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# Northwest Zero Energy Watchlist

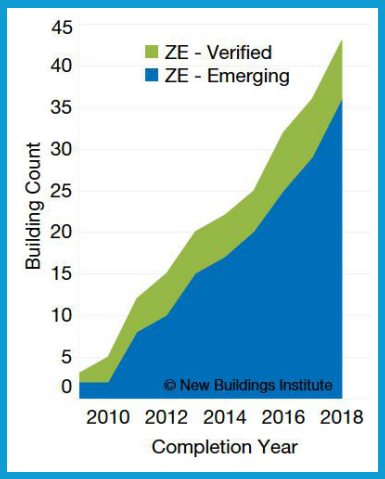
## Zero Energy Buildings | 2018

The *Northwest Zero Energy Watchlist* tracks commercial and multifamily zero energy (ZE) buildings across the states of Washington, Oregon, Idaho and Montana. The Watchlist is published to show the status of ZE projects in the region and to increase public awareness, market acceptance, and adoption of ZE projects. The 43 trailblazing projects listed here are helping move the needle toward a lower-carbon future for the Northwest.

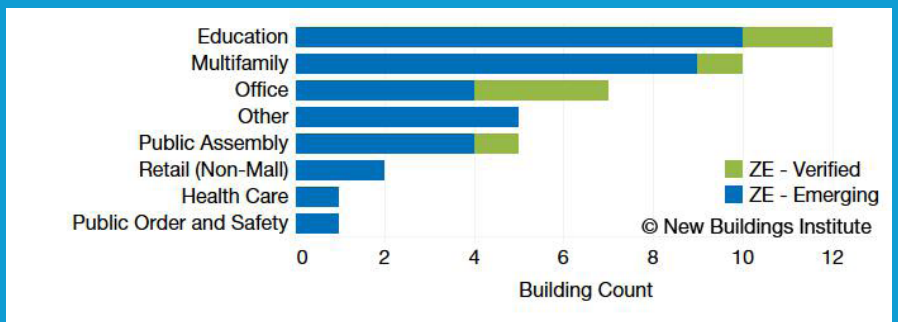
> A zero energy building produces as much energy through clean, renewable resources as it consumes over the course of a year.

The Northwest has seen a consistent increase in interest regarding ZE buildings. Seven buildings have documented ZE performance through New Buildings Institute (NBI) verification or by a third party. Thirty-six more have publicly stated a ZE performance goal putting them on the emerging project list. The education sector is leading with two verified ZE projects and ten more on the way, representing 28% of all regional ZE projects. In the multifamily sector, the ZE movement is picking up steam, with ten projects listed—a near doubling since 2017.

