BetterBuiltNW

GO ABOVE STATE ENERGY CODE WITH THESE CREATIVE BUILDING STRATEGIES

Drain-water heat recovery systems and continuous insulation solutions can help a project go above-code and yield significant energy efficiency outcomes for new homes. Despite their benefits—and untapped potential to meet newly stringent codes and go above-code—neither intervention is widely used in the Northwest.

WHAT ARE DRAIN-WATER HEAT RECOVERY SYSTEMS?

Drain-water heat recovery systems passively improve the efficiency of water heating through the use of heat exchangers. By harnessing heat from hot water used in showers, dishwashers, clothes washers, and other appliances, these systems warm cold water as it goes into plumbing fixtures and water heaters.

There are two types of drain-water heat recovery technology: storage and non-storage systems. Storage systems harness recovered heat in water stored for later use, while non-storage systems warm incoming cold water for immediate use.

Storage and non-storage systems work with all models of water heaters. By increasing the amount of accessible hot water—a benefit of pre-warming the incoming water—these systems in a way augment the capacity of tank-style water heaters. They also shorten the amount of time and energy it takes to replenish a depleted supply of hot water.

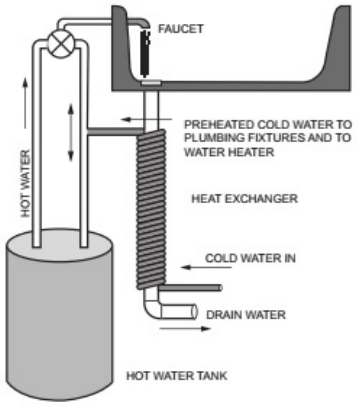


Diagram of a storage-style drain-water heat recovery system.

DRAIN-WATER HEAT RECOVERY SYSTEMS IN NORTHWEST ENERGY CODES

The 2021 Washington State Energy Code includes drain-water heat recovery systems in Section R406 Additional Energy Efficiency Requirements under Efficient Water Heating Options. Builders can earn 0.5 energy credits for installing a drain-water heat recovery system that, at a minimum, "captures waste water heat from at least two showers, including tub/shower combinations." To claim this credit, building permit drawings must include a plumbing diagram that "specifies the drain water heat recovery units and the plumbing layout needed to install it."

Drain-water heat recovery is part of a High-Efficiency Water Heating System additional measure option in Chapter 11 of the 2023 Oregon State Energy Code. To qualify a natural gas or propane tankless water heater with a minimum 0.80 Uniform Energy Factor as an additional measure, builders must install drain-water heat recovery technology that serves at least one shower or shower/tub combination.

WHY CONSIDER DRAIN-WATER HEAT RECOVERY SYSTEMS?

These systems provide immediate benefits to hot water recovery and reduction in water heating energy use. Although there is added cost to include this technology in hot water delivery and drainage piping infrastructure design, these benefits can easily justify it. Depending on the exact model, drain-water heat recovery system materials generally cost between $300 and $500.

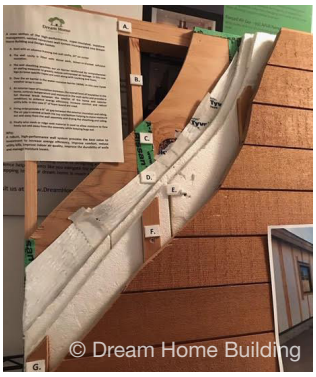
Installing drain-water heat recovery systems in the homes you build may boost overall energy performance. This is something to keep in mind if you seek tax credits or plan to participate in above-code programs, such as Energy Trust of Oregon's EPS™ New Construction. Consider these systems if you need more efficiency in your builds, especially when cost, equipment availability, or other factors limit your options.

TWO TYPES OF CONTINUOUS INSULATION

Installing a continuous layer of insulation prevents the thermal bridging that occurs when insulation is separated by framing members. Two examples of this concept are thermal break shear (TBS) and exterior rigid insulation wall assemblies.

TBS walls have rigid foam panels between standard framing and structural sheathing to provide continuous insulation with no gaps. While manufacturers sell sheathing products with pre-attached rigid foam insulation, builders can layer 1" foam panels and plywood or oriented strand board on interior walls in the field before nailing in sheathing.

Similar in design to TBS walls, exterior rigid insulation walls have foam or mineral wool boards installed over sheathing and weather-resistive barriers. Installing rigid insulation boards on the outer side of sheathing ensures effective and continuous thermal protection with an added layer of air and moisture protection.



Demonstration of an exterior rigid insulation assembly featuring two layers of foam paneling.

TBS continuous insulation assembly with external wall sheathing.

CONTINUOUS INSULATION IN NORTHWEST ENERGY CODES

While the 2021 Washington State Energy Code prescriptively requires continuous insulation, many builders defer to more popular, alternative methods of compliance. Section R402, Building Thermal Envelope, lists requirements for insulation by type and home component.

The 2023 Oregon State Energy Code allows builders to use continuous insulation in place of other wall insulation products. The Prescriptive Envelope Requirements table in Chapter 11 lists above-grade wall insulation minimum U-Factor requirements. The Additional Measure table details wall insulation upgrade requirements when using continuous insulation as an alternative method for compliance.

2021 Washington State Energy Code: Building Thermal Envelope

Home Component	Required Performance Value
Above-grade wall insulation	U-Factor ≤ 0.056
Wood frame wall*	Minimum R-value of 20+5 or 13+10

**The first value is cavity insulation and the second value is continuous insulation. "R13+10" means R-13 cavity insulation plus R-10 continuous insulation.*

2023 Oregon State Energy Code: Energy Efficiency

Home Component	Required Performance Value
Above-grade wall insulation	U-Factor ≤ 0.059
Exterior wall framing and continuous insulation	**Conventional framing:** U-Factor ≤ 0.045, R-value ≤ 21 **Continuous insulation:** R-value ≤ 5

WHY SHOULD YOU CONSIDER CONTINUOUS INSULATION?

Builders should consider continuous insulation to incorporate greater energy efficiency and resiliency into their homes. Because the typical U-Factor of exterior rigid insulation and TBS walls is 0.028-0.038 and 0.035-0.038, respectively, either would also help a home achieve energy code compliance in Washington and Oregon. Both offer non-energy benefits such as ease of assembly, durability, and noise attenuation.

Compared to standard new construction wall assemblies, TBS walls have a higher lateral load capacity and shear strength requirements, making homes with them more seismically resilient. Exterior rigid insulation walls act as an additional barrier to moisture and temperature fluctuations that can compromise wooden framing and sheathing. In exchange for these benefits and added energy efficiency, continuous insulation can increase project costs, which is something to consider during the design phase.

CONSIDER NEW METHODS TO HELP YOUR HOMES ACHIEVE SUPERIOR EFFICIENCY

There are a variety of equipment and measure combinations that go into building high-performance homes. If typical strategies can't deliver the energy performance results you need, adding drain-water heat recovery systems and continuous insulation into the mix could help.

Explore overlooked options like these two solutions to discover missed opportunities that address your challenges in achieving a higher level of efficiency, earning energy credits, and qualifying for above-code programs. Highlighting the enhanced durability and comfort of homes with drain-water heat recovery systems and continuous insulation to potential home buyers could even help you sell them.

BetterBuiltNW helps inform you of underutilized products, technology, and strategies that can help your builds go above residential energy code requirements. Review our resources on continuous exterior insulation, Washington State Energy Code additional requirements, and Oregon Building Code Division tools to learn how to further improve home efficiency.