of work</b>	Grantee	Assesses purpose of system (e.g., energy bill reduction, resilience), where systems are likely to be housed, and anticipates potential challenges (e.g., electric panel, rooftop space, roof age). Engages renewables installer to provide a bid.
	Solar installer	May conduct site visit to inform scope. Develops bid based on grantee needs.
<b>2. Complete scope review prior to starting construction</b>	PCEF grant manager	Convenes PCEF kickoff meeting, including Grantee, renewables installer, and PCEF QA Provider to discuss scope of work and PCEF process. If project includes efficiency measures, this discussion may occur as part of a larger QA meeting.
	PCEF QA Provider	Reviews scope of work and provides feedback within 10 business days. QA Provider requests scope adjustments, if needed.
<b>3. Complete construction</b>	Solar installer	Installs system according to PCEF requirements and receives sign-off from City and utility.
	Grantee	<i>If participating in Energy Trust program:</i> Submits to PCEF the Energy Trust sign-off incentive payment confirmation letter, confirming that project completed quality assurance sign-off from Energy Trust.  <i>If not participating in Energy Trust program:</i> Notifies PCEF when installation is complete.
	PCEF grant manager	<i>If participating in Energy Trust program:</i> Confirms project as complete.  <i>If not participating in Energy Trust program:</i> Schedules QA Provider site visit. After successful inspection, confirms project as complete.

## Net Zero

Projects that install solar may be able to achieve net zero energy status. For the purposes of PCEF, net zero means that projects install solar that generates at least as much electricity as the building uses each year. Net zero buildings have ultra-low electric bills, typically only paying for utility service fees. As with other solar projects, PCEF encourages projects to first maximize energy efficiency and then size their solar system appropriately.

To leverage the PCEF net zero funding option, projects must be new construction, all electric, and complete one of the following pathways:



- Complete a whole building energy model (e.g., (e.g., REM/Rate, Treat, EnergyPlus, Equest) to predict whole building electric use. Size solar system to generate electricity that matches the predicted modeled use.
- Use ENERGY STAR Portfolio Manager to complete utility bill analysis for an entire year. If conducting energy efficiency improvements, this analysis must begin after completing efficiency upgrades. Size solar system to generate electricity to align with the actual annual energy use.
- Certify as Earth Advantage Zero Energy or Living Building Challenge Zero Energy.
- Complete participation in Energy Trust of Oregon program focused on net zero: Path to Net Zero for new buildings or EPS New Construction net zero for new homes.

## Funding for Net Zero

PCEF will pay up to 25% of the total development cost for a net zero project. Eligible costs are 25% of total net zero development costs including: Design and engineering; site and systems development; total construction costs (such as building materials, labor, finishes; mechanical equipment and rooftop solar), site acquisition and realtor fees, and project management fees.

On occasion, a PCEF applicant applies with the intent of their project achieving net zero, only to realize that net zero isn't possible. Following are examples of constraints that PCEF grantees have encountered:

- Building electric use is higher than can be reasonably offset by solar, even with major efficiency upgrades.
- Rooftop doesn't provide adequate solar resource due to shading, obstructions like vent or chimney protrusions, or building equipment taking up space on the roof.
- Rooftop isn't structurally able to support weight of solar array.
- Project doesn't have adequate budget to achieve net zero scope.
- Existing building or building design cannot be adapted to net-zero.
- Historic designation prevents net-zero scope.

PCEF encourages thorough project planning in advance of applying for the net zero funding option. If a project encounters challenges and can't resolve them, PCEF is not able to accommodate a change in scope.

Because of this additional funding, net zero projects are subject to additional reporting expectations. Grantees must provide invoices for the total project expenses paid. PCEF will reimburse 25% of the total of each invoice. For example, in the following project, the grantee submitted an invoice for \$200,000 and highlighted the \$50,000 or 25% portion for which they are requesting PCEF reimbursement.



They documented this request as follows:

Sample Net Zero Invoice		
Developer Name 1234 NE Halsey St Portland OR 97232 Invoice Date: March 1, 2024		
<b>February 2024 Expenses</b>	<b>Total Project Fees</b>	<b>PCEF 25%</b>
Gonzales Architecture	\$25,000.00	\$6,250.00
Permitting	\$20,000.00	\$5,000.00
Engineering services	\$ 5,000.00	\$1,250.00
Superb Contracting – Draw #1	\$150,000.00	\$37,500.00
<b>Invoice Total</b>	<b>\$200,000.00</b>	<b>\$50,000.00</b>
Paid in Full 3/15/2024		

- Net zero contractor reporting:** In quarterly contractor reporting, Grantees must include the amount of PCEF funds paid to each contractor. For net zero projects, enter 25% of the amount paid to each contractor. To help PCEF verify that the amount reported was adjusted correctly, please enter the calculation used to determine the PCEF portion in the "Amount billed this reporting period" cell in your report. Please see example below:

<a href="#">Contractor or Subcontractor:</a> Enter organization name in Workforce and Contractor Detail tab first so they will appear in the dropdown	Superb Contractor
<b>Amount billed this reporting period:</b> Please include amounts going to subcontractors	=150,000*.25

- Net zero workforce reporting:** Grantees must report the number of hours worked and hourly rate paid to workers in quarterly workforce reports. For net zero projects, enter 25% of the number of hours worked. Please enter the calculation used to determine the PCEF portion in the 'Number of hours worked this reporting period' cell in your report. Please see example below:

<a href="#">Staff name or unique ID:</a> Enter Staff name in Workforce and Contractor Detail tab first so they will appear in the dropdown	Joey
<b>Apprentice or journey:</b>	Apprentice
<b>Number of hours worked during reporting period:</b>	=55*0.25
<b>Hourly wage:</b>	\$30.00
<b>Benefits:</b>	\$5.75



# Portland Clean Energy Community Benefits Fund

## Guidelines & Eligible Measures

### Commercial Retrofits v2

#### Document Overview

The Portland Clean Energy Community Benefits Fund (PCEF) invests in climate action projects, in alignment with the City’s climate action goals, which support environmental justice and environmental, social, and economic benefits for all Portlanders. This document is a resource for commercial projects that are retrofitting an existing space, outlining project requirements, quality assurance processes, and measures that are eligible for PCEF funding. For new construction and major renovation projects, refer to the new construction eligible measures document on the [PCEF energy resources page](#).

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*This document is intended for the following audiences:*

- Prospective grantees looking to learn more about PCEF requirements and process.
- Active grantees and their contractors looking for guidance on their projects.
- Program staff at City bureaus dispersing PCEF funds.

For questions, contact [cleanenergy@portlandoregon.gov](mailto:cleanenergy@portlandoregon.gov), or reach out to your PCEF project manager.



# Program Framework

## Commercial Retrofit Measure Requirements

- For retrofit projects, project's entire PCEF energy efficiency and renewable energy (EE/RE) construction budget (or annual EE/RE construction budget, if a multi-year grant,) may achieve a maximum 70/30 split of energy and non-energy measures. Individual sites may not exceed a 60/40 split. The 30% non-energy allowance is intended to first cover required upgrades that enable or improve EE/RE measures. Once that has been satisfied, funds remaining in the 30% may be used for other life/health/safety measures in the building. The 70% EE/RE measures must appear on the eligible measures list or be program approved.
- At a minimum, any EE/RE measure not specifically identified here must increase energy efficiency by at least 10% over the replaced equipment or existing conditions. When cooling is added to HVAC systems, this applies to the heating efficiency components.
- No more than 35% of PCEF-funded hard construction costs related to the energy scope may be allocated to windows and lighting. PCEF may consider exceptions to this percentage for projects that include a comprehensive energy reduction package that is estimated to achieve a minimum site-Energy Use Intensity (EUI) reduction of 30%.
- Program approval is required for the installation of non-electric equipment and/or for switching from a ducted to a non-ducted heating system.
- PCEF Eligible Measures are for use as one part of the PCEF process, by PCEF grantees and contractors.
- For projects that include renewable components, refer to [Appendix C: Renewables Guidelines](#) for additional guidance.

## Quality Assurance Process

- 1) A PCEF assigned QA Provider will work as a partner from project initiation through completion to guide your project through the PCEF process. Include your QA Provider early and often.
- 2) For each project site, project team must submit a scope of work for PCEF-funded measures that demonstrate the proposed project will comply with industry best practices and manufacturer specifications.
- 3) Scope of work may include (but is not limited to) the following:
  - a) Building description, including number of floors, units, configuration and use.
  - b) Bid or contractor proposal for planned clean energy upgrades including weatherization, HVAC upgrades, plumbing, venting, and electrification.
  - c) Material specifications including quantity, manufacturer, model numbers, etc.
- 4) QA Provider will work with the project team to ensure the scope meets PCEF requirements. Grantees must obtain written approval of the scope of work by PCEF or the QA Provider prior to beginning construction.
- 5) QA Provider will conduct site inspections or visual or virtual inspections to ensure installation meets PCEF requirements. QA Provider will provide project team and PCEF a post-installation Quality Assurance report.



# Custom Energy Efficiency Measures

PCEF considers efficiency measures to be “custom” when energy savings are very dependent on site conditions. Custom measures are usually larger and/or more complex, requiring their own analysis and review to determine how they save energy for a particular project. Some common custom measure examples include, but are not limited to, control upgrades, variable speed motor upgrades and larger equipment replacements such as chillers or ground source heat pumps. If you would like to explore a custom measure option, please access and refer to PCEF’s Commercial Modeling and Technical Guidelines on the [PCEF energy resources page](#). There are many custom measures to consider depending on the site and intended use. See [Appendix B](#) for examples. Project teams may request PCEF approval for custom measures as part of the scoping process.

# Prescriptive Energy Efficiency Measures

Prescriptive measures, also referred to as “deemed” measures, have established savings and funding values that fit a specific product or practice. The measures listed below are common prescriptive measures that are eligible for PCEF funding. Note that when a measure is flagged with an asterisk (\*), PCEF may make an exception for exceeding 30% and when portfolio is balanced to maintain 70/30 split. If a potential project cannot be found in the “Prescriptive Measures” list below, it can still be considered as a custom measure that is potentially eligible for PCEF funding.

## Weatherization

To ensure proper HVAC equipment sizing, evaluate and pursue all available weatherization upgrades prior to proposing HVAC upgrades.

### W1 Roof or Attic Insulation

- Install R-30 or greater in a roof, R-25 or greater in an attic.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"><li>• Carpentry for air leakage reduction (e.g., building stem walls between roof and plenum space)</li><li>• Insulation removal due to mold or vermin as required for installation of attic insulation.</li><li>• Access door rebuilding or access cover.</li></ul>	<ul style="list-style-type: none"><li>• Roof replacement.</li><li>• Sealing roof leaks to address attic water intrusion*</li><li>• Storage platform – (raised to accommodate insulation installed to code R-values).</li><li>• Asbestos mitigation.</li><li>• Knob and tube wiring decommissioning as required for installation of attic insulation*.</li></ul>



## W2 Wall Insulation

- For Exterior Wall: R-25 or fill cavity, all heated exterior walls must be insulated.
- Buildings with vinyl, aluminum, asbestos, or stucco siding/exterior, wall insulation should be installed from the interior.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Lead paint testing/Lead safe practices as required for Lead RRP License.</li> <li>• Siding removal for traditional wall insulation installation.</li> <li>• Re-installation of siding/new siding if removed siding breaks. Leave primed &amp; paint ready.</li> <li>• Drywall hole patching/texturing/painting if wall installation is not feasible from exterior.</li> <li>• Insulation removal.</li> <li>• Air sealing.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigating water leaks and water intrusion.</li> <li>• Dry rot repair.</li> <li>• Knob and tube wiring decommissioning as required for installation of wall insulation*.</li> <li>• Siding replacement.</li> </ul>

## W3 Efficient Windows

- Replacement window must be [Northern Climate Energy Star](#) 0.26 U value or better.
- Replace single-pane or double-pane windows.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Dry rot repair as required for door or window replacement.</li> </ul>	<ul style="list-style-type: none"> <li>• Installing new windows that are larger than the original size.</li> </ul>

## W4 Secondary Glazing System (SGS) Retrofit

- Glazing system must be permanently installed and non-operable.
- New, post-retrofit windows shall be products classified as "Secondary Glazing Systems" by the Construction Specification Institute (CSI) or "Hi-R Low-E Window Retrofit Panels" by the General Service Administration (GSA).
- SGS shall have one or more low-E coatings, resulting in an overall solar heat gain coefficient (SHGCO<sub>Overall</sub>) of 0.55 or less, as certified by the Attachments Energy Rating Council (AERC), or as simulated using the National Fenestration Rating Council (NRFRC) procedure 200.
- SGS shall have a center-of-glass U-factor (UCOG) less than or equal to 0.20 and an overall U-factor (U<sub>Overall</sub>), including the full window frame, of less than or equal to 0.45, as certified by AERC, or as simulated using NFRC procedure 100.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• SGS frame and adhesive(s) as required.</li> </ul>	<ul style="list-style-type: none"> <li>• Window cleaning/re-caulking to prep for SGS install.</li> <li>• Scaffolding.</li> </ul>

## Heating, Ventilation and Air Conditioning (HVAC)

HVAC system and control efficiency measures are common occurrences in commercial buildings. However, choosing the most efficient HVAC option is not always feasible due to competing factors such as existing space on the site, operational requirements, or electric service constraints. As such, PCEF has provided a decision table in [Appendix A](#) to assist with



choosing the most efficient HVAC system possible given the requirements on site. To ensure proper HVAC equipment sizing, evaluate and pursue all available weatherization upgrades prior to proposing HVAC upgrades.

## HC1 Air-Cooled Variable Refrigerant Flow (VRF) Multi-Split Heat Pumps

- Must be installed in buildings used for retail, offices or school classrooms.
- Must install dedicated outdoor air supply (DOAS) with energy recovery meeting at least 50% enthalpy recovery efficiency.
- Each condenser unit must serve multiple ductless indoor evaporator units and must have a rated cooling capacity over 5 tons with variable speed compressor operation.
- DOAS ventilation air must be supplied at a neutral space temperature.
- Must meet or exceed 2024 CEE Tier 1 air-cooled VRF efficiency levels.
- The majority of indoor unit fans must be set to cycle rather than run continuously during occupied hours.

