



2020 STATE ENERGY EFFICIENT DESIGN BIENNIAL REPORT

For the
OREGON LEGISLATURE

by the
**OREGON
DEPARTMENT OF
ENERGY**

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**OREGON
DEPARTMENT OF
ENERGY**

EXECUTIVE SUMMARY

BACKGROUND

In 1991, the Oregon Department of Energy established the State Energy Efficient Design (SEED) program as a result of ORS 276.900-915.

Adopted legislation states: “It is the policy of the State of Oregon that facilities to be constructed or purchased by authorized state agencies be designed, constructed, renovated and operated so as to minimize the use of energy resources and to serve as models of energy conservation.”

In January 2001, the Energy Conservation Initiative was added to the statute, requiring all state agency facilities newly constructed or substantially remodeled to perform better than the energy conservation provisions of the Oregon state building code by a minimum of 20 percent. The SEED program divides new construction and renovation projects into two classes, depending upon their size. Class 1 buildings are 10,000 or more square feet, and Class 2 buildings are less than 10,000 square feet. Regardless of building class, state agencies must incorporate cost-effective energy conservation measures into building projects.

Requirements for state agencies to reduce energy consumption in existing state-owned buildings was added to ORS 276.900-915 in 2001 and Governor Brown’s Executive Order 17-20. Agencies are required to report energy use to ODOE. ODOE collaborates with state agencies to support uploading facility energy use reporting, establishing performance benchmarks for their buildings, tracking progress, and providing technical guidance to achieve those goals. The result of these efforts includes more detailed energy consumption reporting and the establishment of facility-specific energy performance targets based on national standards.

SEED PROGRAM RESULTS

Completed SEED Construction Projects:

- **189** state building projects completed since 2003
- **Two** SEED renovation projects completed construction in 2019-2020

State of Oregon SEED Program Investment since 2003:

- **\$1.9 billion** is the total cost for completed SEED construction projects
- **\$30.2 million** invested in the incremental costs of SEED energy conservation improvements
- **\$5.7 million** in estimated annual energy costs saved
- **\$54 million** in program lifetime savings

2019- 2020 SEED Program completed construction projects:

- **\$22.6 million** is the total construction cost of the two completed SEED projects in 2019-2020
- **98,370** total square footage of facilities
- **\$56,141** incremental cost of SEED energy conservation
- **\$25,443** annual estimated savings

Existing Building SEED Program Energy Use Tracking:

- **21** participating state agencies
- **328** state owned buildings participating in 2019
- **143** state owned buildings met performance targets in 2019
- **18.3** million square feet of state-owned facilities participating
- **1,541,498** million Btu of total energy used by participating facilities

Oregon State agencies focus on improving the performance and comfort of their buildings. Annually, agencies share with ODOE cost effective building improvements invested in during the previous year, demonstrating progress to performance goals. Energy use across Oregon’s state-owned facility portfolio has fluctuated year to year as the state adds and sells facilities or the use of facilities changes.

ABOUT THE REPORT

The first section of this report covers the two Class 1 buildings that completed renovation construction during calendar years 2019 and 2020.

The second part of the report describes state agency energy use benchmarking, the platform selected for reporting energy use data and collected results from 2015-2019. Tracking energy use by buildings helps agencies identify tangible opportunities for energy savings and set reasonable benchmarking goals for each facility based on the assets of the facility and how it is used. ODOE actively supports reduced agency energy consumption by analyzing facility energy use data and identifying opportunities for energy and cost savings. Tables and graphs included in the report show energy use intensity for each agency’s buildings over time and how they perform in comparison to performance target values.

This project is successful due to the diligent reporting of energy use and investment in efficiency by Oregon state agencies.

The full 2020 State Energy Efficient Design (SEED) report is available online:

<https://www.oregon.gov/energy/Data-and-Reports/Pages/Reports-to-the-Legislature.aspx>

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SECTION 1: NEW CONSTRUCTION AND REMODELS

Process

The SEED process calls for state agencies to work with ODOE in the initial design of their building projects so cost-effective energy conservation measures (ECMs) are planned for and incorporated into building designs. If a state agency is planning a new construction or renovation project, they are responsible for ensuring compliance with SEED requirements. Here are the initial steps:

1. Determine if the project is subject to SEED requirements. New construction or renovation projects that add to, alter, or repair energy systems accounting for 50 percent or more of the facility's total energy use are subject to SEED requirements.
2. Determine if the project is a Class 1 or Class 2 building. In general, buildings 10,000 square feet or more are Class 1, and buildings smaller than 10,000 square feet are usually Class 2. See the full program guidelines for more information.
3. Notify the Oregon Department of Energy.

Once ODOE staff are notified, they guide the state agency through the initial project planning process, facilitating meetings, analyzing potential energy conservation measures, and working with the project management team. Once the project is complete, ODOE works with the project team to implement and evaluate their verification plan, confirming energy savings are achieved in the facility.

Cost-Effective Investment

There are a variety of energy conservation measures (ECM) that may be implemented in buildings. ODOE supports state agencies in determining which measures make the most sense in how the building will be used and the return on the investment. Cost-effectiveness is determined by conducting an analysis of the “benefit-to-cost ratio” (BCR) and the “net present value” (NPV) over the life of a measure. If the BCR exceeds 1.0 and NPV is greater than 0, then a project is cost-effective. Depending upon the size and complexity of the project, SEED program staff provide technical consulting services to the state agency throughout the course of a project. SEED staff work closely with state agencies and their building design teams to develop a list of energy conservation measures for consideration for each project. ECMs can be either baseline measures or analyzed measures. Baseline ECMs are those that are already known to be generally cost-effective, due to past analysis and experience with the technologies. Baseline ECMs are incorporated into the proposed system design and do not receive a detailed cost-effectiveness analysis. Analyzed ECMs are evaluated for cost-effectiveness based on a life-cycle cost analysis. An ECM package is developed for each project, resulting in a building design that will perform better than energy code levels by 20 percent or more.

Participating Buildings

The SEED program divides buildings into two classes depending upon their size. Class 1 buildings are 10,000 or more square feet and Class 2 buildings are less than 10,000 square feet. Regardless of building class, state agencies must incorporate cost-effective ECMs into building projects.

For Class 1 buildings, ODOE staff collaborate with agency design teams to develop an ECM package for each building project, provide agencies with technical advice, and monitor the Class 1 buildings for an 18-month period once it is occupied. Working together, SEED program staff and agency design teams ensure all cost-effective energy conservation measures are included in each building's design and buildings perform better than the energy efficiency provisions of the Oregon state building code by 20 percent or more.

For Class 2 projects, or those less than 10,000 square feet, agencies are responsible for administering their own review and implementation of energy conservation measures. ODOE SEED staff is available to provide support as needed.

This report summarizes the two Class 1 buildings that completed construction during calendar years 2019-2020.

Program Savings to Date

Over the course of the SEED program, 189 state building projects have been completed. Two SEED renovation projects completed construction in 2019-2020.

Since SEED's inception, the total cost for completed state building construction projects exceeds \$1.9 billion, with more than \$30.2 million invested in energy conservation improvements. Energy conservation investments are estimated to have saved more than \$5.7 million in annual energy costs and almost \$54 million in program lifetime savings.

Biennium Savings Summary

The following table summarizes SEED new construction and renovation projects completed in the 2019-2020 calendar years, including projected energy savings resulting from the SEED analysis and process. Although there are a variety of SEED projects in planning and development stages, only two Oregon Military Department (OMD) projects completed construction in the 2019-2020 biennium. OMD invested \$22.6 million dollars in these projects. OMD designed and built the facilities to exceed Oregon's commercial building code by 21 percent and 28 percent, more than meeting the 20 percent above code requirement. The SEED program enabled annual savings of \$25,443 per year from these two new buildings alone.

| Project | Construction Budget | Project Square Feet | Project Type | Annual Savings | | |
|---------------------------------|---------------------|---------------------|--------------|-------------------|-------------------|--------------------|
| | | | | Total Million Btu | Annual \$ Savings | % Better Than Code |
| OMD Youth Challenge | \$11,112,516 | 73,337 | Renovation | 1191.9 | \$15,806 | 21.4% |
| OMD Regional Training Institute | \$11,500,000 | 25,033 | Renovation | 24.7 | \$9,637 | 28.0% |
| Total | \$22,612,516 | 98,370 | -- | 1,217 | \$25,443 | -- |

Post-Occupancy Metering Results

After a SEED project is completed, post-occupancy energy use is tracked for 18 months, ensuring the facility is meeting its energy use targets. Buildings need to perform 20 percent or better than the code baseline to meet SEED program requirements. Performance targets are established through comprehensive energy modeling of the building at the design stage. Energy use is commonly expressed as “Energy Use Intensity” or EUI, which is calculated by dividing the total annual energy consumed (in units of thousand Btu, or kBtu) by the gross floor area (in units of square feet, or sf) of the building.

Post-occupancy metering data is provided in the following table for two projects that completed the measurement phase in 2019-2020. Oregon Youth Authority’s New Bridge High School completed construction in 2018 and was an addition to the Rogue Valley Campus that also includes a correctional facility. The entire campus is metered together so we are unable to determine the exact energy use of the new high school. Our analysis does show that although the campus added 22 percent of additional square footage, the renovation has led to lower annual energy use in 2018 and 2019. In 2019, the EUI of the building decreased by 27 percent from 2017.



New Bridge High School

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The Oregon Military Department built the Major General George White Headquarters in Salem, a new construction project that was completed in 2018. 2019 was the first full year of energy use data and the facility preformed 52 percent better than the modeled code baseline, far exceeding the required 20 percent. ODOE will continue to monitor the facility’s energy use.



Major General George White Headquarters

| Project | Energy Use Intensity, EUI (kBtu/sq ft/yr) | | | | | | | 2019 Actual % Better Than Modeled Code Baseline |
|---|---|-----------------------|-------------|-------------|-------------|-------------|-------------|---|
| | Modeled Code Baseline | Modeled SEED Building | Actual 2015 | Actual 2016 | Actual 2017 | Actual 2018 | Actual 2019 | |
| OYA New Bridge High School | 62.1 | 46.5 | 124.7 | 119.7 | 133.5 | 113.4 | 98.1 | |
| OMD Major General George White Headquarters | 82.7 | 55.4 | - | - | - | - | 40.1 | 52% |

Agencies with projects not meeting the predicted energy performance goals are required to investigate the reasons and develop a corrective plan. Agencies are responsible for developing and implementing energy conservation plans outlining modifications to be made. ODOE collaborates with agencies to address the issues until energy monitoring demonstrates the

building meets the projected energy use or all reasonable attempts to reduce energy use have been made.

SEED Project Highlights

Two SEED projects completed construction in 2019-2020.

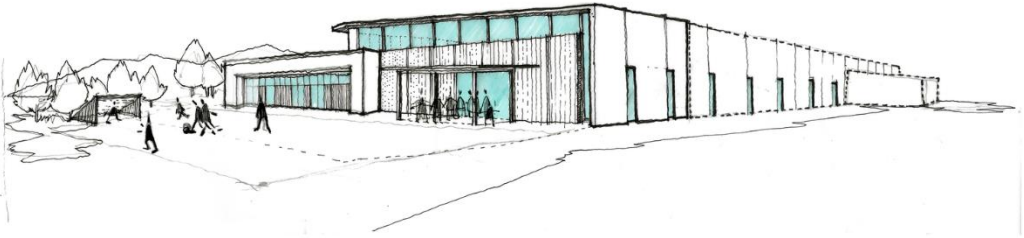
Oregon Youth Challenge Program

Oregon Military Department
Bend, Oregon

Warehouse facility converted to a school and living quarters. Facility before the remodel:



Planned renovation drawing:



New Oregon Youth Challenge Program facility included a 24.4 kW PV system as a solar shed roof:



Under solar overhang:



Energy conservation features include:

- High-efficiency Heating Ventilation and Air Conditioning unit (HVAC) units, with heat recovery ventilation.
- Direct digital HVAC Control System and Controls Strategies.

- Efficient hot water pumps.



- Increased envelope insulation in 7,000 square feet addition.
- Windows with improved thermal performance compared to code.
- High efficiency LED lighting, with improved lighting power density, daylight sensing, and dimming capabilities.
- Two new efficient condensing gas hot water heaters and low flow fixtures.



Regional Training Institute

Oregon Military Department
Umatilla, Oregon

Facility Entrance:



Reception area with reclaimed wood:



Southeast corner of the facility:



Energy conservation features include:

- Increased envelope insulation.
- Windows sized and oriented to improve performance.
- High efficiency LED lighting, with improved lighting power density, daylight sensing, and dimming capabilities.
- Building envelope will be air sealed and tested by a third party.
- High-efficiency Heating Ventilation and Air Conditioning unit (HVAC) units.

SECTION 2: ENERGY CONSERVATION IN EXISTING STATE BUILDINGS

History

In the summer of 2000, wholesale electricity prices soared to unprecedented levels as a result of the restructuring of California's electric industry. Oregon and other western states were equally affected due to the interconnected nature of electricity generation and distribution throughout the region. Governor Kitzhaber, by way of his Energy Conservation Initiative, directed all of Oregon's state agencies to improve energy conservation efforts in their facilities. The goal was to reduce state agencies' energy consumption by 10 percent below levels measured in 2000.

ORS 276.915 was amended in 2001 to make the 10 percent savings a requirement for all state-owned buildings effective June 30, 2003. The SEED statute was amended again in 2007 to reset the savings goal to 20 percent by June 30, 2015. Agencies collectively met the 20 percent energy use reduction requirement two years before the 2015 deadline.

Process

ORS 276.900-915 directs state agencies to report energy use in state owned facilities to Oregon Department of Energy (ODOE). Agencies report calendar year electricity and fossil fuel use for their facilities 5,000 square feet or greater and using 10 kBtu/sf/yr or more. ODOE supports agencies by:

- Tracking energy use.
- Collaborating with agencies to establish standard or calculated benchmarks.
- Delivering annual agency energy use reports of facility energy use over time.
- Providing auditing and technical support.

Benchmarking

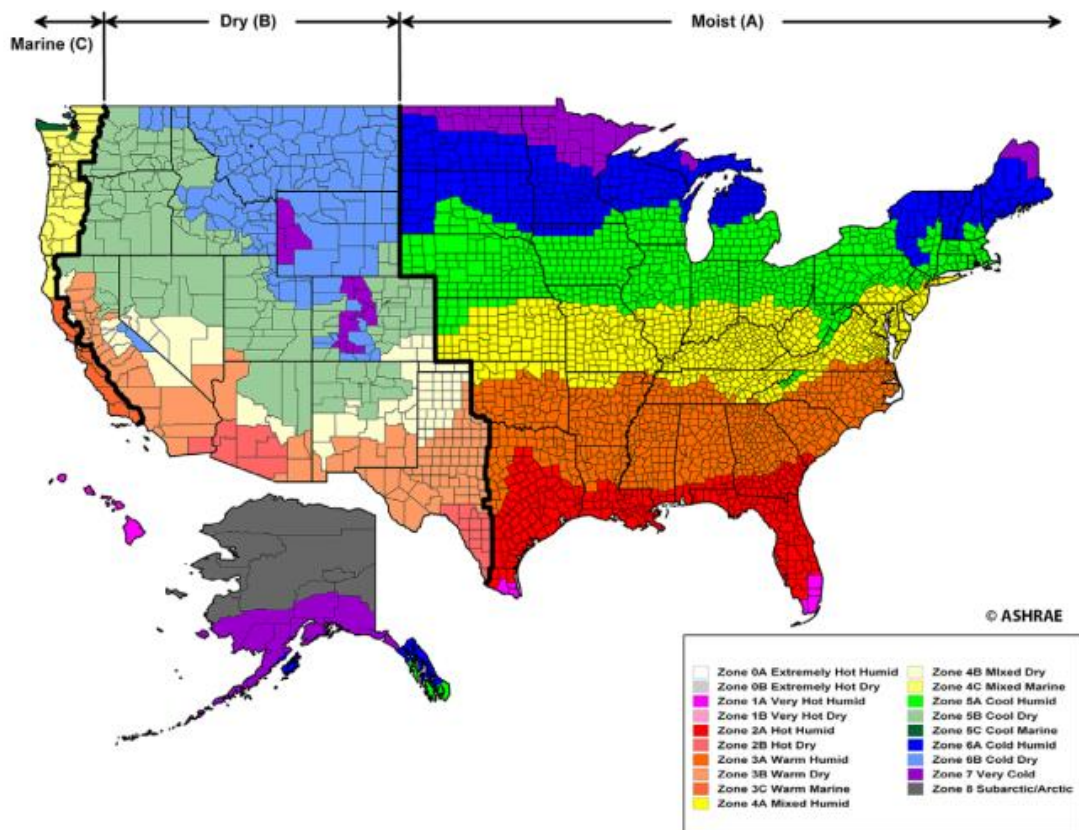
The initial existing state building energy reduction goal of a 20 percent decrease was met in 2013. No new energy use reduction requirements for state agencies has been established. Agencies are aware of the 10 Year Energy Action Plan (YEAP) goals developed in 2012 and many have initiated climate action plans that include energy conservation goals.

Executive Order 17-20, issued in November 2017, states that ODOE will work with all agencies to benchmark and track energy use in state-owned facilities. EO 17-20 reinforced SEED program objectives, supporting state agencies in adopting Energy Use Intensity (EUI) targets for their buildings and tracking progress to those targets. EUI is energy use per square foot per year, which is calculated by dividing the total annual energy consumed (in units of thousand Btu, or kBtu) by the gross floor area (in units of square feet) of the building. EUI for each facility can then be compared to average EUIs for similar building types, i.e. office, hospital, laboratory, etc. 2015, or the first full year of tracked energy use, is used to determine the baseline energy use

intensity (EUI) for a facility, with subsequent years through 2019 now available. Agencies with buildings exceeding target EUIs are directed to evaluate potential retrofits to increase the efficiency of their buildings, and ODOE is directed to guide agencies to implement tactical and achievable energy use reductions.

The charts in the following section summarize energy use in the buildings belonging to each agency. The intent is to “benchmark” agency buildings, comparing their annual EUI to similar buildings, national targets, and usage over time. Performance target EUIs are based on the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 100-2015 for climate zones 4C (western Oregon) and 5B (Eastern Oregon). Please see the map below with the varying national climate zones. ASHRAE is an international organization promoting sustainable technology for the built environment. ASHRAE Standard 100-2015 is a data-driven, internationally recognized standard for improving energy conservation in existing buildings, providing a comprehensive approach for addressing energy conservation in a quantitative, objective manner. This standard’s targets represent high performing buildings for each building category and region and is represented by the black horizontal lines in the building energy use graphs in this report.

**INFORMATIVE ANNEX G
CLIMATE ZONES**



Not all building types have ASHRAE targets, however, and Oregon Department of Energy staff worked with each agency to establish calculated high-performance targets for those buildings based on their benchmark year of 2015, or whenever they first reported annual energy use.

Energy Use Reporting

Oregon state agencies began reporting building-level energy use of state-owned facilities to the ENERGY STAR Portfolio Manager database on January 1, 2015 per SEED rules in OAR 330-130-0080.

The data presented in this report represents five years of energy consumption data from 2015-2019. Agency 2020 building energy use data is due to ODOE by March 31, 2021. Therefore, the energy use presented in this report does not reflect the effects of the COVID-19 pandemic, which dramatically changed the energy use of many State of Oregon buildings.

With a dataset of five years available, ODOE may identify and evaluate specific building energy consumption trends and work with agencies to better understand them. The following building energy use charts demonstrate some individual facility energy EUIs are decreasing, while some have increased. This can be due to changes in operational profiles (such as operating hours or occupancy), occupant behavior, equipment changes, or external factors such as weather. The data presented in the graphs below represent actual energy consumption and has not been normalized for variables such as weather.

Upon issuing annual energy use report cards to each agency, ODOE offers assistance in performing a more in-depth analysis to understand building energy performance. As more data is collected and trends are established, ODOE will perform more in-depth analysis on specific buildings as appropriate with agencies to help prioritize opportunities for energy and cost savings.

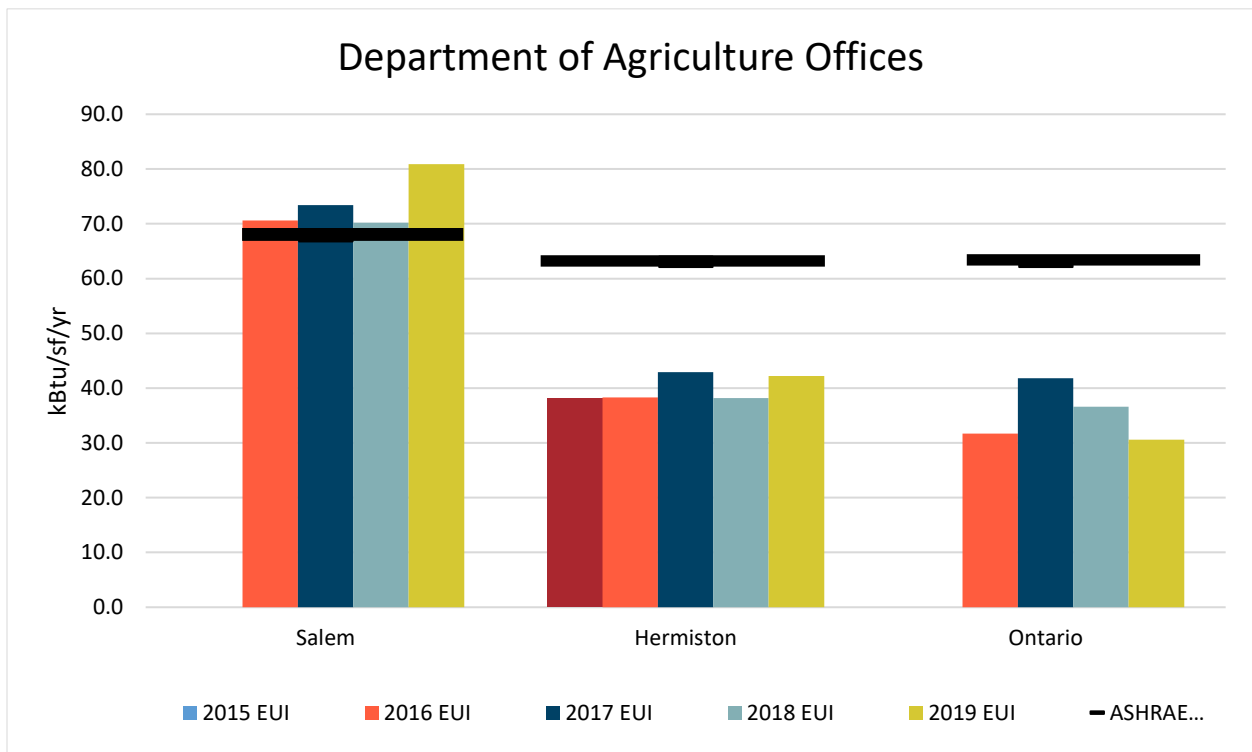
SECTION 3: AGENCY STATUS REPORTS

The information below is a summary of data recorded in the ENERGY STAR Portfolio Manager database by state agencies from 2015-2019. Annual building energy use for each facility is tracked and summarized in tables and graphs below. Graphs show the annual building EUI in comparison to previous years and to national targets for similar high-performance buildings. Additional information about the buildings, agency activities, and future plans is provided to ODOE by individual agencies.

Oregon Department of Agriculture (Agriculture)

- Agriculture developed an agency sustainability plan that includes dedicated staff evaluating opportunities to reduce energy consumption in their agency.
- Agriculture is evaluating potential behavior and equipment changes to improve the efficiency of their offices.
- Agriculture’s building portfolio consists of multi-use facilities including offices, warehouses, and inspection facilities used by staff to evaluate agricultural goods.

Agriculture- Other Service Buildings



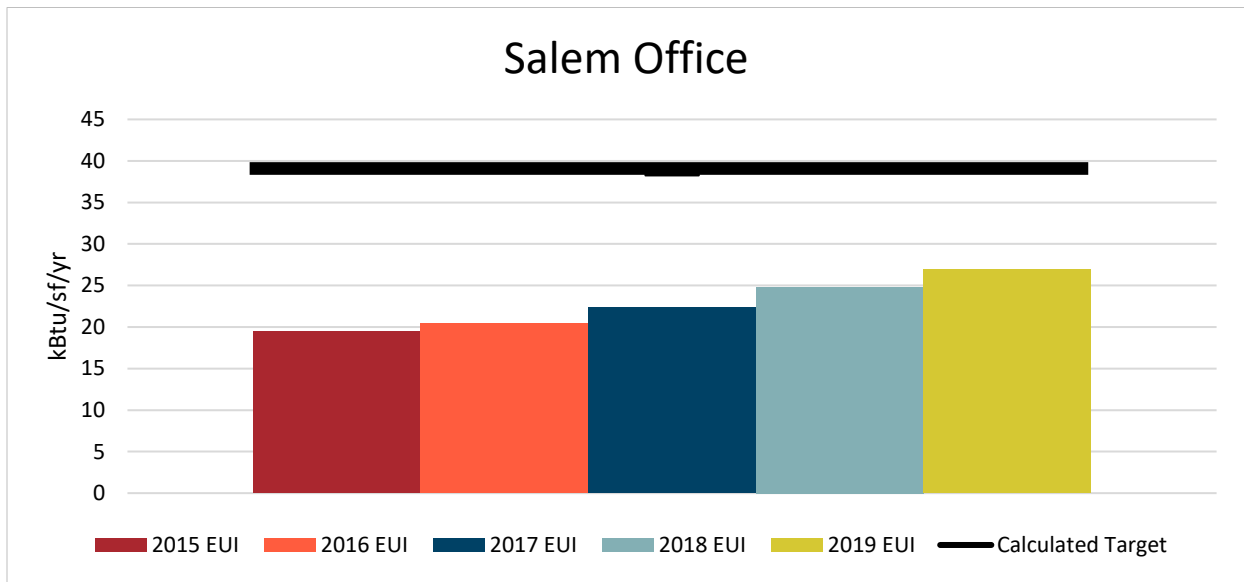
- ASHRAE Standard 100 EUI target for other service buildings in climate Zone 4C is 60 kBtu/sf/yr (black line).
- ASHRAE Standard 100 EUI target for other service buildings in climate Zone 5B is 63 kBtu/sf/yr (black line).

- The Salem facility received a calculated performance score of 67.7 due to its various unique uses. The Salem facility’s energy use continues to increase and presents the greatest opportunity for energy conservation improvements.
- The Salem facility consists of 7 buildings with unique uses:
 - 2 large green houses, one used for plants and the other used for plants and insects with heaters and fans.
 - 1 modular building with a conference room, small entomology lab, and storage.
 - 3 metal pole building storage barns/sheds.
 - 1 metal pole building that is a Hop Lab, Large Mass Weights and Measures Lab, and mechanics shop.

Oregon Department of Aviation (Aviation)

- Aviation’s building portfolio consists of their Salem Shop/Hangar Building and attached Office Building to each other.
- Aviation had a Facility Condition Assessment completed for each building in May 2019, identifying seismic, energy conservation, and health safety improvements needed.
- The facility was built in 1954 and needs major capital improvements.
- Aviation is evaluating the potential to fund a replacement of the building rather than a retrofit.
- The office building utilizes a variety of HVAC equipment including:
 - Oil furnace
 - Electric floorboard heaters
 - Portable heaters
 - Heat Pump for cooling
 - Portable AC units in windows
- Aviation invested in the following energy conservation upgrades:
 - LED lighting
 - Window tinting
 - Electric hot water heater
 - Nest thermostat

Aviation Office and Shop

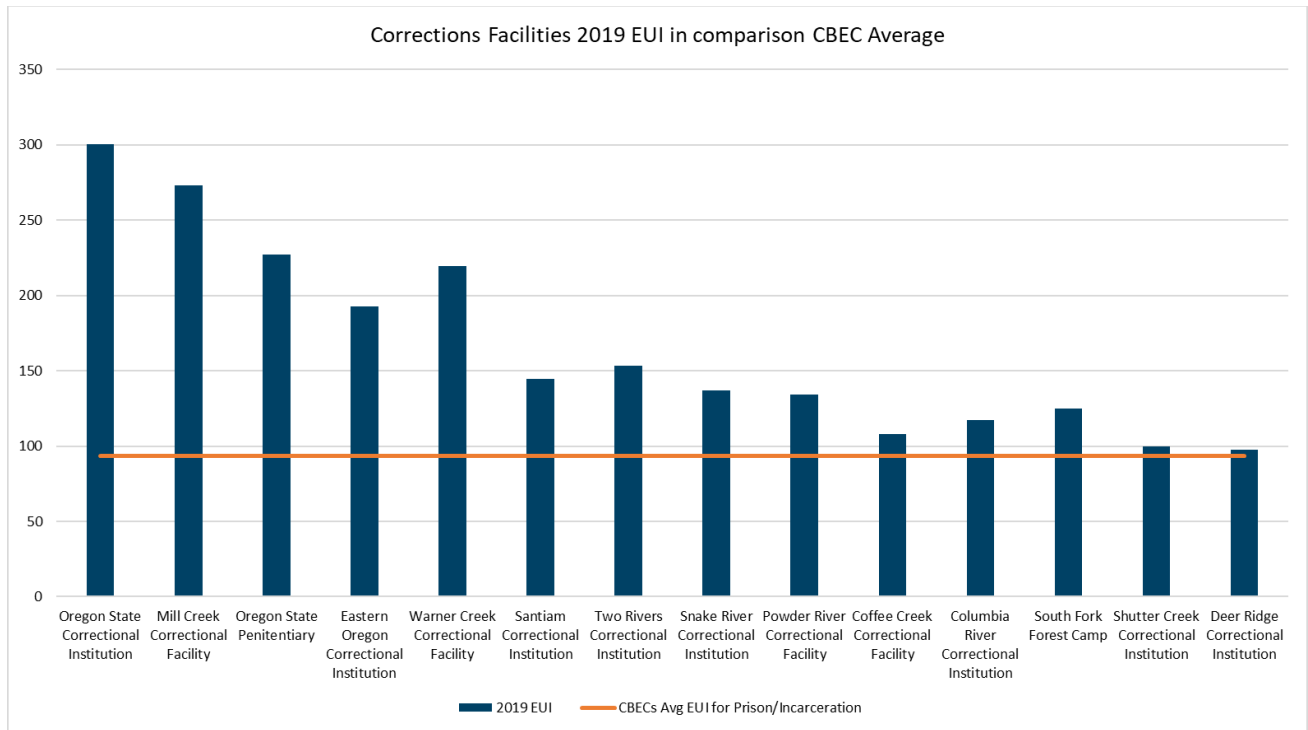


- Aviation’s facility consists of an office and hanger/shop.
- ASHRAE Standard 100 EUI target for government office buildings in climate Zone 4C is 50 kBtu/sf/yr (black line).
- ASHRAE Standard 100 EUI target for vehicle storage/maintenance in climate Zone 4C is 14 kBtu/sf/yr (black line).
- ODOE created a calculated performance target of 38.9 EUI for Aviation’s facility based on the square footage dedicated to these different uses.
- Agency staff and operating hours increased gradually over the last few years and are reflected in the increased building energy use.

