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Energy Star Portfolio Manager Benchmarking & Performance Rating

JANUARY 2020 — DECEMBER 2021

Facility Professional Services
Division

Report to the Legislature

Agency Overview

The Department of Enterprise Services (DES) provides centralized services to state government agencies; to other public entities such as cities, counties and tribes; and to Washington residents.

DES' mission is to strengthen the business of government.

We do this by creating overall operating efficiencies so our state's government entities can focus on their core missions. Our buying power, economies of scale and years of experience help government get the best value for the products and services they need to support their missions.

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Executive Summary

Under state law, the Department of Enterprise Services (DES) is responsible for compiling energy use data for all state owned and leased buildings 10,000 square feet or larger and submitting an energy benchmarking report every two years to the Legislature.

Since the Legislature established the benchmarking program in 2009, the energy efficiency landscape has changed significantly. Renewable energy sources are being introduced to state buildings, and as building occupancy and use has changed agency tracking of those changes has not kept pace.

The Benchmarking Law requires state agencies to use the Environmental Protection Agency's online tool called the Energy Star Portfolio Manager (ESPM) to track building energy efficiency. However, state agency staff are not consistently or sufficiently versed in account management in ESPM leading to inaccurate and missing data.

Over the last two years, DES has spent considerable time and resources providing additional tools, training and individualized support to staff at other state agencies to improve state agency compliance with the Benchmarking Law. While data reporting and collection has improved significantly, there are still approximately half of state buildings with incorrect data, preventing energy benchmarking.

After agencies enter their data into ESPM, they select the building data to send to DES to compile for the report. The gaps and inaccuracies make it clear that many agencies' regular data management and evaluation is limited, and that they are not integrating use of ESPM into their regular work practices as the Legislature originally intended to help evaluate and improve energy efficiency. Furthermore, the agency building data in ESPM will be used to assess state agency compliance under the Clean Buildings Law (RCW 19.27A.210). Without significant investment in account management and data cleaning from each account manager, state agencies will not be able to effectively demonstrate compliance with the Clean Buildings Law deadline in 2026 which could result in significant fines.

DES is identifying a need for additional guidance to clarify roles and responsibilities in ongoing data management and recommending the establishment of specific expectations for account maintenance and data management.

Furthermore, DES recommends an evaluation of the benchmarking program and its relation to benchmarking requirements under the Clean Buildings Law, to identify any needed streamlining or clarification.

Introduction

DES submits the benchmarking report to the Legislature every two years, capturing energy benchmarking data for state owned and leased buildings with 10,000 or more square feet. DES uses that data to identify data gaps and training needs.

When the benchmarking program started, the Legislature's intent was to reduce energy use in buildings by changing building codes and creating a measurement to help identify buildings that fit into the state's criteria when leasing, making Washington state the leader in energy efficiency.

Statutory Directive

In 2009, the Legislature found that the quickest, easiest, and cleanest way to meet the rise of energy use while fighting climate change in Washington was to address energy efficiency in state owned or leased buildings (RCW 19.27A).

The law documents stakeholders and their responsibilities (RCW 19.27A.170 and RCW 19.27A.190) and gives utilities instructions for providing data to their customers (RCW 10.27A.170).

The law also requires agencies to open ESPM accounts and benchmark their buildings, assigning the DES Energy Program to:

- help with benchmarking,
- provide a reporting system for agencies, and
- to write a biennial benchmarking report (RCW 19.27A.190).

Background

Starting with state agencies, universities, and colleges, the law directed owners of buildings 10,000 square feet and larger to create an energy performance benchmark of their buildings and to report their findings to the Department of Enterprise Services (DES). The law also required DES to collect that information and provide a benchmarking report for the state and the Legislature to monitor each stakeholder's progress.