## HC2 Demand Controlled Kitchen Ventilation

- Demand controlled kitchen ventilation system that uses variable speed motors for makeup air and exhaust air.
- System includes a make-up air unit (MAU) that conditions outdoor air, hood exhaust and automated controls.
- System should have a programmable controller with scheduling and heat sensing capabilities.
- System automatically varies fan speed based on cooling load and/or time of day.
- Both the make-up air and hood exhaust fans should use variable speed motors.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Variable speed drives for supply and exhaust systems.</li> <li>• Inverter rated motors for supply and exhaust systems.</li> <li>• Exhaust hood and associated exhaust ductwork.</li> <li>• Heat pump make-up air unit and/or associated make-up air ductwork.</li> <li>• Controller, thermostats and/or sensors.</li> <li>• Electrical conduit, electrical panel, control wiring associated with exhaust hood system.</li> </ul>	<ul style="list-style-type: none"> <li>• Ductwork not part of kitchen exhaust or make-up air.</li> <li>• Curbs for new equipment.</li> </ul>

## HC3 Destratification Fan

- Fans should be High-Volume, Low-Speed (HVLS) fans.
- Installed fans should have a ceiling fan energy index (CFEI) greater than or equal to
  - 1.00 at high speed; and
  - 1.31 at 40% speed or the nearest speed that is not less than 40% speed.
- Minimum ceiling height where HVLS fan is installed must be 20 feet.



## HC4 Ductless Heat Pumps

- Choose inverter-driven, variable-speed heat pumps, sized with a heat load calculation for the area served.
- Perform a load calculation using Manual N or the [HVAC sizing tool](#) and provide to PCEF. Reflect actual zone surface areas and insulation levels. Match system capacity to the load calculation as closely as possible.
- Controls must be set with an auxiliary heat lockout setting when available.
- Plan to install system on a dedicated electrical circuit.
- Plan to install power disconnect and service outlet to code.
- Where possible, decommission existing electric resistance or gas heating system.
- If adding heat pump coil to an existing gas furnace – contact PCEF administrator or QA provider.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Outdoor Unit equipment.</li> <li>• Indoor Unit equipment.</li> <li>• Refrigerant and piping.</li> <li>• Thermostats and/or controllers.</li> <li>• Electrical, including Panel/Service upgrades as required for installation of system selected when fuel switching.*</li> </ul>	<ul style="list-style-type: none"> <li>• Demolition and decommissioning of existing system.</li> </ul>

## HC5 Ducted Heat Pumps

- Perform and document a load calculation. Match the system capacity to the calculation as closely as possible.
- Perform a load calculation using Manual N or the [HVAC sizing tool](#) and provide to PCEF. Reflect actual zone surface areas and insulation levels. Match system capacity to the load calculation as closely as possible.
- Plan to install system on a dedicated electrical circuit.
- Plan to install power disconnect and service outlet to code.
- Where a new thermostat location is provided, it shall be located on an interior wall away from heating or cooling registers, appliances, lighting fixtures, exterior doors, skylights, windows and areas that receive direct sunlight or drafts.
- A room-to-room pressurization test is recommended. If a room pressure exceeds 3Pa or more, remediation measures such as a door undercut, transfer grille or dedicated return should be made.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Outdoor Unit equipment.</li> <li>• Indoor Unit equipment.</li> <li>• Ductwork.</li> <li>• Refrigerant and piping.</li> <li>• Thermostats and/or controllers.</li> <li>• Electrical, including Panel/Service upgrades as required for installation of system selected when fuel switching.*</li> </ul>	<ul style="list-style-type: none"> <li>• Demolition and decommissioning of existing system.</li> <li>• Asbestos removal as required for HVAC replacement. (e.g., material attached to components being replaced*)</li> </ul>



## HC6 Energy Recovery Ventilator (ERC) or Heat Recovery Ventilator (HRV)

- Minimum sensible heat recovery effectiveness (SRE) of 68%.
- Commissioning required.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Re-routing of existing ductwork for ganged exhaust.</li> <li>• New ductwork and associated diffusers.</li> <li>• Testing and balancing.</li> </ul>	<ul style="list-style-type: none"> <li>• Curb adapters.</li> </ul>

## HC7 HVAC Controls or Smart Thermostats

- Smart thermostats and/or central controls save energy by optimizing fan mode scheduling and temperature setbacks during unoccupied hours.
- At a minimum the thermostat should have the ability for daily scheduling with temperature setpoints.
- Placement of thermostats in the conditioned space should be considered when installing thermostat.
- Primary savings are a reduction in heating load and fan energy reduction, with slight cooling savings.
- Use heat pump proprietary control system where appropriate.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Smart thermostats.</li> <li>• Control wiring, electrical.</li> </ul>	<ul style="list-style-type: none"> <li>• Relocation of thermostats as needed including demolition, construction, drywall.</li> </ul>

## HC8 Rooftop Unit (RTU) with Controls

- Applicable to installations of new RTUs with DX cooling and heat pump heating.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Advanced digital controller.</li> <li>• Variable Frequency Drive (VFD) and motor.</li> <li>• Advanced controls for DCV and CO<sub>2</sub> sensors.</li> <li>• Additional sensors needed for control.</li> </ul>	<ul style="list-style-type: none"> <li>• New curb adapter* to fit RTU onto existing roof penetration.</li> <li>• Removal and disposal of existing RTU.</li> </ul>

## HC9 Hydronic Heating Circulator Pump

- Pump motor must be Electronically Commutated Motor (ECM) with speed controls.
- Pump must be in-line circulator with horizontal motor and used for hydronic heating applications.
- Applicable to installations of multiple pumps in parallel.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Additional sensors needed for control.</li> <li>• Piping reconfiguration to adapt new pump to existing hydronic system.</li> </ul>	<ul style="list-style-type: none"> <li>• Vibration isolation.</li> </ul>



## HC10 Packaged Terminal Heat Pump in Residential Care or Lodging

- Packaged Terminal Heat Pump has an AHRI certificate of rated performance.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"><li>• Packaged terminal heat pump.</li><li>• Electrical conduit and controls associated with PTHP.</li><li>• Thermostats.</li><li>• Condensate drain system.</li></ul>	<ul style="list-style-type: none"><li>• N/A</li></ul>

## HC11 Server Closet Mini Split A/C

- High-efficiency mini-split air conditioners or heat pumps providing cooling to server closets located within commercial buildings.
- Cooling efficiency must be greater than SEER2 22.5.
- Cooling capacity is no greater than 4.5 tons per unit.
- Only mini-split air conditioners or heat pumps are eligible. Other data room cooling systems (such as CRAC units) would be considered as a custom measure.

## HC12 Variable Frequency Drive (VFD) for Fans and Pumps

- Eligible as a retrofit on existing fans and pumps of any size.
- Motor must be inverter-duty rated.

## V1 Garage Ventilation Exhaust Controls

- Garage ventilation exhaust controls shall use CO sensors with variable speed control on ventilation fans in enclosed parking garages.

## Lighting

### L1 Lighting (Simple Lamp Retrofit)

- Replace existing screw in or pin based fluorescent lamp with LED fixture.

### L2 Lighting (Linear LED Replacement)

- Replace existing linear lamp with LED fixture.

### L3 Lighting (Common Area or Exterior Only)

- Replace existing light fixtures with LEDs.
- Must include occupancy sensors or control system.
- Must replace existing HID lighting.

### L4 Lighting (Street Lights)

- Replace existing HID street light with LED.



## L5 Lighting (High and Low Bay Luminaires)

- Replace existing high or low bay luminaires with LED.

## L6 Lighting Controls

- Include wall mounted and wireless occupancy/vacancy sensors and Luminaire Level Lighting Controls (LLCs)
- Occupancy and vacancy sensors detect motion within the sensor's boundary and control lighting levels with the coverage area. During unoccupied periods the controls turn off or reduce the lighting with stepped switching or continuous dimming.
- LLC systems are a type of networked control system with integrated sensors and controllers in each luminaire that are wireless networked, enabling luminaire within the system to communicate with each other.

## L7 Refrigeration Case LED Lighting

- Retrofit must replace T8s or T12s and not replace existing LEDs.

# Refrigeration

## R1 Advanced Controls for Walk-ins

- Controller for walk-in cooler or freezers that save energy by reducing evaporator fan usage, compressor usage and defrost time.
- Evaporator fan should intermittently turn off based on coil and air temperature. Evaporator fans should turn on in lieu of compressor when applicable.
- Defrost controls should be demand based and occur independently of time and temperature.

## R2 Anti-sweat Heater Controls

- Technology that reduces antisweat heater energy consumption based on space ambient dew point or glass door condensation.
- Existing anti-sweat controls must not be present prior to installation.

## R3 Commercial Reach-In Refrigerators and Freezers

- New or replacement commercial reach-in refrigerators or freezers that meet or exceed [ENERGY STAR v5.0](#).
- Used or rebuilt equipment is not eligible.
- Sizes must be checked against ENERGY STAR requirements. Not all sizes are approved.

## R4 Grocery Evaporator Fan Motors

- This only applies to retrofits of existing walk-in and reach-in refrigeration cases.

## R5 Grocery Refrigeration Measures on Compressor Rack Systems

- Includes measures applicable to compressor rack systems found in medium to large grocery stores.



- Add variable frequency drive (VFD) to condenser fans. VFDs modulate the bank of fans based on refrigeration load. Savings are achieved by reducing fan speed during part load hours.
- Floating head pressure control (FHPC). Allows compressor discharge pressure to float depending on outdoor air temperature. Savings are achieved by reducing compressor power draw when outdoor air conditions allow a lower discharge pressure. The existing condenser fan may cycle or be VFD controlled.
- Floating suction pressure control (FSPC). Allows suction pressure to float up as the temperature setpoint in the refrigerated case is achieved. Savings are achieved by allowing the system to float and cycling the compressor off based on demand.
- Combined floating head and suction pressure control (FHPC + FSPC).

## R6 High Speed Doors for Walk-ins

- New high-speed doors equipped with or without air curtains and/or door heaters are eligible.
- Walk-in doorway must be at least 5 ft wide to be eligible.
- Retrofit measure applications apply to:
  - Walk-ins with existing, operational, non-high speed door infiltration barriers, including, but not limited to, strip curtains with at least 50% strip coverage remaining, spring-hinged doors, impact doors, or another method of minimizing infiltration when doors are open.
- Walk-in coolers or freezers 3,000 ft<sup>2</sup> or greater are not eligible but could be considered as custom measures.
- High temperature refrigerated spaces set above 50°F are not eligible.

## R7 Refrigerated Cases with Doors

- Installation of new refrigerated cases with doors instead of open cases.
- Retrofits of open cases with doors also applies.

# Water Heating

## WH1 Commercial Heat Pump Water Heaters

- Water heater capacity must be rated between 40-120 gallons.
- Split system water or refrigerant lines connecting tank and outdoor units insulated with minimum R-4.



- Heat pump water heater must meet minimum efficiency criteria in [NEEA Advanced Water Heater specifications](#).
- Unit must have a backup electric resistance heating element.
- Unit must replace existing electric resistance or natural gas water heater.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"> <li>• Electrical outlets or circuits, as needed for water heater installation.</li> <li>• Heat pump water heater cold exhaust ducting in conditioned space.</li> <li>• Condensate pump.</li> <li>• Thermostatic mixing valve.</li> <li>• Electrical panel replacement if replacing gas water heating.</li> </ul>	<ul style="list-style-type: none"> <li>• Thermostatically controlled heat trace cable for outdoor water lines.</li> </ul>

## WH2 Domestic Hot Water Recirculation Controls

- Only applies to HW loops that are heated by electric resistance water heaters.
- Applicable only in buildings >5 stories or dormitories with hot water recirculation loops
- Controls shall reduce water heating use and recirculation pump energy by turning off the recirculation pump during periods low usage.
- Acceptable control types are temperature, learning and combined temperature and timer control.
- Temperature control monitors the temperature in the DHW distribution piping, learning monitors usage and develops usage patterns, and combined controls use a timer and temperature sensor to control the DHW pump.
- Pump motor must be ECM.
- Both add-on and integral controls are acceptable.

## WH3 Low Flow Fixtures

- Replace and install hot water fixtures (e.g., faucets, showerheads) that meet [WaterSense](#) standards.

## WH4 Pool Covers

- Pool cover and reel on a heated indoor or outdoor pool used during unoccupied hours at a facility without a pre-existing cover.
- The cover must fit the entire surface of the pool.
- Liquid evaporation suppressants, solar disks, and mesh covers are ineligible.
- A storage reel is required and eligible for funding.
- Pool must be heated by either heat pump or electric resistance heat; Unheated pools are not eligible.



# Other Eligible Measures

## Renewables and Electric Vehicle Chargers

### REV1 Rooftop Solar, with or without Battery Storage

- Renewables system purchases must be predominantly manufactured in the United States unless such a product is unavailable, or the cost is prohibitive.
- System design and installation must comply with [Energy Trust of Oregon Solar + Storage Design and Installation Requirements V21.0](#), excluding requirements for systems to be grid-tied and for projects to submit through the PowerClerk system. To receive funds from PCEF, projects do not need to participate in Energy Trust programs.
- Grantees should plan for other needed improvements (e.g., electrical panel upgrades, security measures, and/or fire containment walls) and propose these in their scope.
- Projects must secure building and electrical permits as required and obtain final approvals for these permits.
- If adding battery storage, projects must complete analysis to identify critical building loads to be served, the site areas the battery system will back up, and the capacity of the battery system.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"><li>• Electrical, including panel/service upgrades as required for installation of system selected.</li></ul>	<ul style="list-style-type: none"><li>• Security measures to protect system from vandalism.</li><li>• Structural upgrades as needed for a solar installation.</li><li>• Roof replacement.</li></ul>

### REV2 Level II Electric Vehicle Battery Charger

- New charger must be on one of the following lists:
  - ENERGY STAR Electric Vehicle Service Equipment (EVSE) [Version 1.2](#) or newer.
  - Portland General Electric qualified products list ([residential](#) | [commercial](#))
- PCEF encourages but does not require charger to be equipped with networking capabilities.
- PCEF encourages projects to incorporate ADA accessibility considerations for at least a portion of installed EVSEs.
- Charger must be 240V designed for electric vehicle charging.
- For EVSE in publicly accessible locations, PCEF encourages grantees to consider the following security measures: retractable cords, lights, cameras, fencing.
- EVSE must be fully installed and operational.