Oregon Department of Corrections

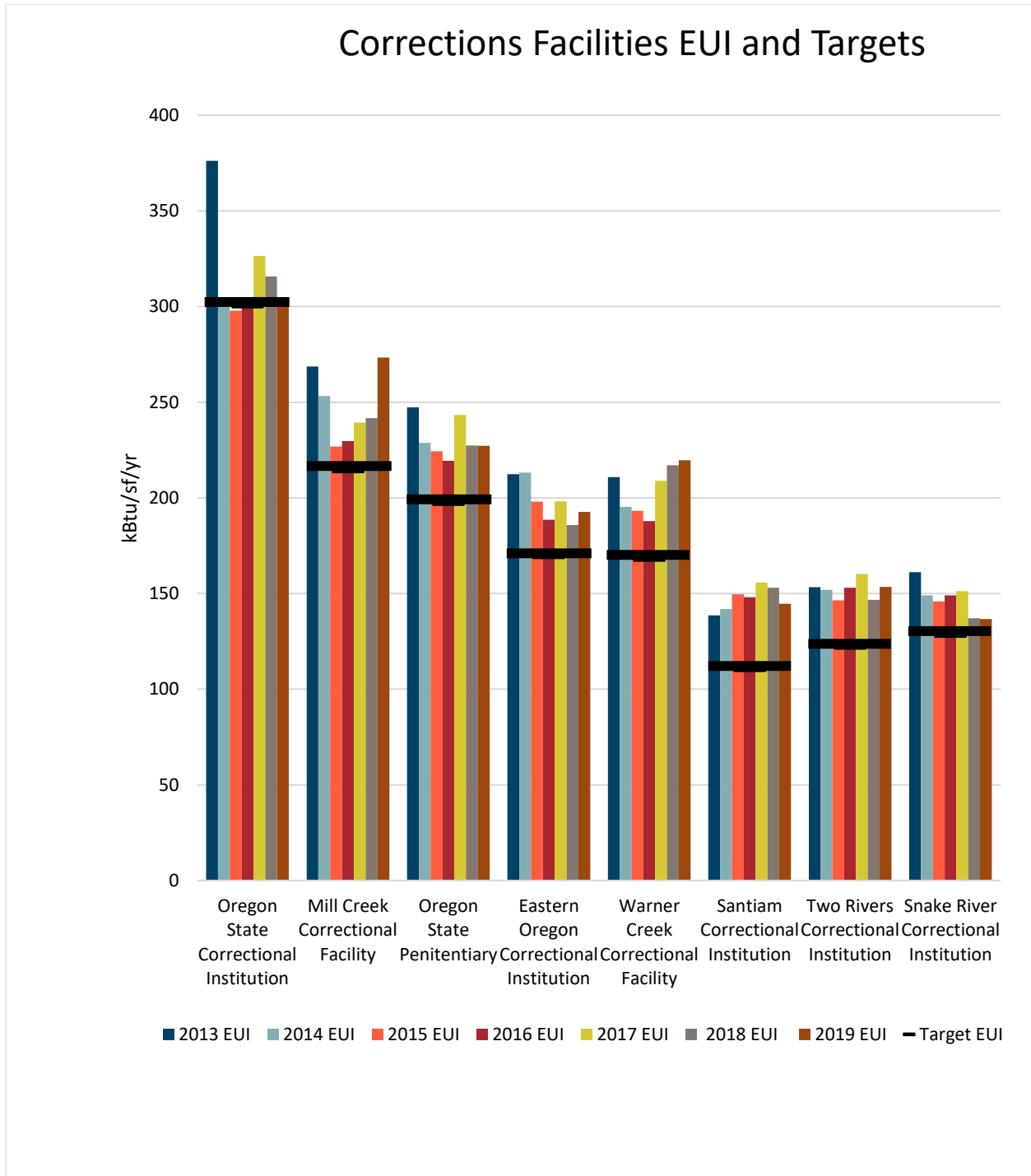
- Corrections established an internal annual energy use reduction goal of 2 percent across their portfolio of buildings from 2013 to 2023 to reach an overall goal of 20 percent.

Corrections Facilities 2019 EUI in Comparison CBEC Average

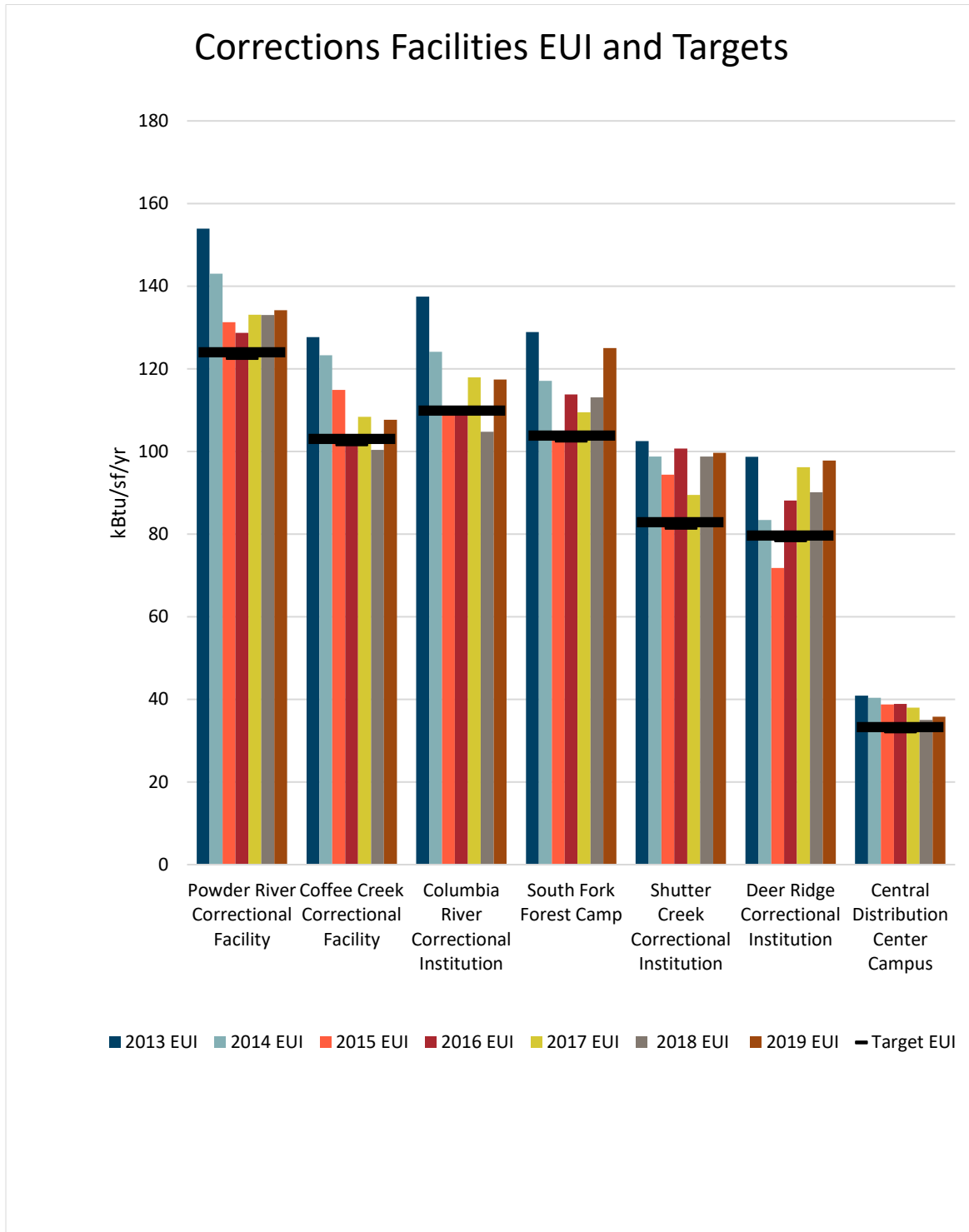


- Commercial Buildings Energy Consumption Survey (CBECS) average EUI for Prison/Incarceration facilities is 93.2.
- All of Oregon’s Corrections facilities exceeded this average EUI in 2019.

Corrections Facilities EUI and Target



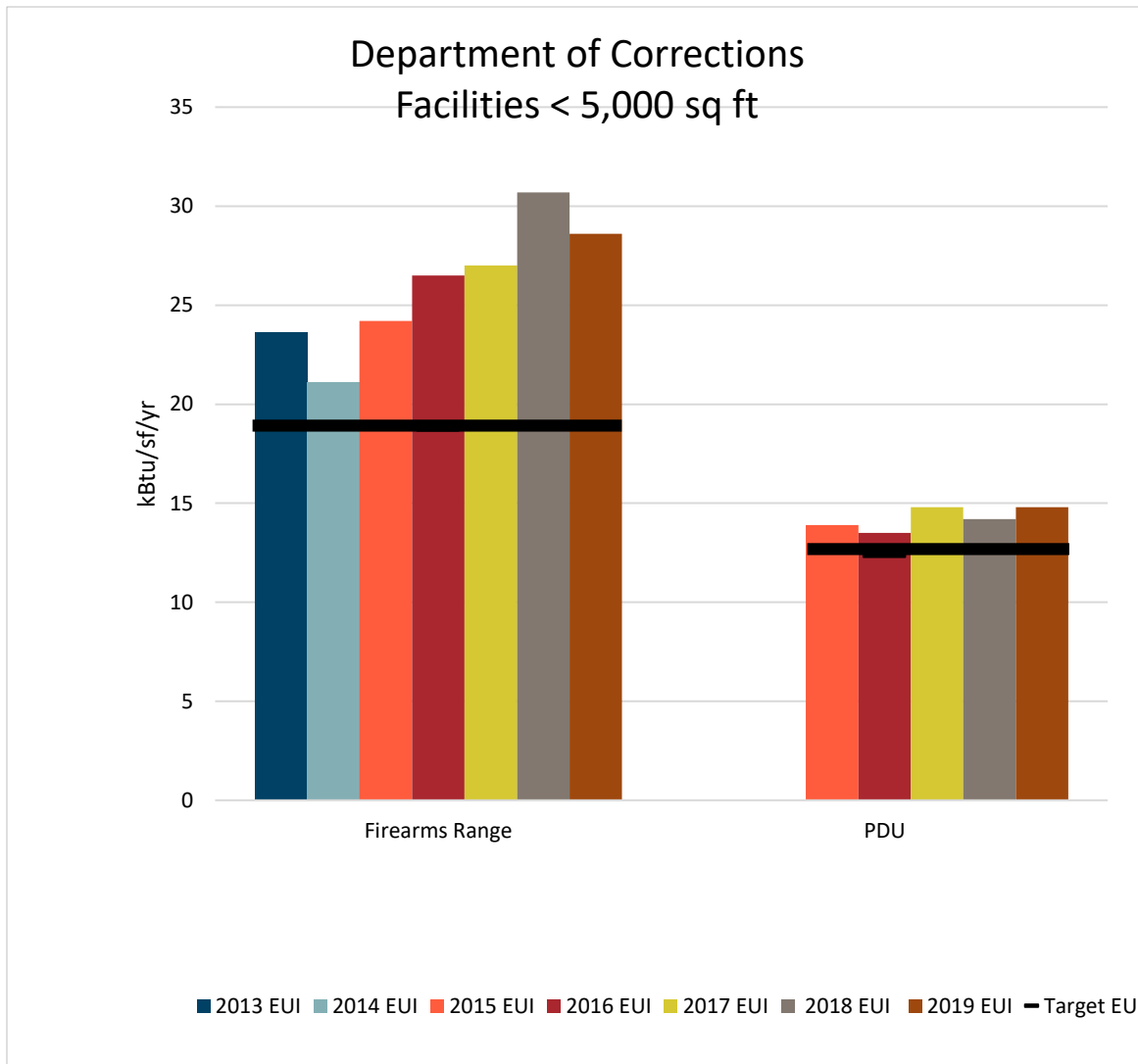
Corrections Facilities EUI and Target



- ASHRAE Standard 100 does not have a directly applicable EUI target for prison/incarceration facilities.

- ASHRAE Standard 100 does have EUI targets for Other Public Order and Safety office buildings. In climate Zone 5B it is 76 kBtu/sf/yr. In climate Zone 4C it is 73 kBtu/sf/yr.
- ODOE and Corrections agreed to use a 20 percent reduction from the 2013 EUI as an appropriate efficiency target for Corrections buildings. Black lines above mark the target EUI for each building.
- Each facility presents an opportunity for improvement in reducing energy consumption to their target EUI.

Corrections Facilities < 5,000 sq. ft.



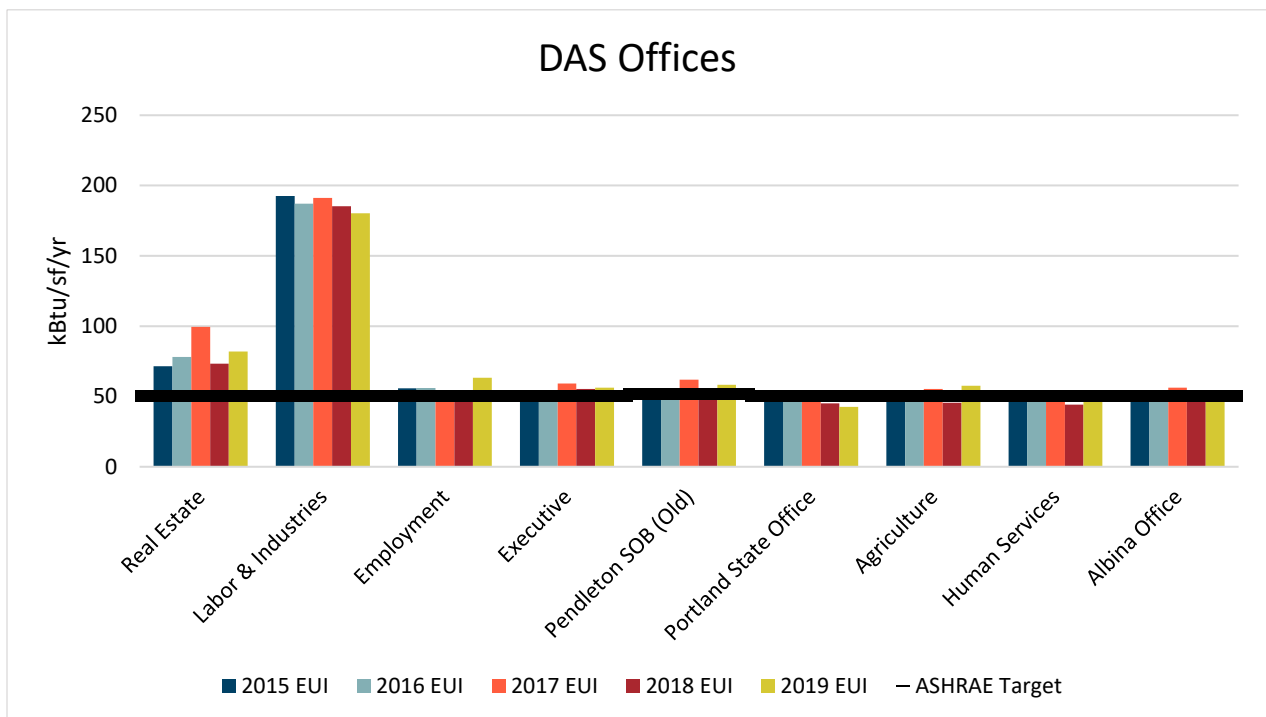
- Due to their size, these buildings are not required to report energy use.
- ASHRAE Standard 100 does not have a directly applicable EUI target for these smaller facilities.
- ODOE and Corrections agreed to use a 20 percent reduction from the 2013 EUI as an appropriate efficiency target. Black lines above mark the target EUI for each building.

- The Firearms Range has steadily increased its energy consumption year to year.

Department of Administrative Services (DAS)

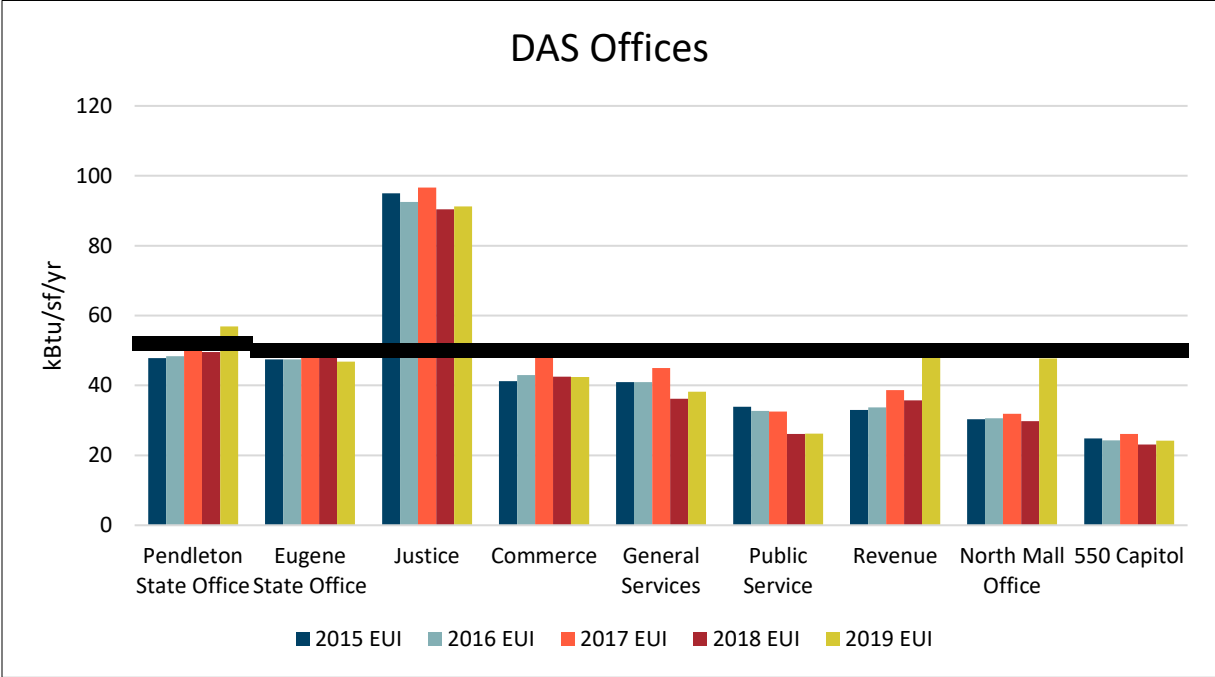
- DAS is participating in Energy Trust of Oregon’s Strategic Energy Management (SEM) Program. DAS staff incorporated lessons learned from the SEM program in agency communications and in implementation of energy conservation upgrades in facilities throughout the state. DAS has also had Energy Trust of Oregon’s commercial buildings team conduct energy audits to identify opportunities, potential incentives and estimated payback.
- DAS has a designated Energy Manager to develop and guide their Energy Management Plan.
- DAS contributed to and incorporated the state of Oregon’s plug load strategy to reduce energy use.
- DAS conducts night walks to evaluate facilities and identify opportunities to influence occupant behavior.
- DAS has adopted an internal agency Energy Policy to support energy management efforts, including ASHRAE 100 and other EUI targets for applicable buildings in its portfolio.

DAS Office Buildings



- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr (black lines).
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr (black lines).
- Labor and Industries building contains a large atrium through its center with the exterior of the building covered in glass. After HVAC shutdown, the building loses or gains heat rapidly. DAS has completed several projects to increase efficiency, including replacing dampers, adjusting warm-up schedules, and adding more efficient variable-frequency drives (VFD) which improve the efficiency of motors. DAS is currently developing a building-specific energy plan for how to meet its target EUI through a combination of additional capital, operating and behavioral actions, as well as ensuring proper meter function. DAS is forecasting a major remodel in 2026 to implement energy conservation upgrades to improve EUI, dependent on an approved funding request.
- DAS replaced four vane axial fans in the Portland State Office Building with a return and supply fan wall controlled with VFDs, resulting in increased energy conservation that lowered the building's EUI below target in 2019.
- Two chillers were replaced in the Employment building in Spring 2020, which should significantly reduce building EUI. Funding has also been requested to conduct a major remodel of the Executive building, which includes significant upgrades to its energy systems (including a major lighting upgrade and chiller replacement) for greater efficiency. DAS identified the Executive and Employment buildings as having further potential for behavior change to reduce energy use below their target EUI.
- In 2019, DAS completed a capital improvement project on the Agriculture building, replacing the air-cooled chiller with a magnetic bearing air cooled chiller. The basement parking structure received LED lighting control upgrades that included motion sensors. These projects should reflect a lower EUI in 2020. This building also contains a laboratory on the second floor running 24/7; Agriculture will be moving these lab operations to the recently acquired DAS North Valley Complex.

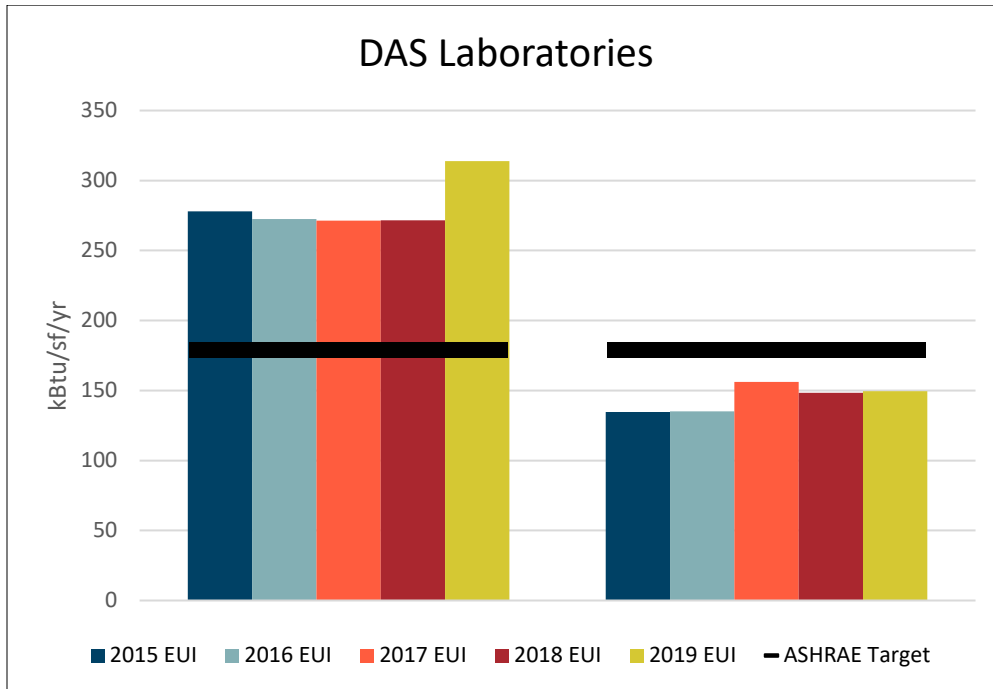
DAS Offices



- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr (black lines).
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr (black lines).
- The Eugene State Office building utilizes an efficient chilled beam system. Agencies such as DHS, Department of Justice, and DEQ are in the building, which operated below its target EUI in 2019.
- Justice and Commerce have local facilities management that DAS is engaging to better monitor and manage their energy use. As an example, they are encouraging building staff to conduct their own night audits. This should help the Justice building achieve an improved EUI going forward. The Justice building is also funded for a building envelope project including upgrading single-pane windows with insulated glass.
- The General Service Building’s basement is conference rooms only and is sporadically occupied. DAS has completed a reconfiguration of space conditioning ducting for the first floor to further increase building efficiency.
- Revenue’s facility management team has been interested in improving the energy conservation of their building, where energy use increased in 2019. DAS will be working with the agency’s management team to explore operational and behavioral strategies in 2020.
- The 550 Capitol building, where Oregon Department of Energy is located, received a major renovation in 2017, including new windows, insulated roof, complete lighting

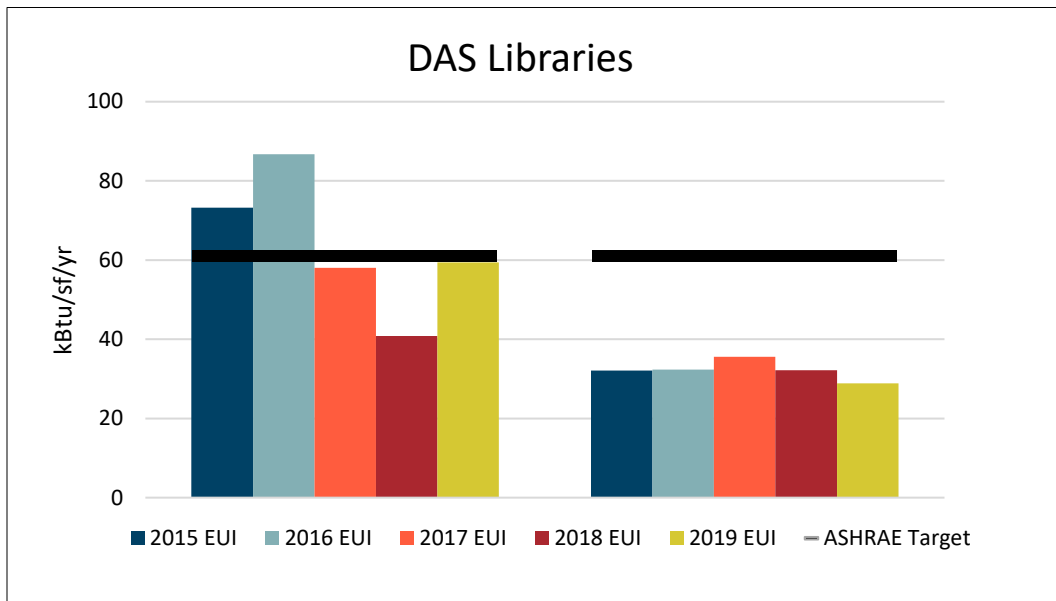
package, chiller, and variable air volume (VAV) system changes. These upgrades continue to be reflected in 2019 EUI.

DAS Laboratories



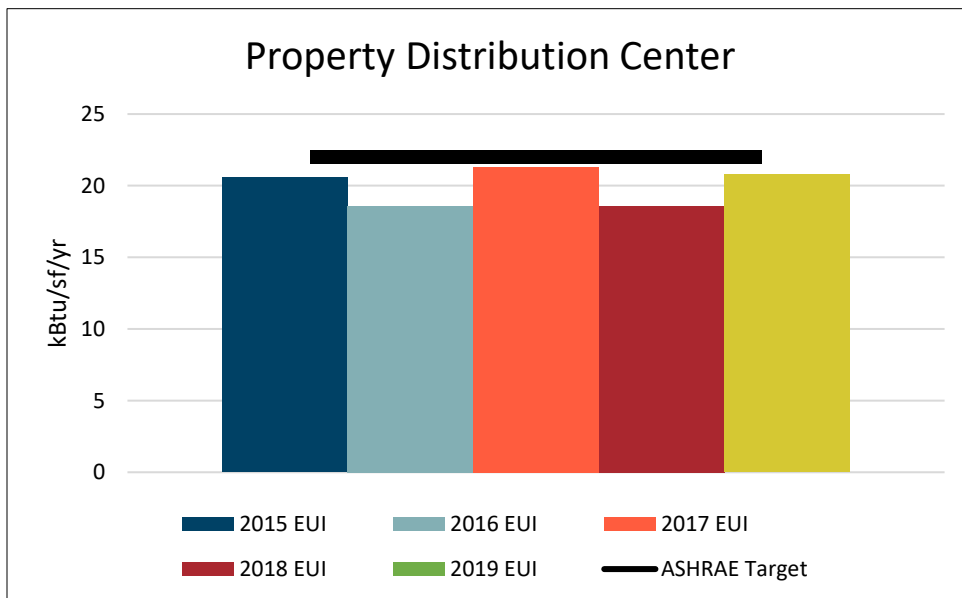
- ASHRAE Standard 100 EUI target for all laboratories in Zone 4C is 179 kBtu/sf/yr. ASHRAE does not distinguish the energy use of different types of laboratories.
- DEQ Health Laboratory is in operation 24/7 and performs tests on blood samples of newborns in Oregon and five other states as well as air, water, and fish samples for Oregon. In 2019 VFDs were added to several constant volume fans, which should be reflected in lower EUI going forward.
- Portland Crime Laboratory had a reciprocating Chiller and cooling tower replaced with an air-cooled magnetic bearing chiller in 2018. All four of the makeup air units were replaced as well in 2018. It is operating under the target EUI for labs.

DAS Libraries



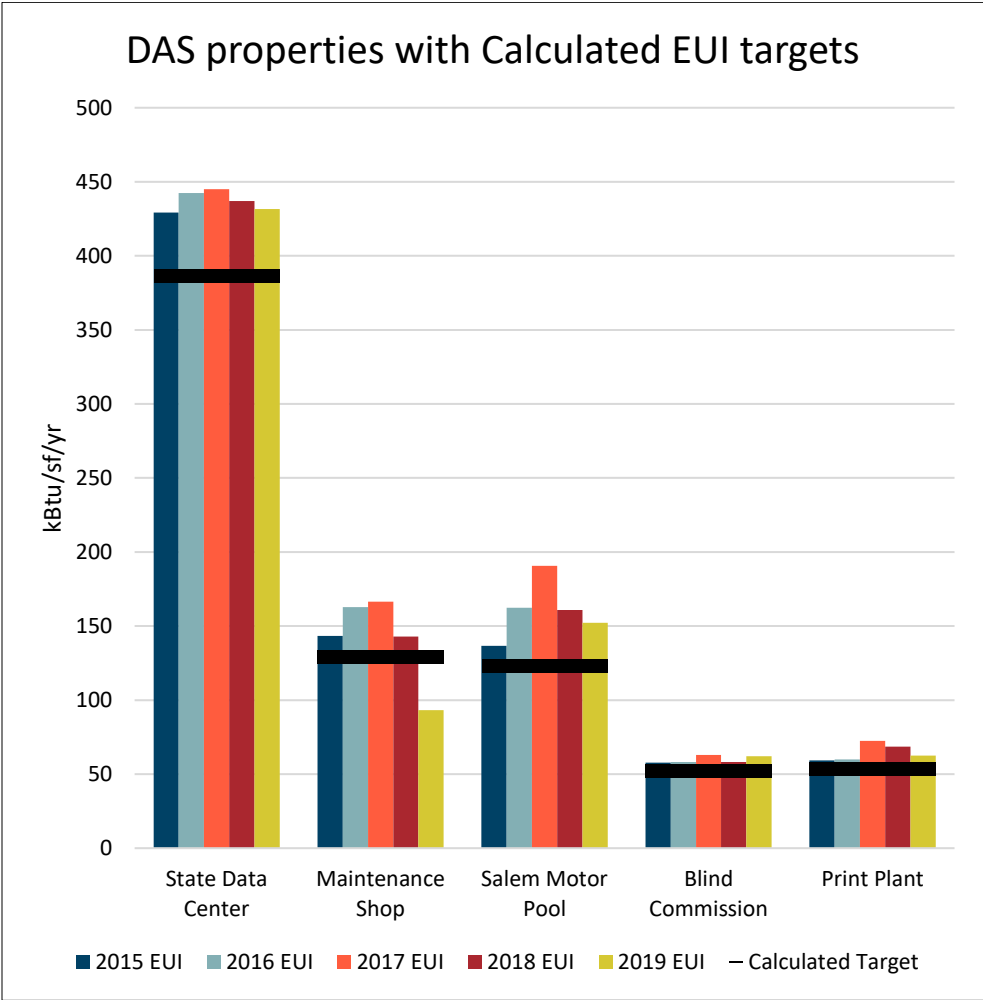
- ASHRAE Standard 100 EUI target for Libraries in Climate Zone 4C is 61 kBtu/sf/yr.
- The Archives building was operating above the EUI target, but in 2017 and 2018 energy consumption declined due to a major dehumidification project. In 2019, energy use increased, but the building remained below its EUI target.
- The State Library started a major remodel in 2020. A new LED lighting package and boiler isolation valves were installed. In 2021, a new air-cooled magnetic bearing chiller will be installed. These building upgrades should result in significant energy savings.

DAS Property Distribution Centers



- ASHRAE Standard 100 EUI target for Distribution Centers in climate zone 4C is 22 kBtu/sf/yr.
- The Property Distribution Center is operating below the performance target. Electrical distribution gear was replaced in 2019.