Northwest Zero Energy Market Growth




Northwest Zero Energy Building Types




Hood River Middle School Music and Science Building | Hood River, OR
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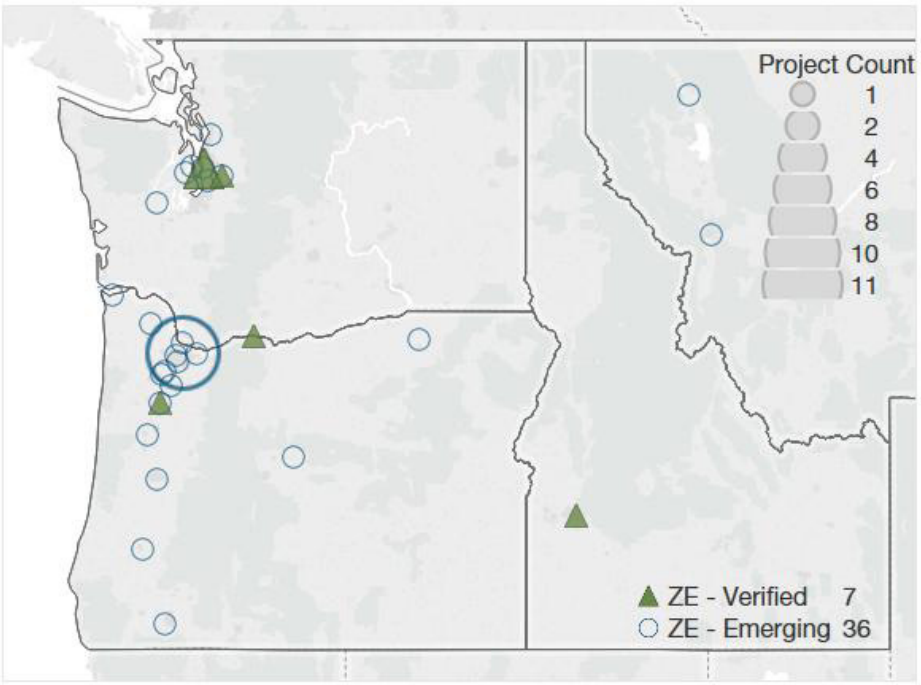
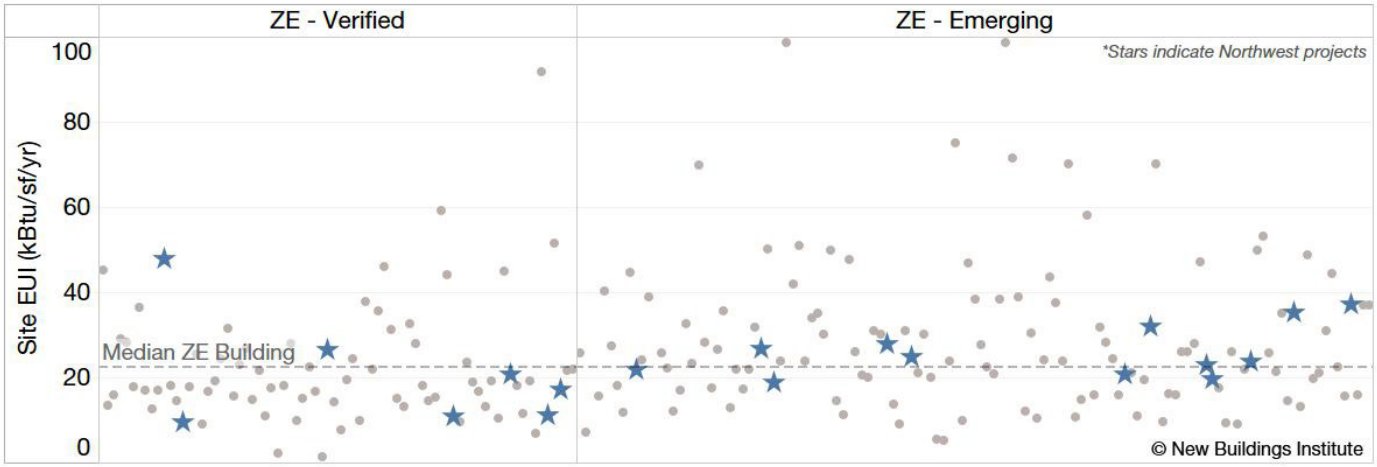
Nearly all ZE project teams take an efficiency-first approach and deliver high performance, ultra-low energy buildings. In the Northwest and across the U.S. and Canada, ZE buildings typically consume less than half the energy of their non-ZE peers.[1] The nationwide median site energy use intensity (EUI) of ZE projects tracked by NBI is just 22 kBtu per square foot per year (kBtu/sf/yr), before renewables. These extremely low-energy outcomes are the result of aggressive energy targets, careful design, experienced teams, and consideration of building operations, typically including occupant education and engagement.

[1] For existing buildings, CBECS 2012 provides a useful baseline: the median U.S. office building EUI is 53 kBtu/sf/year (site).

Locations of Zero Energy Buildings in the Northwest




## Energy Performance of Northwest and National Zero Energy Buildings




Zero Energy Projects with Measured or Predicted Energy Performance

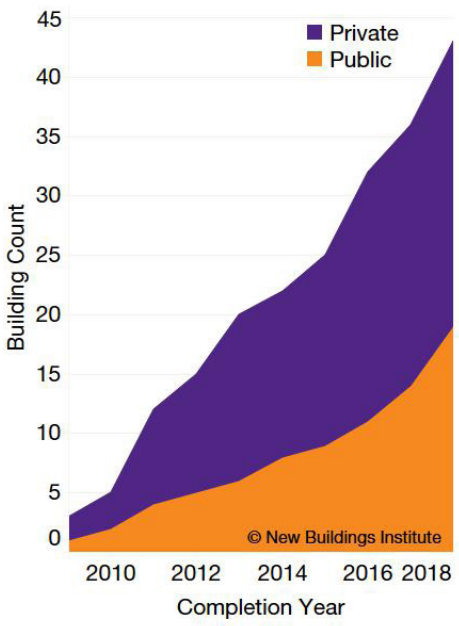
Blue stars indicate verified or predicted site energy use for the seven verified and 12 emerging ZE projects in the Northwest that have shared energy data.