# Food Service Measures

## F.1 Commercial Coffee Brewers

- Must meet or exceed [ENERGY STAR v3.0](#) standards for commercial coffee brewers.
- Batch commercial coffee brewers (Type II) with a standard brew volume of >24 to 384 fluid ounces/brew.

## F.2 Commercial Dishwasher

- Must meet or exceed [ENERGY STAR v3.0](#) standards.
- Flight type dishwashers do not qualify.
- Energy savings can be calculated compared to an ENERGY STAR v2.0 baseline.

## F.3 Commercial Fryer

- High efficiency commercial electric fryers which meet or exceed [ENERGY STAR v3.0](#) standards.
- Standard Vat, Electric Fryer Requirements:  $\geq 85\%$  efficiency, Idle Energy Rate  $\leq 700$  W.
- Large Vat, Electric Fryer Requirements:  $> 88\%$  efficiency, Idle Energy Rate  $< 1,000$  W.

## F.4 Commercial Griddles

- High efficiency commercial electric griddles which meet or exceed [ENERGY STAR v1.2](#) standards.
- Normalized idle energy rate of  $< 320$  watts/ft<sup>2</sup>.

## F.5 Commercial Hot Food Holding Cabinet

- Must meet or exceed [ENERGY STAR v2.0](#) standards.

## F.6 Commercial Ice Maker

- [ENERGY STAR v3.0](#) rated commercial batch and continuous air-cooled ice machines.
- Ice-Making Head (IMH), Remote condensing unit (RCU) or Self-contained unit (SCU).

## F.7 Commercial Ovens

- Must meet or exceed [ENERGY STAR v3.0](#) standards.

## F.8 Commercial Steam Cookers

- High efficiency commercial electric steam cooker which exceeds [ENERGY STAR v1.2](#) standards by 40%.

## F.9 On-Demand Overwrappers

- Overwrappers must be on-demand based, drawing power only when in use.

## F.10 Induction Stoves

- Must meet or exceed [ENERGY STAR v1.0](#) standards.



# Commercial Laundry

## CL1 Commercial Clothes Washers

- Replace existing common area washers with MEF of 2.2 or greater and IWF of 4.0 or less.
- Must be frontloading and used in common area only.

## CL2 Ozone Laundry Systems

- Each ozone generator may serve one or more washers.
- All existing/new washers at the facility must be programmed to and connected to work with ozone laundry system.
- Ozone laundry system(s) must transfer ozone into the water with either a venturi diffusion or bubble injection process.

Included in 70% EE/RE Cost	Included in 30% Non-Energy Costs (Not Exhaustive)
<ul style="list-style-type: none"><li>• Ozone laundry generator and system.</li><li>• Associated piping.</li></ul>	<ul style="list-style-type: none"><li>• Removal and recycling of existing laundry equipment.</li></ul>



# Appendix A: HVAC System Decision Tree

When considering HVAC system choices, PCEF recommends pursuing the highest efficiency electric option possible. While this may not be possible in all cases, take the following steps to ensure the best chance of achieving a high-performance project in line with PCEF objectives.

## STEP 1 – LOAD REDUCTION MEASURES

Pursue all reasonable load-reduction measures, particularly with regards to envelope and interior loads (i.e. appliances, etc.) By pursuing load reduction measures first, HVAC equipment can often be smaller, resulting in both cost and energy savings. Several prescriptive eligible measures are shown below that assist in achieving this.

Measure type	Savings methodology
Roof/attic insulation	Prescriptive: W1
Wall insulation	Prescriptive: W2
Efficient windows / secondary glazing	Prescriptive: W3, W4
Lighting upgrades and controls	Prescriptive: L1-L7
Appliances and Equipment	Prescriptive: F1-F10, CL1, CL2
Standalone air sealing	Custom
Exterior/continuous insulation or overclad retrofits	Custom

## STEP 2 – SPACE HEATING & COOLING SOLUTIONS

Focus on implementing optimal options wherever possible, which are the most efficient HVAC options. If optimal solutions aren't feasible, proceed to secondary options based on the particular constraint.

Option type	System type	Savings methodology	
Optimal HVAC Systems	Ground-source heat pumps	Custom	
	Air-to-water heat pumps	Custom	
	Radiant heating/cooling paired with heat pumps	Custom	
	VRF with DOAS and energy recovery	Prescriptive: HC1, HC6	
Motors and Controls	Building automation system (BAS) capabilities expansion	Custom	
	CO <sub>2</sub> -based demand-controlled ventilation	Custom	
	Demand Controlled Kitchen Ventilation	Prescriptive: HC2	
	Variable Frequency Drives for fans and pumps	Prescriptive: HC12	
Secondary HVAC options for projects with constraints	Cost constraints	Ductless / ducted heat pumps	Prescriptive: HC4, HC5
		Heat Pump Rooftop Unit with Controls	Prescriptive: HC8
	Space constraints	Ductless heat pumps	Prescriptive: HC4
		Targeted ERV/HRV installations	Prescriptive: HC6
	Code/ ventilation constraints	Standalone DOAS	Custom
		ERV/HRV	Prescriptive: HC6
	Electrical / infrastructure constraints	Thermal energy storage (e.g., DHW tanks)	Custom
		Load management or demand flexibility controls	Custom
Phased or partial electrification strategies		Custom	



### STEP 3 – DOMESTIC HOT WATER SOLUTIONS

Selection of a domestic hot water system should also follow a similar approach to the HVAC approach, pursuing optimal choices first and then moving to secondary choices based on the space, capacity, or temperature constraints.

Option type	System type	Savings methodology
Optimal DHW choices	Heat pump water heaters	Prescriptive: WH1
	DHW recirculation controls	Prescriptive: WH2
	Low-flow fixtures	Prescriptive: WH3
	Pool covers for heated pools	Prescriptive: WH4
	Hot Water Reset	Custom
Secondary DHW choices for projects with constraints	Hot Water System Domestic Hot Water Decentralization	Custom



## Appendix B: Common Custom Measures

Custom Measures	System Type	Description
<b>Scheduling</b>	Control	Optimize the schedule of an air-handler, chiller, pump, lighting, or other piece of equipment so that it aligns with the needs of the building. This schedule may be by time of day, day of week, outside air temperature, or some other variable.
<b>Optimal Start/Stop</b>	Control	Morning warm-up and cool-down involves varying the start-time of the HVAC equipment based on Outside Air Temperature (OAT) and inside conditions. This allows for equipment to be started closer to the time of occupancy when the building is close to setpoint anyway and outside conditions are favorable. Conversely, the HVAC equipment will start earlier if the building temp is far from setpoint, or outside conditions require it gradually increasing or decreasing the building's temperature before occupants arrive. Implementing these strategies typically involves automated building controls that adjust based on time-of-day schedules, outside air temperatures, and space sensors. This approach is especially beneficial in buildings with predictable occupancy patterns.
<b>Duct Static Pressure Reset</b>	Control	Duct static pressure reset is a strategy to adjust the static pressure within the ductwork based on the actual demand of the system. This approach ensures that the airflow is optimized for current conditions by modulating the fan speed in response to real-time requirements. The goal is to align the system's performance with the immediate demands, reducing unnecessary energy usage and is typically based on outside air temperatures or variable air volume (VAV) damper position.
<b>Supply Air Temperature Reset</b>	Control	This measure typically applies to VAV air handlers, that serve terminal units with reheat coils. Some units will have constant supply air temperature setpoints year-round. While this ensures comfort, it is not efficient, as most zones in the winter do not require colder air. This measure recommends resetting the supply air temperature based on zonal demand or outdoor air temperature, typically between 55°F and 65°F. This saves energy at the unit's cooling coil, but more significantly at the reheat coils in the terminal units.
<b>Economizing</b>	Control	Improved economizer control is the enhancement of the economizer by utilizing outside air instead of return when the conditions are favorable, and more return air than outside air when conditions are not. This can be done through a dry-bulb economizer that only looks at outside air temperature, or enthalpy-based economizer that also takes outdoor air humidity into account.
<b>Demand Control Ventilation</b>	Control	Demand Control Ventilation (DCV) is designed to ensure air quality while maximizing energy efficiency by adjusting ventilation based on occupancy levels. Utilizing CO <sub>2</sub> sensors, the system gauges the number of occupants in a space and regulates the outside air intake accordingly. In areas with low occupancy, ventilation is reduced, lessening the load on heating and cooling systems, which leads to energy savings. Conversely, higher occupancy triggers an increase in ventilation, ensuring adequate air quality. Common application of this approach is found in spaces with fluctuating occupancy patterns like schools, conference rooms, or auditoriums.
<b>Zonal Occupancy Controls</b>	Control	For HVAC systems with terminal units, a zonal occupancy control strategy requires installing occupancy sensors or thermostats with occupancy sensors. If no occupancy is detected for a certain period of time, the zone will enter a setback mode, relaxing the space's

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Custom Measures	System Type	Description
		temperature setpoint. This will allow the dampers of unoccupied zones to close to their minimum position more often while the HVAC system is operating.
<b>Outdoor Air Lockout</b>	Control	Typically used for central hot water or chilled water systems, an outdoor lockout prevents the heating or cooling system from turning on when temperature is above or below a defined temperature threshold. A heating system typically is locked out when Outside Air Temperature > 70°F and a cooling system is typically locked out when Outside Air Temperature < 55°F.
<b>Constant Volume to Variable Air Volume for Packaged RTU</b>	Motor	This measure adds a controller with VFD to a constant volume packaged (DX Cooling, Gas Furnace) Rooftop unit (RTU). The control modulates the supply fan and temperature setpoints based on heating and cooling demand.
<b>Chilled Water Reset</b>	Control	Chilled water reset involves adjusting the temperature of the chilled water circulated through the system based on the actual cooling load. By varying the chilled water temperature to meet the real-time requirements of the building, chilled water reset optimizes the efficiency of the chiller and reduces energy consumption during periods of lower cooling demand. This strategy ensures that the chiller operates at the most energy-efficient conditions, aligning its performance with the building's cooling needs and is typically based on OAT or chilled water valve positions in the system.
<b>Condenser Water Reset</b>	Control	Condenser water reset involves adjusting the temperature of the condenser water based on the current cooling demand and outside air conditions. By varying the condenser water temperature to align with demand at OAT conditions, condenser water reset optimizes the efficiency of the chiller and reduces energy consumption during periods of lower cooling demand and lower temperatures. This strategy aims to ensure the chiller operates at the most energy-efficient conditions while balancing the energy usage of pumps and cooling towers. Typically, condenser water reset is based on factors such as outside air temperature and humidity and includes consideration of chilled water temperatures.
<b>Hot Water Reset</b>	Control	Hot water reset involves adjusting the temperature of the hot water circulated through the system based on heating demand. This saves energy at the boiler, as boilers are typically more efficient as they see cooler hot water return temperatures. This is seen especially in condensing boilers, which see a large improvement in efficiency when the return temperature falls below approximately 130°F. Similar to the chilled water reset, the temperature setpoint usually modulates in response to hot water valve position or OAT.



Custom Measures	System Type	Description
<b>Variable Frequency Drive Retrofit</b>	Motor	Variable Frequency Drives are a way of controlling the flow of air or water through the system by slowing down and speeding up a pump. Although not all systems are suitable for installation of a VFD, there are many times when 100% flow may not be needed. In these cases, it may make sense to install a VFD and slow the equipment down. Energy savings can be realized both through the energy saved by the motor moving less air or water, and since less mechanical heating and cooling may be needed due to the reduced flow. For pumping systems, this often also converting three-way valves to two-way valves.
<b>Differential Pressure Reset</b>	Control	This measure applies to pumping systems. Similar to the duct static pressure reset strategy, the differential pressure setpoint in the loop is relaxed until a critical number of valves are close to or fully open. This measure works for variable flow systems with two-way valves. It does not apply to constant volume systems with three-way valves at coils. Energy savings are seen as the pump works less, only providing flow to the coils that are calling for flow.
<b>Domestic Hot Water Decentralization</b>	Hot Water	For central hot water systems that serve both heating loads and domestic hot water systems, this measure recommends installing dedicated domestic hot water systems to serve the domestic hot water loads. This allows the hot water system to turn off when there is no heating demand.
<b>Ground Source Heat Pumps</b>	Heating / Cooling	A ground source heat pump saves energy by using the relatively stable temperature of the earth as a heat source in winter and a heat sink in summer, rather than creating heat through combustion or relying on large temperature differences with outdoor air. The Portland climate allows the system to operate at high efficiency year-round, with significantly lower electricity use than electric resistance heating and much lower energy input than gas furnaces or air-source heat pumps during cold snaps. Ground source systems typically deliver three to four times output for every unit of electricity consumed, reducing both operating costs and emissions.
<b>Radiant Floor Heating</b>	Heating	Radiant floor heating is more energy efficient than air-source heating because it delivers heat directly to occupants and surfaces, rather than heating large volumes of air that stratify or escape through ventilation. Buildings with high ceilings and/or frequent air exchanges stand to save the most as radiant heating reduces distribution losses and improves comfort at lower operating temperatures. Radiant systems can also pair efficiently with low-temperature heat sources such as heat pumps, further improving overall system efficiency and control.
<b>Air Sealing</b>	Envelope	Air sealing commercial buildings reduces uncontrolled infiltration and exfiltration, lowering heating and cooling loads, improving HVAC system efficiency, and stabilizing indoor temperatures. In addition to increasing occupant comfort, air sealing can reduce HVAC equipment sizing which in turn reduces overall capital costs.