DAS Properties Without ASHRAE EUI Targets

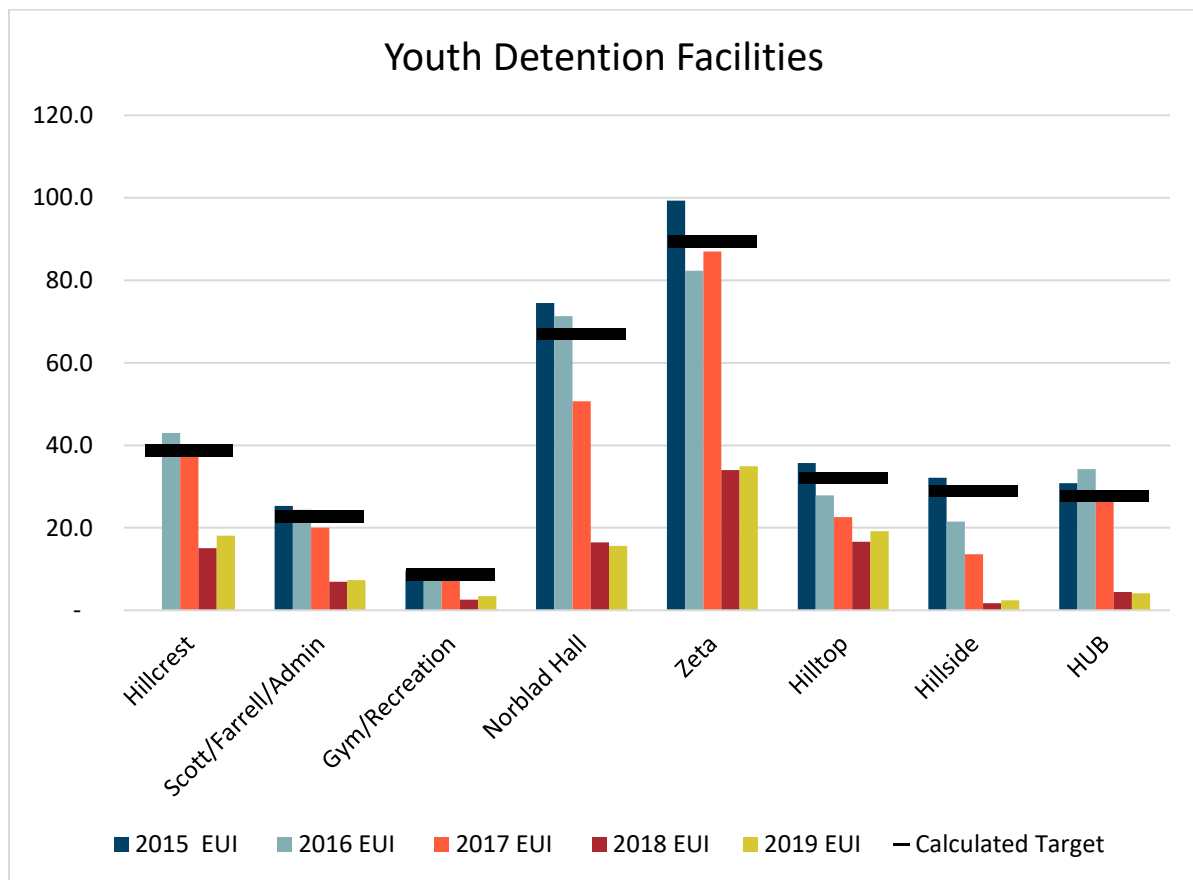


- These DAS properties have calculated EUI targets established based on their baseline use. ASHRAE Standard 100 targets are not available.
- ODOE collaborated with DAS to create a Target EUI of a 10 percent reduction from the 2015 baseline year use by 2022 (black lines).
- State Data Center is currently undergoing a power capacity upgrade and hot/cold aisle containment. There were seven air handlers, three pumps, a chiller, and packaged unit added. The three existing chillers were replaced with water cooled magnetic bearing chillers. Additional server capacity, however, has also been added at the facility. These upgrades are expected to show an increased EUI, but also increased facility efficiency

when evaluated looking at power usage effectiveness (PUE). DAS will work with ODOE to develop appropriate metrics for this facility moving forward.

- The Maintenance Shop is 25 percent office space, 25 percent maintenance shops, and 50 percent warehouse. DAS plans to conduct a night audit to identify opportunities for improvement.
- DAS completed LED lighting upgrades for the Salem Motor Pool in in 2014 and 2019, which should be reflected going forward. DAS is also engaging occupants for ideas to help save energy.
- Print Plant operates 24/7 and has both printing shop space and office space. DAS intends to engage Print Plant management to evaluate operational changes to lower EUI below target going forward.

DAS Youth Detention Facilities



- In 2018, ownership of this campus of buildings was transferred from the Oregon Youth Authority to DAS. These buildings have been sold and will be removed from the DAS building portfolio in 2021.
- ASHRAE Standard 100 has not established EUI targets for a detention center campus of facilities.

- ODOE collaborated with OYA to create a calculated target EUI of a 10 percent reduction from the 2015 baseline year use by 2022 (black lines).
- Each of the campus buildings have their own electric meter, but there is a single gas meter for the campus. Hillcrest represents natural gas use for the campus of buildings.
- Energy consumption of all buildings dramatically decreased in 2018 once OYA vacated the facility. In 2019, the buildings were unoccupied as well. In 2020, for approximately 3 months, meals on wheels used the cooking and cold storage facilities.

Oregon Department of Public Safety Standards and Training (DPSST)

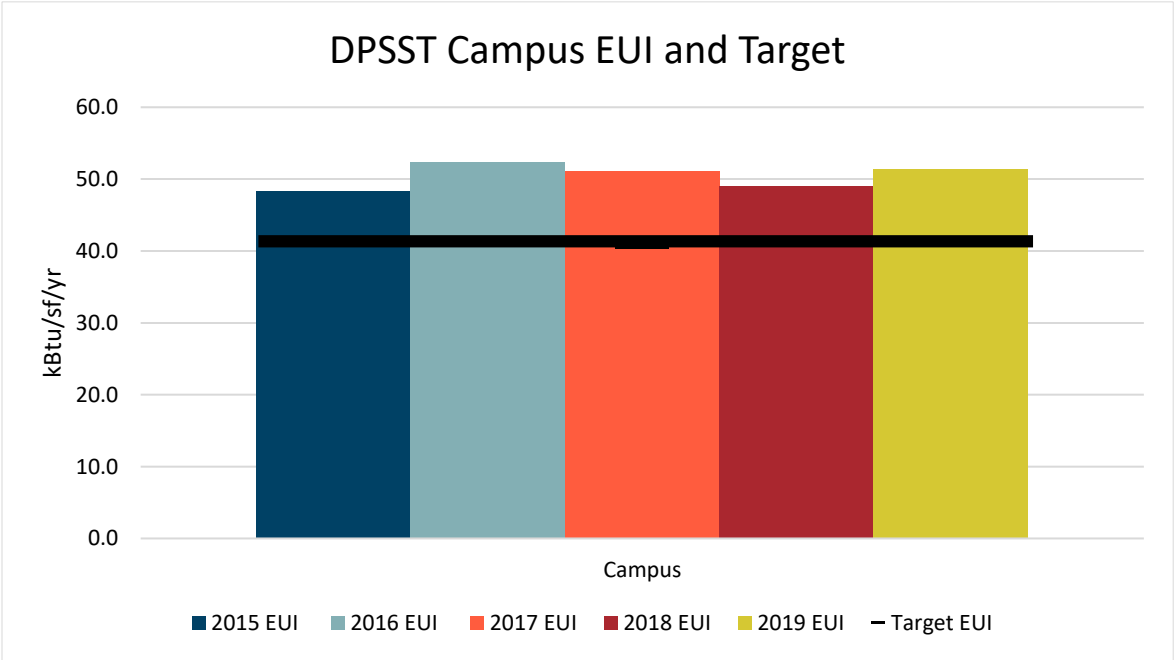
- DPSST is participating in Energy Trust of Oregon’s Strategic Energy Management (SEM) Program to identify no to low cost energy savings opportunities and capital improvements. Energy Trust of Oregon has also conducted building audits on campus to identify opportunities.
- LED lighting upgrades have been completed. Deferred maintenance project plans for the near future include replacement of boilers that serve Building A, B, and C with downsized, more efficient units, and the addition of VFDs to the main circulation pumps.
- DPSST has designated an Energy Manager to develop and guide their Energy Management Plan.
- Building occupancy fluctuates throughout the year with training cycles. Recruit class sizes vary depending on police employment demand.
- DPSST has evaluated and incorporated the state of Oregon’s plug load strategy to reduce energy use.

DPSST Building Types and EUI Targets

| Facility | Commercial Building Type | ASHRAE Standard 100 Target by Building Type | Calculated Target: 15% reduction from 2015 |
|------------------|-----------------------------|---|--|
| DPSST Campus | training campus | | 41 |
| Building A, C | government office | 61 | |
| Building B | other food service | 103 | |
| Building D | other classroom education | 32 | |
| Building E | dormitory/frat/sorority | 66 | |
| Building F | other classroom education | 32 | |
| Building G | other classroom education | 32 | |
| Building H | other classroom education | 32 | |
| Building J, K | other classroom education | 32 | |
| Building M, N, P | vehicle service/repair shop | 40 | |

- ASHRAE Standard 100 Targets are based on the type of a building and its use within the appropriate climate zone.
- The above table has the building types used to determine the ASHRAE targets in climate zone 4C.
- ASHRAE Standard 100 does not have a directly applicable EUI target for campus training facilities, so the target was calculated. ODOE and DPSST agreed to use a 15 percent reduction from the 2015 EUI as an appropriate energy conservation target for buildings without an ASHRAE EUI target.
- Buildings F, H, and K are all generally unconditioned spaces used for training exercises.
- Building G is the fire tower – which includes a gas ‘fire simulator’ that consumes gas from the same meter as the rest of campus. Use is irregular and generally causes usage spikes when fire training is occurring.
- Building J is a firing range that requires 100 percent outside air when in operation. Firearms training is a critical component of the training provided on campus and this facility is in frequent use.

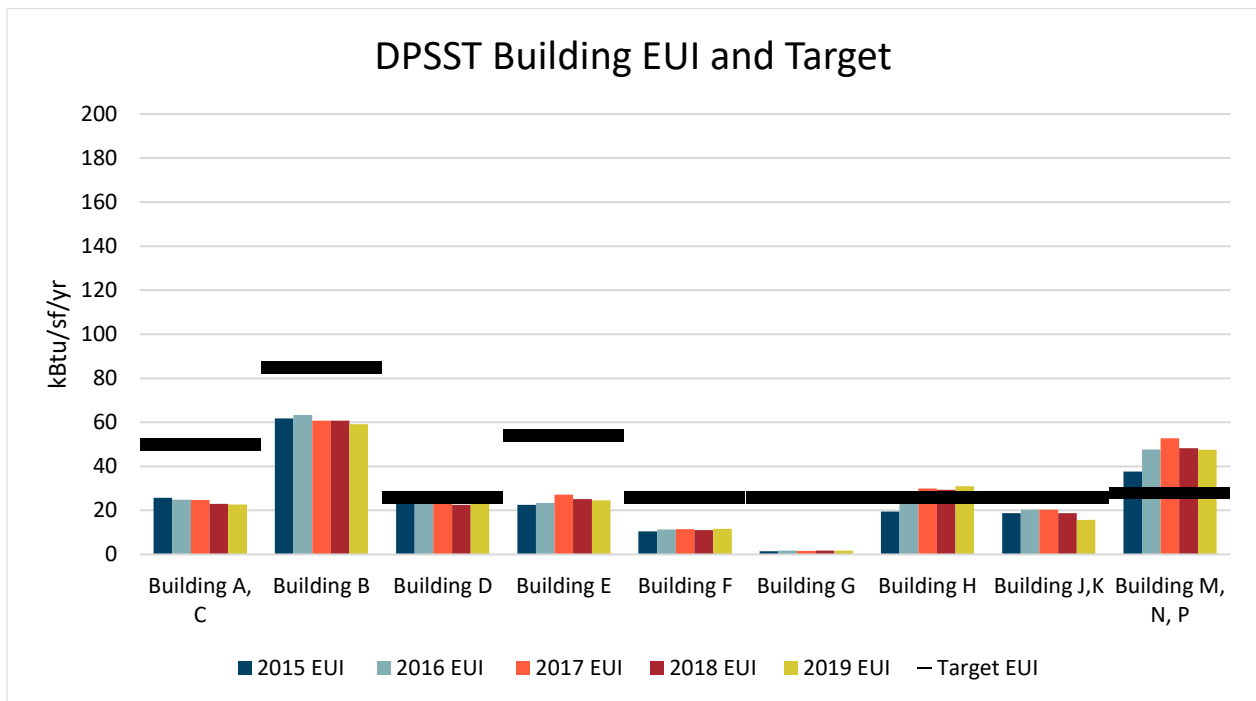
DPSST Campus



- ASHRAE Standard 100 does not have a directly applicable EUI target for campus training facilities. ODOE and DPSST agreed to use a 15 percent reduction from the 2015 EUI as an appropriate efficiency target. The black horizontal line above marks the target EUI for the campus.

- Since the 2015 benchmarking, DPSST has seen an increase in the number of students graduating from the training facility. DPSST also leases areas of the facility to Oregon State Police and other public agencies with similar training facility needs. The increase in use from 2015 to 2016 correlates with these operational changes. In addition, the last 4-5 years have been heavy fire seasons requiring fire training for Oregon’s Army National Guard in addition to the normal training activities.
- The DPSST campus has only one natural gas meter, making it difficult to isolate energy consumption concerns or unusual high use events such as training on the fire tower. DPSST has considered investing in natural gas sub meters.

DPSST Buildings on Campus



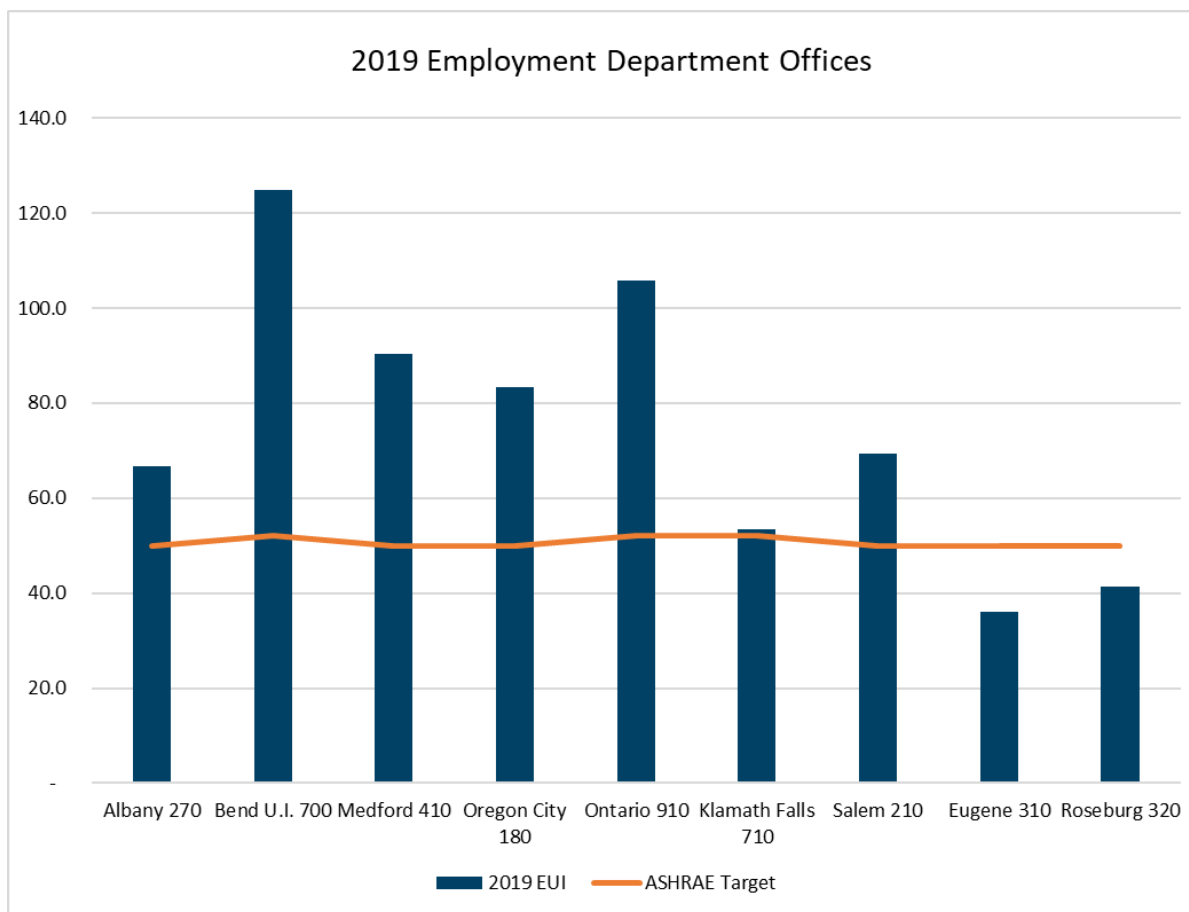
- Half of DPSST buildings are at or below their expected target based on building use assumptions.
- Building A and C are getting new condensing boilers in Summer 2020 to replace the existing pulse boilers installed in 2005.
- Building D is a training facility/gym. Due to the nature of use, heating and cooling loads are high during peak summer/winter months.
- Building H is a manufactured building that has a packaged HVAC system. The facility is often used as a meeting space and for training exercises during normal hours. The packaged HVAC system is controlled at the unit and is aging and inefficient.
- Buildings J and K have combined electrical metering. The high use is driven by the 100 percent outside air necessary for operation of the firing range.

- Building M, N, and P include the maintenance complex for both facilities and vehicles. These buildings have furnaces and electric resistance unit heaters as well as large overhead doors that allow large volumes of conditioned air to escape.
- Building B has a cafeteria with a commercial kitchen and DPSST has identified opportunities to upgrade the efficiency of equipment.

Oregon Employment Department (OED)

- OED’s building portfolio consists of government office buildings.
- OED leases space to partner organizations within their buildings and has increased occupancy within their buildings by adding new tenants.
- In 2019, OED conducted Facility Maintenance Assessments on their buildings to identify needed facility investment.
- OED’s Facilities Management team was allocated \$14 million to invest in HVAC, controls, lighting, window, and door upgrades in this biennium.

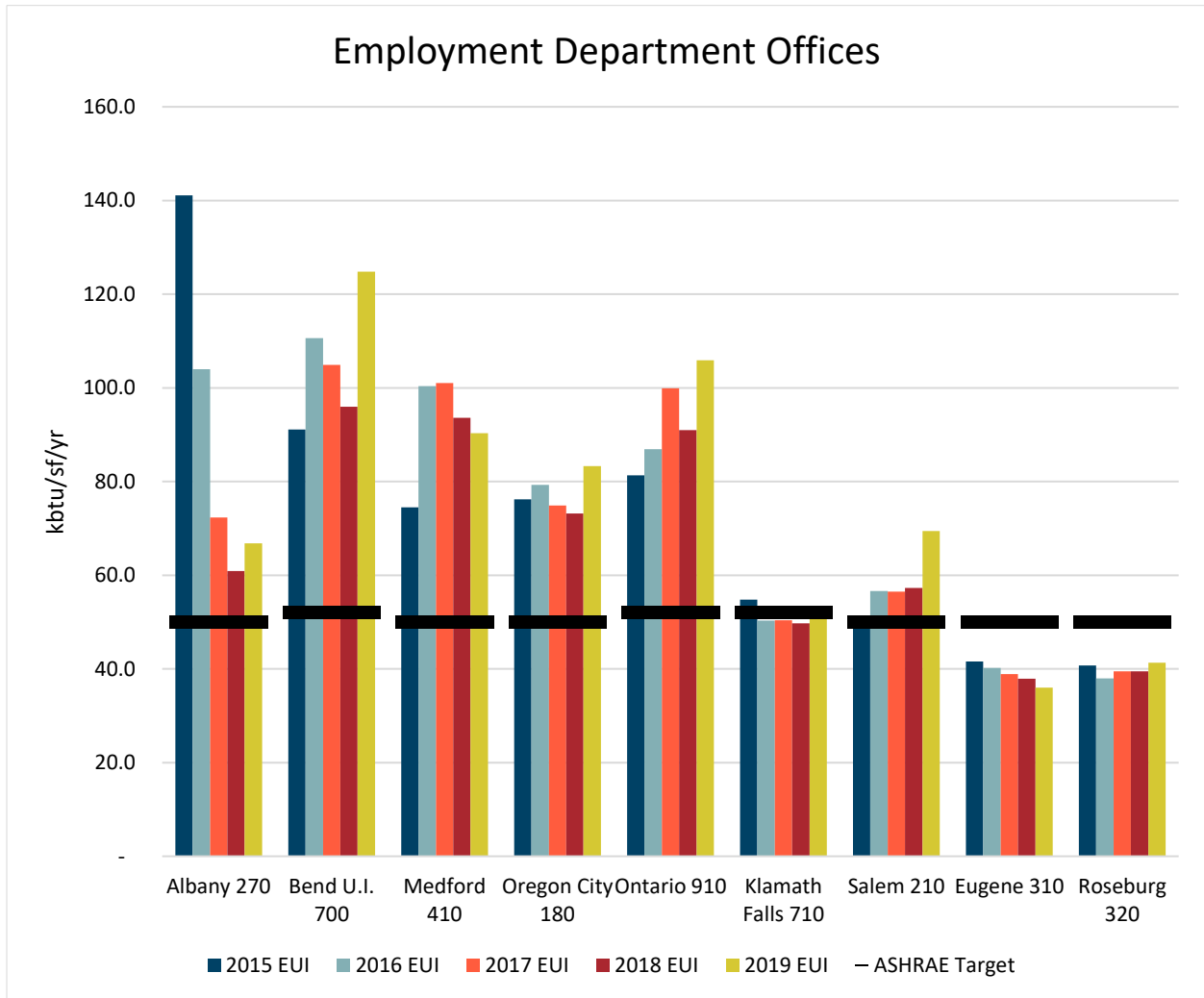
Employment Facilities



- Above is a chart comparing 2019 energy use of each of OED’s buildings to the established ASHRAE EUI target.

- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr (orange line).
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr (orange line).

Employment Department Offices



- Above is a chart comparing the energy use of OED’s buildings from the baseline year of 2015 to 2018.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr (green lines).
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr (green lines).
- Albany 270 has steadily reduced energy consumption. OED evaluated the facility and discovered HVAC systems were conditioning the building for use 24/7, 7 days a week.

OED locked down local controls so they can manage the controls from their central office in Salem. In 2015, Albany 270 also received an insulation upgrade.

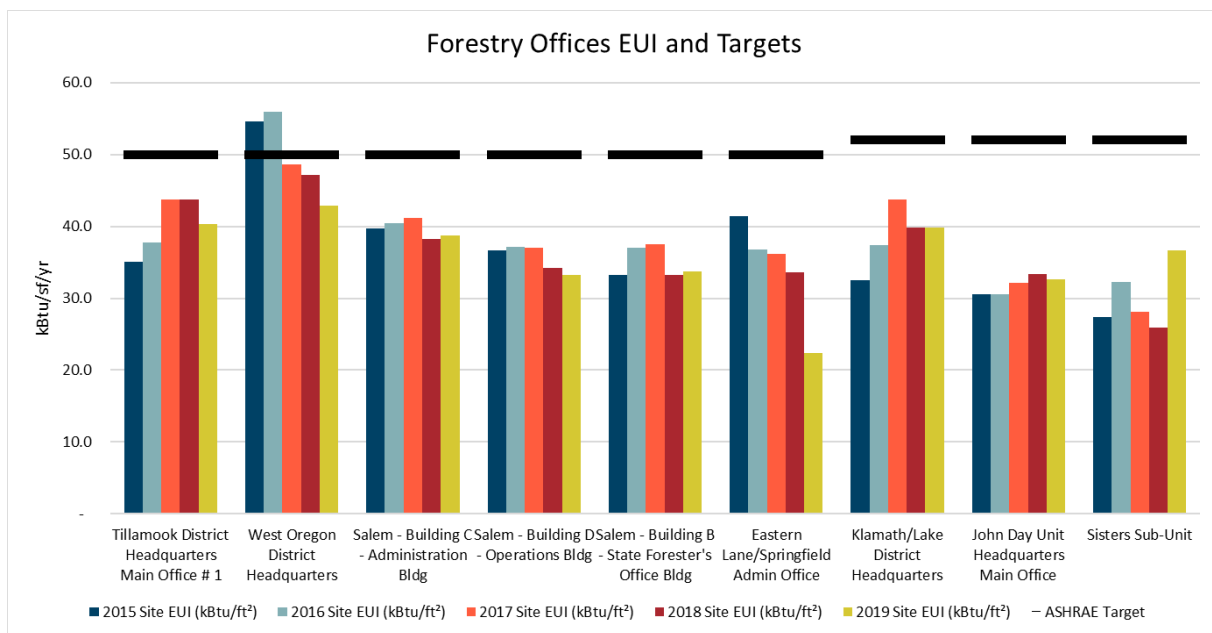
- Medford 410's occupancy increased over the last few years by 25 percent due to partner organizations moving in. In 2021, OED is planning a major building retrofit including a new roof, new lighting, HVAC, and controls.
- Salem 210 had a boiler system upgrade in 2019, which should lead to reduced energy use in 2019 and beyond.
- Eugene 310 and Roseburg 320 have had HVAC, controls, lighting, window, and door upgrades to improve the comfort, performance, and efficiency of their buildings. They are both currently performing below their performance target.
- Oregon City 180 occupancy increased over the last few years by 15 percent due to partner organizations moving in. OED has identified opportunities to improve energy conservation in this building by upgrading single pane windows, HVAC, and controls.
- Bend U.I. 700 was built in 1989 and is OED's newest building. The building is currently at maximum capacity as occupancy increased by 25 percent due to partner organizations moving in. OED's Bend office has a contact center and added a server room in 2016, increasing building energy use. New HVAC controls have been added to the facility, but the roof lacks insulation and the HVAC system is failing so potential energy conservation improvements remain.
- Ontario 910's occupancy increased over the last few years by 25 percent due to partner organizations moving in. OED replaced one failing HVAC unit in 2016. OED identified opportunities to improve energy conservation in this building and is planning a new roof, insulation, lighting, windows, and doors in 2020.
- Klamath Falls 710 occupancy increased by 15 percent due to partner organizations moving in. In 2016, OED replaced two boilers and they have added a new snow melt system to their exterior paths. In Spring 2020, OED plans to start a roof and exterior upgrade project that should show energy savings in 2021.

Oregon Department of Forestry (Forestry)

- Forestry's facilities management business model is de-centralized. Regional field offices manage their own building/structures portfolio, and are responsible for budgets, maintenance, and utility bills. Region Managers (aka District Foresters) typically replace or upgrade equipment upon failure and need to see a short payback to their operations budget before they invest in energy conservation facility improvements. Region Managers are influenced by successes of other Region Managers and are interested in successful case studies that may apply to their facilities.
- Forestry is participating in Energy Trust of Oregon's Strategic Energy Management (SEM) Program. Forestry staff have incorporated lessons learned from the SEM program in agency communications and in implementation of energy conservation upgrades in facilities throughout the state.

- To increase occupancy engagement, Forestry’s Agency Administration Branch has issued quarterly newsletters (“The Branch”) that also incorporates energy conversation/savings tips and ideas to help the field offices understand the benefits of having a long-term energy management strategy.
- Forestry has invested in numerous LED lighting and HVAC upgrades in many of their facilities and are gradually upgrading all buildings. They are focusing on behavioral changes and have conducted night walks to identify opportunities to reduce energy consumption.
- Building occupancy fluctuates seasonally due to seasonal hiring and fire management demands.

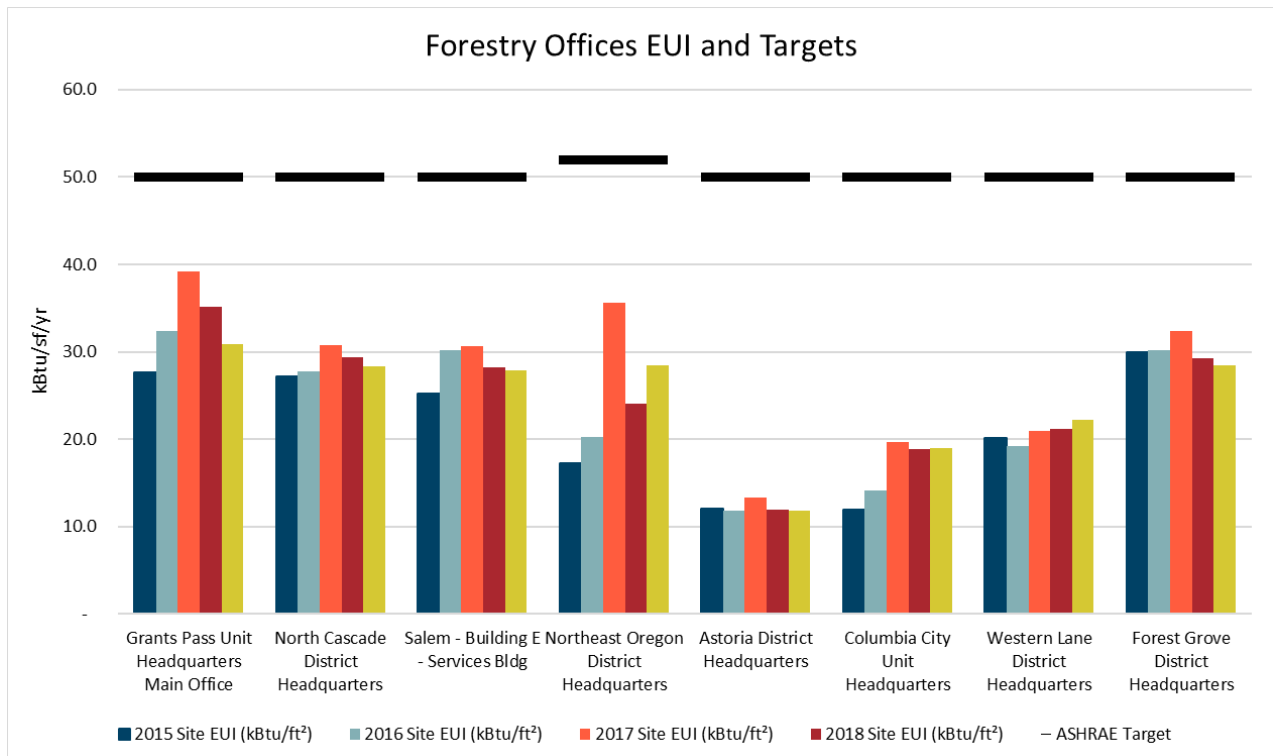
Forestry Office Buildings



- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- Forestry is aware of HVAC challenges at Tillamook District Headquarters. Staff identified simultaneous heating and cooling occurring, they are monitoring the systems and troubleshooting issues as they come up. The 2016 dip in energy use is likely due to the boiler being down for a few months in the winter.
- Salem Forestry Buildings A, F, and I are not reported within this document as they are under 5000 square feet.
- West Oregon District Headquarters’ declining energy use is due to LED lighting upgrades, which have an estimated payback of 1.2 years.
- Salem Building B, C, D, and E received LED lighting upgrades in 2019.
- Salem Building D received additional LED lighting upgrade in 2020.