The Energy Trust of Oregon's **Path to Net Zero** program supports project teams pursuing zero and ultra-low energy projects in Oregon with technical assistance and financial incentives. Path to Net Zero supports the entire design and construction process from project kick-off through completion to occupancy. It provides financial incentives for a project kick off, early design assistance, renewable energy, equipment installation, functional testing and energy metering. Energy Trust even covers 50% of the cost of certification from the International Living Future Institute (ILFI). Learn more at Path to Net Zero

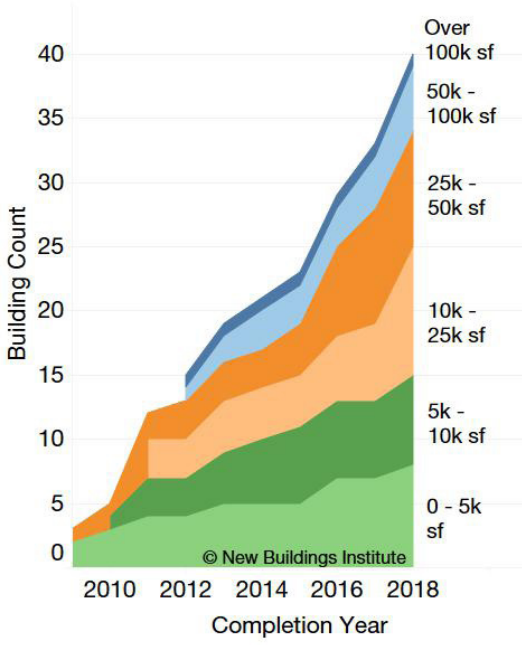
ILFI's Net Zero Energy Building Certification™ is based on 12 months of actual performance data and not an energy model, so it verifies that the building is performing as expected. The ILFI certification amplifies the story of exemplary projects and ensures that the building is meant to last.

Zero energy buildings in the Northwest represent a mix of public and private ownership. Publicly owned buildings, especially education facilities, have historically accounted for most ZE projects nationwide. However, of the 43 buildings on the 2018 Northwest Zero Energy Watchlist, more than half (56%) are privately owned. This trend toward private-sector leadership is encouraging as bringing the ZE movement to scale will require major private-sector buy-in and full participation.

Northwest Zero Energy Building Ownership




Northwest Zero Energy Building Sizes




Across the nation, the great majority (about 80%) of verified ZE buildings are under 25,000 sf, reflecting the early trend of small demonstration projects getting to zero. This trend is shifting: more than 40% of the ZE emerging projects on this list are now over 25,000 sf. This includes the largest project, the 135,000-sf Vernonia School in Northwest Oregon. Building size is not shown for a handful of projects, either due to lack of data or because building size doesn't tell the whole story. For example, the City of Gresham has set a ZE goal for their wastewater treatment plant. While the building footprint is not enormous, getting a highly energy-intensive facility like the plant to zero energy will be a major achievement.

PASSIVE HOUSE is a stringent building design and construction standard that requires very tight and well-insulated building envelopes as well as carefully sized and balanced HVAC systems. This dramatically reduces the energy needed to condition the building. The leading multifamily and commercial projects in the Northwest, listed below, have attained certification from either the Passive House Institute (PHI) or Passive House Institute US (PHIUS).