# Appendix C: Renewables Guidelines

This appendix is a companion resource to the [REV1 Rooftop Solar, with or without Battery Storage](#) eligible measure section above. To be eligible for PCEF funding for renewables, grantee projects must follow PCEF process below. The process varies based on the project scope or approach.

## Rooftop Solar with or without Battery Storage

PCEF strongly encourages prospective grantees to obtain a bid from a solar installer to inform their grant application. If you don't already have a connection with a solar contractor, you can request a bid through Energy Trust of Oregon's [solar bid request form](#).

For active projects that PCEF is funding, the participation process is typically as-follows:

Step	Responsible	Activities
<b>1. Develop scope of work</b>	Grantee	Assesses purpose of system (e.g., energy bill reduction, resilience), where systems are likely to be housed, and anticipates potential challenges (e.g., electric panel, rooftop space, roof age). Engages renewables installer to provide a bid.
	Solar installer	May conduct site visit to inform scope. Develops bid based on grantee needs.
<b>2. Complete scope review prior to starting construction</b>	PCEF grant manager	Convenes PCEF kickoff meeting, including Grantee, renewables installer, and PCEF QA Provider to discuss scope of work and PCEF process. If project includes efficiency measures, this discussion may occur as part of a larger QA meeting.
	PCEF QA Provider	Reviews scope of work and provides feedback within 10 business days. QA Provider requests scope adjustments, if needed.
<b>3. Complete construction</b>	Solar installer	Installs system according to PCEF requirements and receives sign-off from City and utility.
	Grantee	<i>If participating in Energy Trust program:</i> Submits to PCEF the Energy Trust sign-off incentive payment confirmation letter, confirming that project completed quality assurance sign-off from Energy Trust.  <i>If not participating in Energy Trust program:</i> Notifies PCEF when installation is complete.
	PCEF grant manager	<i>If participating in Energy Trust program:</i> Confirms project as complete.  <i>If not participating in Energy Trust program:</i> Schedules QA Provider site visit. After successful inspection, confirms project as complete.



# Portland Clean Energy Community Benefits Fund

## Guidelines & Eligible Measures

### Commercial New Construction v1

#### Document Overview

The Portland Clean Energy Community Benefits Fund (PCEF) invests in climate action projects, in alignment with the City’s climate action goals, which support environmental justice and environmental, social, and economic benefits for all Portlanders. This document is a resource for new construction commercial projects, outlining project requirements, quality assurance processes, and measures that are eligible for PCEF funding. For retrofit projects, refer to the retrofit eligible measures document on the [PCEF energy resources page](#).

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*This document is intended for the following audiences:*

- Prospective grantees looking to learn more about PCEF requirements and process.
- Active grantees and their contractors looking for guidance on their projects.
- Program staff at City bureaus dispersing PCEF funds.

For questions, contact [cleanenergy@portlandoregon.gov](mailto:cleanenergy@portlandoregon.gov), or reach out to your PCEF project manager.



# Program Framework

## Commercial New Construction Project Requirements

Commercial new construction projects are eligible for funding through PCEF. Following are high level requirements for commercial new construction projects to be eligible for funds:

- For new construction projects, 100% of the PCEF-funded construction costs must be for energy efficiency and renewable energy (EE/RE) measures.
- To be eligible for PCEF funds, EE/RE measures must increase whole building energy efficiency by at least 5% above code standards. See the eligible measures sections below for guidance on how to calculate savings.
- PCEF will not fund natural gas systems or components associated with natural gas systems.
- No more than 35% of PCEF-funded hard construction costs related to the energy scope may be allocated to windows and lighting. PCEF may consider exceptions to this percentage for projects that include a comprehensive energy reduction package that is estimated to achieve a minimum site-Energy Use Intensity (EUI) reduction of 30%.
- PCEF Eligible Measures are for use as one part of the PCEF process, by PCEF grantees and contractors.
- For projects that include renewable components, refer to [Appendix C: Renewables Guidelines](#) for additional guidance.

New construction projects may follow one of two funding pathways:

- **Above code path:** Projects must exceed minimum requirements for the energy code that the project permitted to. PCEF will pay for the installed cost of eligible measures.
- **Net zero path:** Projects must install solar that generates at least as much electricity as the building uses each year (net zero). Net zero projects must meet above code requirements above, as well as net zero requirements in [Appendix C: Renewables Guidelines](#). PCEF will pay up to 25% of the total development cost for net zero projects.

## Quality Assurance Process

- 1) A PCEF-assigned quality assurance (QA) Provider will work as a partner from project initiation through completion to guide your project through the PCEF process. Include your QA Provider early and often.
- 2) For each project site, project team must submit a scope of work for PCEF-funded measures that demonstrate the proposed project will comply with industry best practices and manufacturer specifications.
- 3) Scope of work may include (but is not limited to) the following:
  - Building description, including number of floors, units, configuration and use.
  - Bid or contractor proposal for planned clean energy upgrades including weatherization, HVAC upgrades, plumbing, venting, and electrification.
  - Material specifications including quantity, manufacturer, model numbers, etc.
- 4) QA Provider will work with the project team to ensure the scope meets PCEF requirements. Grantees must obtain written approval of the scope of work by PCEF or the QA Provider prior to beginning construction.
- 5) QA Provider will conduct site inspections or visual or virtual inspections to ensure installation meets PCEF requirements. QA Provider will provide project team and PCEF a post-installation Quality Assurance report.



# Custom Energy Efficiency Measures

PCEF considers efficiency measures to be “custom” when energy savings are very dependent on site conditions. Custom measures are usually larger and/or more complex, requiring their own analysis and review to determine how they save energy for a particular project. Some common custom measure examples include, but are not limited to, control upgrades, variable speed motor upgrades, and larger equipment replacements such as chillers or ground source heat pumps. If you would like to explore a custom measure option, please refer to PCEF’s Commercial Modeling and Technical Guidelines on the [PCEF energy resources page](#). There are many custom measures to consider depending on the site and intended use. See [Appendix B](#) for examples. Project teams may obtain PCEF approval for custom measures as part of the scoping process, prior to starting construction.

# Prescriptive Energy Efficiency Measures

Prescriptive measures, also referred to as “deemed” measures, have established savings and funding values that fit a specific product or practice. The measures listed below are common prescriptive measures that are eligible for PCEF funding. Note that when a measure is flagged with an asterisk,, PCEF may make an exception for funding the item if sufficient supporting documentation is provided. If a potential project cannot be found in the “Prescriptive Measures” list below, it can still be considered as a custom measure that is potentially eligible for PCEF funding.

## Weatherization

To ensure proper HVAC equipment sizing, evaluate and pursue all available weatherization upgrades prior to proposing HVAC upgrades.

### W1 Insulation, Air Sealing and Windows

- Install a combination insulation, air sealing, and windows that perform a minimum of 5% better than the envelope requirements listed in the OEESC for the listed assemblies.
  - Project teams must submit Comcheck report demonstrating they have met this requirement.
- Air seal all gaps, cracks, seams, and penetrations between conditioned and unconditioned space.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"><li>• Carpentry for air leakage reduction (e.g., building stem walls between roof and plenum space).</li><li>• Carpentry required for framing modifications necessary for higher R-value insulation.</li><li>• Window units.</li></ul>	<ul style="list-style-type: none"><li>• Roofing.</li><li>• Code minimum framing.</li><li>• Siding material.</li><li>• Window framing and weatherization.</li></ul>



# Heating, Ventilation and Air Conditioning (HVAC)

HVAC system and control efficiency measures are common occurrences in commercial buildings. However, choosing the most efficient HVAC option is not always feasible due to competing factors such as space on the site, operational requirements, or electric service constraints where the utility is unable to provide sufficient electrical service to the site. As such, PCEF has provided a decision table in [Appendix A](#) to assist with choosing the most efficient HVAC system possible given the requirements on site.

## HC1 Air-Cooled Variable Refrigerant Flow (VRF) Multi-Split Heat Pumps

- Must be installed in buildings used for retail, offices or school classrooms.
- Must install dedicated outdoor air supply (DOAS) with energy recovery meeting at least 50% enthalpy recovery efficiency.
- Each condenser unit must serve multiple ductless indoor evaporator units and must have a rated cooling capacity over 5 tons with variable speed compressor operation.
- DOAS ventilation air must be supplied at a neutral space temperature.
- Must meet or exceed 2024 CEE Tier 1 air-cooled VRF efficiency levels.
- The majority of indoor unit fans must be set to cycle rather than run continuously during occupied hours.

## HC2 Demand Controlled Kitchen Ventilation

- Demand controlled kitchen ventilation system that uses variable speed motors for makeup air and exhaust air.
- System includes a make-up air unit (MAU) that conditions outdoor air, hood exhaust and automated controls.
- System should have a programmable controller with scheduling and heat sensing capabilities.
- System automatically varies fan speed based on cooling load and/or time of day.
- Both the make-up air and hood exhaust fans should use variable speed motors.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Variable speed drives for supply and exhaust systems.</li> <li>• Inverter rated motors for supply and exhaust systems.</li> <li>• Exhaust hood and associated exhaust ductwork.</li> <li>• Heat Pump Make-up Air unit and/or associated make-up air ductwork.</li> <li>• Controller, thermostats and/or sensors.</li> <li>• Electrical conduit, electrical panel, and control wiring associated with exhaust hood system.</li> </ul>	<ul style="list-style-type: none"> <li>• Ductwork not part of kitchen exhaust or make-up air.</li> <li>• Curbs for new equipment.</li> </ul>



## HC4 Ductless Heat Pumps

- Choose inverter-driven, variable-speed heat pumps, sized with a heat load calculation for the area served.
- Perform a load calculation using Manual N or the [HVAC sizing tool](#) and provide to PCEF. Reflect actual zone surface areas and insulation levels. Match system capacity to the load calculation as closely as possible.
- Controls must be set with an auxiliary heat lockout setting when available.
- Plan to install system on a dedicated electrical circuit.
- Plan to install power disconnect and service outlet to code.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Propriety thermostats and/or controllers.</li> <li>• Electrical and control wiring associated with Ductless Heat Pump.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## HC5 Ducted Heat Pumps

- Perform a load calculation using Manual N or the [HVAC sizing tool](#) and provide to PCEF. Reflect actual zone surface areas and insulation levels. Match system capacity to the load calculation as closely as possible.
- Plan to install system on a dedicated electrical circuit.
- Plan to install power disconnect and service outlet to code.
- Thermostat shall be located on an interior wall away from heating or cooling registers, appliances, lighting fixtures, exterior doors, skylights, windows and areas that receive direct sunlight or drafts.
- A room-to-room pressurization test is recommended. If a room pressure exceeds 3Pa or more, remediation measures such as a door undercut, transfer grille or dedicated return should be made.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Ductwork.</li> <li>• Electrical and control wiring associated with Heat Pump.</li> <li>• Propriety thermostats and/or controllers.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## HC6 Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV)

- Minimum sensible heat recovery effectiveness (SRE) of 68%.
- Commissioning required.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Ductwork and associated diffusers.</li> <li>• Testing and balancing.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>



## HC8 Rooftop Unit (RTU) with Controls

- Applicable to installations of new RTUs with DX cooling and heat pump heating.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Advanced digital controller.</li> <li>• Variable Frequency Drive (VFD) and motor.</li> <li>• Advanced controls for DCV and CO<sub>2</sub> sensors.</li> <li>• Additional sensors needed for control.</li> </ul>	<ul style="list-style-type: none"> <li>• Roof curbs.</li> <li>• Ductwork.</li> </ul>

## HC9 Hydronic Heating Circulator Pump

- Pump motor must be Electronically Commutated Motor (ECM) with speed controls.
- Pump must be in-line circulator with horizontal motor and used for hydronic heating applications.
- Applicable to installations of multiple pumps in parallel.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Additional sensors needed for control.</li> <li>• Vibration isolation.</li> </ul>	<ul style="list-style-type: none"> <li>• Piping, valves, fittings.</li> </ul>

## HC10 Packaged Terminal Heat Pump in Residential Care or Lodging

- Packaged Terminal Heat Pump has an AHRI certificate of rated performance.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Packaged terminal heat pump.</li> <li>• Electrical conduit and controls associated with PTHP.</li> <li>• Thermostats.</li> <li>• Condensate drain system.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## HC11 Server Closet Mini Split A/C

- High-efficiency mini-split air conditioners or heat pumps providing cooling to server closets.
- Cooling efficiency must be greater than SEER2 22.5
- Cooling capacity is no greater than 4.5 tons per unit.
- Only mini-split air conditioners or heat pumps are eligible. Other data room cooling systems (such as CRAC units) would be considered as a custom measure.

## HC12 Variable Frequency Drive (VFD) for Fans and Pumps

- Eligible if installed on fan or pump with motor sizes as follows:
  - Chilled Water pumps < 7.5hp
  - Heating Water Pumps < 10hp
  - Fans < 5hp
- Motor must be inverter-duty rated.



# Lighting

## L6 Networked Lighting Controls

- Control system must be on the Design Lights Consortium’s Networked Lighting Controls [Qualified Products List](#).
- Luminaire Level Lighting Controls (LLLCs) are a type of networked control system with integrated sensors and controllers in each luminaire that are wireless networked, enabling each luminaire within the system to communicate with each other. LLLCs must include verification showing installation and proper configuration.

## L8 Lighting Improvements

- Meet a maximum Lighting Power Density (LPD) as per the 2025 OEEESC as shown in the table below. If project is permitted under a different code, refer to LPD tables in the applicable code version.
- Lighting must exceed stated LPD thresholds by a minimum of 5%.
  - Project teams must submit Comcheck report demonstrating they have met this requirement.