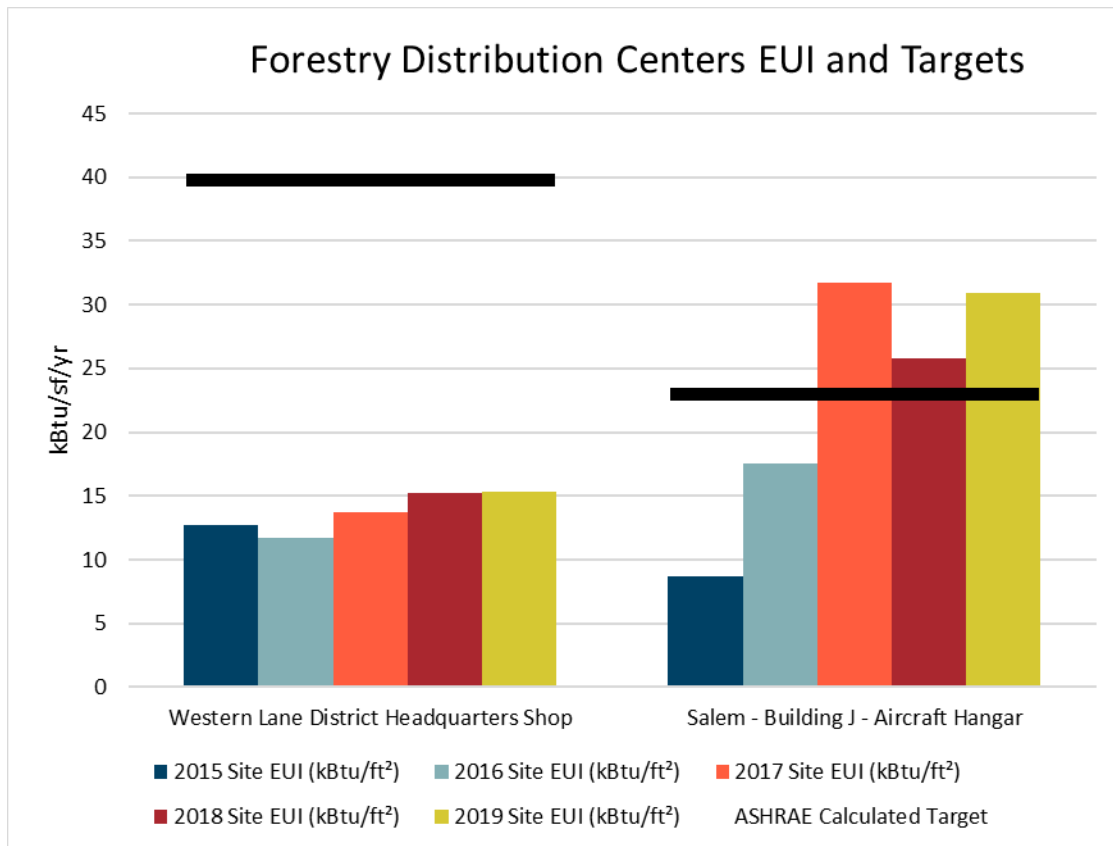
- Bldg. D: all can lights replaced with LED ROI 1.7 years completed 3-25-20, all fluorescent T5s to be replaced with LED and ballast bypassed, ROI 4 months, completion by 10-2020.
- Upcoming Project: DDC replacement for Salem Campus (affects 9 buildings) - anticipating energy reductions with better trending and scheduling capabilities with the new software.
- DOF facilities staff have planned outreach for John Day to evaluate facilities and identify lighting upgrade needs.

Forestry Offices EUI and Targets



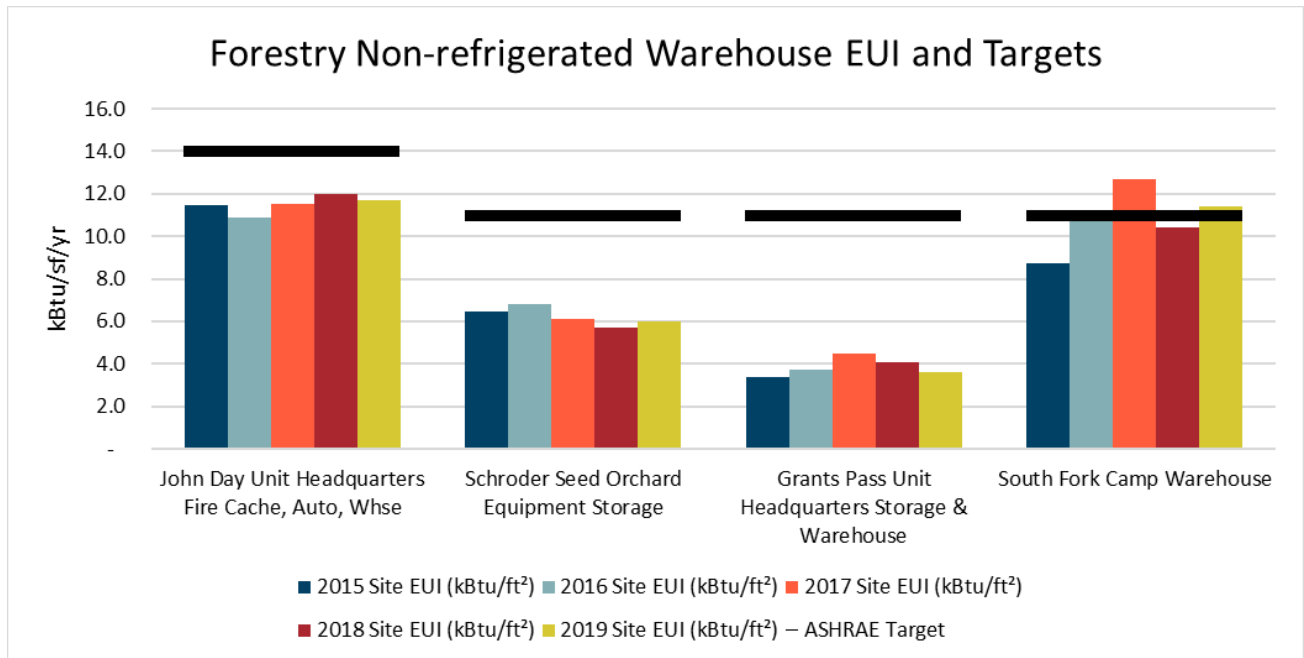
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- All buildings are operating below national performance targets.
- Forest Grove recently completed a building retrofit which included adding insulation to the thermal envelope.

Forestry Distribution Centers



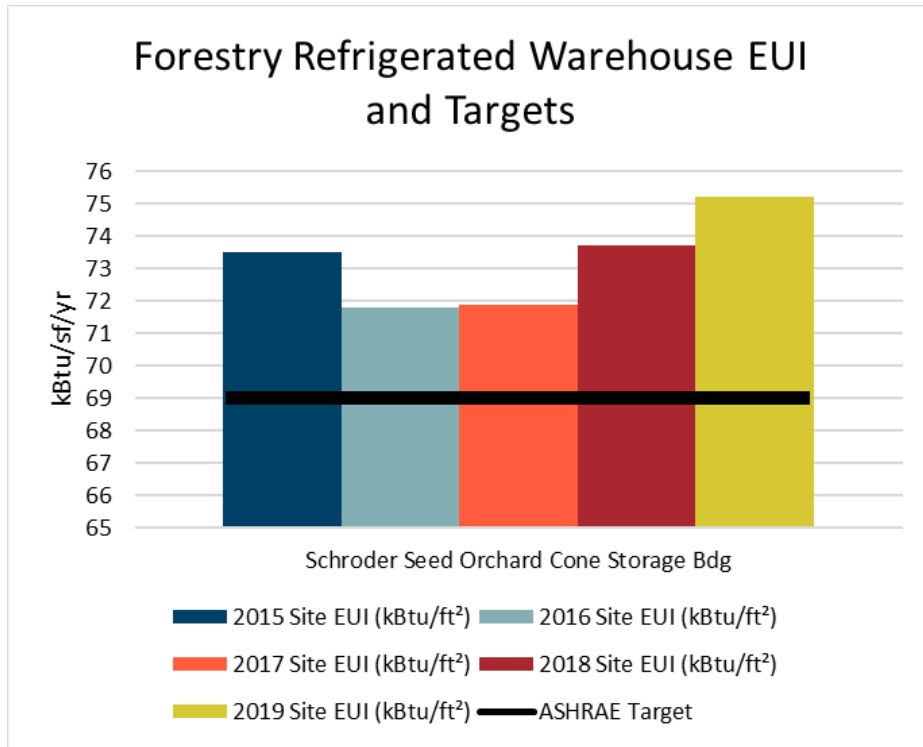
- ASHRAE Standard 100 EUI target for all Distribution Centers in Zone 4C is 22 kBtu/sf/yr.
- ASHRAE does not distinguish the energy use of different types of Distribution Centers. We elected to use calculated targets for both distribution centers based on the variety of uses of the buildings.
- Salem- Building J – Aircraft Hanger exceeds target EUI and may be a good candidate for an energy conservation audit. The building is an aircraft hangar, distribution center and office space with limited envelope insulation and HVAC equipment. Occupancy fluctuates throughout the year. Increased occupancy and usage of the building in 2017-2018 required heating when the building would usually be cold. The scale of the Fire Season impacts annual variation in building and energy use. The facility is shared with Oregon State Police, whose use is variable.
- The Western Lane District Headquarters Shop was built in 2012 and has a variety of uses including repair shop, wood shop, garage, office, locker rooms, and chemical storage space.

Forestry Non-refrigerated Warehouse



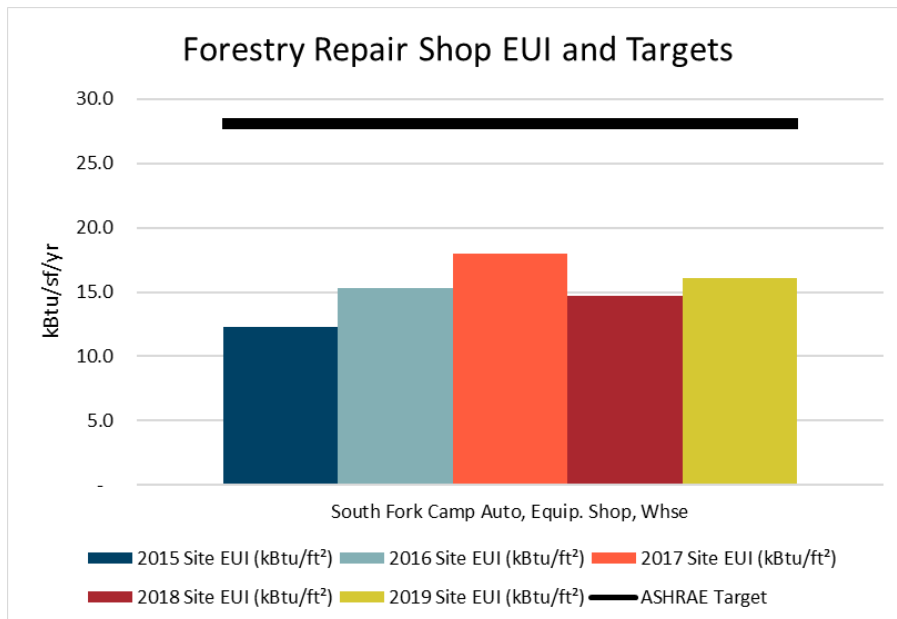
- ASHRAE Standard 100 EUI target for Non-refrigerated warehouses in Climate Zone 4C is 11 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for Non-refrigerated warehouses in Climate Zone 5B is 14 kBtu/sf/yr.
- The South Fork Camp facility is operating a little above the EUI target and presents the greatest opportunity for energy conservation improvements. FORESTRY identified the need for a LED lighting upgrade and opportunities for behavior changes to improve energy savings.

Forestry Refrigerated Warehouse



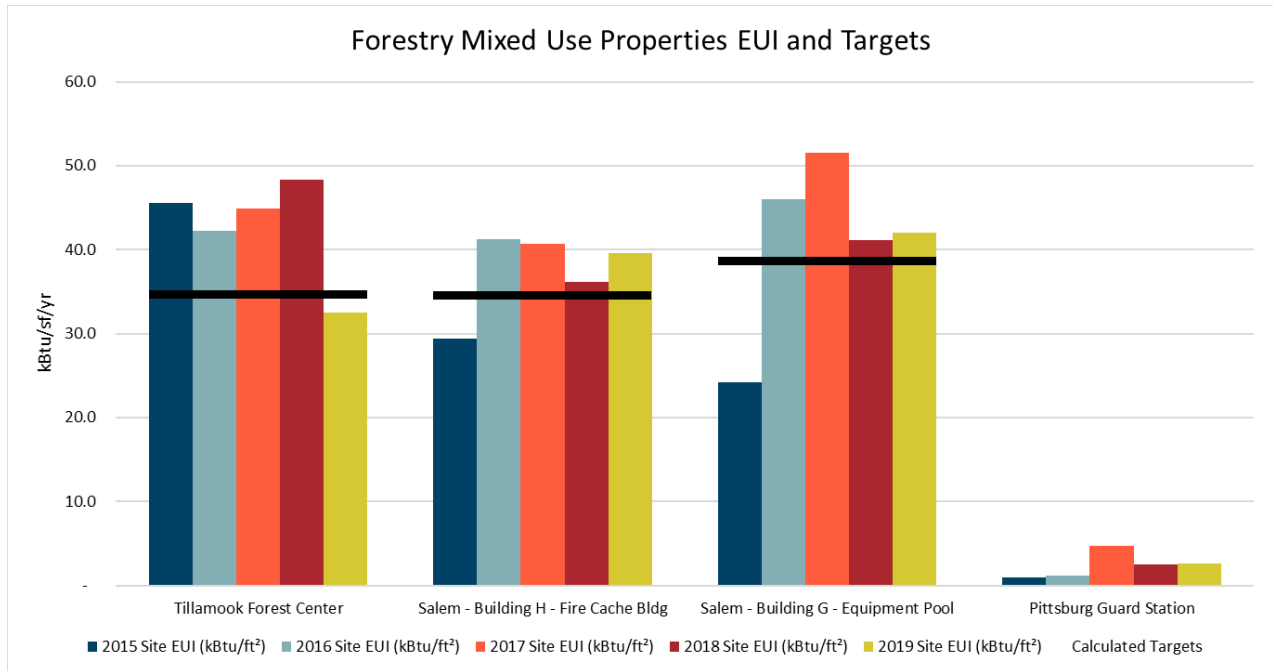
- ASHRAE Standard 100 EUI target for Refrigerated Warehouses in Climate Zone 4C is 69 kBtu/sf/yr.
- The Schroder Seed Orchard Cone Storage Building was retrofitted with exterior LED lighting in 2019. It is operating above its EUI target.

Forestry Repair Shop



- ASHRAE Standard 100 EUI target for Repair Shops in Climate Zone 4C is 28 kBtu/sf/yr.
- The South Fork repair shop upgraded to LED lighting in 2019. It is operating well below its EUI target.

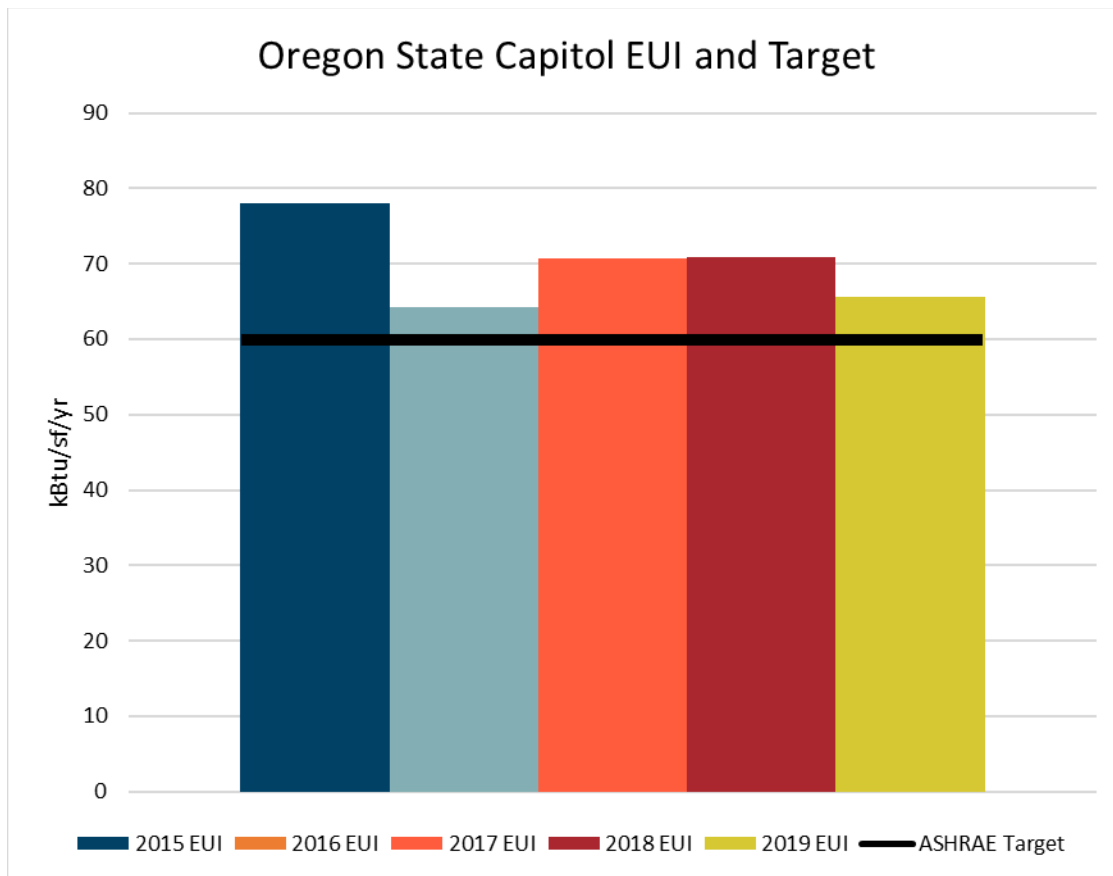
Forestry Mixed Use Properties



- ASHRAE Standard 100 does not have an EUI target for Mixed Use properties.
- ODOE calculated the targets of each building by comparing square footage of the buildings, use, and comparable EUI targets.
- Tillamook Forest Center completed construction of a new pavilion in October 2018. Construction and additional visitors have increased energy use.
- Salem Building H- Fire Cache’s energy use is driven by natural gas domestic hot water and space heating.
- Salem Building G lighting was upgraded to LEDs in 2019.
- The Western Lane District Headquarters Shop was built in 2012 and has a variety of uses including repair shop, wood shop, garage, office, locker rooms, and chemical storage space.
- The Pittsburg Guard Station does not have a designated target as it is not required to report and is well under the 10 kBtu/sq. ft. threshold. Only occupied during fire seasons.

Oregon Legislative Administration

Oregon State Capitol



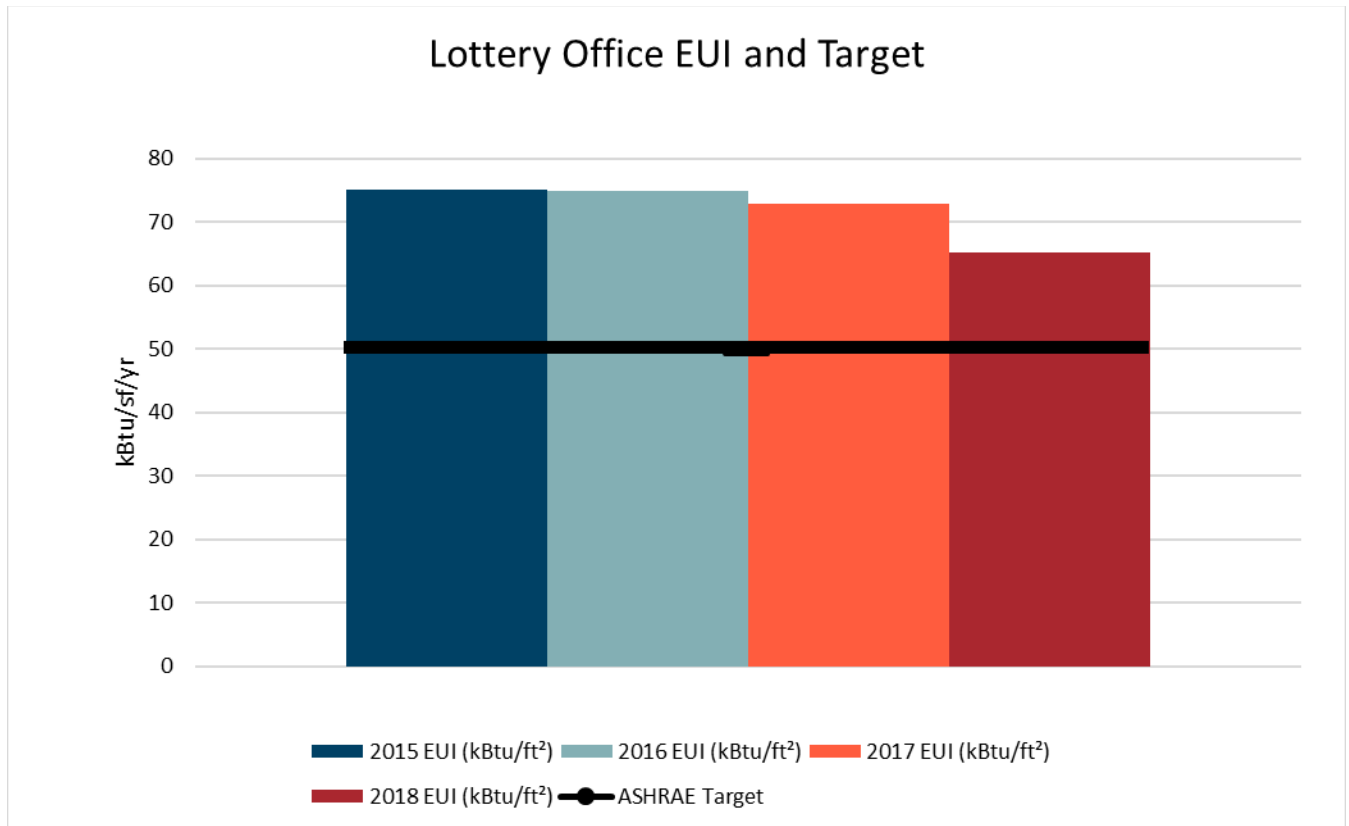
- The Oregon State Capitol was built in 1938, expanded in 1977 and is on the National Register of Historic Places.
- The Capitol building contains historic features and lighting that are challenging to cost effectively retrofit.
- Annual building occupancy and use change depending upon legislative sessions:
 - On odd years, full legislative sessions last six months and building operations.
 - On even years, short sessions last a maximum of 35 days.
 - When the legislature is not in session, building occupancy reduces by half and when the business day is over, all systems are turned off.
- Recent renovations include:
 - 2007/2008 building wings received a lighting upgrade to T-8s and VFDs for the supply fans.
 - 2010 LED lighting upgrade in offices.
 - 2019 construction of mechanical vaults, replacement of high-pressure steam boilers with low pressure more efficient boilers, new electrical service, and LED lighting upgrades.

- ASHRAE Standard 100 EUI target for Other- Public Service Buildings in climate Zone 4C is 60 kBtu/sf/yr (black line).
- Based on national performance targets, the Oregon State Capitol is over its target energy use.

Oregon Lottery (Lottery)

- Lottery participates in Energy Trust of Oregon’s Commercial Building Program. From 2015 to 2017, Lottery invested in 13 energy conservation improvement projects leading to 1,237,168 kWh and 22,823 therms in annual savings. Lottery received \$310,633 in incentives from Energy Trust.
- Evaluating adding roof Insulation at time of roof replacement.
- Lottery has designated Facility Management staff to develop and guide their Energy Management Plan.
- Lottery is aware of the state of Oregon’s plug load strategy to reduce energy use and has engaged in energy management best practices to minimize phantom loads.

Lottery Facility



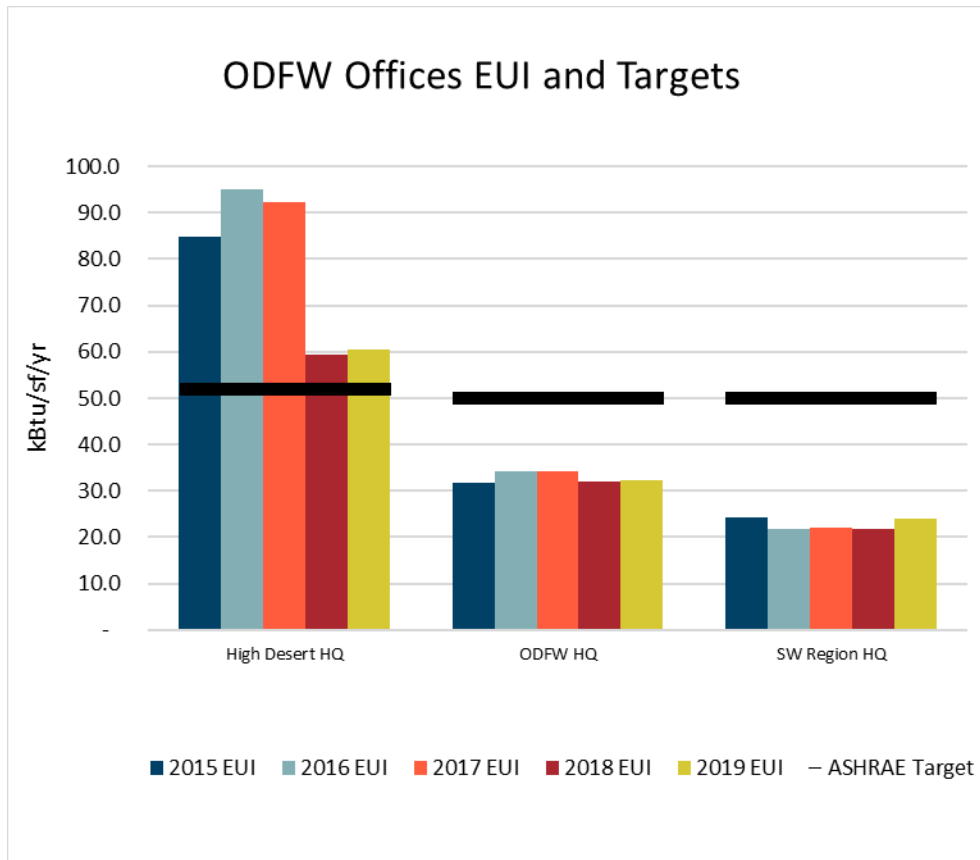
- Oregon Lottery’s Salem Office was built in 1995. Its buildings make up 98,222 sq ft. with 108,000 sq ft. dedicated to parking use.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.

- Lottery’s office includes both warehouse space and a data center which requires high energy use. Energy intensive lottery machines are tested, used, and evaluated in the building. Providing an explanation for energy use exceeding the ASHRAE Standard 100 performance target for government office buildings.
- The Lottery office has seen a steady decline in energy consumption each year of monitoring as they have invested in HVAC and Lighting upgrades.

Oregon Department of Fish and Wildlife (Fish and Wildlife)

- Fish and Wildlife has a decentralized model of building management and relies on local building project managers to monitor buildings and provide energy use data.
- Fish and Wildlife has invested in a hydro generator at their Oak Springs facility and is evaluating an investment in a second hydro generator at their Clackamas facility.
- Many of Fish and Wildlife facilities have mixed uses.

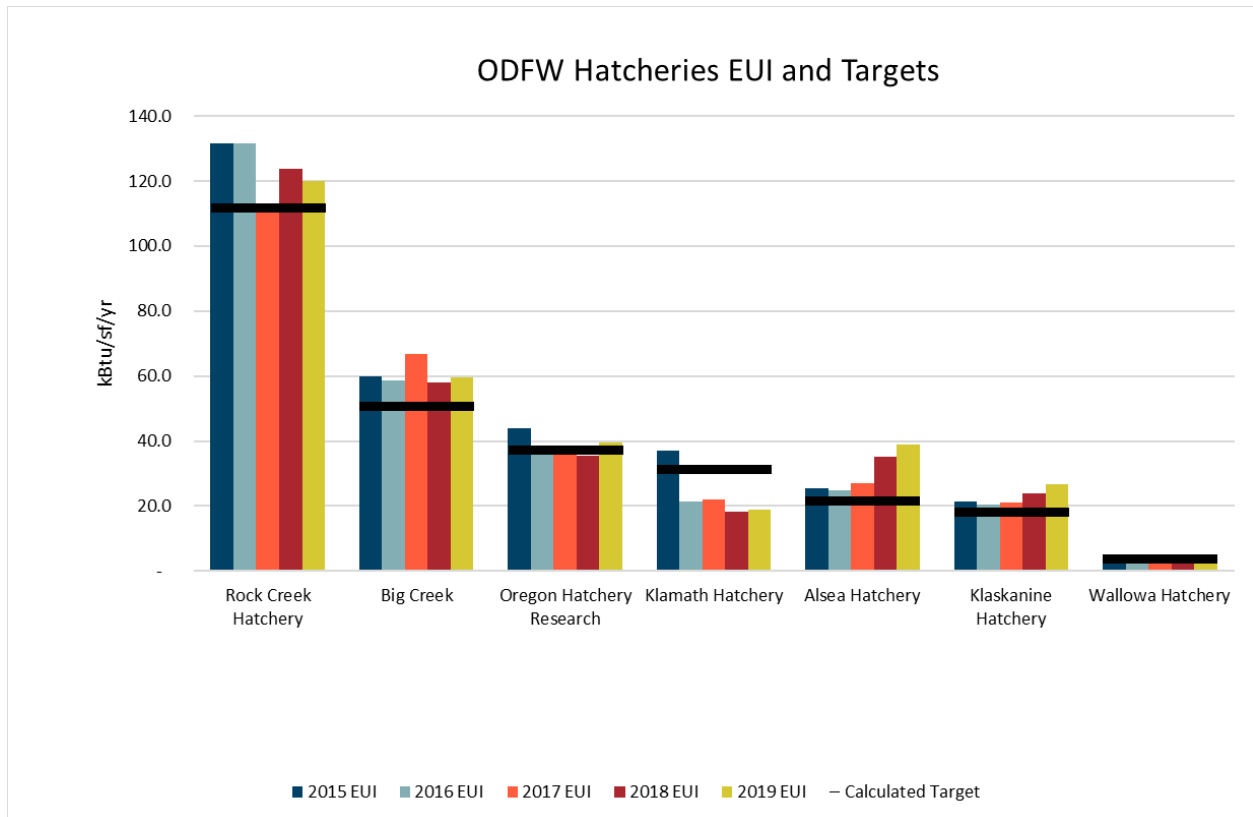
Fish and Wildlife Offices



- ASHRAE Standard 100 EUI target for Government Offices in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for Government Offices in climate Zone 5B is 52 kBtu/sf/yr.

- Based on national performance targets, High Desert HQ presents the greatest opportunity for energy conservation improvements.
- High Desert HQ is a 6,300 sq ft office building that includes equipment storage and a maintenance shop.
- Fish and Wildlife’s Salem Headquarters has a solar PV system that offsets much of the buildings use.