## Passive House Certified Projects in the Northwest

| Project Name | Location | Building Type | Floor Area | Number of Multifamily Units |
|---|---|---|---|---|
| **Ankeny Row Townhomes** | Portland, OR | Multifamily | 8,500 | 7 |
| **Orchards at Orenco Phase 1** | Hillsboro, OR | Mixed Use | 56,400 | 57 |
| **Orchards at Orenco Phase 2** | Hillsboro, OR | Mixed Use | 41,500 | 58 |
| **Pax Futura (aka Cascade Hudson)** | Seattle, WA | Mixed Use | 20,100 | 32 |
| **Sunshine Health Facilities** | Spokane Valley, WA | Medical Housing | 17,852 | 29 |

CASE STUDY

# Chemeketa Community College Health Sciences Complex | Salem, OR

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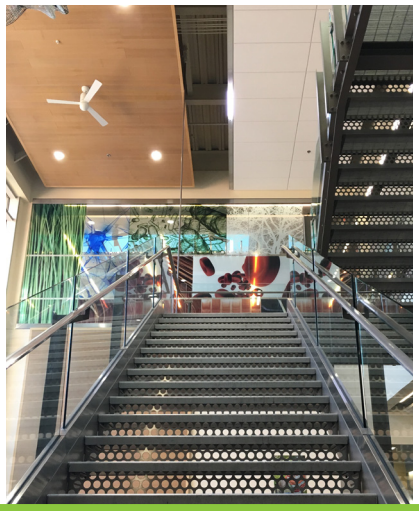
Chemeketa Community College Health Sciences Complex | Salem, OR



## Details

| | |
|---|---|
| **Project Size** | 133,000 sf (61,000 sf renovation, 72,000 sf new construction) |
| **Construction Year** | 2011 |
| **Project Cost** | $31,000,000 |
| **Building Type** | Public, Higher Education |
| **ASHRAE Climate Zone** | 4C |
| **Owner** | Chemeketa Community College |
| **Architect** | SRG Partnership |
| **Engineer** | PAE |
| **Gross Site EUI (kBtu/sf/year)** | 31.9 |
| **Onsite Renewable Generation (kBtu/sf/year)** | 3.0 |
| **Net Site EUI (kBtu/sf/year)** | 28.9 |

The Chemeketa Community College's Health Sciences Building was built as an addition to the existing health and sciences facility in order to accommodate future growth and add a fully integrated health sciences complex. This project included two phases: a deep retrofit of the existing 61,000 sf building that combines classrooms, clinic space, and research and dental labs; and the demolition of a small wing of the existing building to accommodate a 72,000 sf addition.

The design team led extensive workshops with stakeholders and occupants (including the President, College deans, and Facilities Director) as part of the integrated design process. The design team proposed an unconventional approach for the addition: a focus on passive ventilation strategies as opposed to a traditional HVAC system. Using a transparent process with a focus on operator and occupant education, the design team was able to overcome major challenges including convincing the college that the building would be comfortable year round.

The project's innovative strategies employed included maximizing passive heating and cooling, separating space conditioning and ventilation systems, perimeter radiant panels, and a super insulated wall panel system. Night flush ventilation, automated shading, ceiling fans, and automated windows combine to keep temperatures below 82°F, minimizing the use

**Daylighting was incorporated wherever possible with the use of skylights, clerestories, and shading techniques.**

of air conditioning. The building uses an advanced energy management control system for both ventilation and lighting controls. Daylighting was incorporated wherever possible with the use of skylights, clerestories, and shading techniques. In order to provide daylighting and passive ventilation effectively throughout the building, the roof holds turbine ventilators and skylights, leaving little roof space for photovoltaic (PV) arrays. Therefore, most of the PV panels associated with this project are on an adjacent building. The College expects to add more solar panels in the future to move farther down the path to zero energy. Additionally, the building incorporates a science-on-display dashboard in the student tutor space and classrooms for a cohesive learning environment.

So far, the building is using slightly more energy than projected: 31.9 kBtu/sf/yr (actual) vs. 27.0 kBtu/sf/yr (projected). The higher-than-expected energy use is due to the heat recovery units running longer than anticipated, but the building has remained comfortable with indoor temperatures not exceeding the modeled 82°F in an average year. An occupant survey is planned to ensure that the building's passive ventilation strategies are functioning properly.

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# Northwest List
## of Zero Energy Buildings | 2018

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ZERO ENERGY projects are buildings, or groups of buildings, with greatly reduced energy loads such that, totaled over a year, 100% or more of the energy use can be met with renewable energy generation. In this List, projects are categorized as ZE Certified, ZE Verified, or ZE Emerging. For simplicity, projects that have set a zero carbon goal are listed as zero energy.

The 2018 Northwest Zero Energy Watch List provides examples of commercial, institutional, and multifamily projects that have verified ZE performance or are emerging toward a ZE goal. Undoubtedly, other projects belong on this list. Add new projects or provide corrections and updates through the New Buildings Institute Registry at: https://newbuildings.org/share or email us at info@newbuildings.org.