Building Type	Code LPD	Building Type	Code LPD	Building Type	Code LPD
Automotive facility	0.73	Hotel/motel	0.53	Museum	0.56
Convention Center	0.64	Library	0.83	Office	0.62
Courthouse	0.75	Manufacturing facility	0.82	Parking garage	0.17
Dining: Bar lounge/leisure	0.74	Motion picture theater	0.43	Performing arts theater	0.82
Dining: Cafeteria/fast food	0.70	Multifamily	0.46	Police station	0.62
Dining: Family	0.65	Museum	0.56	Post office	0.64
Dormitory	0.52	Office	0.62	Religious facility	0.66
Exercise center	0.72	Parking garage	0.17	Retail	0.78
Fire station	0.56	Penitentiary	0.65	School/university	0.70
Gymnasium	0.75	Transportation	0.56	Sports arena	0.73
Health-care clinic	0.77	Warehouse	0.45	Town hall	0.67
Hospital	0.92	Workshop	0.86		

# Refrigeration

## R1 Advanced Controls for Walk-ins

- Controller for walk-in cooler or freezers that save energy by reducing evaporator fan usage, compressor usage and defrost time.
- Evaporator fan should intermittently turn off based on coil and air temperature. Evaporator fans should turn on in lieu of compressor when applicable.
- Defrost controls should be demand based and occur independently of time and temperature.

## R3 Commercial Reach-In Refrigerators and Freezers

- New commercial reach-in refrigerators or freezers that meet or exceed [ENERGY STAR v5.0](#).
- Used or rebuilt equipment is not eligible.
- Sizes must be checked against ENERGY STAR requirements. Not all sizes are approved.



## R6 High Speed Doors for Walk-ins

- High-speed doors equipped with or without air curtains and/or door heaters are eligible.
- Walk-in doorway must be at least 5 ft wide to be eligible.
- Walk-in coolers or freezers 3,000 ft<sup>2</sup> or greater may be considered through custom pathway.
- High temperature refrigerated spaces set above 50°F are not eligible.

## R7 Refrigerated Cases with Doors

- Installation of new refrigerated cases with doors instead of open cases.

## Water Heating

### WH1 Commercial Heat Pump Water Heaters (HPWH)

- Water Heater capacity must be rated between 40-120 gallons.
- Split system water or refrigerant lines connecting the tank and outdoor units insulated with minimum R-4.
- HPWH must meet minimum criteria in [NEEA Advanced Water Heater specifications v8.1](#).
- Unit must have a backup electric resistance heating element.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Electrical outlets or circuits, as needed for water heater installation.</li> <li>• HPWH cold exhaust ducting.</li> <li>• Thermostatically controlled heat trace cable for outdoor water lines.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

### WH2 Domestic Hot Water Recirculation Controls

- Only applies to HW loops that are heated by electric resistance water heaters.
- Applicable only in buildings >5 stories or dormitories with hot water recirculation loops
- Controls shall reduce water heating use and recirculation pump energy by turning off the recirculation pump during periods low usage.
- Acceptable control types are temperature, learning and combined temperature, and timer control.
- Temperature control monitors the temperature in the DHW distribution piping, learning monitors usage and develops usage patterns. Combined controls use a timer and temperature sensor to control the DHW pump.
- Pump motor must be ECM.
- Both add-on and integral controls are acceptable.

### WH3 Low Flow Fixtures

- Install hot water fixtures (e.g., faucets, showerheads) that meet [WaterSense](#) standards.



## WH4 Pool Covers

- Pool cover and reel on a heated indoor or outdoor pool used during unoccupied hours
- The cover must fit the entire surface of the pool.
- Liquid evaporation suppressants, solar disks, and mesh covers are ineligible.
- A storage reel is required and eligible for funding.
- Pool must be heated by heat pump; Unheated pools are not eligible.

# Other Eligible Measures

## Renewables and Electric Vehicle Chargers

PCEF invests in solar and battery storage projects that provide community benefit, usually in the following forms:

- Reduced household or non-profit organization energy bills, as a result of net metering or community solar.
- Resilience for community spaces, made possible by battery storage that enables buildings to operate critical loads during utility outage events.

The table below shows which renewables PCEF does and does not fund. Note that alternate forms of renewable energy require pre-approval from PCEF.

Renewable type	PCEF will fund	PCEF will not fund
<b>Solar</b>	Rooftop solar on for single-unit homes, multi-unit housing, and commercial buildings. "Offsite" and ground-mounted solar for sites without sufficient roof space or solar resource. Community solar.	Offsite solar outside of Portland, OR.
<b>Battery storage</b>	On-site critical load backup for single-unit homes, multi-unit housing, and commercial buildings.	Battery storage without solar.

Please review [Appendix C: Renewables Guidelines](#) for process consideration for renewables projects, particularly ones that expect to achieve net zero.

## REV1 Rooftop Solar, with or without Battery Storage

- Renewables system purchases must be predominantly manufactured in the United States unless such a product is unavailable, or the cost is prohibitive.
  - If you are unsure whether a product meets domestic manufacturing requirements, please contact your renewables installer, which may need to contact the equipment manufacturer.
- System design and installation must comply with [Energy Trust of Oregon Solar + Storage Design and Installation Requirements V21.0](#), excluding requirements for systems to be grid-tied and for projects to submit through the PowerClerk system. To receive funds from PCEF, projects do not need to participate in Energy Trust programs.
- Grantees should plan for other needed improvements (e.g., electrical panel upgrades, security measures, and/or fire containment walls) and propose these in their scope.
- Projects must secure building and electrical permits as required and obtain final approvals for these permits.



- If adding battery storage, projects must complete analysis to identify critical building loads to be served, the site areas the battery system will back up, and the capacity of the battery system.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"> <li>• Electrical, including panel/service upgrades as required for installation of system selected.</li> <li>• Security measures to protect system from vandalism.</li> </ul>	<ul style="list-style-type: none"> <li>• N/A</li> </ul>

## REV2 Level II Electric Vehicle Battery Charger

- New charger must be on one of the following lists:
  - ENERGY STAR Electric Vehicle Service Equipment (EVSE) [Version 1.2](#) or newer.
  - Portland General Electric qualified products list ([residential](#) | [commercial](#))
- PCEF encourages but does not require charger to be equipped with networking capabilities.
- PCEF encourages projects to incorporate ADA accessibility considerations for at least a portion of EVSEs.
- Charger must be 240V designed for electric vehicle charging.
- For EVSE in publicly accessible locations, PCEF encourages grantees to consider the following security measures: retractable cords, lights, cameras, fencing.
- EVSE must be fully installed and operational.

## Food Service Measures

### F.1 Commercial Coffee Brewers

- Must meet or exceed [ENERGY STAR v3.0](#) standards for commercial coffee brewers.
- Batch commercial coffee brewers (Type II) with a standard brew volume of >24 to 384 fluid ounces/brew.

### F.2 Commercial Dishwashers

- Must meet or exceed [ENERGY STAR v3.0](#) standards.
- Flight type dishwashers do not qualify.
- Energy savings can be calculated compared to an [ENERGY STAR v2.0](#) baseline.

### F.3 Commercial Fryer

- High efficiency commercial electric fryers which meet or exceed [ENERGY STAR v3.0](#) standards.
- Standard Vat, Electric Fryer Requirements:  $\geq$  85% efficiency, Idle Energy Rate  $\leq$  700 W.
- Large Vat, Electric Fryer Requirements:  $>$  88% efficiency, Idle Energy Rate  $<$  1,000 W.

### F.4 Commercial Griddles

- High efficiency commercial electric griddles which meet or exceed [ENERGY STAR v1.2](#) standards.
- Normalized idle energy rate of  $<$  320 watts/ft<sup>2</sup>



## F.5 Commercial Hot Food Holding Cabinet

- Must meet or exceed [ENERGY STAR v2.0](#) standards.

## F.6 Commercial Ice Maker

- [ENERGY STAR v3.0](#) rated commercial batch and continuous air-cooled ice machines.
- Ice-Making Head (IMH), Remote condensing unit (RCU) or Self-contained unit (SCU).

## F.7 Commercial Ovens

- Must meet or exceed [ENERGY STAR v3.0](#) standards.

## F.8 Commercial Steam Cookers

- High efficiency commercial electric steam cooker which exceeds [ENERGY STAR v1.2](#) standards by 40%.

## F.9 On-Demand Overwrappers

- Overwrappers must be on-demand based, drawing power only when in use.

## F.10 Induction Stoves

- Must meet or exceed [ENERGY STAR v1.0](#) standards.

# Commercial Laundry

## CL1 Commercial Clothes Washers

- Washers with MEF of 2.2 or greater and IWF of 4.0 or less.
- Must be frontloading and used in common area only.

## CL2 Ozone Laundry Systems

- Each ozone generator may serve one or more washers.
- All existing/new washers at the facility must be programmed to and connected to work with ozone laundry system.
- Ozone laundry system(s) must transfer ozone into water via a venturi diffusion or bubble injection process.

Eligible for PCEF funding	Not eligible for PCEF funding
<ul style="list-style-type: none"><li>• Ozone laundry generator and system</li><li>• Associated piping</li></ul>	<ul style="list-style-type: none"><li>• N/A</li></ul>



# Appendix A: HVAC System Decision Tree

When considering HVAC system choices, PCEF recommends pursuing the highest efficiency electric option possible. While this may not be possible in all cases, take the following steps to ensure the best chance of achieving a high-performance project in line with PCEF objectives.

## STEP 1 – LOAD REDUCTION MEASURES

Pursue all reasonable load-reduction measures, particularly with regards to envelope and interior loads (i.e. appliances, etc.) By pursuing load reduction measures first, HVAC equipment can often be smaller, resulting in both cost and energy savings. Several prescriptive eligible measures are shown below that assist in achieving this.

Measure type	Savings methodology
Envelope Improvements	Prescriptive: W1
Lighting improvements and controls	Prescriptive: L6, L8
Appliances and Equipment	Prescriptive: F1-F10, CL1, CL2
Standalone air sealing	Custom

## STEP 2 – SPACE HEATING & COOLING SOLUTIONS

Focus on implementing optimal options wherever possible, which are the most efficient HVAC options. If optimal solutions aren't feasible, proceed to secondary options based on the particular constraint.

Option type	System type	Savings methodology	
Optimal HVAC Systems	Ground-source heat pumps	Custom	
	Air-to-water heat pumps	Custom	
	Radiant heating/cooling paired with heat pumps	Custom	
	VRF with DOAS and energy recovery	Prescriptive: HC1, HC6	
Motors and Controls	Building automation system (BAS) capabilities expansion	Custom	
	CO <sub>2</sub> -based demand-controlled ventilation	Custom	
	Demand Controlled Kitchen Ventilation	Prescriptive: HC2	
	Variable Frequency Drives for fans and pumps	Prescriptive: HC12	
Secondary HVAC options for projects with constraints	Cost constraints	Ductless / ducted heat pumps	Prescriptive: HC4, HC5
		Heat Pump Rooftop Unit with Controls	Prescriptive: HC8
	Space constraints	Ductless heat pumps	Prescriptive: HC4
		Targeted ERV/HRV installations	Prescriptive: HC6
	Code/ ventilation constraints	Standalone DOAS	Custom
		ERV/HRV	Prescriptive: HC6
	Electrical / infrastructure constraints	Thermal energy storage (e.g., DHW tanks)	Custom
Load management or demand flexibility controls		Custom	
Phased or partial electrification strategies		Custom	

## STEP 3 – DOMESTIC HOT WATER SOLUTIONS

Selection of a domestic hot water system should also follow a similar approach to the HVAC approach, pursuing optimal choices first and then moving to secondary choices based on the space, capacity, or temperature constraints.



Option type	System type	Savings methodology
Optimal DHW choices	Heat pump water heaters	Prescriptive: WH1
	DHW recirculation controls	Prescriptive: WH2
	Low-flow fixtures	Prescriptive: WH3
	Pool covers for heated pools	Prescriptive: WH4
	Hot Water Reset	Custom
Secondary DHW choices for projects with constraints	Central heat pump water heater plant	Custom



# Appendix B: Common Custom Measures

Custom Measures	System Type	Description
<b>Scheduling</b>	Control	Optimize the schedule of an air-handler, chiller, pump, lighting, or other piece of equipment so that it aligns with the needs of the building. This schedule may be by time of day, day of week, outside air temperature, or some other variable.
<b>Optimal Start/Stop</b>	Control	Morning warm-up and cool-down involves varying the start-time of the HVAC equipment based on Outside Air Temperature (OAT) and inside conditions. This allows for equipment to be started closer to the time of occupancy when the building is close to setpoint anyway and outside conditions are favorable. Conversely, the HVAC equipment will start earlier if the building temp is far from setpoint, or outside conditions require it gradually increasing or decreasing the building's temperature before occupants arrive. Implementing these strategies typically involves automated building controls that adjust based on time-of-day schedules, outside air temperatures, and space sensors. This approach is especially beneficial in buildings with predictable occupancy patterns.
<b>Duct Static Pressure Reset</b>	Control	Duct static pressure reset is a strategy to adjust the static pressure within the ductwork based on the actual demand of the system. This approach ensures that the airflow is optimized for current conditions by modulating the fan speed in response to real-time requirements. The goal is to align the system's performance with the immediate demands, reducing unnecessary energy usage and is typically based on outside air temperatures or variable air volume (VAV) damper position.
<b>Supply Air Temperature Reset</b>	Control	This measure typically applies to VAV air handlers that serve terminal units with reheat coils. Some units will have constant supply air temperature setpoints year-round. While this ensures comfort, it is not efficient, as most zones in the winter do not require colder air. This measure recommends resetting the supply air temperature based on zonal demand or outdoor air temperature, typically between 55°F and 65°F. This saves energy at the unit's cooling coil, but more significantly at the reheat coils in the terminal units.
<b>Economizing</b>	Control	Improved economizer control is the enhancement of the economizer by utilizing outside air instead of return when the conditions are favorable, and more return air than outside air when conditions are not. This can be done through a dry-bulb economizer that only looks at outside air temperature, or enthalpy-based economizer that also takes outdoor air humidity into account.
<b>Demand Control Ventilation</b>	Control	Demand Control Ventilation (DCV) is designed to ensure air quality while maximizing energy efficiency by adjusting ventilation based on occupancy levels. Utilizing CO <sub>2</sub> sensors, the system gauges the number of occupants in a space and regulates the outside air intake accordingly. In areas with low occupancy, ventilation is reduced, lessening the load on heating and cooling systems, which leads to energy savings. Conversely, higher occupancy triggers an increase in ventilation, ensuring adequate air quality. Common application of this approach is found in spaces with fluctuating occupancy patterns like schools, conference rooms, or auditoriums.
<b>Zonal Occupancy Controls</b>	Control	For HVAC systems with terminal units, a zonal occupancy control strategy requires installing occupancy sensors or thermostats with occupancy sensors. If no occupancy is detected for a certain period of time, the zone will enter a setback mode, relaxing the space's temperature setpoint. This will allow the dampers of unoccupied zones to close to their minimum position more often while the HVAC system is operating.
<b>Outdoor Air Lockout</b>	Control	Typically used for central hot water or chilled water systems, an outdoor lockout prevents the heating or cooling system from turning on when temperature is above or below a defined temperature threshold. A heating system typically is locked out when Outside Air Temperature > 70°F and a cooling system is typically locked out when Outside Air Temperature < 55°F.