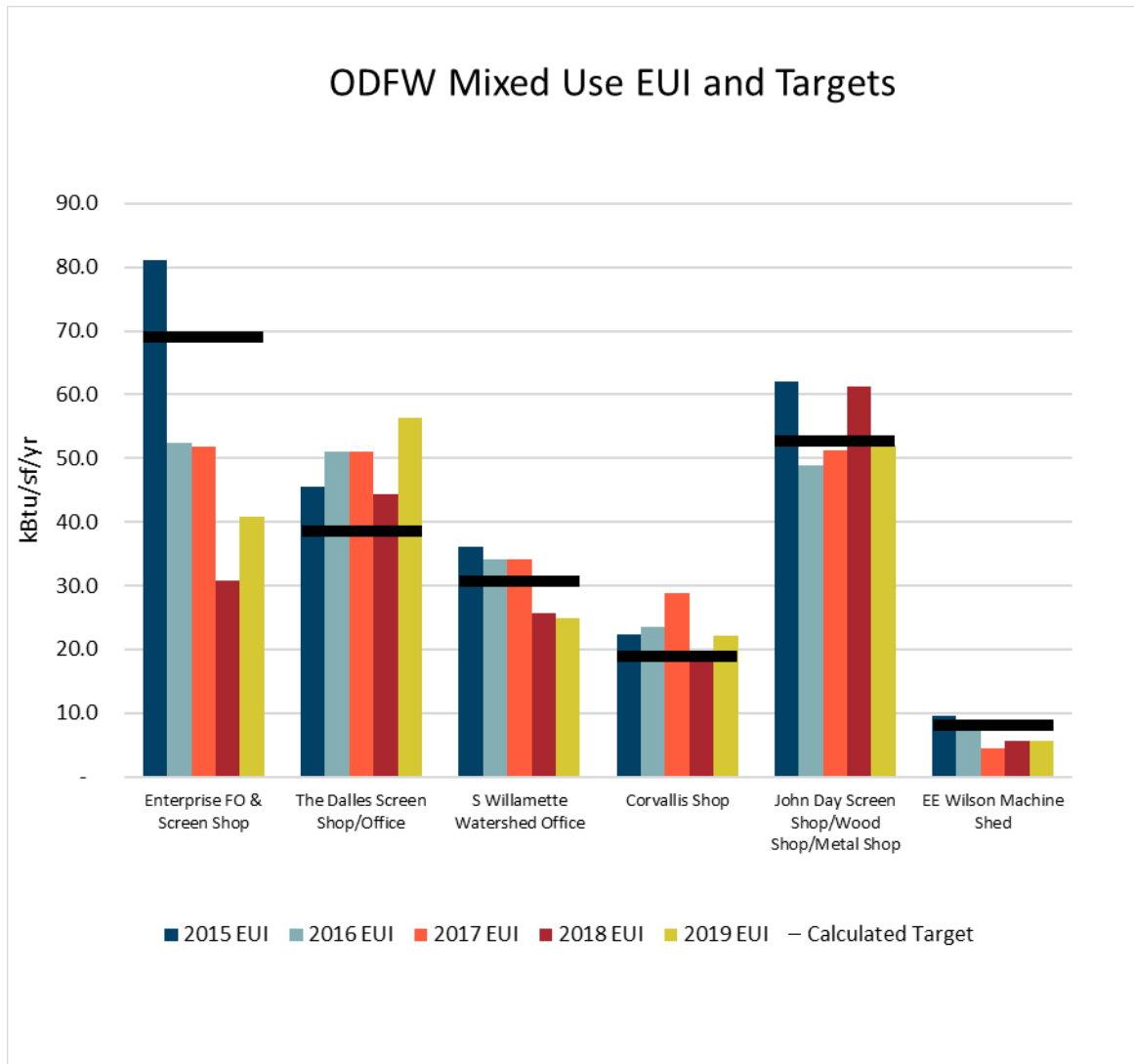
Fish and Wildlife Hatcheries



- Hatcheries do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE collaborated with Fish and Wildlife to create a Target EUI of a 15 percent reduction from the 2015 baseline year.
- Hatchery campuses include warehouses with equipment, fabrication areas, hatch houses, and offices.
- The majority of the electricity used by a hatchery can be attributed to water use. Hatcheries have gravity fed systems from a local waterway. When waterways are low, hatcheries pump in water to their facilities. Many of the pumps are old and expensive to operate.
- Fish and Wildlife identified installing new VFDs on the pumps as a potential solution, but has invested in the retrofits slowly due to the cost.

- During fire season, fire crews utilize hatcheries to get water, increasing demands on their pumps and energy use of facilities.

Fish and Wildlife Mixed Use



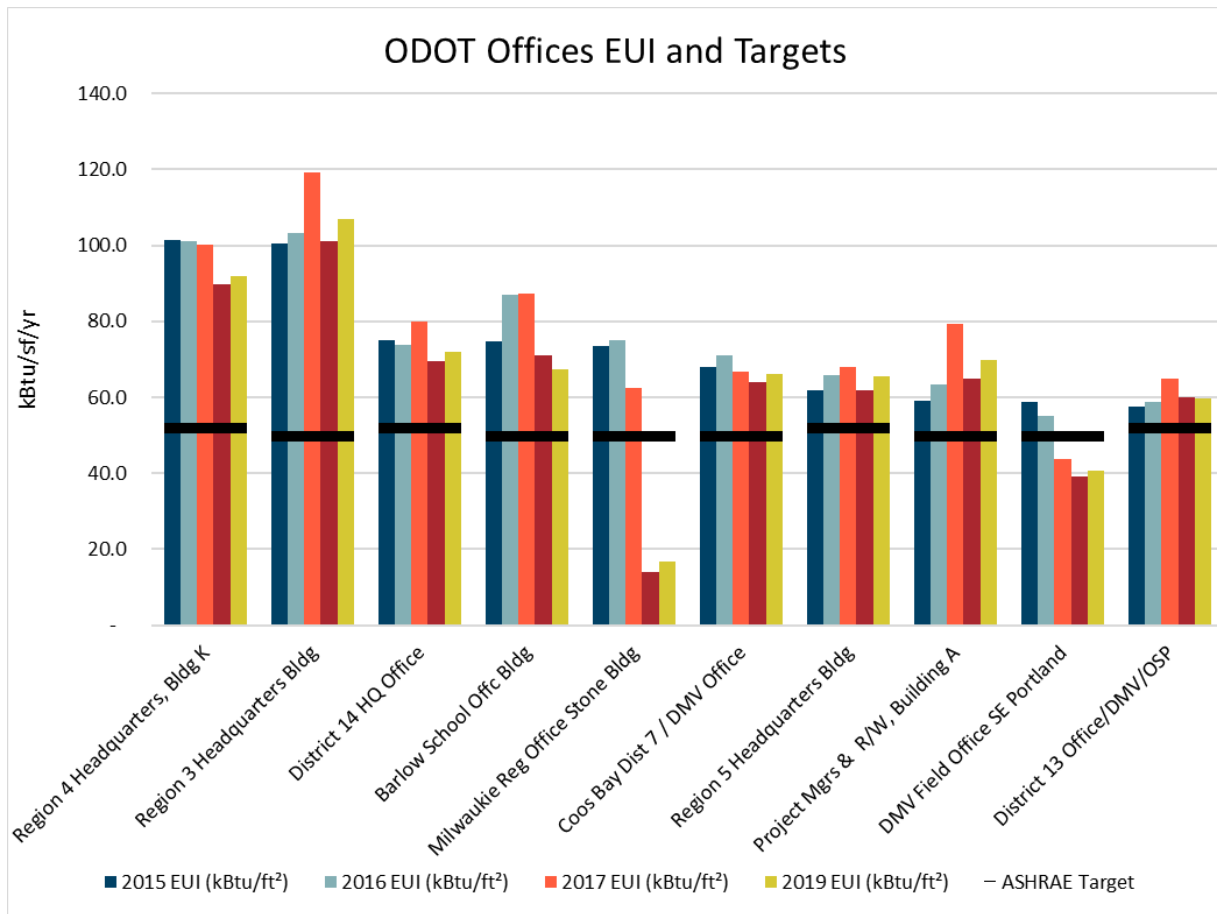
- Fish and Wildlife mixed use buildings are combined spaces that are used for varying operations. There is not an appropriate ASHRAE Standard 100 EUI target.
- ODOE collaborated with Fish and Wildlife to create a Target EUI of a 15 percent reduction from the 2015 baseline year.
- The Enterprise building consists of office space and metal fabrication. They also lease a floor of the building to Oregon State Police.
- The Dalles Screen Shop/Office is split between a metal fabrication shop and a government office.

- The S Willamette Watershed Office added a Veterinary lab in 2017. The remaining square footage of the building is dedicated to office and warehouse space. In 2017/18, Fish and Wildlife retrofitted the heating and cooling system.
- The Corvallis shop is a metal fabrication shop with no heat.
- The John Day building consists of office space, wood shop, storage, and metal manufacturing. Energy use varies seasonally as it is used as a metal fabrication shop in the winter and an Office in the summer. Project demand dictates energy use.
- The EE Wilson Machine Shed is an open storage pole barn with three sides. Energy use is mostly lighting.

Oregon Department of Transportation

- ODOT has participated in Energy Trust of Oregon's Strategic Energy Management (SEM) Program for five years. ODOT staff have incorporated lessons learned from the SEM program in facilities throughout the state.
- ODOT invested in LED lighting upgrades in many of their facilities and are gradually upgrading all buildings.
- ODOT buildings increased their overall occupancy due to agency growth.
- ODOT is decentralized, Region Managers pay bills and track their facility use and maintenance. Region Managers need to see payback in their operations budgets to invest in facility improvements.

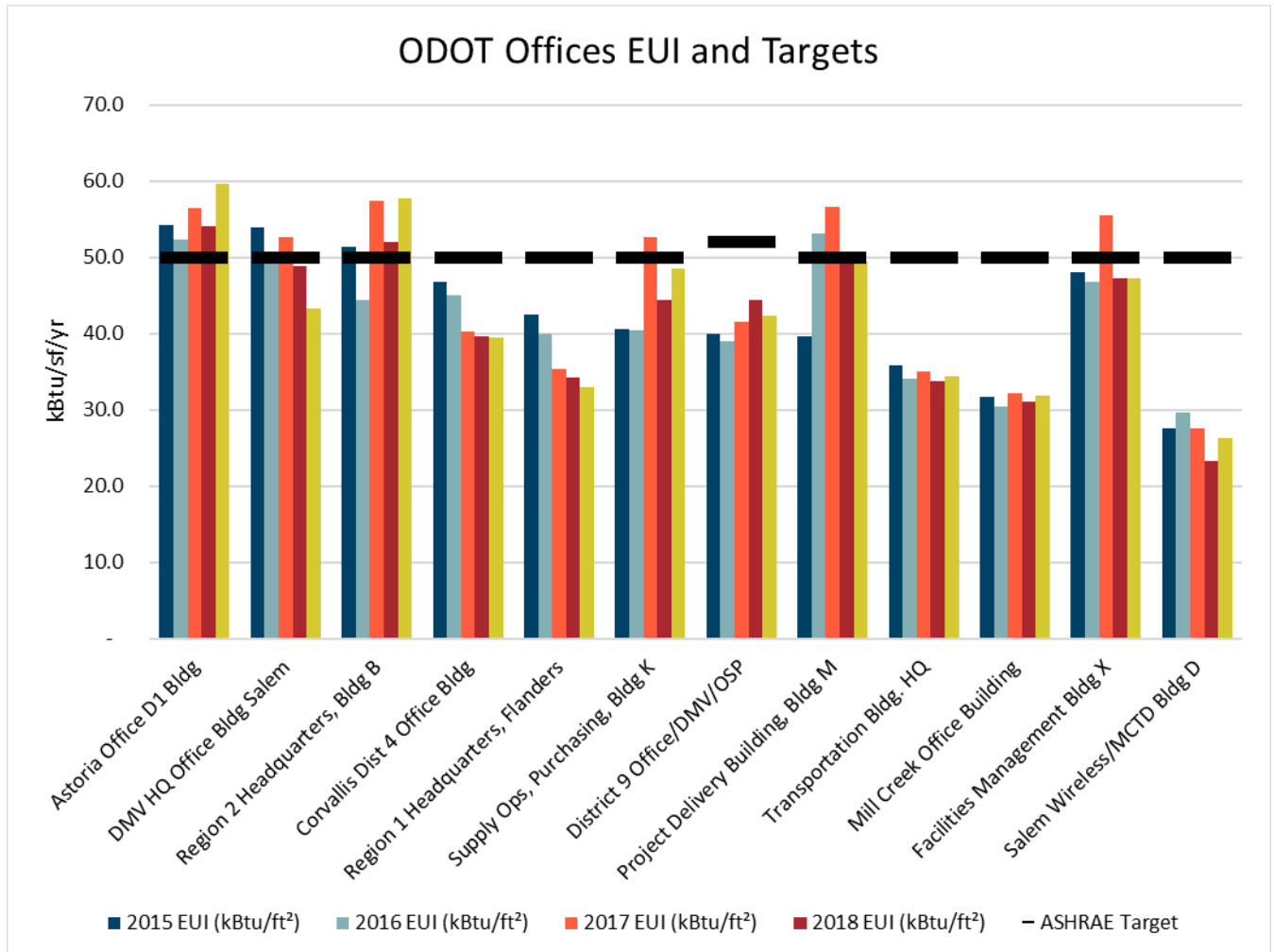
ODOT Office Buildings



- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- Region 3 Headquarters was originally a warehouse that has been converted to offices. The building needs a new HVAC system as the existing system is oversized. Programmable thermostats have been installed for the existing HVAC system.
- Milwaukie Regional Office Stone Building energy use dramatically declined, as ODOT is no longer occupying the building. ODOT may sell the building.
- DMV Field Office SE Portland steadily decreased energy use. The building received a major renovation including a high efficiency water source heat pump upgrade. Improvements of the Direct Digital Control System have led to continued energy use reductions.
- Barlow School Office Building replaced existing HVAC equipment with ductless heat pumps and added a heat recovery ventilator. ODOT may replace the windows or invest in additional energy conservation measures.
- District 13 Office includes both a DMV and Oregon State Police. ODOT facilities staff have limited access and visibility to Oregon State Police leased buildings operation.

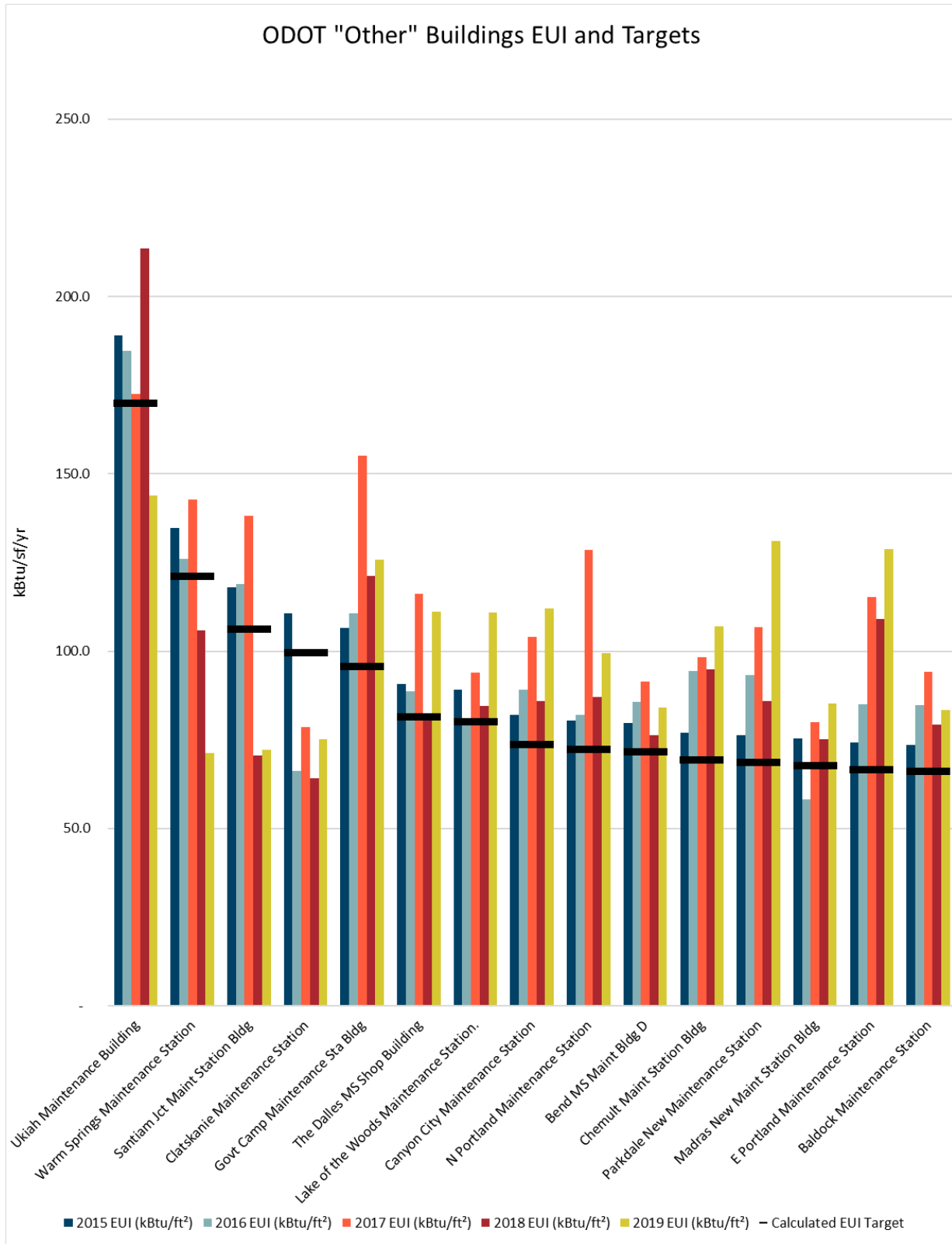
- Region 5 headquarters needs a significant upgrade in building infrastructure to realize energy savings.

ODOT Offices EUI and Targets



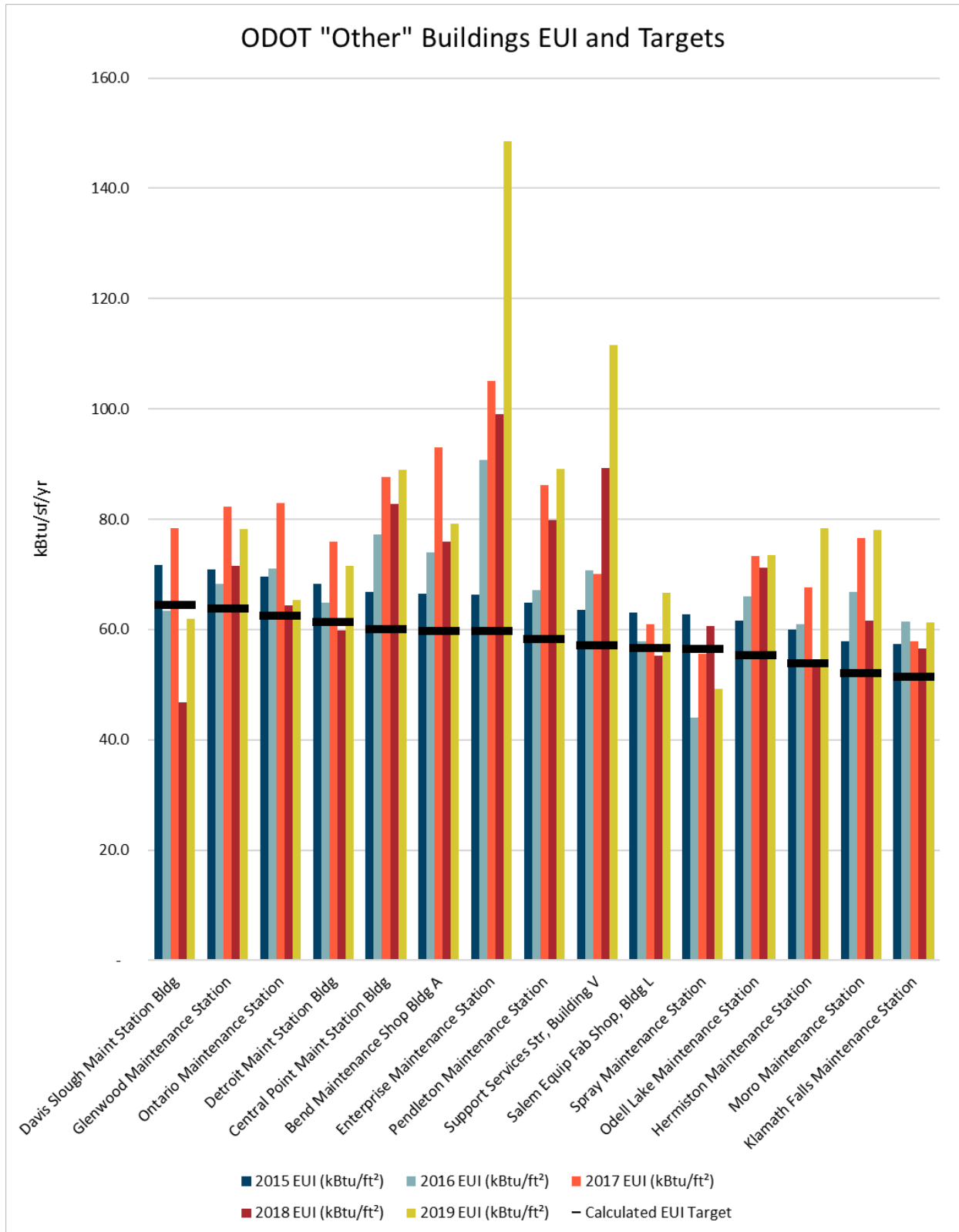
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- Based on national performance targets, Astoria Office D1 Building and Region 2 Headquarters Building B present the greatest opportunity for energy conservation improvements.
- Many of the buildings demonstrated gradual decreased energy use. ODOT attributes their success to continued internal messaging about ODOT energy efficiency and LED lighting upgrades throughout their portfolio.

ODOT “Other” Buildings



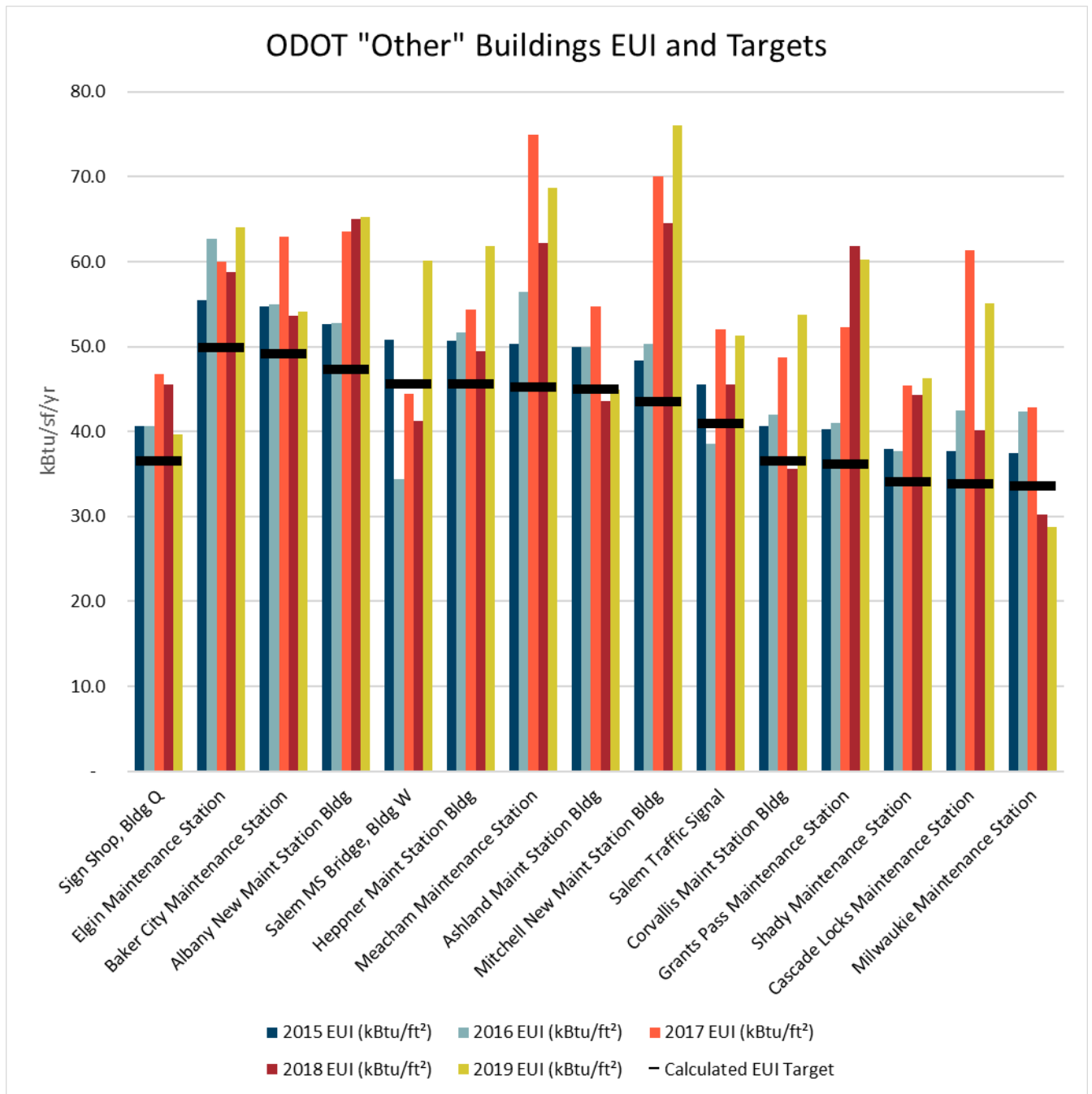
- ODOT maintenance building's energy use is impacted by severe weather. In the winter, snow and ice lead to increased use by vehicles clearing roads and assisting motorists. In summer, these stations are utilized by fire crews to get water, supplies, and maintain vehicles. Many maintenance stations are a campus of buildings providing various services on a single meter. Many of the maintenance facilities are too small for the trucks they need to have, so doors remain open as the trucks are being serviced or stored.
- These ODOT buildings do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE collaborated with ODOT to create a Target EUI of a 10 percent reduction from the 2015 baseline year use.
- Santiam Junction Maintenance Station Building had a dramatic decrease in energy use in 2018 and it continued in 2019. This site receives power by diesel generators. Energy usage is estimated based upon comparable sites' consumption such as Odell Lake. Diesel consumption is reported through ODOT's fleet management and ODOT's Facility Management is unable to determine how much has been consumed by vehicles and how much via facility generators at this time. The facility completed an LED retrofit, reducing consumption.
- Clatskanie Maintenance Station completed a major remodel including upgrades to lighting, occupancy sensors, and switches on service doors.
- Most buildings are operating above the Target EUI and present significant opportunity for energy savings.

ODOT “Other” Buildings



- These ODOT buildings do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE collaborated with ODOT to create a Target EUI of a 10 percent reduction from the 2015 baseline year use.
- Pendleton Maintenance Station invested in a solar photovoltaic system and has been using less energy than they are generating which should be demonstrated in the 2019 report.
- Most buildings are operating above the Target EUI and present significant opportunity for energy savings.

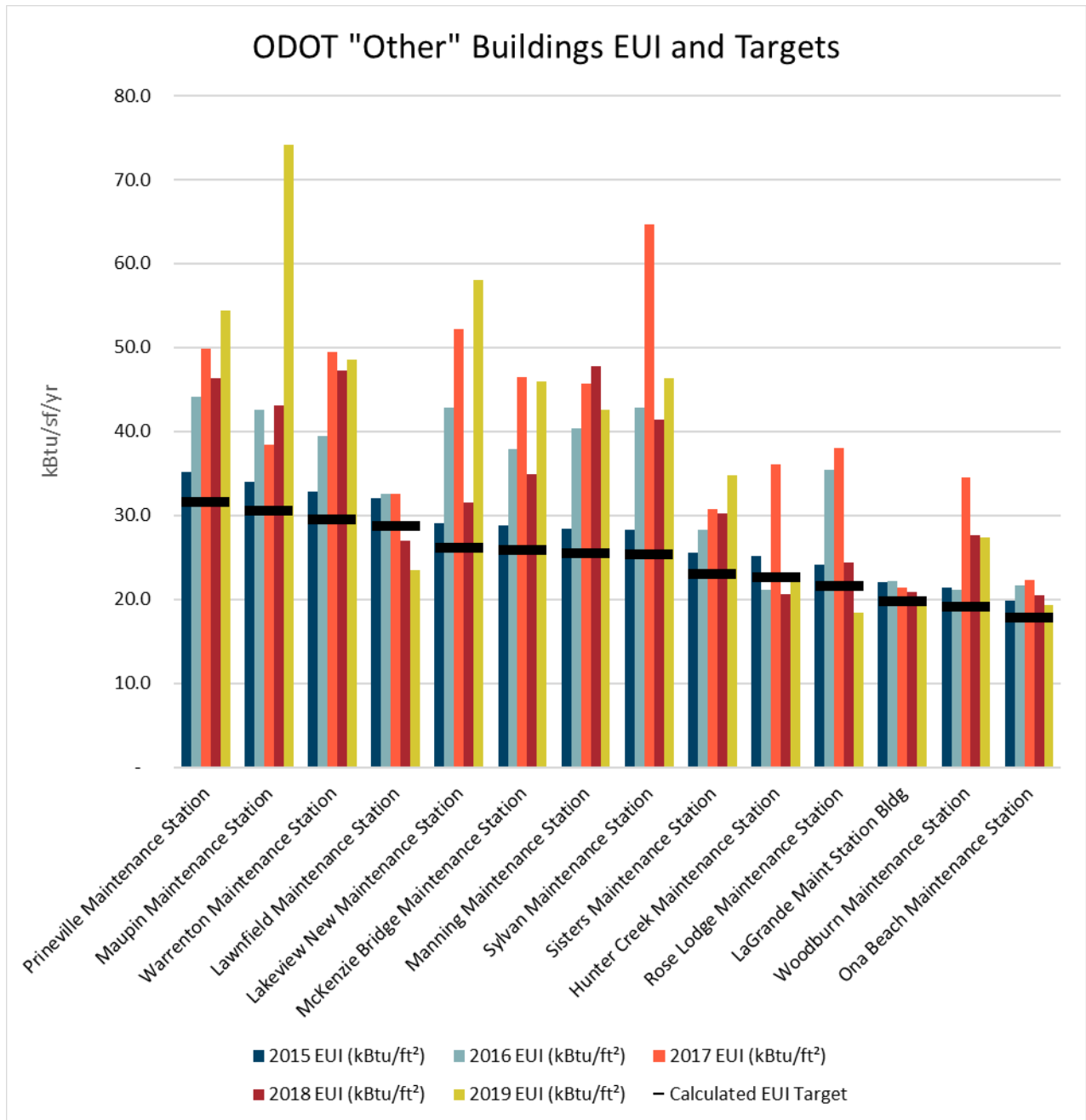
ODOT “Other” Buildings



- These ODOT buildings do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE collaborated with ODOT to create a Target EUI of a 10 percent reduction from the 2015 baseline year use.

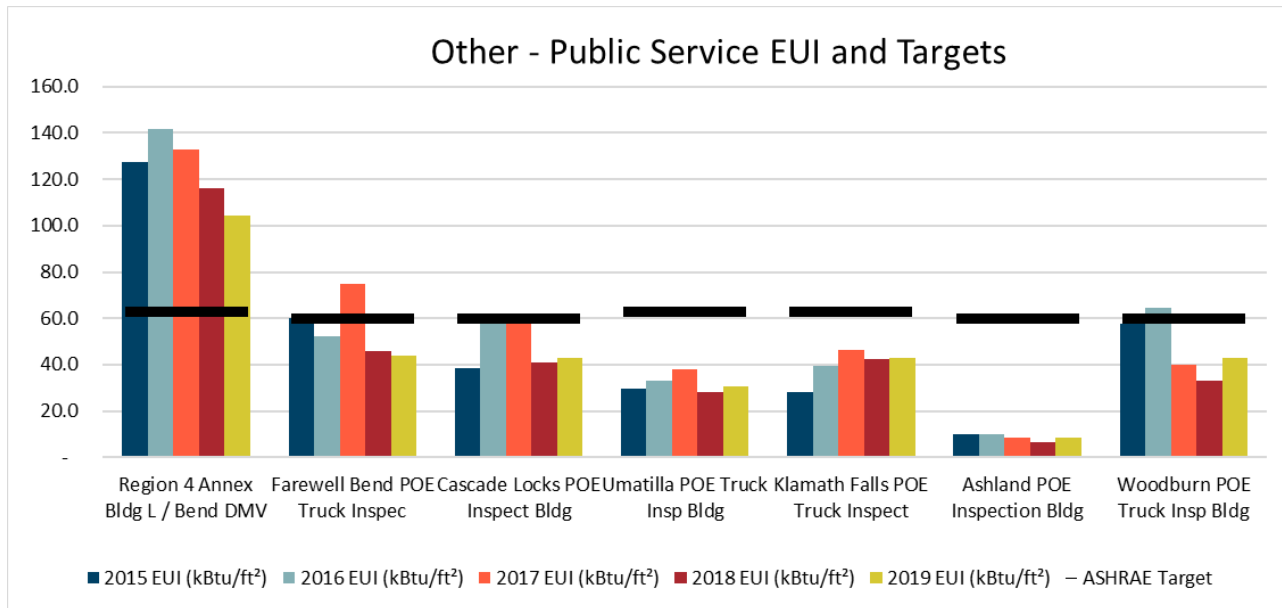
- Grants Pass Maintenance Station completed a building addition in which unconditioned storage space was converted to conditioned space. Total square footage didn't change, but heat and building envelope upgrades were made to convert the space. Most buildings are operating above the Target EUI and present significant opportunity for energy savings.