ZERO ENERGY CERTIFIED projects have been awarded Net Zero Energy, Living Building, or Energy Petal certification by ILFI. ILFI has thoroughly reviewed one continuous year of energy consumption and generation data to certify zero energy performance.

ZERO ENERGY VERIFIED projects have achieved ZE for at least one full year and NBI has verified the performance data.

ZERO ENERGY EMERGING buildings have publicly stated a goal of reaching ZE but have not yet demonstrated achievement of that goal. These buildings may be in the planning or design phase, under construction, or have been in operation for less than twelve months. Others may have been operating for at least a year, but their measured energy use data either has yet to achieve ZE, or the data to document ZE performance was not available.

**zEPI** provides a scale for ranking commercial building energy performance and on a scale from 100 to 0, with 100 being the average energy usage from the 2003 Commercial Buildings Energy Consumption Survey and 0 representing zero energy. A lower zEPI score indicates lower energy consumption and negative means the building produces more than it uses. For more information on zEPI, including how to calculate scores, see: https://newbuildings.org/zero-energy-performance-index-zepi

**(L)** after the project name indicates a project has achieved USGBC LEED certification (at any level).

**(M)** after the project name indicates a project that has provided measured energy use data.

**Site EUI** stands for the total gross site-level Energy Use Intensity, a metric used to measure annual energy use per square foot (sf) of building floor area. Energy use includes consumption from all fuels (grid-delivered and onsite-generated electricity, natural gas, district energy, and delivered fuels) in thousands of British Thermal Units (kBtu) per year (yr). That sum is divided by the building's gross size, thus the units are kBtu/sf/yr.

**Source EUI** accounts for the upstream generation, transmission, and distribution losses associated with delivering consumable energy to the site. Site to Source EUI conversions in this list follow the 2018 US Energy Star Portfolio Manager guidelines.[2]

**Net EUI** is annual energy use minus annual onsite renewable generation, divided by the building's floor area in sf. A building with a measured net EUI (site or source) less than zero has achieved ZE. Some buildings in the ZE Emerging category show a negative net EUI based on modeled or estimated data.

[2] See the 2018 US Energy Star Portfolio Manager Source Energy Technical Reference Document: https://www.energystar.gov/buildings/tools-and-resources/portfolio-manager-technical-reference-source-energy)

## Zero Energy **Certified**

| Year Completed | Project Name | Location | Building Type | Size (sf) | Site EUI | Net EUI | Source EUI | Net Source EUI | zEPI Score | Owner<br>Architect<br>Engineer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2016 | **King Street (L) (M)** | Seattle, WA | Office | 3,680 | 17.5 | -8.8 | 55.1 | -27.7 | -12.4 | 1257 King, LLC<br>Julian Weber Architects, LTD |
| 2012 | **Bullitt Foundation Cascadia Center for Sustainable Design and Construction (M)** | Seattle, WA | Office | 51,800 | 9.7 | -6.9 | 30.6 | -21.8 | -9.8 | The Bullitt Foundation<br>Miller Hull<br>PAE Engineering |
| 2011 | **zHome - Issaquah (M)** | Issaquah, WA | Multifamily | 5,813 | 21.0 | -1.0 | 66.2 | -3.1 | -1.5 | City of Issaquah<br>David Vandervort Architects<br>Stantec |
| 2010 | **Bertschi School Science Wing (L) (M)** | Seattle, WA | Education | 1,425 | 48.0 | -0.4 | 151.2 | -1.3 | -0.4 | Bertschi School<br>KMD Architects<br>Rushing |
| 2010 | **Hood River Middle School Net-Zero Addition (L) (M)** | Hood River, OR | Education | 5,331 | 26.8 | -0.4 | 84.3 | -1.1 | -0.4 | Hood River County School District<br>Opsis Architecture<br>Interface Engineering |
| 2009 | **Pringle Creek Painter's Hall (L) (M)** | Salem, OR | Public Assembly | 3,595 | 11.1 | -4.3 | 35.0 | -13.4 | -4.6 | Pringle Creek Community<br>Opsis Architecture<br>PAE Engineering |