Custom Measures	System Type	Description
<b>Constant Volume to Variable Air Volume for Packaged RTU</b>	Motor	This measure adds a controller with VFD to a constant volume packaged (DX Cooling, Gas Furnace) Rooftop unit (RTU). The control modulates the supply fan and temperature setpoints based on heating and cooling demand.
<b>Chilled Water Reset</b>	Control	Chilled water reset involves adjusting the temperature of the chilled water circulated through the system based on the actual cooling load. By varying the chilled water temperature to meet the real-time requirements of the building, chilled water reset optimizes the efficiency of the chiller and reduces energy consumption during periods of lower cooling demand. This strategy ensures that the chiller operates at the most energy-efficient conditions, aligning its performance with the building's cooling needs and is typically based on OAT or chilled water valve positions in the system.
<b>Condenser Water Reset</b>	Control	Condenser water reset involves adjusting the temperature of the condenser water based on the current cooling demand and outside air conditions. By varying the condenser water temperature to align with demand at OAT conditions, condenser water reset optimizes the efficiency of the chiller and reduces energy consumption during periods of lower cooling demand and lower temperatures. This strategy aims to ensure the chiller operates at the most energy-efficient conditions while balancing the energy usage of pumps and cooling towers. Typically, condenser water reset is based on factors such as outside air temperature and humidity and includes consideration of chilled water temperatures.
<b>Hot Water Reset</b>	Control	Hot water reset involves adjusting the temperature of the hot water circulated through the system based on heating demand. This saves energy at the boiler, as boilers are typically more efficient as they see cooler hot water return temperatures. This is seen especially in condensing boilers, which see a large improvement in efficiency when the return temperature falls below approximately 130°F. Similar to the chilled water reset, the temperature setpoint usually modulates in response to hot water valve position or OAT.
<b>Variable Frequency Drive (small motors only)</b>	Motor	Variable Frequency Drives are a way of controlling the flow of air or water through the system by slowing down and speeding up a pump. Although not all systems are suitable for installation of a VFD, there are many times when 100% flow may not be needed. In these cases, it may make sense to install a VFD and slow the equipment down. Energy savings can be realized both through the energy saved by the motor moving less air or water, and since less mechanical heating and cooling may be needed due to the reduced flow.
<b>Differential Pressure Reset</b>	Control	This measure applies to pumping systems. Similar to the duct static pressure reset strategy, the differential pressure setpoint in the loop is relaxed until a critical number of valves are close to or fully open. This measure works for variable flow systems with two-way valves. It does not apply to constant volume systems with three-way valves at coils. Energy savings are seen as the pump works less, only providing flow to the coils that are calling for flow.
<b>Ground Source Heat Pumps</b>	Heating / Cooling	A ground source heat pump saves energy by using the relatively stable temperature of the earth as a heat source in winter and a heat sink in summer, rather than creating heat through combustion or relying on large temperature differences with outdoor air. The Portland climate allows the system to operate at high efficiency year-round, with significantly lower electricity use than electric resistance heating and much lower energy input than gas furnaces or air-source heat pumps during cold snaps. Ground source systems typically deliver three to four times output for every unit of electricity consumed, reducing both operating costs and emissions.



Custom Measures	System Type	Description
<b>Radiant Floor Heating</b>	Heating	Radiant floor heating is more energy efficient than air-source heating because it delivers heat directly to occupants and surfaces, rather than heating large volumes of air that stratify or escape through ventilation. Buildings with high ceilings and/or frequent air exchanges stand to save the most as radiant heating reduces distribution losses and improves comfort at lower operating temperatures. Radiant systems can also pair efficiently with low-temperature heat sources such as heat pumps, further improving overall system efficiency and control.
<b>Air Sealing</b>	Envelope	Air sealing commercial buildings reduces uncontrolled infiltration and exfiltration, lowering heating and cooling loads, improving HVAC system efficiency, and stabilizing indoor temperatures. In addition to increasing occupant comfort, air sealing can reduce HVAC equipment sizing which in turn reduces overall capital costs.



# Appendix C: Renewables Guidelines

This appendix is a companion resource to the [REV1 Rooftop Solar, with or without Battery Storage](#) eligible measure section above. To be eligible for PCEF funding for renewables, grantee projects must follow PCEF process below. The process varies based on the project scope or approach.

## Rooftop Solar with or without Battery Storage

PCEF strongly encourages prospective grantees to obtain a bid from a solar installer to inform their grant application. If you don't already have a connection with a solar contractor, you can request a bid through Energy Trust of Oregon's [solar bid request form](#).

For active projects that PCEF is funding, the participation process is typically as-follows:

Step	Responsible	Activities
<b>1. Develop scope of work</b>	Grantee	Assesses purpose of system (e.g., energy bill reduction, resilience), where systems are likely to be housed, and anticipates potential challenges (e.g., electric panel, rooftop space, roof age). Engages renewables installer to provide a bid.
	Solar installer	May conduct site visit to inform scope. Develops bid based on grantee needs.
<b>2. Complete scope review prior to starting construction</b>	PCEF grant manager	Convenes PCEF kickoff meeting, including Grantee, renewables installer, and PCEF QA Provider to discuss scope of work and PCEF process. If project includes efficiency measures, this discussion may occur as part of a larger QA meeting.
	PCEF QA Provider	Reviews scope of work and provides feedback within 10 business days. QA Provider requests scope adjustments, if needed.
<b>3. Complete construction</b>	Solar installer	Installs system according to PCEF requirements and receives sign-off from City and utility.
	Grantee	<i>If participating in Energy Trust program:</i> Submits to PCEF the Energy Trust sign-off incentive payment confirmation letter, confirming that project completed quality assurance sign-off from Energy Trust.  <i>If not participating in Energy Trust program:</i> Notifies PCEF when installation is complete.
	PCEF grant manager	<i>If participating in Energy Trust program:</i> Confirms project as complete.  <i>If not participating in Energy Trust program:</i> Schedules QA Provider site visit. After successful inspection, confirms project as complete.

## Net Zero

Projects that install solar may be able to achieve net zero energy status. For the purposes of PCEF, net zero means that projects install solar that generates at least as much electricity as the building uses each year. Net zero buildings have ultra-low electric bills, typically only paying for utility service fees. As with other solar projects, PCEF encourages projects to first maximize energy efficiency and then size their solar system appropriately.



To leverage the PCEF net zero funding option, projects must be new construction, all electric, and complete one of the following pathways:

- Complete a whole building energy model (e.g., REM/Rate, Treat, EnergyPlus, Equest) to predict whole building electric use. Size solar system to generate electricity that matches the predicted modeled use.
- Use ENERGY STAR Portfolio Manager to complete utility bill analysis for an entire year. If conducting energy efficiency improvements, this analysis must begin after completing efficiency upgrades. Size solar system to generate electricity to align with the actual annual energy use.
- Certify as Earth Advantage Zero Energy or Living Building Challenge Zero Energy.
- Complete participation in Energy Trust of Oregon program focused on net zero: Path to Net Zero for new buildings or EPS New Construction net zero for new homes.

## Funding for Net Zero

PCEF will pay up to 25% of the total development cost for a net zero project. Eligible costs are 25% of total net zero development costs including: Design and engineering; site and systems development; total construction costs (such as building materials, labor, finishes; mechanical equipment and rooftop solar), site acquisition and realtor fees, and project management fees.

On occasion, a PCEF applicant applies with the intent of their project achieving net zero, only to realize that net zero isn't possible. Following are examples of constraints that PCEF grantees have encountered:

- Building electric use is higher than can be reasonably offset by solar, even with major efficiency upgrades.
- Rooftop doesn't provide adequate solar resource, due to shading, obstructions like vent or chimney protrusions, or building equipment taking up space on the roof.
- Rooftop isn't structurally able to support weight of solar array.
- Project doesn't have adequate budget to achieve net zero scope.

PCEF encourages thorough project planning in advance of applying for the net zero funding option. If a project encounters challenges and can't resolve them, PCEF is not able to accommodate a change in scope.

Because of this additional funding, net zero projects are subject to additional reporting expectations. Grantees must provide invoices for the total project expenses paid. PCEF will reimburse 25% of the total of each invoice. For example, in the following project, the grantee submitted an invoice for \$200,000 and highlighted the \$50,000 or 25% portion for which they are requesting PCEF reimbursement.



They documented this request as follows:

Sample Net Zero Invoice		
Developer Name 1234 NE Halsey St Portland OR 97232 Invoice Date: March 1, 2024		
February 2024 Expenses	Total Project Fees	PCEF 25%
Gonzales Architecture	\$25,000.00	\$6,250.00
Permitting	\$20,000.00	\$5,000.00
Engineering services	\$ 5,000.00	\$1,250.00
Superb Contracting – Draw #1	\$150,000.00	\$37,500.00
<b>Invoice Total</b>	<b>\$200,000.00</b>	<b>\$50,000.00</b>
Paid in Full 3/15/2024		

- Net zero contractor reporting:** In quarterly contractor reporting, Grantees must include the amount of PCEF funds paid to each contractor. For net zero projects, enter 25% of the amount paid to each contractor. To help PCEF verify that the amount reported was adjusted correctly, please enter the calculation used to determine the PCEF portion in the "Amount billed this reporting period" cell in your report. Please see example below:

<a href="#">Contractor or Subcontractor:</a> Enter organization name in Workforce and Contractor Detail tab first so they will appear in the dropdown	Superb Contractor
<b>Amount billed this reporting period:</b> Please include amounts going to subcontractors	=150,000*.25

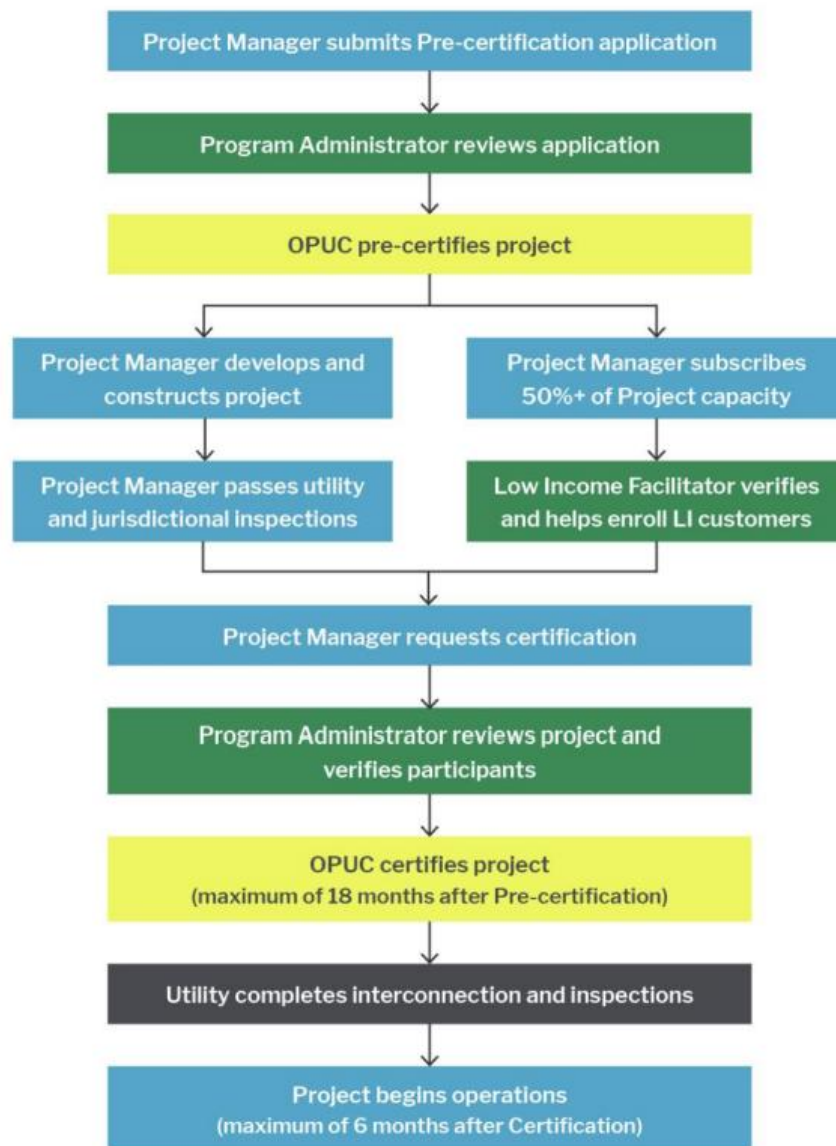
- Net zero workforce reporting:** Grantees must report the number of hours worked and hourly rate paid to workers in quarterly workforce reports. For net zero projects, enter 25% of the number of hours worked. Please enter the calculation used to determine the PCEF portion in the 'Number of hours worked this reporting period' cell in your report. Please see example below:

<a href="#">Staff name or unique ID:</a> Enter Staff name in Workforce and Contractor Detail tab first so they will appear in the dropdown	Joey
<b>Apprentice or journey:</b>	Apprentice
<b>Number of hours worked during reporting period:</b>	=55*0.25
<b>Hourly wage:</b>	\$30.00
<b>Benefits:</b>	\$5.75



# Community Solar

Community solar is solar electricity generated from a central location and shared by multiple subscribers. Subscribers receive a credit on their electricity bill, reducing the amount they pay each month. PCEF provides grants for nonprofits that wish to establish a community solar site under the Oregon Public Utility Commission (OPUC) rules and structure of the Oregon Community Solar Program (CSP). Participating projects must comply with requirements outlined in the CSP [Program Implementation Manual](#), summarized in the process overview below. Additional information can be found at the CSP [frequently asked questions](#) page. As evidence that projects have completed the quality assurance process through the CSP, the Grantee must provide the OPUC certification documentation to PCEF.