ODOT "Other" Buildings



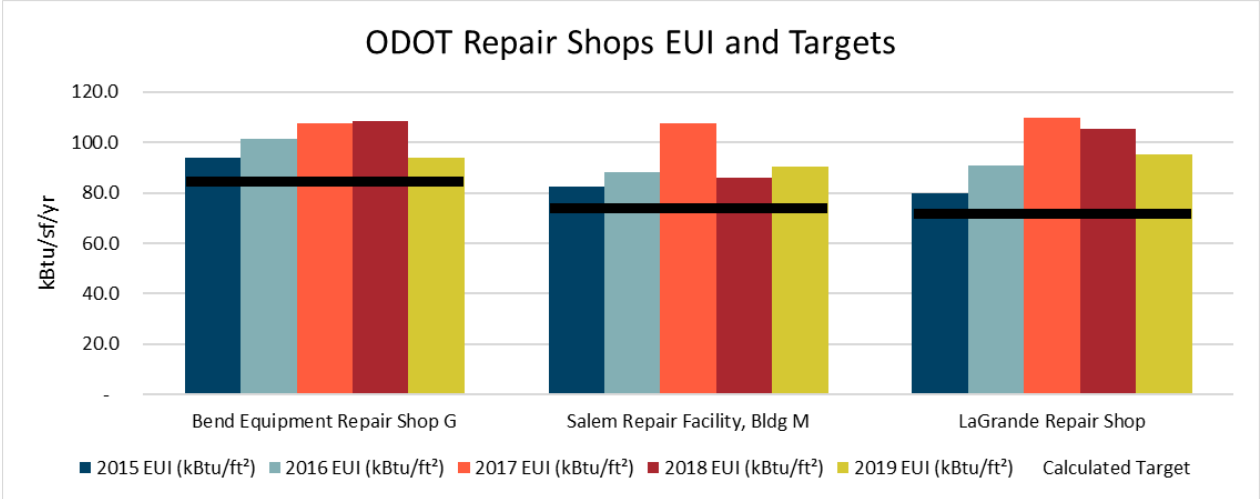
- These ODOT buildings do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE collaborated with ODOT to create a Target EUI of a 10 percent reduction from the 2015 baseline year use.
- Most buildings are operating above the Target EUI and present significant opportunity for energy savings.

ODOT Other – Public Service Buildings



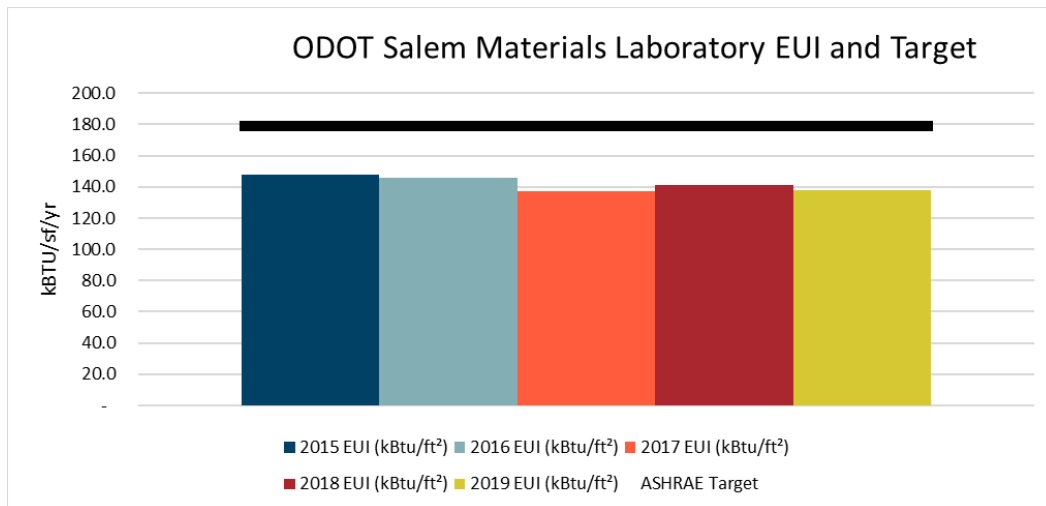
- ASHRAE Standard 100 EUI target for Other – Public Service Buildings in Climate Zone 4C is 60 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for Other – Public Service Buildings in Climate Zone 5B is 63 kBtu/sf/yr.
- Region 4 Annex Building is the only building operating above its ASHRAE energy use target.

ODOT Repair Shops



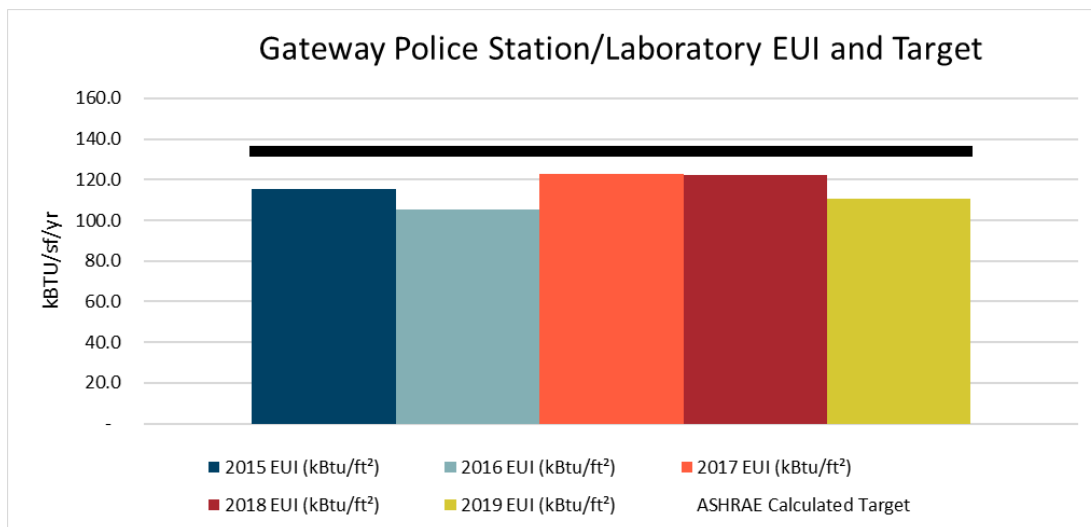
- ODOT repair shops maintain road maintenance and fleet vehicles and are heavily used in fall/winter/spring. The buildings contain plows and other large equipment and have significant ventilation requirements. The buildings include manufacturing and are used 24/7 during extreme weather events. There is limited opportunity for savings beyond major, multi-million dollar retrofits of the mechanical systems and envelope.
- ODOT and ODOE negotiated calculated targets of a 10 percent reduction in energy use from the baseline year of 2015 for Repair Shops.
 - Bend Equipment Repair Shop G- 85 kBtu/sf/yr.
 - Salem Repair Facility, Bldg M- 74 kBtu/sf/yr.
 - LaGrande Repair Shop- 72 kBtu/sf/yr.
- All buildings are operating significantly over ASHRAE Targets, but are getting closer to calculated targets.
- The Bend Equipment Repair Shop completed a major retrofit in 2017/18 adding mechanical ventilation to improve safety and a new hydronic heating system.

ODOT Laboratories



- ASHRAE Standard 100 EUI target for Laboratories in Climate Zone 4C is 179 kBTU/sf/yr.
- The Material Laboratory is participating in Energy Trust of Oregon’s SEM program.

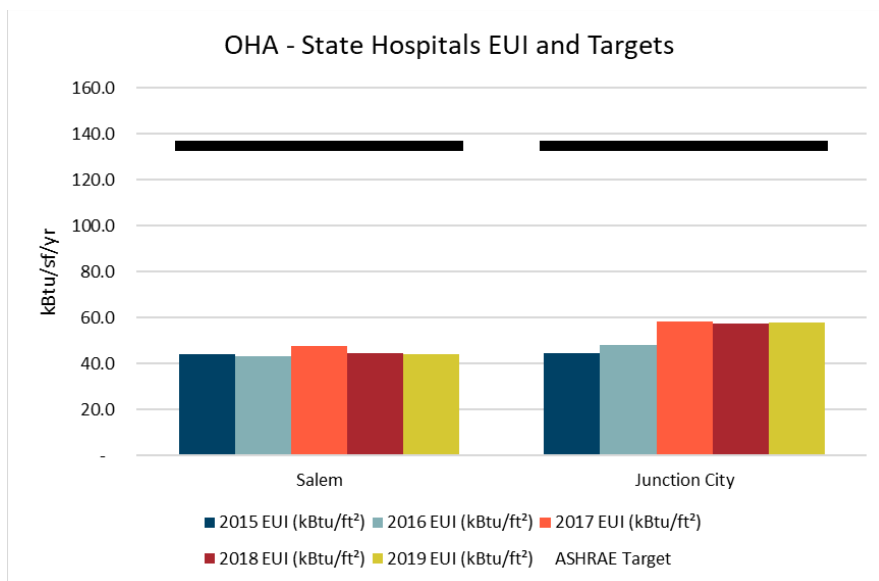
Gateway Police Station/Laboratory



- Gateway Office is 60 percent a forensic lab and 40 percent an Oregon State Police station.
- ASHRAE Standard 100 EUI target for Laboratories in Climate Zone 4C is 179 kBTU/sf/yr.
- ASHRAE Standard 100 EUI target for Police Stations in Climate Zone 4C is 66 kBTU/sf/yr.
- Gateway has an ASHRAE calculated performance target of 134 EUI.

Oregon Health Authority (OHA)

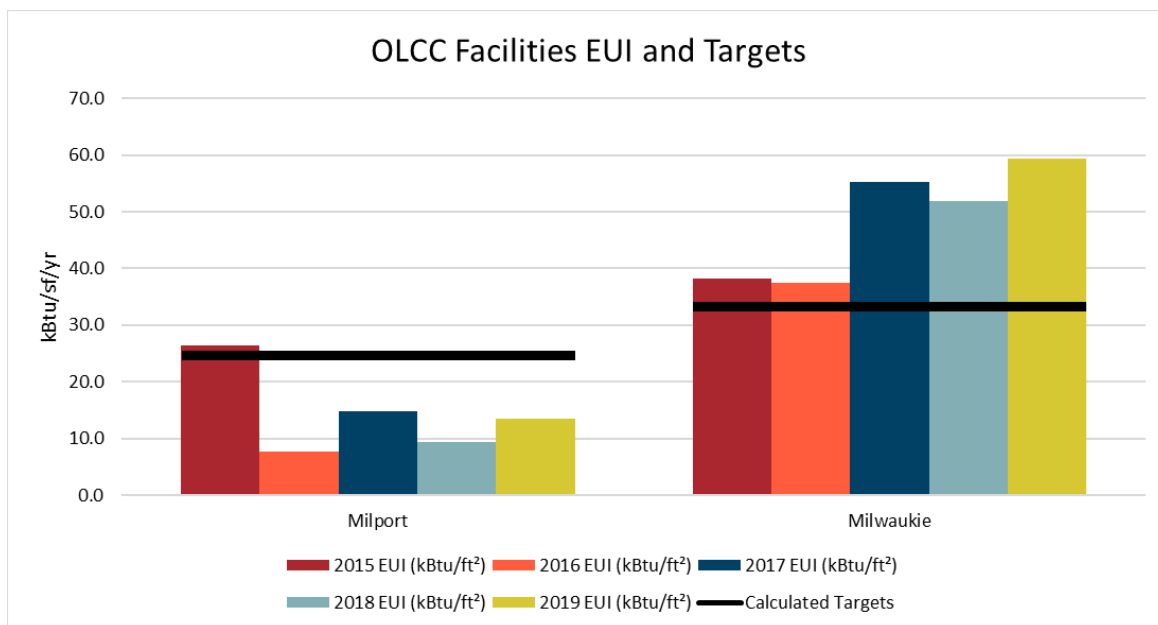
OHA- State Hospitals



- ASHRAE Standard 100 EUI target for hospitals in climate Zone 4C is 135 kBtu/sf/yr.
- Both buildings are performing well under their performance targets.

Oregon Liquor Control Commission (OLCC)

OLCC Facilities



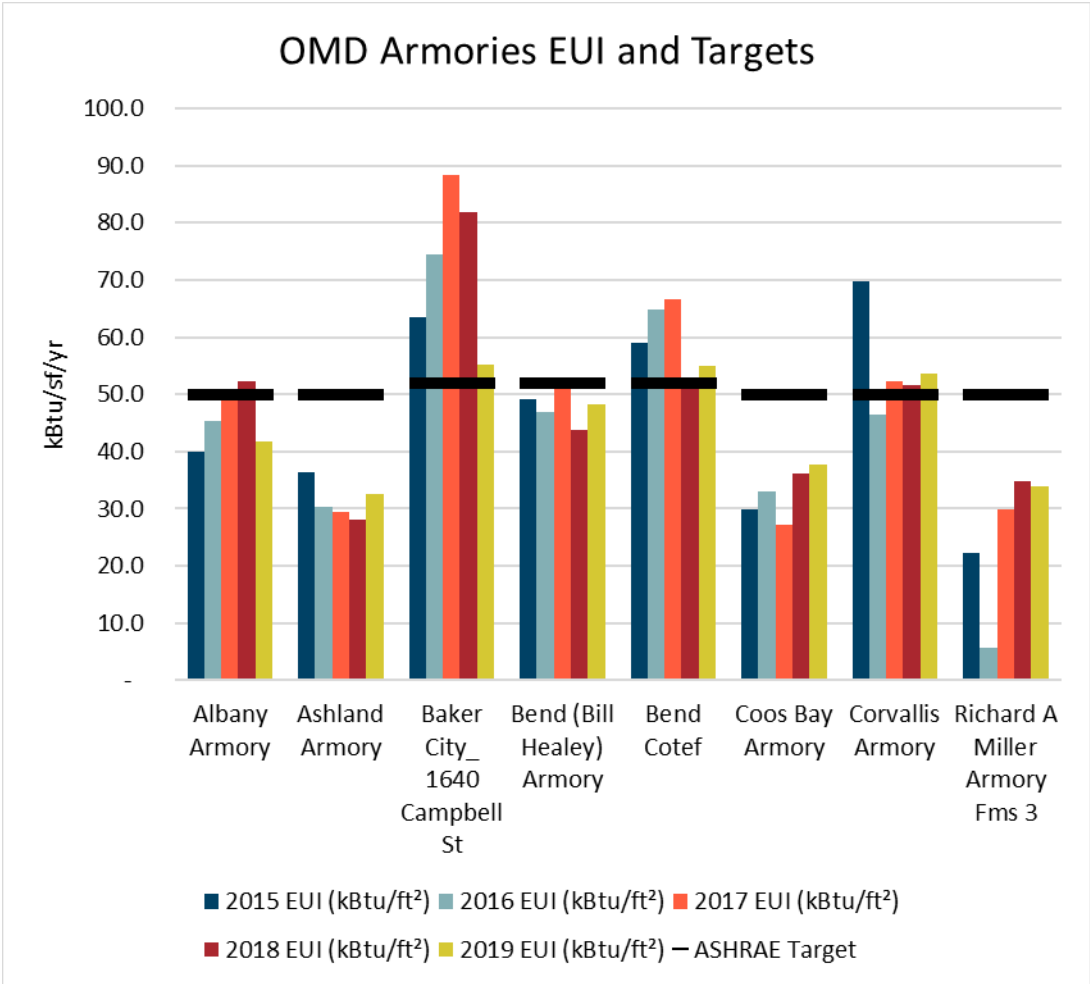
- OLCC facilities function as both offices and distribution centers, there is not an ASHRAE building type that accurately matches how these buildings are used.

- ODOE created a calculated target for these buildings by estimating the percentage of the buildings that are office and distribution centers based on information provided by OLCC staff.
- Milport is estimated to be 10 percent Office and 90 percent Distribution Center.
- Milwaukie is estimated to be 40 percent Office and 60 percent Distribution Center.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for distribution centers in climate Zone 4C is 22 kBtu/sf/yr.
- Milport's calculated target is 24.8.
- Milwaukie's calculated target is 33.2.
- Based on calculated targets, Milwaukie presents the greatest opportunity for energy conservation improvements.

Oregon Military Department (OMD)

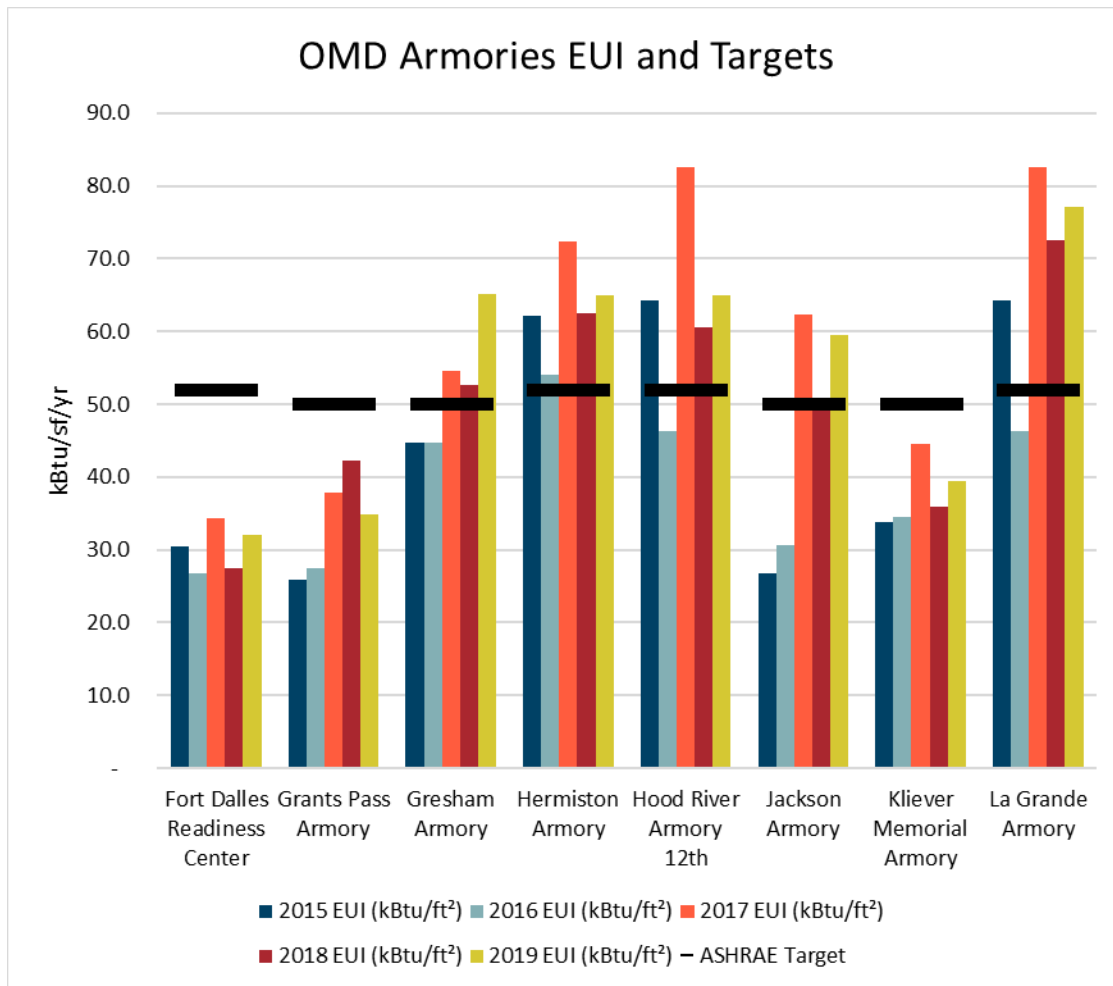
- OMD has a designated Energy Manager to develop and guide their Energy Management Plan within their Facilities and Operations division.
- OMD has increased focus on resilience, designated locations will have a goal of being independent of utilities for 14 days during an event.
- Recruiting has decreased within the National Guard resulting in low building occupancy at this time. Recruiting may increase numbers and energy use will increase as a result.
- OMD evaluates their portfolio as a whole and has a goal to reduce their facility portfolio energy use by 2.5 percent annually.
- OMD is funded by both the State of Oregon and the federal government, which puts them in the unique position of following both state and federal energy guidelines.
- OMD is limited in what building information they can provide due to security concerns.
- OMD building occupancy and use fluctuates dramatically as facilities are used as rentals or for National Guard trainings over weekends, but may be empty or only have maintenance staff occupying the building the rest of the time. When soldiers occupy facilities, they train, eat, and live in the buildings 24/7.
- OMD staff have identified energy conservation upgrade opportunities in improving building thermal envelopes, occupancy controls, and lighting. They are working to acquire funding for projects.
- OMD now has 14 locations with solar photovoltaic that produce 1300 MWh annually.

OMD Armories



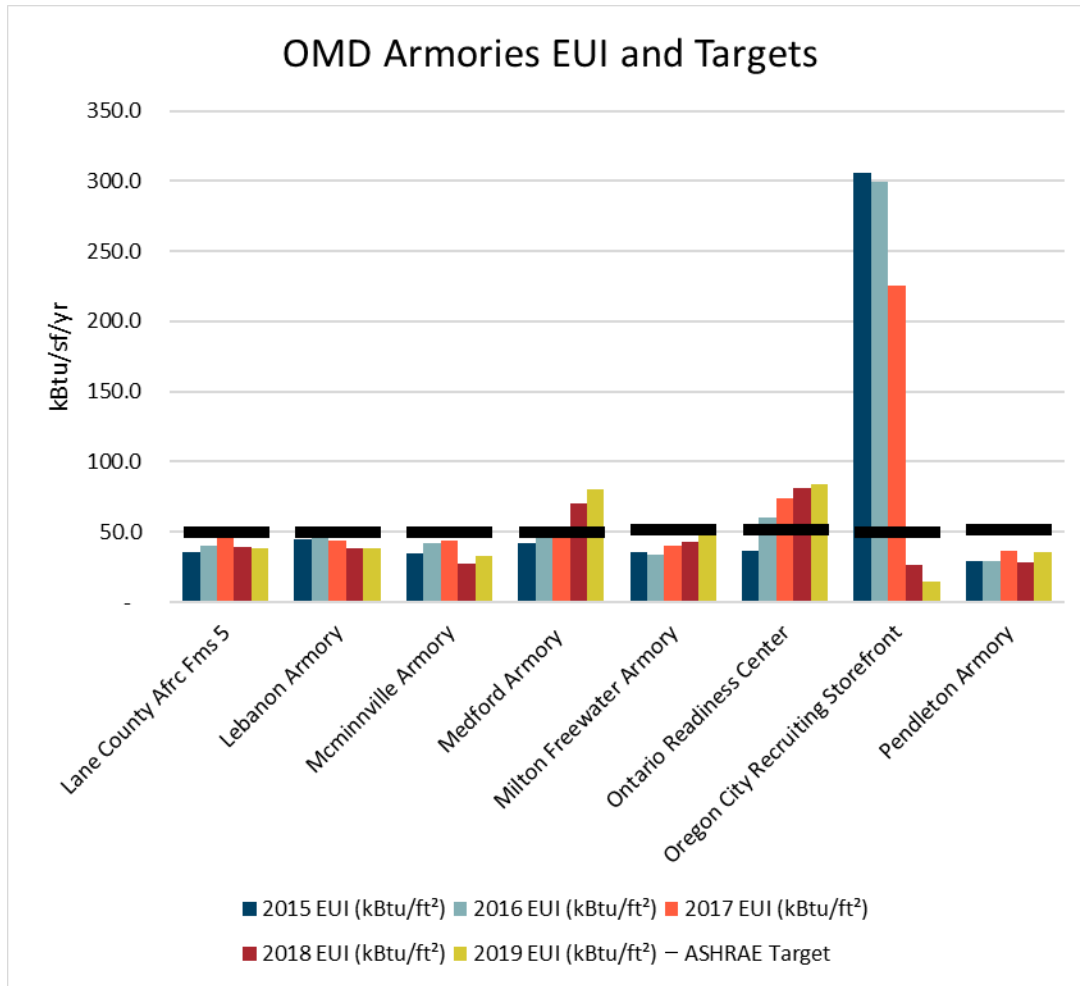
- Oregon armories have a similar use pattern as a government office.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- Baker City had the greatest decrease in energy use. The facility is now on a long-term lease and the tenant may not have been fully operational in 2019.

OMD Armories



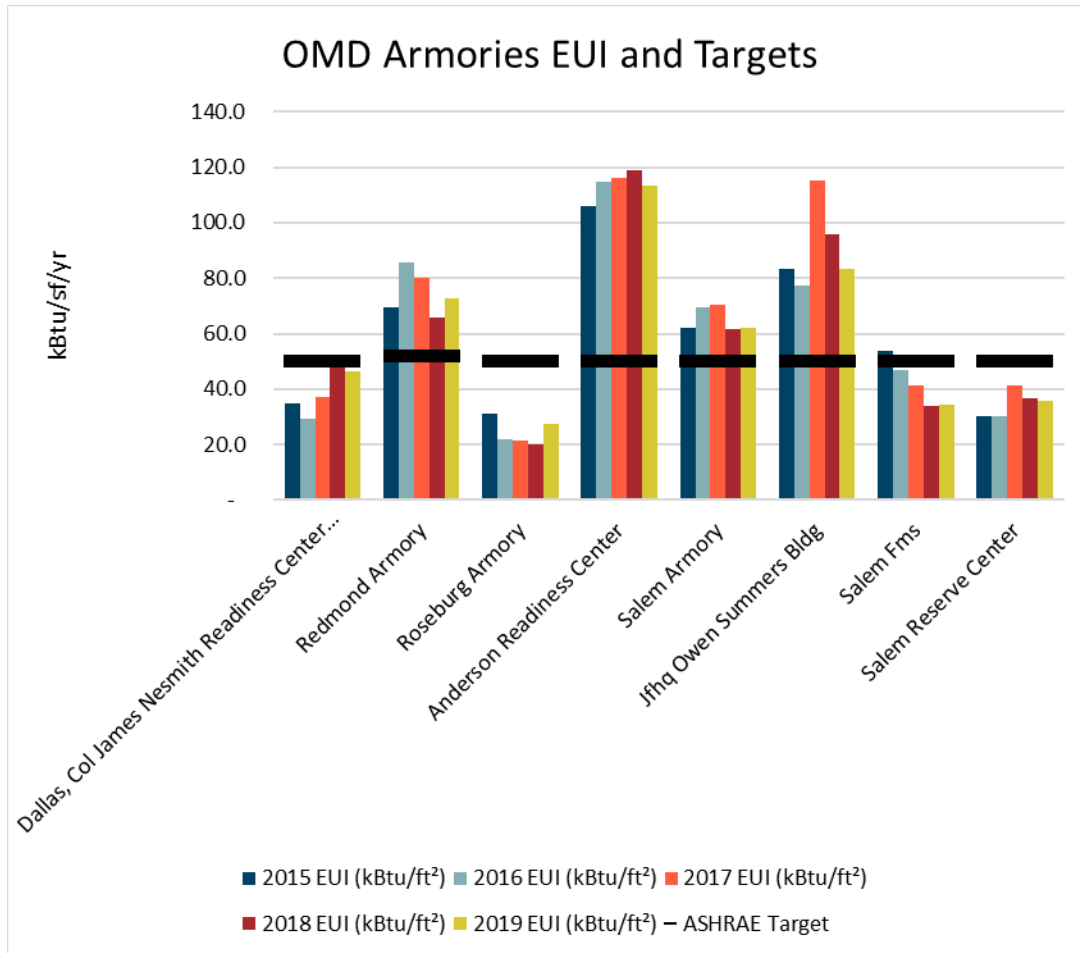
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.

OMD Armories



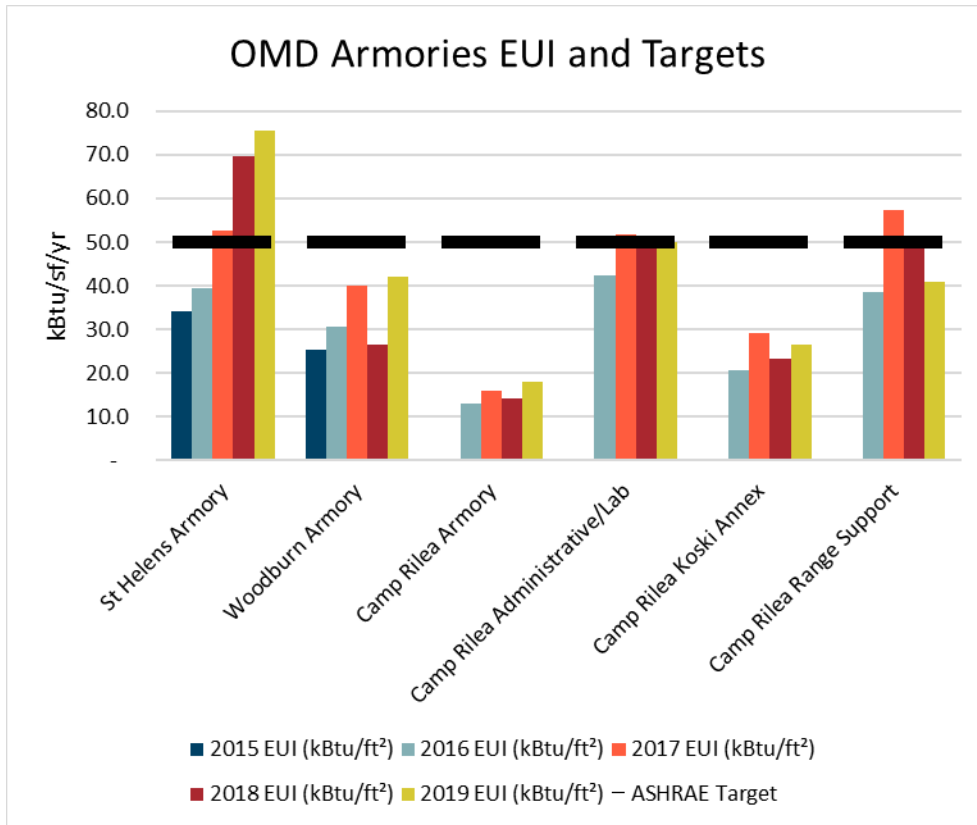
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.

OMD Armories



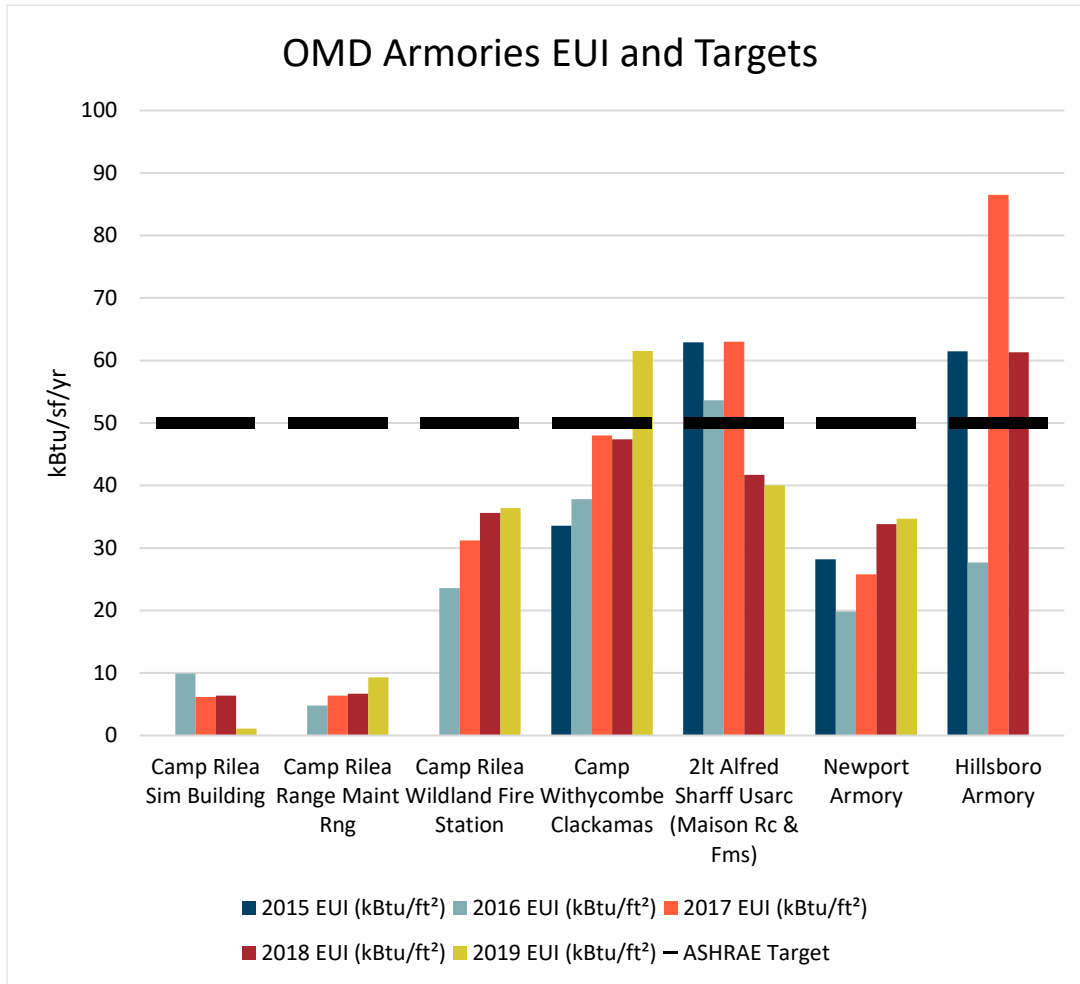
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- Roseburg received a building envelope, HVAC zoning, controls retrofit, and a 90 kW solar renewable system. The Energy Manager is using this site as a model retrofit that he would like to replicate. More permanent staffing of military personnel has led to greater energy use.
- Anderson Readiness Center will be installing a 250KW photovoltaic solar and battery system.