## Zero Energy **Verified**

| Year Completed | Project Name | Location | Building Type | Size (sf) | Site EUI | Net EUI | Source EUI | Net Source EUI | zEPI Score | Owner<br>Architect<br>Engineer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2016 | **Twenty Mile Farm Administration and Maintenance Building (L) (M)** | Boise, ID | Office | 15,222 | 11.3 | -7.3 | 35.6 | -23.0 | -9.8 | City of Boise<br>Insight Architects<br>SPF Water Engineering |

# Zero Energy **Emerging**

| Year Completed | Project Name | Location | Building Type | Size (sf) | Site EUI | Net EUI | Source EUI | Net Source EUI | zEPI Score | Owner<br>Architect<br>Engineer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2020 | **Garfield Veterans Apartments** | Portland, OR | Multifamily | 18,000 | | | | | | Ink Built Design |
| 2020 | **Going Street Commons** | Portland, OR | Multifamily | | | | | | | Stewart SRI Development<br>Birdsmouth Construction<br>Birdsmouth Construction |
| 2020 | **Oregon National Guard** | Roseburg, OR | Other | 20,000 | | | | | | Oregon Army National Guard<br>MWN Architect<br>Solarc Engineering |
| 2019 | **Everett Hopeworks Station Phase 2** | Everett, WA | Multifamily | 67,300 | | | | | | |
| 2018 | **Durham Education Center** | Tigard, OR | Education | 17,000 | 19.0 | -9.7 | 59.9 | -30.5 | -10.3 | Tigard-Tualatin School District<br>BORA Architects<br>Glumac |
| 2018 | **Skokomish Tribal Community Center** | Shelton, WA | Public Assembly | 20,230 | 23.2 | 0.0 | 73.1 | 0.0 | 0.0 | Skokomish Indian Tribe<br>7 Directions<br>Ecotope |
| 2018 | **Tillamook Row** | Portland, OR | Multifamily | 9,200 | | | | | | BCMC Properties<br>Green Hammer<br>Green Hammer |
| 2018 | **Solterra HQ** | Portland, OR | Office | 41,000 | 20.0 | | 63.0 | | | Solterra<br>Solterra<br>Solterra |
| 2018 | **Whitefish Center for Sustainability and Entrepreneurship** | Whitefish, MT | Education | 4,200 | | | | | | |
| 2018 | **Woodburn Success High School (L)** | Woodburn, OR | Education | 11,000 | | | | | | Woodburn School District<br>Opsis Architecture<br>Interface Engineering |
| 2017 | **Bonneville Power Ross Admin Building** | Vancouver, WA | Office | 38,120 | 37.4 | | 117.7 | | | Bonneville Power<br>Soderstrom Architects<br>Interface Engineering |
| 2017 | **Clatsop Community College - Patriot Hall** | Astoria, OR | Education | 36,000 | | | | | | Clatsop Community College<br>SRG Partnership<br>Catena Consulting Engineers |
| 2017 | **Oregon Zoo Ed Center (L)** | Portland, OR | Public Assembly | 20,000 | | | | | | Oregon Zoo<br>Opsis Architecture<br>KPFF Consulting Engineers |