# Portland Clean Energy Community Benefits Fund

## Technical Guidelines

### Commercial Energy Savings Analysis v1.0

#### Document Overview

The Portland Clean Energy Community Benefits Fund (PCEF) invests in climate action projects, in alignment with the City’s climate action goals, which support environmental justice and environmental, social, and economic benefits for all Portlanders. This document provides technical guidelines and an overview of best practice analysis methods for applicants seeking to quantify energy savings.

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*This document is intended for the following audiences:*

- Prospective grantees looking to learn more about PCEF requirements and process.
- Active grantees and their contractors looking for guidance on their projects.
- Program staff at City bureaus dispersing PCEF funds.

For questions, please contact [cleanenergy@portlandoregon.gov](mailto:cleanenergy@portlandoregon.gov), or contact your project manager.



# Introduction

Energy efficiency plays an important role in PCEF’s mission to reduce carbon emissions. As such, estimating the amount of energy saved on a project requires careful consideration of many factors such as project type (retrofit, major renovation, or new construction), the efficiency measures pursued, and the correct analysis techniques to determine energy savings. Energy savings calculations should be performed by those who are familiar with how commercial systems operate and rely on established techniques for quantifying energy consumption and savings. While some measures are standardized and do not require additional analysis (Refer to Eligible Measure documents on the [PCEF energy resources page](#)), more complex efficiency measures will require customized analysis to determine the amount of energy being saved. PCEF will review all measure savings calculations to ensure correctness and program applicability prior to processing final invoices for funding requests.

This guide provides an overview of the different types of measure analyses that energy efficiency professionals rely on and outlines the correct techniques to analyze energy efficiency savings.

The typical process for scoping and completing projects in line with PCEF’s requirements are as follows:

Scope Proposal Phase
<ul style="list-style-type: none"><li>• Project Team identifies scope and provides energy savings information whenever feasible.</li><li>• PCEF reviews proposed scope to determine whether stated improvements are likely to achieve required energy savings (5% for new construction and 10% for retrofit). Any eligible measures included in scope will also be reviewed at this phase to ensure they are applicable to project.</li><li>• Custom measure analysis (or modeling) is not required to be completed at this phase, however Project Teams should engage in discussions with PCEF staff regarding proposed analysis methods.</li></ul>
Construction Phase
<ul style="list-style-type: none"><li>• Work commences on project.</li><li>• PCEF staff and consultants are available for technical consultation as need arises.</li><li>• Project Team notes any deviations in design, equipment, or operation compared to original proposal to submit with final documentation for PCEF review.</li></ul>
Project Completion Phase
<ul style="list-style-type: none"><li>• Project Team submits complete package of energy savings documentation. If project is pursuing custom measures and did not provide savings methodology at scope proposal stage, Project Team will provide at this phase along with backing calculations or modeling.</li><li>• PCEF QA provider will review installed eligible measures and analysis for custom measures. Backing documentation should include energy analysis, equipment specifications, specifications, etc.</li><li>• After reviewing reporting and savings assumptions, PCEF processes final invoices for each project.</li></ul>



# Project Documentation Requirements

Projects submitting documentation during the early scoping phase do not necessarily need to conduct a full analysis in line with one of the methods noted below. However, Project Teams should adhere to the scoping submission checklist in [Appendix B](#) to ensure PCEF has adequate information to assess potential funding opportunities prior to proceeding with an in-depth analysis.

## Savings Analysis Process

Project teams should follow the process outlined below for quantifying energy savings on a project.

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Determine savings methodology <ul style="list-style-type: none"> <li>• Prescriptive (i.e., Eligible measures)</li> <li>• Custom (i.e., energy modeling or calculations)</li> </ul>	Determine baseline for each measure <ul style="list-style-type: none"> <li>• Existing conditions</li> <li>• Code</li> <li>• Market baseline</li> </ul>	Calculate baseline and improved scenario energy consumption	Determine costs associated with improved scenarios	Determine energy savings as the difference between baseline and improved scenario usage*

*\*Project Teams will report energy savings outputs from step 5 to PCEF.*

## Technical Analysis Paths

An analysis that accompanies an energy related project can take several paths. The three most common analysis paths are as follows:

- Prescriptive** – Also called “deemed” measures, these are established savings values that fit a specific product or practice.
  - Common commercial examples include appliances, HVAC equipment, and motors.
  - The Eligible Measures list on the PCEF energy resources page provided for PCEF commercial and multi-unit housing properties lists a suite of prescriptive measures that do not require additional savings analysis.
- Custom: Non-modeled engineering calculations** – When prescriptive savings aren’t available, custom engineering calculations are an option to determine energy savings. To justify the time and cost of developing calculations, custom analyses are typically reserved for efficiency measures that are likely to save significant amounts of energy.
  - Common commercial examples include refrigeration system upgrades, HVAC control system upgrades, and central heat pump water heating. Refer to Appendix B in the Eligible Measures document for more information. (See [PCEF energy resources page](#)).



- **Custom: Modeled** – Energy modeling is an option to calculate savings when deemed savings aren't available and a project is pursuing multiple measures. Commonly, modeling is reserved for projects where there is a large interactive effect that significantly impacts energy use.
  - Common modeling in commercial projects occurs when evaluating highly interactive systems, such as envelope upgrade projects which have both an impact on heating and cooling loads as well as the sizing (and associated cost) of HVAC equipment.

Projects teams can submit any combination of analysis paths on a project (ex. prescriptive only, prescriptive and modeled, custom and prescriptive, etc.). Furthermore, prescriptive energy measures do not need to be included as part of a custom analysis unless the interactive effects are expected to be large.

- For example: A VRF with DOAS system is listed as an eligible measure and can be submitted as such. However, if the project team is undertaking an envelope upgrade as part of the project, the project should model energy savings for both the envelope and VRF with DOAS, as those have highly interactive effects on one another. Conversely, if a project is pursuing upgraded appliances as well as envelope upgrades, the project should use prescriptive appliances measures and separately conduct an energy model which estimates envelope energy improvements. The interactive effects of those two are minimal and therefore including the prescriptive measure in the model is unnecessary.

The table below outlines typical analysis paths based on the project type. A project team may always submit a more robust analysis, particularly if it may yield a better savings estimate. As such, the table below provides guidance on which analysis path is generally acceptable to the PCEF review team but also a best-practices path for projects that seek to more accurately quantify energy use.

Measure Type	Minimum Required Analysis	Best Practice Analysis
<b>Appliances (including food service equipment)</b>	Prescriptive (offered in eligible measures list)	Prescriptive
<b>Envelope (window upgrades only)</b>	Prescriptive (offered in eligible measures list)	Custom with inputs for weather and rated product R-value/U-Factors
<b>Envelope (window upgrades in addition to HVAC upgrades)</b>	Custom with inputs for location, and rated product R-value/U-Factors	Modeled, with inputs for specific building geometry, weather, solar heat gain, hours of operation, and occupant factors
<b>Fan and pump systems (≤ 50hp)</b>	Prescriptive (offered in eligible measures list)	Custom with inputs for hours of operation, application, and static pressure setpoints
<b>Fan and pump systems (&gt; 50hp)</b>	Custom with inputs for hours of operation, application, and static pressure setpoints	Custom with additional inputs for rated motor efficiency and load profile



Measure Type	Minimum Required Analysis	Best Practice Analysis
<b>HVAC Controls</b>	Prescriptive for 1:1 controls (i.e. Thermostats such as those on eligible measures list); Custom for integrated systems with inputs for setpoints and hours of occupancy	Custom with additional inputs for system efficiency, unit control features (ex. Economizers) and weather
<b>Standalone HVAC Equipment</b>	Prescriptive (in eligible measures list)	Custom with inputs for unit efficiency, load profile, and weather
<b>Lighting Systems (including controls)</b>	Custom with inputs for lighting hours of use, wattage, and control types	Custom with additional inputs for controls savings fractions by control type
<b>Lighting Fixtures (no controls)</b>	Prescriptive (in eligible measures list)	Custom with inputs for lighting hours of use and wattage
<b>Standalone Equipment (ex. Battery Chargers, Refrigeration equipment)</b>	Prescriptive (offered in eligible measures list)	Custom with inputs for hours of operation, load profile, and energy consumption
<b>Water Heating</b>	Prescriptive for individual use (in eligible measures list), custom for central systems	Custom with inputs for tank size, demand profile, and water heating system efficiency

## Baseline Determination

Energy savings calculations differ based on whether a project is a new construction (or major renovation) project, or a retrofit to an existing building or system. Selecting the proper baseline is critical to correctly quantifying energy savings and is a key component that PCEF QA providers look for when reviewing project documentation. A project may have different baselines for different measures.

For prescriptive measures like those listed in PCEF’s eligible measures list, a baseline case is assumed already, and no additional analysis is needed. For custom measures however, a baseline case must be established from which to measure energy savings from. Below are key factors used to determine the appropriate baseline for efficiency measures.

## Existing Conditions Baseline

An existing conditions baseline represents the current equipment or condition found at the project location. This baseline should be used if the equipment is still functioning and could feasibly remain as part of the project. This baseline type is most common for retrofit projects, where a key distinction is that the equipment or space is intended to be used in a similar fashion after the efficiency upgrade is completed. Examples include equipment such as working boilers or ductless heat pumps that could remain on site and continue to provide adequate heating for the new space. Additionally, if the project site had minimal insulation in the walls and a new HVAC system was being sized based on that assumption, the baseline would remain as that existing condition, which is minimal wall insulation.



## Energy Use

The baseline energy use for an existing conditions baseline is the consumption of the existing equipment or end-use. In a retrofit scenario, energy consumption and associated savings are therefore based on the functioning, existing equipment in place. As an example, if a project is retrofitting a functioning electric boiler that was used for space heating with a new air-to-water heat pump, the baseline would be the existing electric boiler energy consumption. In this example, the proposed efficiency measure would be an upgrade to an existing piece of equipment that will continue to serve the space in a similar manner. The savings are calculated as the difference between the existing energy use of an electric boiler and the energy use of the new air-to-water heat pump.

## Cost

The baseline cost should follow the energy use baseline for consistency. Existing conditions costs (common in retrofits) are almost always zero, meaning the existing equipment could remain in place and continue to function as needed. The cost should be the full cost to replace that equipment with newer equipment. These costs typically include the equipment and installation costs.

## Market Baseline

A market baseline is a baseline that represents the typical purchases or actions an owner might make in the absence of other factors such as state energy code, federal standards, or efficiency programs. A market baseline includes a mix of both the efficient and inefficient choices a building owner may make. This baseline type is most commonly used for replacement and new construction measures where the project is intended to replace equipment that is failed or obsolete and where there is a choice of products in the market.

When analyzing custom or modeled measures, the market baseline is often the equipment or practice that the site *would* pursue in the absence of funding. The market baseline should reflect both the local market and the eligible choice a project would make, and not simply the cheapest or most inefficient option available. Vendor quotes, past purchasing decisions, and unique site characteristics can be used to establish an appropriate market baseline.

## Energy Use

The baseline energy use for a market baseline is frequently calculated as the energy use of a viable replacement option for the site. As an example, if a project sought to replace a failed fan motor, the baseline would be the average energy consumption of a new motor that can be purchased in the market to serve the desired needs of the project. Energy savings would then be the difference between that new baseline motor and a more efficient motor being pursued as part of the project. The baseline should not be the energy use of the old, non-functioning motor since the project would need to replace



that motor regardless, and the energy savings being claimed reflect the more efficient choice the project is making.

## Cost

The baseline cost in a market baseline scenario is frequently calculated as the incremental cost of the equipment used for calculating the energy baseline. In the motor example given above, this cost would be the difference between the average baseline motor in the market and the actual cost of the more efficient motor being pursued by the project. In this way the incremental cost refers to the difference in cost between the market baseline and the efficient case option. However, for most PCEF funding opportunities, costs are assumed to be the full cost of pursuing the efficient option and an incremental cost does not need to be established. In the motor example provided, this cost would simply be the full cost (including installation costs) of purchasing and installing the new motor.

## Code Baseline

Most new construction, major renovation, and replace-on-burnout projects (i.e. replacing a failed piece of equipment) will utilize a code baseline. A code baseline represents a building or technology that meets current local and state building code requirements, or an appliance that meets either local or federal standard specifications or complies with local sales bans. A code baseline is used when the best assumptions indicate that most projects would build to code or install minimally efficient equipment without any PCEF funding. In these cases, the market baseline and code baseline are effectively the same.

For technologies with a high market share of equipment that exceeds code or federal standards, such as lighting, HVAC performance, or appliances, or where code does not stipulate a minimum requirement, a market baseline is more appropriate and better represents likely consumer choices.

When code or standard enforcement lags official implementation, or when codes or standards change mid-year, the code in place at time of project development should be used. Projects that rely on a code baseline should reference the version of the [Oregon Energy Efficiency Specialty Code \(OEESC\)](#) that the project permitted under. The OEESC follows the basic structure of ASHRAE 90.1 but adds several amendments to the language and updates the references 90.1 version every three years.