OMD Armories



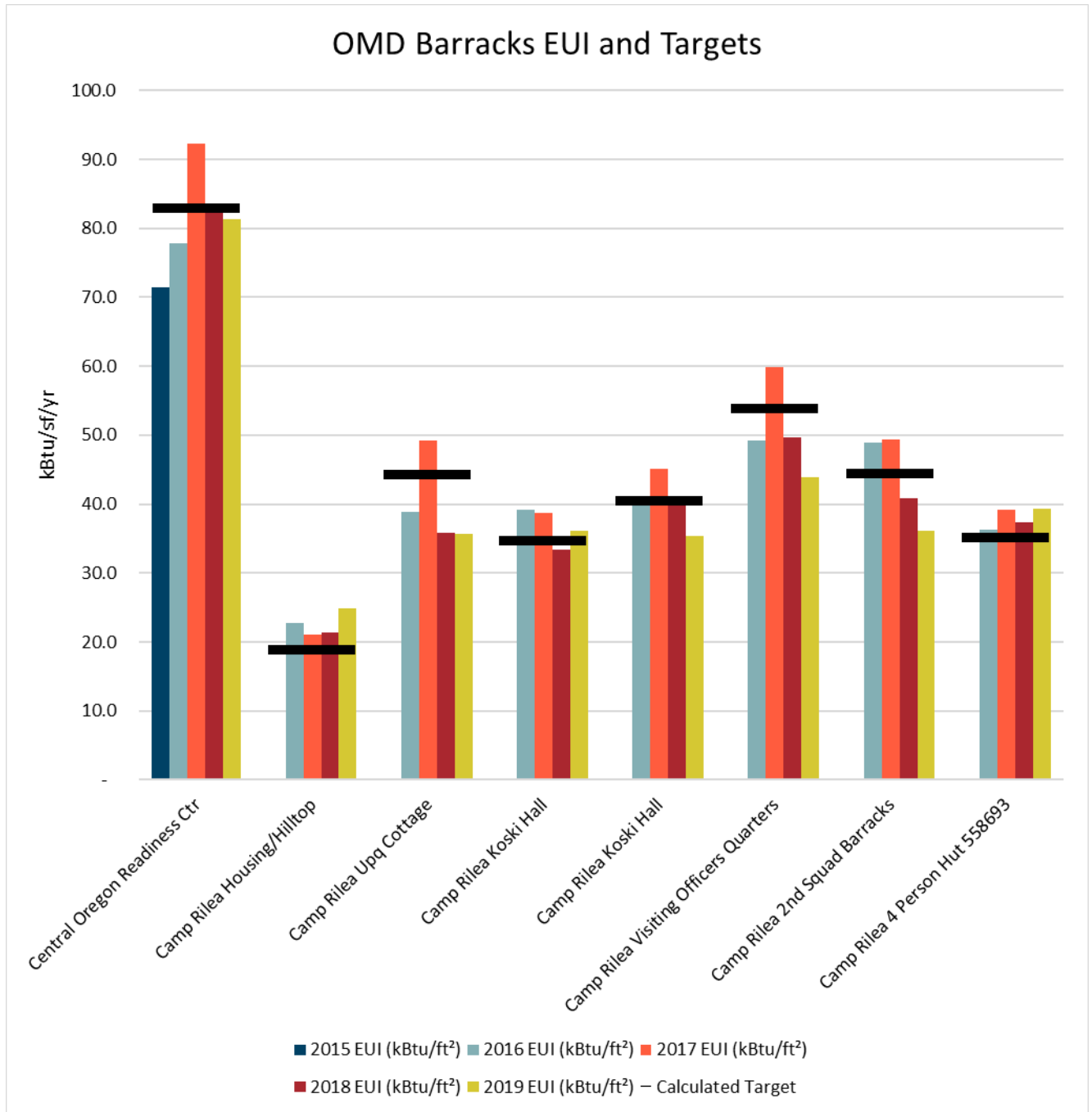
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.

OMD Armories



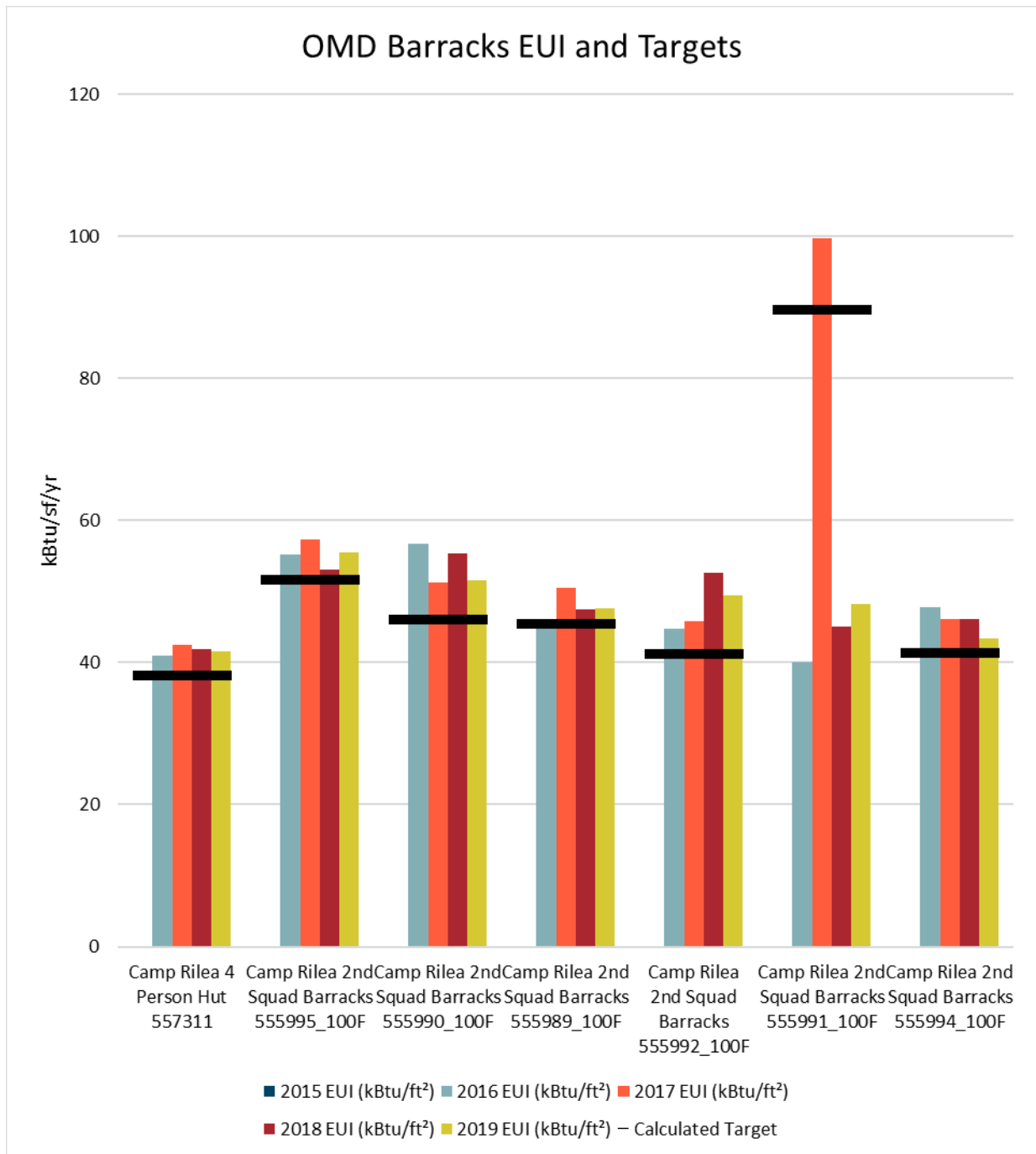
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 5B is 52 kBtu/sf/yr.
- Hillsboro Armory is missing 2019 energy use data.

OMD Barracks



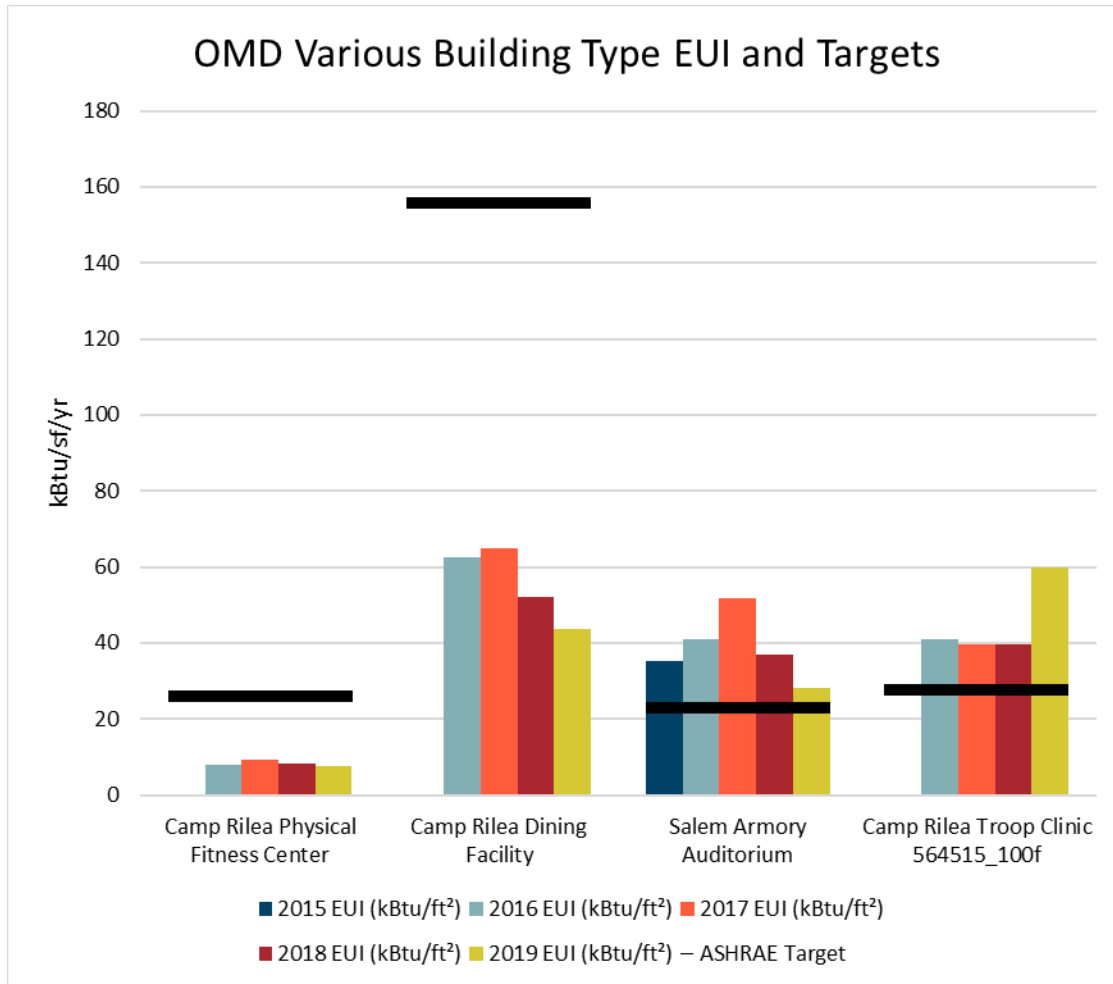
- Barracks do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE established a Target EUI of a 10 percent reduction from the 2017 baseline year.

OMD Barracks



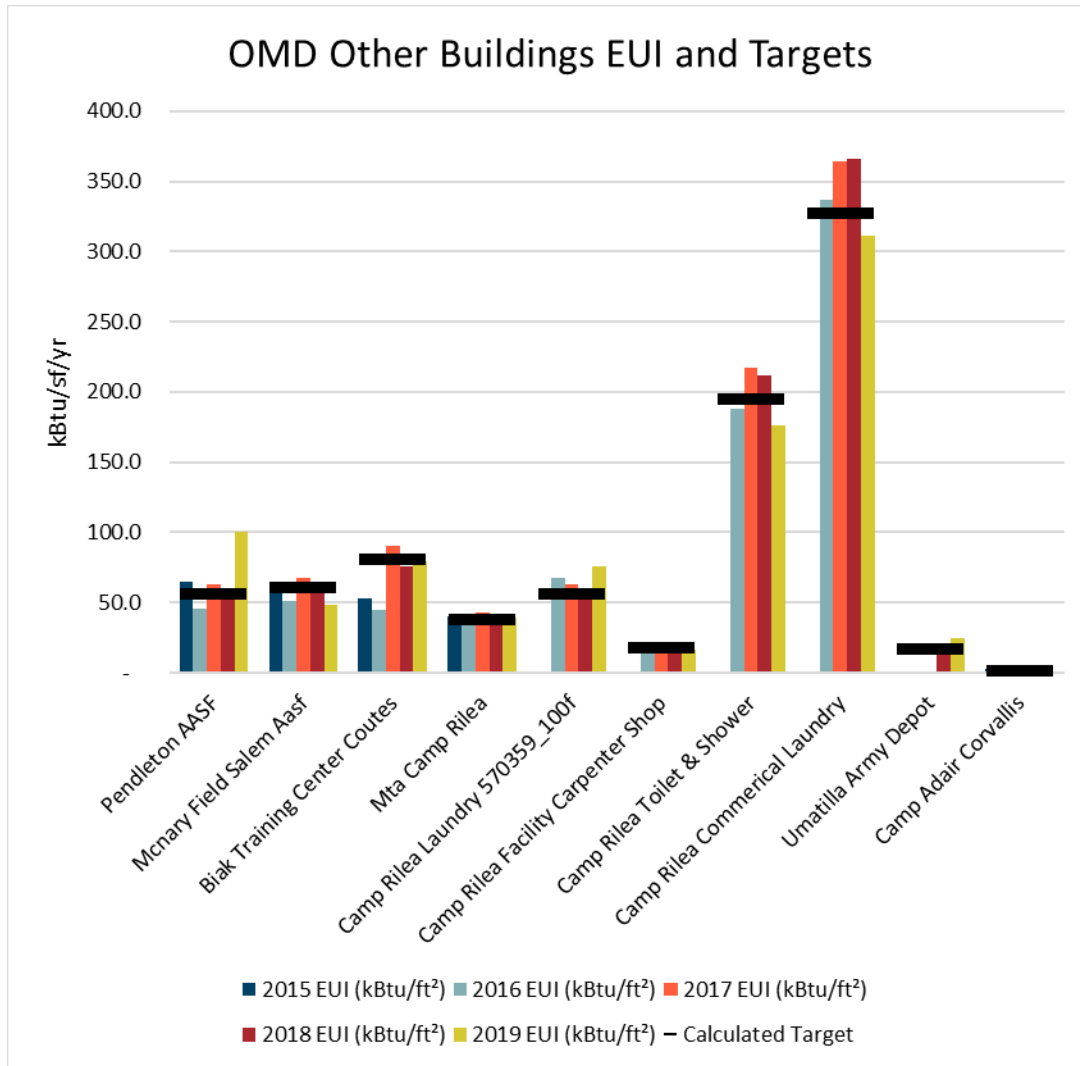
- Barracks do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE established a Target EUI of a 10 percent reduction from the 2017 baseline year.

OMD Various Buildings



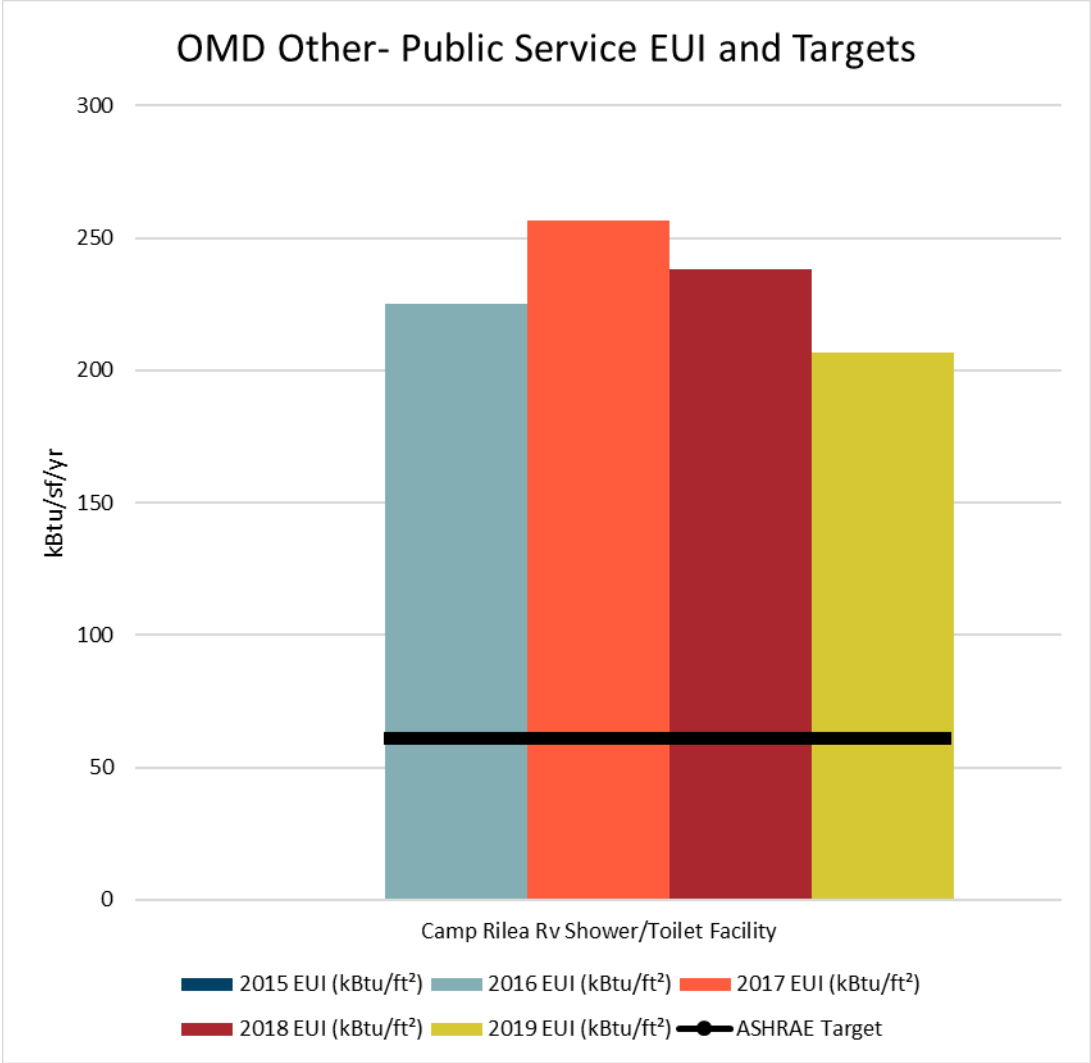
- ASHRAE Standard 100 EUI target for recreation facilities in Zone 4C is 26 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for cafeterias in Zone 4C is 156 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for entertainment/culture facilities in Zone 4C is 23 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for medical office in Zone 4C is 23 kBtu/sf/yr.

OMD Other Buildings



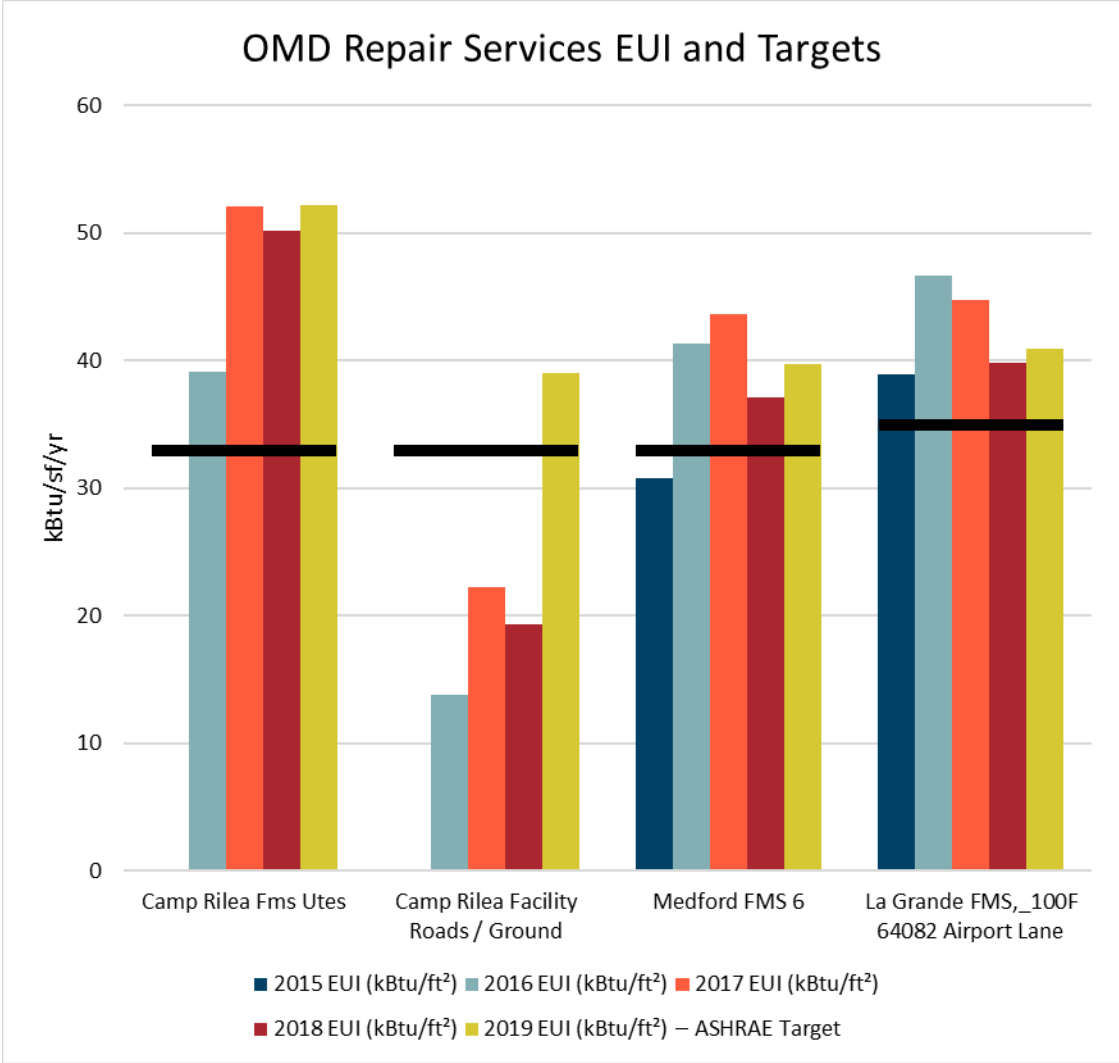
- These Other Buildings do not have ASHRAE Standard 100 EUI targets established based on their use.
- ODOE established a Target EUI of a 10 percent reduction from the 2017 baseline year.

OMD Other- Public Service



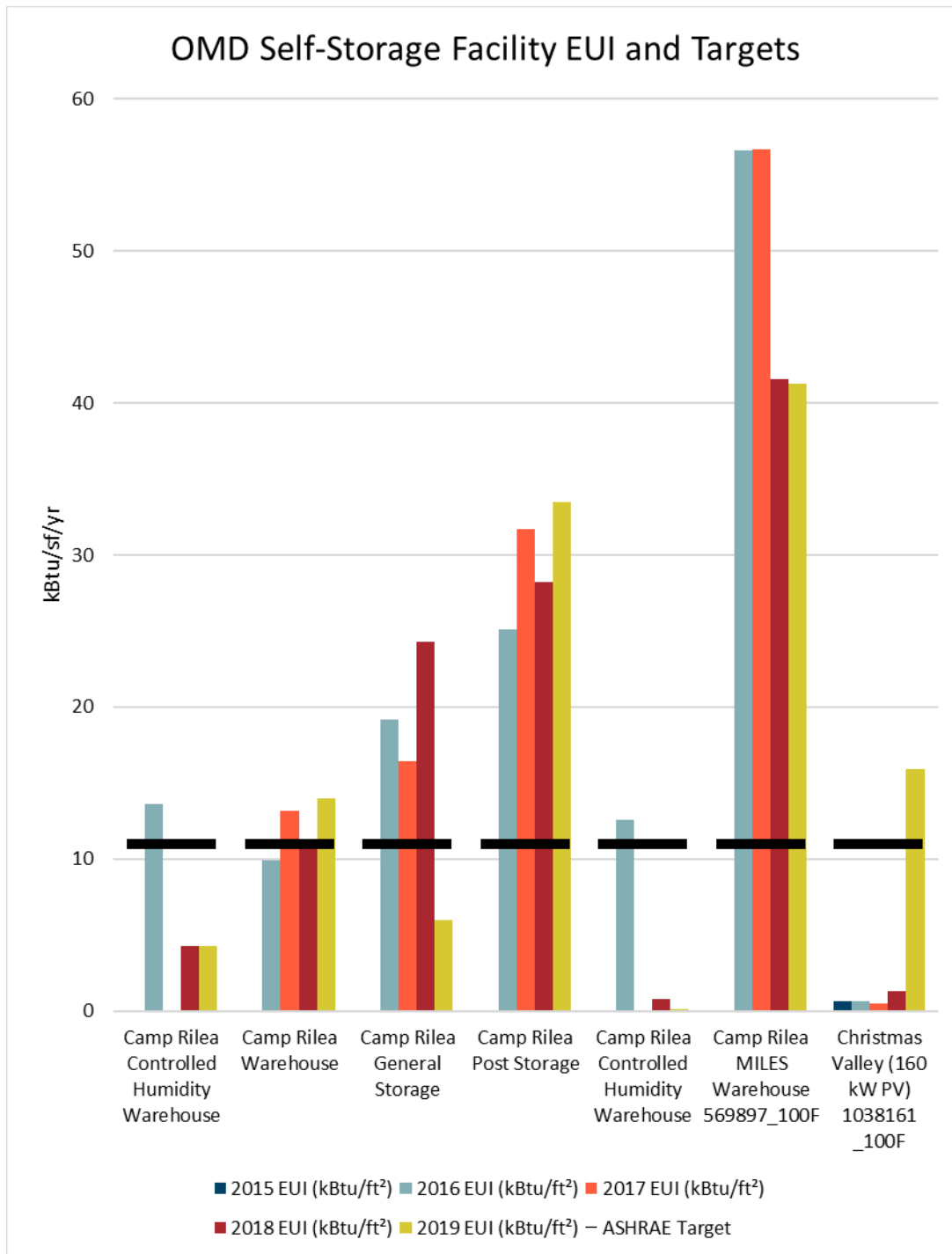
- ASHRAE Standard 100 EUI target for Other- Public Service in climate zone 4C is 60 kBTU/sf/yr.

OMD Repair Services



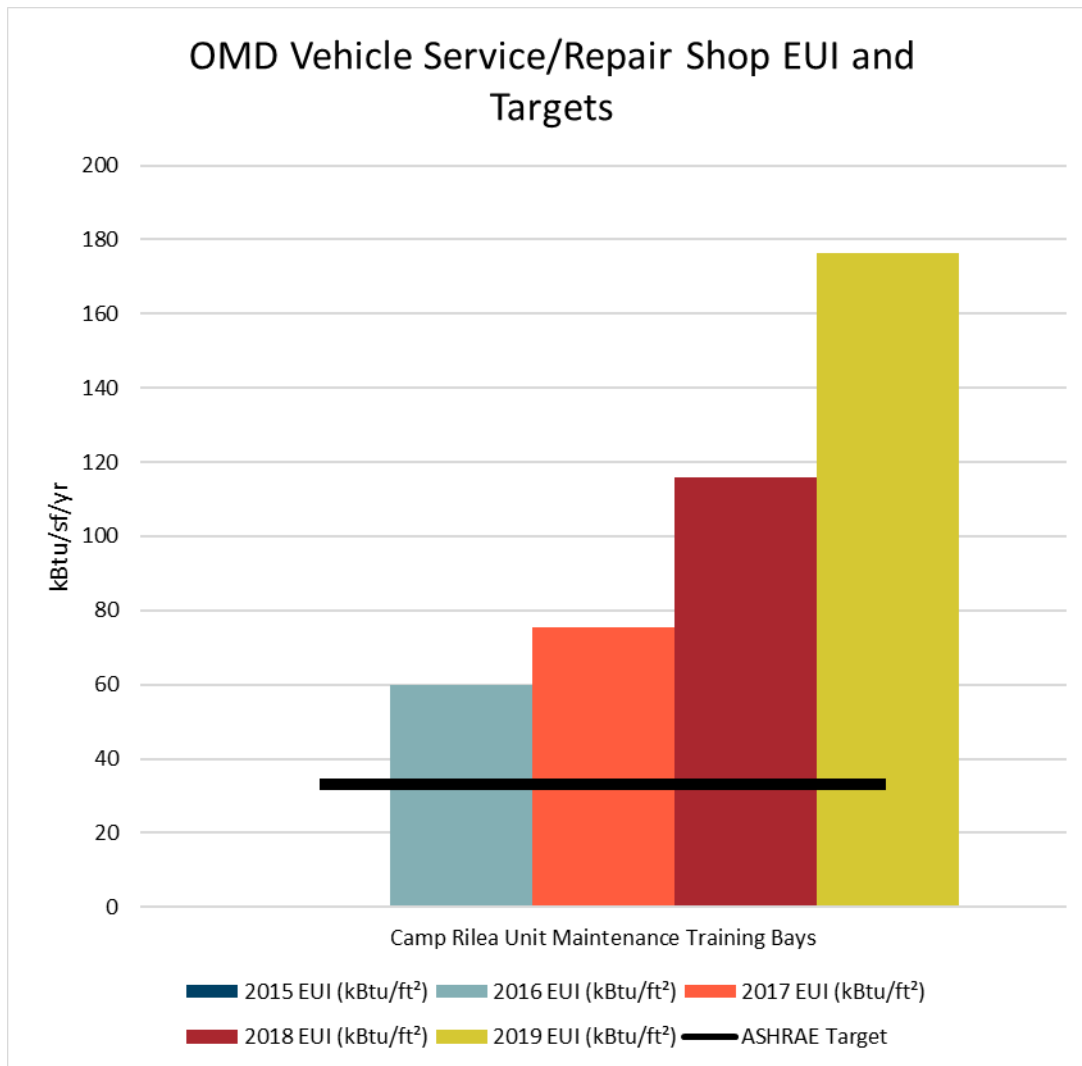
- ASHRAE Standard 100 EUI target for Repair Services in climate zone 4C is 33 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for Repair Services in climate zone 5B is 35 kBtu/sf/yr.