| Year Completed | Project Name | Location | Building Type | Size (sf) | Site EUI | Net EUI | Source EUI | Net Source EUI | zEPI Score | Owner<br>Architect<br>Engineer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017 | **Yellowhawk Tribal Health Center** | Pendleton, OR | Health Care (Outpatient) | 63,000 | | | | | | PSI Inc.<br>NBBJ Architects<br>KPFF Consulting Engineers |
| 2016 | **Cowhorn Vineyard** | Jacksonville, OR | Other | 2,200 | | | | | | Cowhorn Vineyard<br>Green Hammer |
| 2016 | **Grow Community** | Bainbridge Island, WA | Multifamily | | | | | | | Grow Community<br>Davis Studio Architecure + Design<br>Browne Engineering |
| 2016 | **Ironhorse Lodge** | Prineville, OR | Multifamily | 27,000 | | | | | | Pacific Crest Affordable Housing<br>Solarc Engineering<br>BLRB Architects |
| 2016 | **King County Housing Authority Administration Building** | Tukwila, WA | Office | 36,000 | 28.0 | 28.0 | 88.2 | 88.2 | 39.5 | King County Housing Authority<br>Rice Fergus Miller<br>Ecotope |
| 2016 | **Toyota Dealership Corvallis** | Corvallis, OR | Other | 34,800 | | | | | | Steve and Barbara Jackson<br>Gensler<br>CMTA Engineers |
| 2015 | **Ankeny Row Townhomes** | Portland, OR | Multifamily | 8,500 | | | | | | Michael & Francie Royce, Richard Benner, Lavinia Gordon<br>Green Hammer |
| 2015 | **Gresham Wastewater Plant** | Gresham, OR | Other | | | | | | | City of Gresham<br>Veolia North America |
| 2015 | **SAAS Stream (L)** | Seattle, WA | Education | 32,156 | 32.3 | 30.9 | 101.7 | 97.3 | 32.9 | Seattle Academy of Arts & Sciences (SAAS)<br>Miller Hull Partnership |
| 2014 | **Chemeketa Community College Health Science Complex** | Salem, OR | Education | 70,000 | | | | | | Chemeketa Community College<br>SRG Partnership<br>PAE Engineering |
| 2014 | **Zenger Farms Community Building** | Portland, OR | Public Assembly | 8,500 | | | | | | Friends of Zenger Farm/City of Portland<br>DECA Architecture Inc.<br>PAE Engineering |
| 2013 | **Lane Community College, Downtown Academic Center (L) (M)** | Eugene, OR | Education | 90,000 | 25.0 | 25.0 | 78.8 | 78.8 | 26.6 | Lane Community College<br>Robertson Sherwood Architects<br>PAE Engineering |

| Year Completed | Project Name | Location | Building Type | Size (sf) | Site EUI | Net EUI | Source EUI | Net Source EUI | zEPI Score | Owner<br>Architect<br>Engineer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2013 | **Park Place** | Missoula, MT | Other | 4,295 | | | | | | Missoula Parking Commission<br>MacArthurt, Means & Wells<br>DC Engineering |
| 2013 | **Sokol Blosser Winery Tasting Room (L)** | Dundee, OR | Mercantile (Retail Other than Mall) | 5,700 | 24.0 | 24.0 | 75.6 | 75.6 | 26.8 | Sokol Blosser Winery<br>Rice Fergus Miller<br>KPFF |
| 2012 | **Blanchet House of Hospitality (L)** | Portland, OR | Multifamily | 35,000 | 22.0 | | 69.3 | | | Blanchet House<br>SERA Architects<br>PAE Engineering |
| 2012 | **Vernonia School** | Vernonia, OR | Education | 135,000 | 35.4 | | 111.6 | | | Vernonia School District<br>Boora Architects<br>Integral Group |
| 2011 | **Eastside Fire & Rescue Station 72 (L)** | Issaquah, WA | Public Order and Safety | 11,400 | | | | | | City of Issaquah<br>TCA Architects<br>Ecotope |
| 2011 | **EcoFlats Building** | Portland, OR | Multifamily | 19,860 | | | | | | Siteworks, 3935 N Williams, LLC<br>Works Partnership Architecture<br>Imagine Energy |
| 2011 | **Highland Chevron ExtraMile Gas Station** | Beaverton, OR | Mercantile (Retail Other than Mall) | 6,000 | | | | | | Bob Barman<br><br>Emerio Design |
| 2011 | **June Key Delta Community Center** | Portland, OR | Public Assembly | 1,631 | | | | | | Portland Alumnae Chapter Delta Sigma Theta Sorority, Inc. and Piedmont Rose Connection, Inc<br>Sienna Architecture Company |
| 2011 | **Portland Community College Newberg Center (L)** | Newberg, OR | Education | 13,000 | | | | | | Portland Community College<br>Hennebery Eddy Architects<br>KPFF Consulting Engineers |
| 2011 | **Rice Fergus Miller Office & Studio (L) (M)** | Bremerton, WA | Office | 39,000 | 21.0 | 18.0 | 66.2 | 56.7 | 25.4 | Fifth Street Hilltop Partners, LLC<br>Rice Fergus Miller<br>Ecotope |
| 2009 | **da Vinci School High Performance Classroom (L) (M)** | Portland, OR | Education | 1,485 | 27.1 | 2.1 | 85.4 | 6.6 | 2.2 | Portland Public Schools<br>SRG Partnership<br>KPFF Consulting Engineers |