## Energy Use

Savings for new construction, major renovation, or replace-on-burnout projects fall under a “better than code” scenario, where common market practices are seen as the most likely path a project would follow. PCEF funding for energy saving measures is offered to push the project towards something that exceeds the minimum requirements set forth by code or the general market. For the purposes of PCEF funding opportunities, projects that are new construction, undergoing major renovations, or projects



that consider new equipment to replace non-functional existing equipment are considered “new construction” and should follow the code or market baseline path unless sufficient reasoning can be submitted to substantiate an existing conditions baseline.

Calculating energy savings using a code baseline relies on the difference between the energy use of a viable replacement option that meets state energy code requirements and that of the more efficient option being pursued.

## Cost

Similar to a market baseline, the cost in a code baseline is calculated as the incremental cost of the equipment used for the energy baseline. In the motor example given above, this cost would be the difference between the average baseline motor that meets the requirements of the energy code and the actual cost of the more efficient motor being pursued by the project. In this way the incremental cost refers to the difference in cost between a code baseline and the efficient case option. However, for most PCEF funding opportunities, costs are assumed to be the full cost of pursuing the efficient option and an incremental cost does not need to be established. In the motor example provided, this cost would simply be the full cost (including installation costs) of purchasing and installing the new motor.

## Fuel Switching Estimation

Fuel switching may result in increased electric use on a project at the benefit of reduced gas use, providing both a greenhouse gas emissions benefit as well as potential net energy benefits. Measures that fuel switch follow the same baseline selection criteria outlined above, but with an additional step to correctly estimate gas reductions. To calculate savings from fuel switching, the appropriate baseline should be established based on the baseline guidance provided above.

1. Establish energy use of gas equipment
  - a. If using an existing conditions baseline, utilize existing energy use of the gas equipment tied to proposed operations. For example:
    - i. If the proposed use of the existing equipment will closely mimic the existing use, past billing data or equipment operation can be used.
    - ii. If the proposed use of the existing equipment will change significantly to match the new needs of the project, adjust existing gas use to account for this
  - b. If using a code or market baseline, utilize the energy use of code compliant or market based gas equipment.
2. Convert the gas consumption of the baseline equipment to kWh, using the efficiency of the existing system (if using existing conditions baseline) or the efficiency of the code or market based system if using those baselines.
3. Calculate a new all-electric baseline case using the converted energy use of the gas equipment.



- a. Baseline equipment operation should be adjusted to match proposed equipment operation if they are different. For example, if a project was using gas bills from a functioning boiler but the operating hours of the space are expected to change significantly, the historical gas use should be adjusted to reflect new use patterns.
- 4. Determine the consumption of new electric equipment being proposed
- 5. Take the difference in kWh savings between the new electric equipment and the all-electric baseline case as the electric savings
- 6. Projects can also include gas emissions savings for fuel switching by providing the total gas energy use being avoided. PCEF staff will use emissions reductions factors to convert to lbs/CO<sub>2</sub>.

The below example illustrates how a Project Team may calculate the gas reduction benefits at the expense of increased electric usage (compared to an all-electric baseline) for a project.

Scenario	Consumption	Notes
<b>Original gas baseline</b>	10,000 therms	Gas boiler used for heating
<b>Gas use after upgrade</b>	0 therms	Boiler completely removed
<b>New all-electric baseline</b>	234,480 kWh	Conversion equation: 10,000 therms x 80% efficiency x 29.31 kWh/therms
<b>Proposed electric efficiency measure</b>	300,000 kWh	New air-to-water heat pump installed to heat space previously heated by boiler
<b>Energy savings</b>	-65,520 kWh	234,480 kWh all-electric baseline – 300,000 kWh proposed measure
<b>Avoided greenhouse gas emissions</b>	10,000 therms	PCEF staff will use emissions factors to convert this value to lbs/CO <sub>2</sub>

## Measure Life

Measure life, sometimes referred to as effective useful life is the duration of time after which 50% of installed equipment is no longer expected to still be operating and saving energy. Most measures have established measure lives that are used throughout the energy efficiency industry. Common sources of measure life are the Regional Technical Forum, the Oregon Department of Energy’s State Energy Efficiency Design (SEED) program (referenced in [Appendix A](#)), other utility programs, persistence studies, or manufacturer warranty timeframes.

PCEF does not require project teams to submit measure life estimates, but does rely on established values to calculate greenhouse gas emissions. Project teams that pursue measures with long-term measure lives will therefore demonstrate greater greenhouse gas emissions reductions.



# Fuel and Water Savings

There are additional savings that may not be energy related but can be quantified as part of an efficiency measure analysis. These improvements can provide additional greenhouse gas reductions and/or building tenant benefits which can be considered as part of PCEF's application process.

PCEF will determine the appropriate cost and greenhouse gas savings due to reduced water and fuel use. In order to claim these savings, Project teams will need to provide PCEF with the estimate of water or fuel saved in terms of gallons (or CCF) with supporting documentation.



# Analysis Best Practices

## Prescriptive Analysis

For prescriptive analysis, refer to the Eligible Measures companion documents for Retrofit and New Construction projects. Project teams can use prescriptive measures and their associated savings without modification, provided the measure application matches the intended use. A project may also submit prescriptive measures not listed in the Eligible Measures documents for consideration so long as the source and energy savings calculations are provided.

## Custom Analysis Best Practices

Many commercial measures, particularly involving HVAC or refrigeration, rely on custom analysis to determine energy consumption and savings. Custom analyses can take many forms, ranging from simple spreadsheet analyses and simplified calculator tools to more advanced energy simulation models. Any 3<sup>rd</sup> party tools utilized for custom analysis should either be pre-approved by PCEF or be open-source and reviewable by PCEF staff to ensure calculations are correct and assumptions are valid. Below are guidelines for conducting analysis and documenting assumptions, calculations, and savings estimates.

### Baseline Methods

All technical analysis must include a complete description of the proposed system, the methodology used for the baseline (including calculations, operating hours per year, model inputs/outputs, and assumptions), and a summary of baseline results which include energy usage. Any supporting data, calculations, charts, equipment specs, model inputs and outputs, diagrams, and graphs should be included in the Appendix of the analysis for reference.

Since new construction, major renovation, and failed equipment projects use market or code baselines, these projects require a calculated baseline as opposed to a measured baseline since there is no existing equipment or system in place to measure. Assumptions made in a calculated baseline must be stated clearly in the analysis, referring to the appropriate method mentioned in the Baseline Determination section of these guidelines.

### Baseline System Description

Provide a full description of the modeled baseline system or Industry Standard system for the proposed process. Describe the baseline in full detail in an easy-to-read format, including the components below.



## EQUIPMENT TYPE

Outline the types of equipment that will be used for the system of interest. Details should include number and type of energy users including motors, pumps, fans, refrigeration equipment, etc., to perform the operation. It is recommended to include a table listing all equipment and/or a simple system diagram or schematic drawing showing interaction between equipment. When using Industry Standard equipment as the baseline, provide a description and examples of the equipment.

## EQUIPMENT PARAMETERS

Describe any assumed or proposed setpoints, controls, and occupancy profiles of all the equipment.

## OPERATING HOURS

The annual operating hours of each piece of equipment in the system need to be determined. Any seasonal or operational differences experienced or anticipated by the site need to be incorporated and described in the system description of the analysis. Continuously operating systems are often down for maintenance once or twice during the year. In very few cases should 8,760 hours/year be used. For cases where 8,760 hours per year are used, clear evidence and justification should be provided.

## KEY ASSUMPTIONS

All assumptions made in the determination of the baseline energy usage and efficient case energy usage need to be included. This can include any assumptions regarding engineering estimates, best practices, calculations, industry standard, etc. Note the source of the assumptions.

## INDUSTRY STANDARD ASSUMPTIONS

A baseline that incorporates an Industry Standard or modeled baseline needs to describe the basis for which the assumptions are obtained. In general, if an option is being considered that is reasonable and meets minimum requirements of any local code/rules, and a vendor quote can be obtained for the baseline equipment, it can be considered as a valid baseline.

## Weather Stations

Weather normalization in custom and modeled analyses should be based on the closest weather station to the project site. This can be based on local NOAA data<sup>1</sup>, or using Typical Meteorological Year (TMY) data which establishes weather averages for a location over a long period of time. Most energy

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<sup>1</sup> Cleaned NOAA data for specified time periods is available on Energy 350's website here: <https://www.energy350.com/resources/>



modeling software, such as EnergyPlus or eQuest, relies on TMY rather than daily weather data. In those cases, use TMYx data (2004-2018 era<sup>2</sup>), rather than outdated TMY3 data sets.

## Modeling Guidelines

Modeling for PCEF projects should be completed by a qualified energy modeler, preferably by someone with either Building Energy Modeling Certification or who is routinely engaged with commercial energy modeling.

The efficient case measures being employed must first be modeled to estimate total efficient case building energy use. Then, an appropriate baseline system must be modeled to establish energy savings. For new construction, major renovations, and additions, model baselines should reflect the minimum requirements specified in the [2025 OEESC](#) as the current commercial code (or the code the project was permitted under). Modelers should refer to Appendix G. Table G3.1 (Modeling Requirements for Calculating Proposed Building Performance and Baseline Building Performance) in ASHRAE 90.1-2022 which provides a list of appropriate baseline systems depending on the efficient case being modeled.

Savings estimation should not include model outputs from more than one software platform. Approved software platforms are EnergyPlus, IESVE, eQuest, and BEopt. Other platforms may be appropriate but should be reviewed with PCEF staff before undertaking development.

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<sup>2</sup> TMYx files for Oregon can be downloaded at:

[https://climate.onebuilding.org/WMO\\_Region\\_4\\_North\\_and\\_Central\\_America/USA\\_United\\_States\\_of\\_America/index.html#IDOR\\_Oregon-](https://climate.onebuilding.org/WMO_Region_4_North_and_Central_America/USA_United_States_of_America/index.html#IDOR_Oregon-)



# Appendix A. SEED Measure Lifetimes

Equipment life varies, depending on the quality of equipment specified, sizing relative to the load and lifetime maintenance. The list below shows maximum equipment life for common efficiency upgrades.

Equipment	Life
<b>Building Envelope</b>	
Double Glazing	25
Heat mirror	20
Low-emissivity coating	25
Solar shade film (retrofit)	12
Tinted & reflective coating	25
Insulation, cavity	30
Insulation, batt exposed/roof	25
<b>HVAC</b>	
Fans, utility/central	25
Air conditioner, rooftop/split	15
Air-to-air packaged heat pump	15
Water-to-air packaged heat pump	15
Coils, DX, water, steam	25
Coils, electric	15
Radiant/unit heaters, electric	15
Radiant unit heaters, gas	20
Radiant/unit heaters, hot water/steam	25
Furnaces, gas/oil	20
Ice thermal energy storage	20
Water thermal energy storage	20
Plate type/heat pipe recovery system	20
Rotary type heat recovery system	17
Heat recovery from refrigeration condensers	15
Low leak dampers	15
Economizer dampers	20
Ductwork	30
Make-up air unit for exhaust hood	15
Air destratification fan	15
Air curtain	15
Controls, pneumatic	20
Controls, electric	16
Controls, EMCS	15
Controls, electronic	15

Equipment	Life
<b>HVAC Plants &amp; Distribution</b>	
Cooling towers	20
Cooling towers, ceramic	30
Chillers, reciprocating	20
Chillers, centrifugal & absorption	25
Boiler	30
Boiler burners	20
Pumps, base mounted	25
Pumps, inline	20
Piping	30
Insulation	25
<b>Lighting</b>	
Energy-efficient ballast	15
Electronic ballast	20
Lighting fixture (all types)	30
Dimming systems	15
On-off switch	30
Motion sensor	10
<b>Motors, Drives, and Transformers</b>	
Standard electric motor	20
High-efficiency electric motor	25
Variable-speed drive, solid state	20
Efficient AC electronic transformer	30
<b>Domestic Hot Water</b>	
Heat pump water heater	15
Gas water heater	20
Solar water heater	15
<b>Refrigeration</b>	
Unequal parallel refrigeration	15
Condenser float head pressure control	15
Automatic cleaning system for conditioning tubes	15
Hot-gas bypass defrost	12
Polyethylene strip curtain	5
Refrigeration case cover	12



**PORTLAND  
CLEAN ENERGY  
COMMUNITY BENEFITS  
FUND**

# Appendix B. Project Scope Submission Checklist

Projects seeking PCEF funding often submit a scoping assessment with high-level details on the proposed project including building characteristics, estimated savings, and costs. For PCEF staff to best determine the feasibility of a project for eligibility and make for a quicker review, Project Teams should try to include as much information as possible about the project. See below for key areas to include.

## SITE CHARACTERISTICS

- Proposed building use type, such as those listed in [EPA's Portfolio Manager](#) categories
- Proposed average annual hours of occupancy (or days per week each space will be occupied)

## ENERGY/GHG SAVINGS QUANTIFICATION

- Description of baseline equipment used in savings analysis (ex. Existing Conditions, Market, or Code baseline)
- Description of proposed equipment to be installed
- Description of how the project will save energy and/or GHG
- Description of methodology to arrive at energy and/or GHG savings

## NON-ENERGY BENEFITS

- Description of additional benefits from the project that are non-energy related
  - Ex. GHG reduction potential, workforce development, Indoor Air Quality improvements, Infrastructure upgrades, etc.

## COST ESTIMATION

- Expected project cost and major equipment model numbers being proposed
  - Costs should include any associated labor and the total cost should be broken out by major trades as well as by phases (if applicable)
- Sources of cost estimates (vendor, contractor, web-search, etc.)
- Assumptions (and any notable exclusions) used when estimating costs
  - Ex. Number of hours to do work, labor rates, equipment markups, etc.
- Separation of costs related to energy efficiency vs. non-energy efficiency improvements

## PROJECT TIMELINE

- Assumptions over expected timeline for project to be started and completed
- Major phases to project that may impact funding sources

## HELPFUL ADDITIONAL DATA

- Equipment cutsheets or submittals, photos of project site, contractor contacts