OMD Self-Storage Facility



- ASHRAE Standard 100 EUI target for Self-Storage Facility in climate zone 4C is 11 kBtu/sf/yr.
- Missing energy use data.

OMD Vehicle Service/Repair Shop



- ASHRAE Standard 100 EUI target for Vehicle Service/Repair Shops in climate zone 4C is 33 kBtu/sf/yr.
- Missing 2015 energy use data.

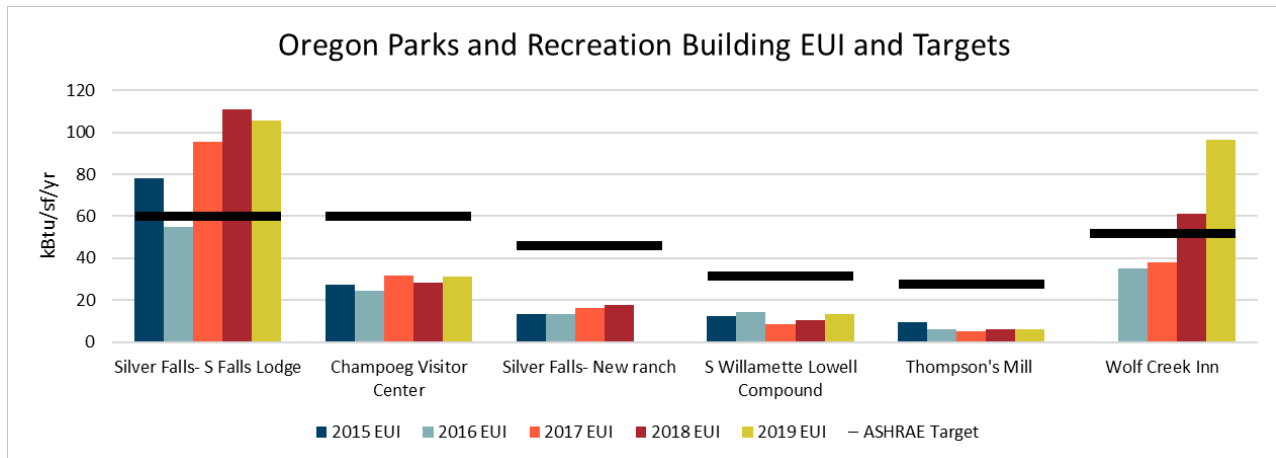
Oregon Parks and Recreation Department (OPRD)

- Many of OPRD’s buildings have historic features limiting energy retrofit opportunities.
- OPRD has a sustainability plan including energy conservation goals and a dedicated Operations and Maintenance team to track progress to goals.
- OPRD had a system-wide increase of 618,455 visits (+1.15 percent) from 2017 to 2018, leading to increases in energy consumption.
- OPRD manages 1,100 facilities across the state with a large percentage of them being restroom facilities. Park restrooms use a modest amount of energy as they are only

heated to keep from freezing and lighting is supplemented by natural light when available.

- Building occupancy and use fluctuates seasonally with the weather and tourist interest.
- OPRD has invested in LED lighting in many of their facilities and is invested in reducing energy use.
- Larger OPRD facilities are tracked by ODOE and represented in the following report.

OPRD Facilities



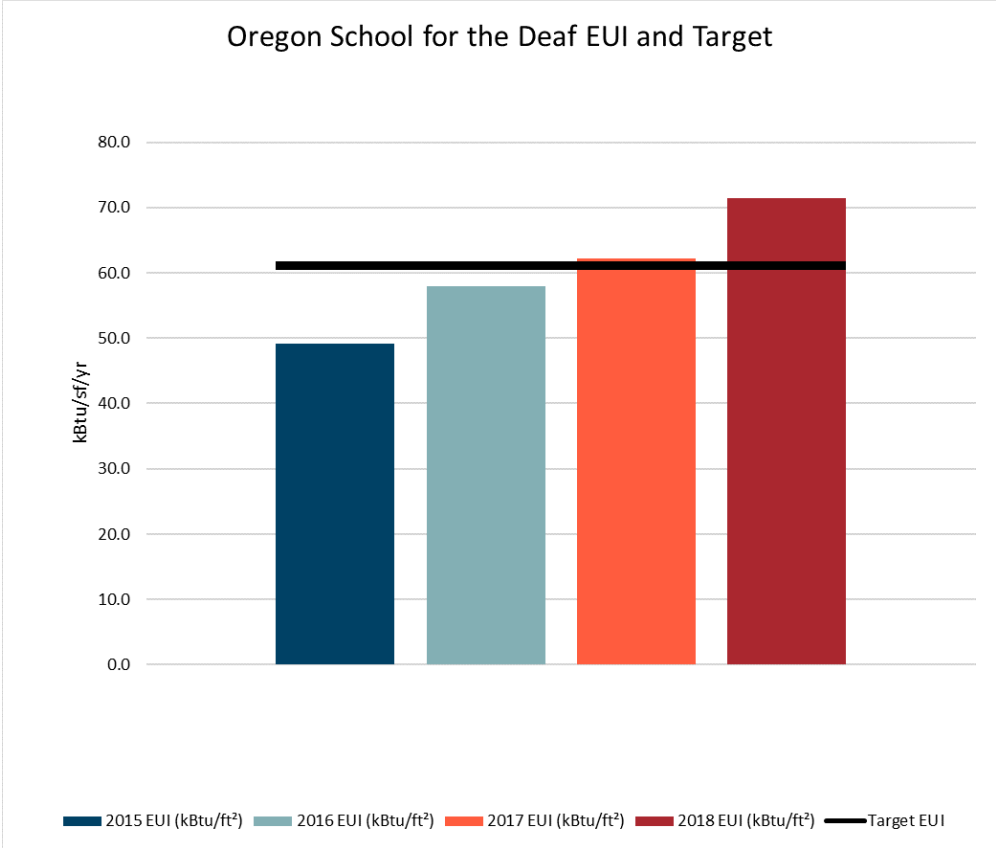
- Silver Falls Lodge and Champoeg Visitor Center are categorized as building type Other-Public Service.
- ASHRAE Standard 100 EUI target for Other-Public Service in climate Zone 4C is 60 kBtu/sf/yr.
- Silver Falls Lodge includes food concessions, offices, and community space within the facility which explains their high EUI. Facility visitations increased in 2017 and 2018 and are reflected in energy use increases.
- Silver Falls Lodge exceeds ASHRAE’s energy use performance target, but Champoeg Visitor Center is well under the target.
- Silver Falls New Ranch is categorized as building type Other- Lodging.
- ASHRAE Standard 100 EUI target for Other-Lodging in climate Zone 4C is 46 kBtu/sf/yr.
- South Willamette Lowell Compound is categorized as 50 percent building type Office and 50 percent maintenance/vehicle storage.
- ASHRAE Standard 100 EUI target for office buildings in climate Zone 4C is 50 kBtu/sf/yr. and maintenance/vehicle storage is 14 kBtu/sf/yr.
- ODOE uses a calculated target of 32 kBtu/sf/yr for South Willamette Lowell Compound based on the dual use of the facility.
- Thompson’s Mill is categorized as building type Public Assembly.
- ASHRAE Standard 100 EUI target for Public Assembly in climate Zone 4C is 28 kBtu/sf/yr.
- Wolf Creek Inn is categorized as building type Hotel and is a state heritage site.
- ASHRAE Standard 100 EUI target for Hotels in climate Zone 4C is 52 kBtu/sf/yr.

- Wolf Creek Inn’s food service and lodging were closed during a renovation in 2016 and 2017. The increase in energy use is due to the facility being fully operational and increased visitors.
- Many of the facilities have concession contractors providing food, drink, and hospitality services. Concession contractors are sub metered and responsible for their own utility bills.
- Based on calculated targets, Silver Falls Lodge and Wolf Creek Inn present great opportunities for energy conservation improvements.

Oregon Department of Education

- Oregon Department of Education’s building portfolio consists entirely of the Oregon School for the Deaf (OSD) campus in Salem, Oregon.
 - Oregon Department of Education was unable to provide complete 2019 energy use data.
- OSD’s campus has 20 buildings including:
 - Campus Administration.
 - Dormitories for students living on campus five days a week for the school year.
 - Elementary and High Schools.
 - Charter Schools leasing facilities.
 - Cafeterias.
 - Gyms, swimming pool, and recreation facilities.
- Recent Operational Changes:
 - The number of students on campus has increased with the addition of charter schools to the campus.
 - 2017 Installation and commissioning of three new condensing boilers has allowed for the boilers to be available year-round, allowing for increased use of the pool at Peck Gym.
- Future Projects:
 - Lindstrom, Smith, Clatterbuck, and Peck will receive new roofs which may include increased roof insulation.
 - Expansion of Peck Gym to include new locker rooms.
- Opportunities Identified by OSD:
 - Energy Trust of Oregon conducted energy audits of buildings.
 - HVAC system controls are pneumatic and due for an upgrade.
 - Lighting to be converted to LEDs.
 - Replacement of aluminum single pane windows.
 - Ulmer Building/High School needs a new HVAC system.
 - Fire alarm system needs to be updated.

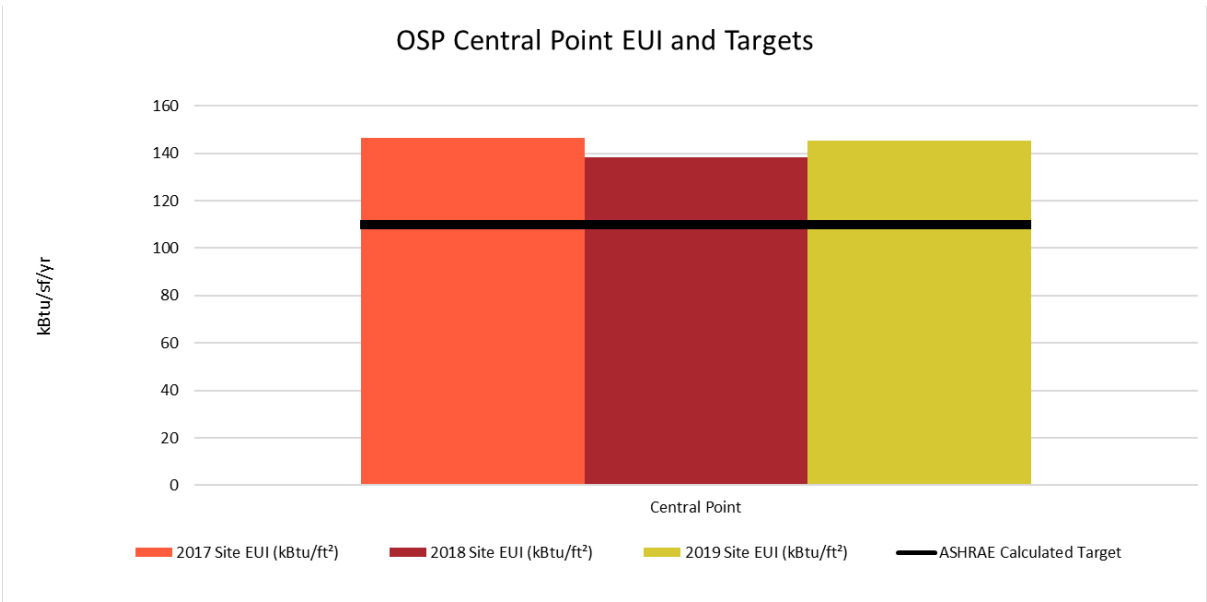
Oregon Department of Education- Campus



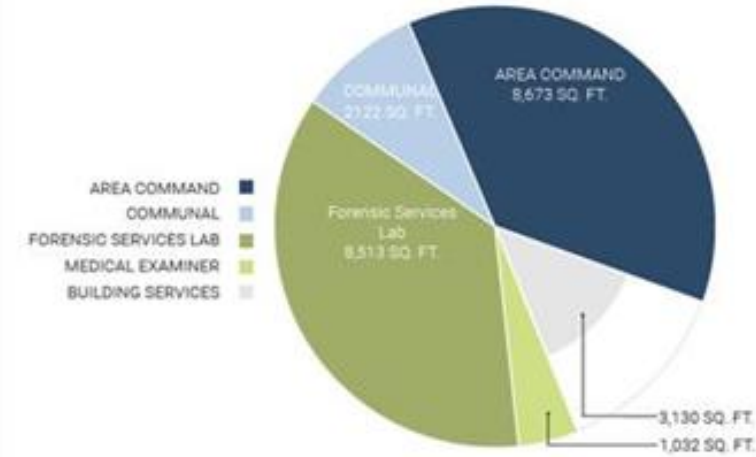
- ASHRAE Standard 100 does not have an EUI target for school campuses.
- ODOE created a target EUI in collaboration with OSD and based on previous performance.
- Campus energy use increased each year of monitoring and is now performing well over the target EUI.

Oregon State Police (OSP)

OSP Central Point



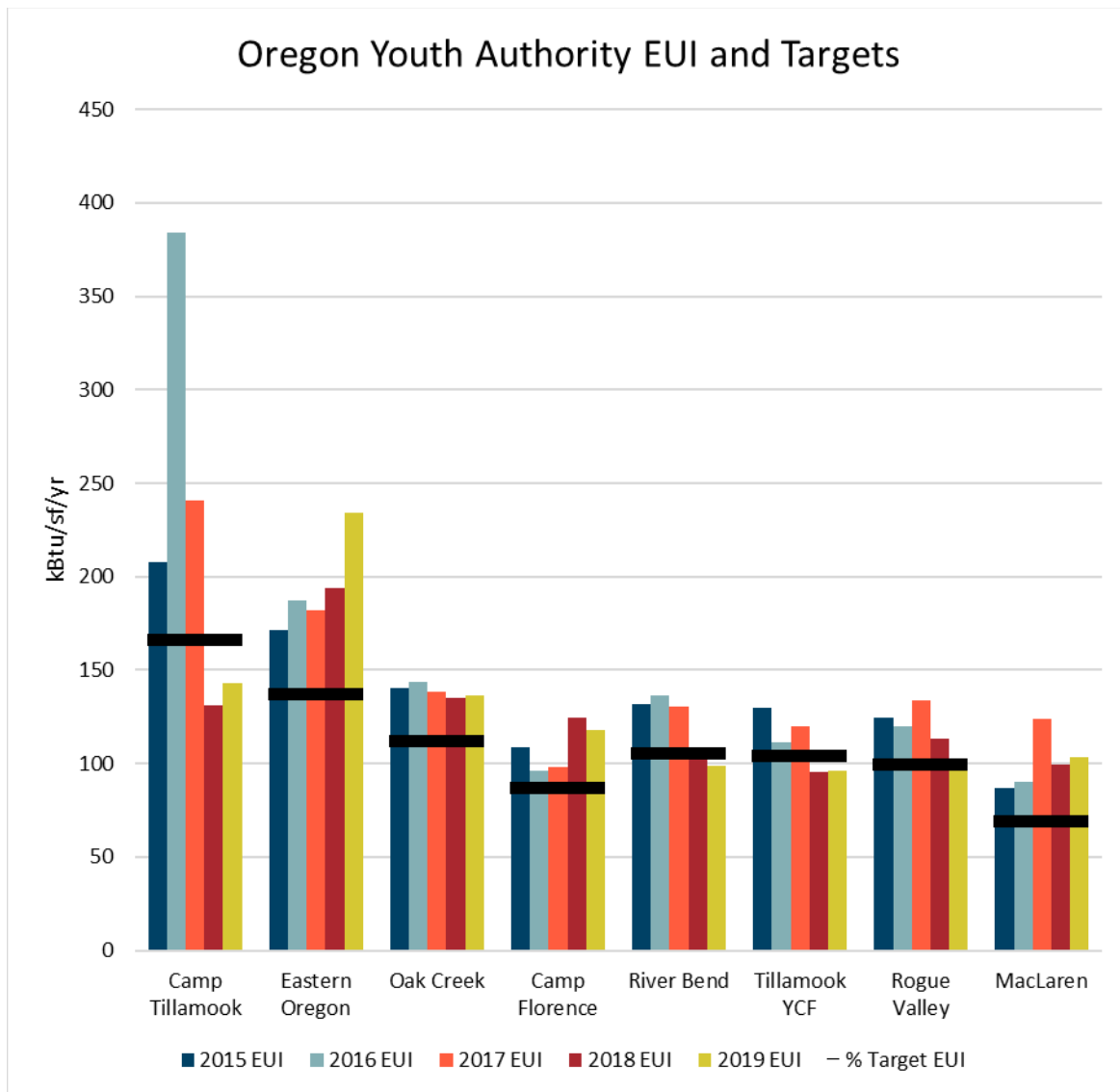
- The Central Point building is categorized as a Mixed-Use building type.
- The property includes two separate buildings with mixed uses including:
 - 24/7 Oregon State Police and Oregon Department of Transportation dispatch services.
 - Southern Command Oregon State Police.
 - Forensic Laboratory with 2 high volume fume hoods and refrigerators.
 - Medical Examiner including large body freezer.
 - Evidence storage including multiple freezers.
- ASHRAE Standard 100 EUI target for fire/police stations in climate Zone 4C is 66 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for Laboratories in climate Zone 4C is 179 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for Hospitals in climate Zone 4C is 135 kBtu/sf/yr.
- Oregon Department of Energy calculated the facility performance target of 110 EUI based on the various uses of the building.



- The buildings at this facility are over 23 years old with original lighting, boiler, and HVAC equipment. OSP has identified the need for upgrades to lighting, HVAC equipment (including a control system), and a rebuild of the boiler.
- Some of OSP facilities have backup generators. Central Point has two generators to maintain emergency lighting, dispatch, and cooling within the medical examiner’s laboratory during an event.
- Based on ASHRAE performance targets, Central Point is operating significantly above its performance target and may be a good candidate for energy conservation improvements.
- Electricity and Natural Gas energy used was reported in Energy Star Portfolio Manager for this building. The fuel used for the backup generators is not represented in this energy assessment.

Oregon Youth Authority (OYA)

Oregon Youth Authority EUI and Targets

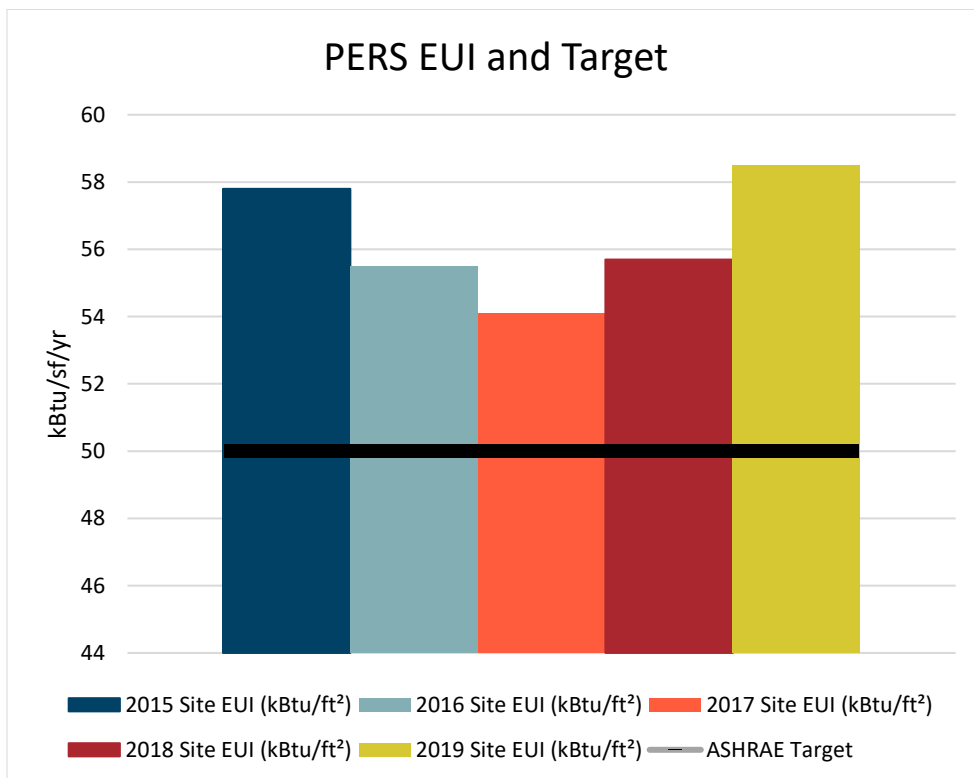


- ASHRAE Standard 100 does not have an EUI target for detention facilities.
- ODOE collaborated with OYA to create a calculated performance target of a 20 percent reduction from the baseline year of 2015 (black line).
- Most buildings within the portfolio are exceeding the current performance target but progress is being made each year.
- OYA is committed to meeting Executive Order 17-20 by reducing energy use by 20 percent compared to the baseline year.
- OYA’s facilities operate 24 hours a day, 7 days a week. This presents challenges because typical HVAC and lighting operational set-backs and similar energy saving opportunities cannot be utilized.

- The agency has an aggressive capital construction campaign to transform facilities from a boot camp atmosphere to a developmental living environment to aid in youth transformation.
- All renovation and new construction projects are designed to meet the requirements to exceed current energy saving building codes by 20 percent.
- OYA has made numerous energy improvements to lighting systems. Replacing antiquated lighting fixtures to LED both within facilities and in exterior locations.
- OYA has also been very successful at installing energy conservation roofing systems and HVAC energy recovery units, as well as highly efficient boilers, variable frequency drives, and automated building and lighting controls to further the goal of reducing energy use.
- Over the last four years OYA has constructed nine new facilities and all of them were constructed to SEED standards and met the requirement to exceed the energy code by 20 percent. One of OYA new facilities, the New Bridge High School, was recently awarded the LEED Platinum rating, the highest LEED standard available.

Public Employees Retirement System

PERS EUI and Targets

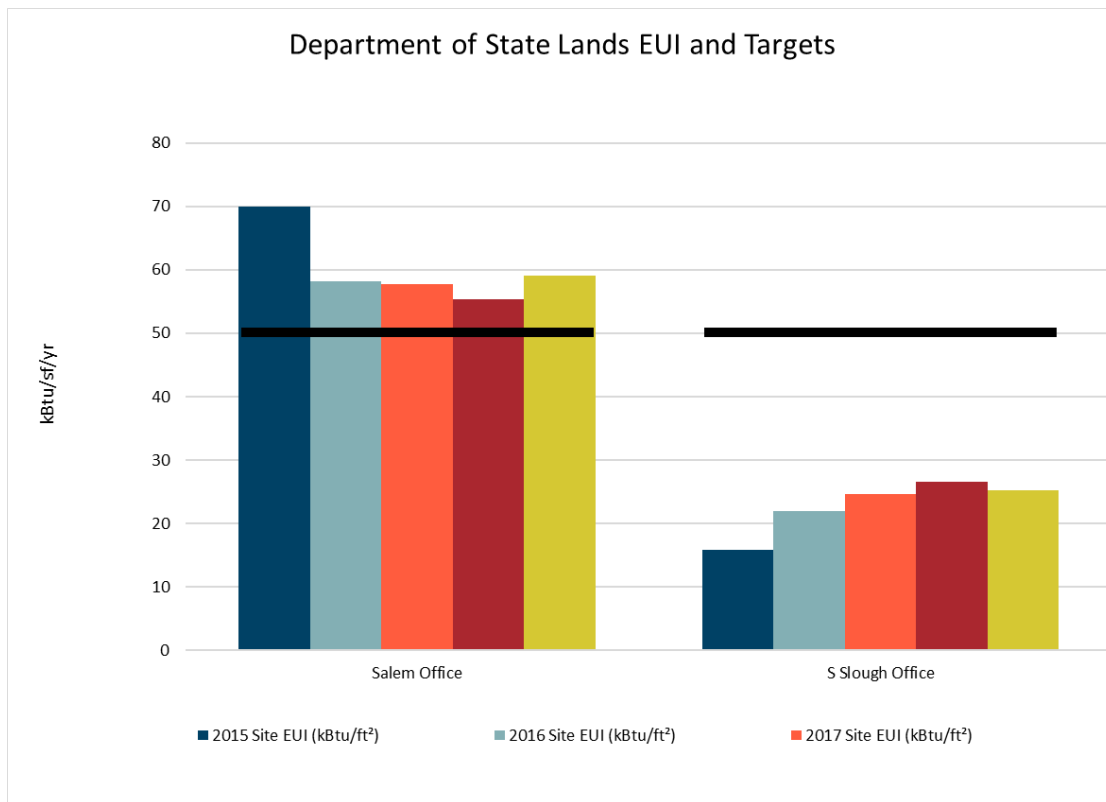


- The PERS building is categorized as building type government office.
- ASHRAE Standard 100 EUI target for government office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- The PERS building was built in 1996 and is due for equipment upgrades.

- Exterior and egress lighting have been upgraded to LEDs and the rest of the facility is upgrading upon lamp failure. An estimated 25 percent of the facility has been upgraded to LEDs.
- PERS has scheduled a rooftop and HVAC equipment replacement with a target completion date of June 30, 2021. The project will lead to improved performance and efficiency of the building.
- The building contains a 1,500 gallon diesel fuel generator. The fuel generator is used once a week for 15 minutes to keep operational, but is not represented in this energy data.
- In 2012 a server room was added to the facility and may represent a significant amount of energy use.

Department of State Lands

Department of State Lands EUI and Targets

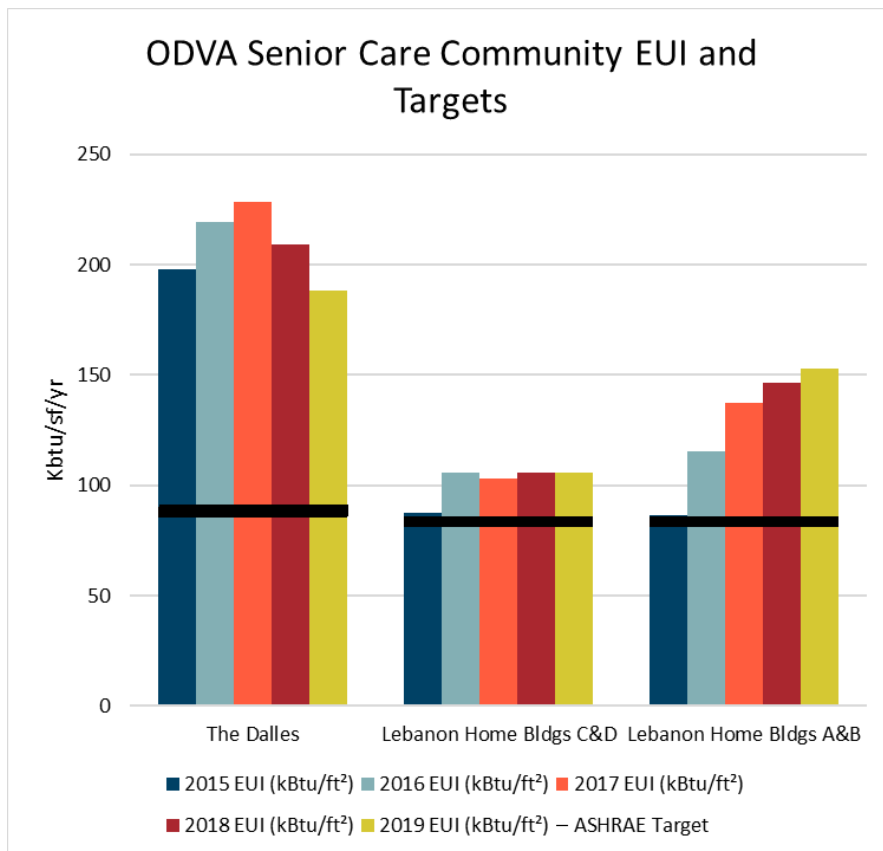


- The Department of State Lands buildings are categorized as building type government office.
- ASHRAE Standard 100 EUI target for government office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- Salem Office:
 - Built in 1990.

- Based on ASHRAE performance targets, the Salem office presents the greatest opportunity for energy conservation improvements.
- Conducted a PV study 10 years ago to evaluate the opportunity.
- Upgraded HVAC system, including a new chiller 10 years ago, and an upgraded DDC system.
- Installing a new Cooling Tower in 2020.
- ODSL staff have identified opportunities in T-8 to LED lighting upgrade and behavior changes.
- Leasing second and third floors to other agencies allows for limited control in enforcing behavior changes and state plug load policy.
- S Slough Office:
 - Building is split between a small office, a visitor center, and gift shop.
 - Office has 10 regular employees.
 - Heated with a heat pump with propane as back up.
 - Energy use has steadily increased each year, but is still below the performance target.

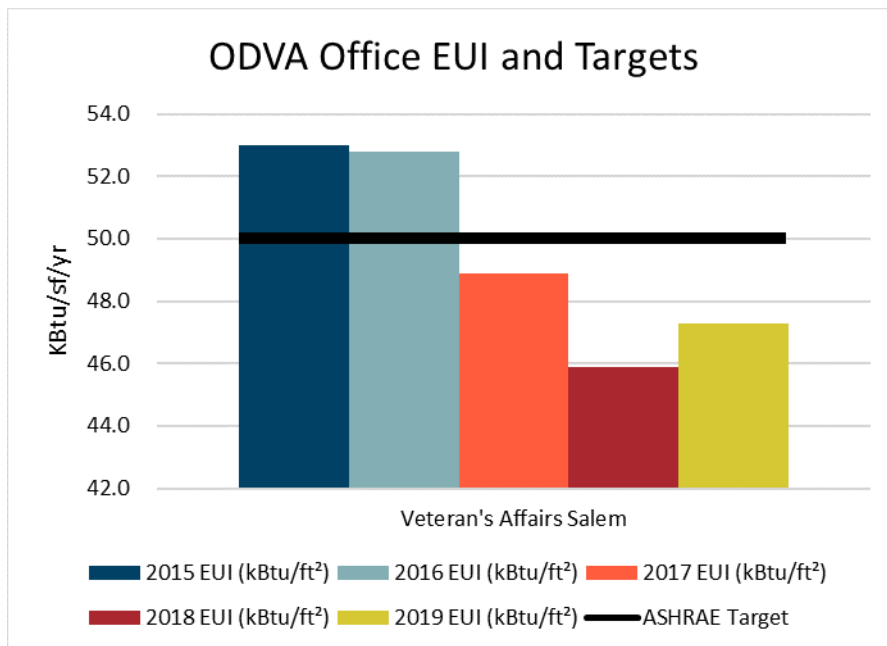
Oregon Department of Veterans Affairs (ODVA)

Senior Care Community Facilities



- ASHRAE Standard 100 EUI target for senior care communities in climate Zone 4C is 84 kBtu/sf/yr.
- ASHRAE Standard 100 EUI target for senior care communities in climate Zone 5B is 88 kBtu/sf/yr.
- All buildings exceed their performance target and present a great opportunity for energy conservation improvements.
- The Dalles facility has 150 beds and is operating at full capacity.
- In 2018, The Dalles facility upgraded their interior and exterior lighting to LEDs, installed new kitchen equipment, and expanded their parking lot.
- In 2020, The Dalles facility will be adding vestibules to reduce exposure to wind, a new roof, and HVAC equipment.
- The Lebanon facility occupancy increased in the last few years and is now full.
- The Lebanon facility has a solar PV system onsite and added a new parking lot and exterior lighting in 2017.
- In 2020, the Lebanon facility is adding an activities room.

Veterans Affairs- Office Facilities



- ASHRAE Standard 100 EUI target for Government Office buildings in climate Zone 4C is 50 kBtu/sf/yr.
- The Veterans Affairs office occupancy has decreased over the last few years, but occupancy is scheduled to increase in January 2020.
- ODVA invested in upgrading their basement parking lighting to LEDs.
- ODVA is utilizing their energy management system to better manage their energy use and reduce HVAC run time to match low occupancy times.

- In the future, ODVA plans to retrofit the remaining lights with LEDs and install new cooling coils.
- DAS is currently developing a facilities condition assessment of the building to identify equipment replacement needs of the building.

FOR MORE INFORMATION

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