The law requires utilities to use the Environmental Protection Agency's (EPA's) Energy Star Portfolio Manager (ESPM) program to track energy consumption data. Smaller utilities must provide data in a spreadsheet for the building owner to upload to ESPM, and utilities with 25,000 or more employees upload their own data directly to ESPM.

2018-2020 Previous Report Recommendations

In the previous 2018-2020 ESPM benchmarking report, DES identified three systematic issues preventing accurate reporting of statewide energy use:

Key Findings

- **Data management by knowledgeable staff.**

Agencies often do not have dedicated staff with the needed skill set to maintain their ESPM accounts. In addition to ESPM competency, the reporting agency's data manager also needs an understanding of the agency's buildings and building operations, how to read detailed utility bills, and energy measurements. Finally, data managers do not consistently receive adequate training.

- **Data provided by utility partners.**

Energy utilities with more than 25,000 customers must upload data directly to ESPM (RCW 19.27A.170), which can result in faulty or missing data. Utilities often make energy usage estimates that they later verify and correct, entering the data a second time to make needed corrections.

Usage data is also lost when the utility replaces energy meters in the field. ESPM organizes data by meter numbers and when the utility uploads data with a new and unknown meter number, ESPM does not recognize the meter leading to an error.

- **Limitations in the ESPM software.**

ESPM is a powerful and sensitive program that requires all data points to be entered and set up correctly for accurate calculations. One piece of missing or out of place data will prevent the program from making calculations – resulting in an error report. For example, if there is a gap or an overlap of one or more days between reported billing cycles, the report will say the data is not available.

Recommendations

To address those systematic limitations, DES made the following recommendations:

- **Highlight the importance of trained staff.**

DES can provide technical assistance and training through the Resource Conservation Management Program to state employees who manage ESPM data.

- **Work with utilities to close the information loop with building owners.**
Improve the communications and create a feedback loop between ESPM account managers and their utility provider(s). This will help catch errors more quickly and reduce rework in the ESPM account.
- **Work with EPA on improvements to ESPM.**
The EPA has committed to helping Washington state improve its experience with ESPM and is willing to make program improvements which include providing training.

Response

DES used the following three tactics to address the recommendations from the previous 2018-2020 benchmarking report.

Trained Staff and Data Management

DES' Resource Conservation Manager Program (RCM Program) provides support to agency data managers. Previously, the RCM Program provided most help via email and referred people to the ESPM help website, forcing new users to learn the program and account set up on their own. Since the 2018-2020 report, the RCM Program has added one-on-one help for data managers, sharing best practices on how to use ESPM, organize and manage building accounts in ESPM, and to answer questions.

Utility Data Uploads

To address data entry issues, Washington state's largest utility company, Puget Sound Energy, has partnered with a data management provider to manage billing data and automatically upload energy usage data to ESPM.

This automation should reduce errors due to small data gaps or overlapping data, data loss from meter replacement, and double reporting caused by billing updates.

ESPM Software

The RCM program has worked with Cadmus Group — the organization managing ESPM — to offer live virtual training sessions to help data managers understand the software and account set up.

Results

DES' efforts to address the three key issues from the 2018-2020 benchmarking report have substantially improved the data collection process.

Energy Use Index

Approximately 3,000 buildings are required to report energy use for the benchmarking report. Over the last two years, the number of buildings that generated an Energy Use Index (EUI) more than doubled, from 16.43% to 37.4%.

Year	Buildings with EUI	Buildings without EUI
Avg. 2018-2019	493	2544
2020	1278	1847
2021	1123	1989

The EPA and ESPM will continue to work with Washington state agencies to learn how to better use and set up their accounts. DES will also continue to work with utility providers to reduce errors by fully integrating automatic data uploads.

2020-2021 Key Findings

Missing EUIs

While DES’ work over the past two years has resulted in a significant increase of buildings with Energy Use Intensity numbers (EUIs), there are still more than half of qualified state buildings without EUIs.

$$\text{Annual energy usage} / \text{Square footage} = \text{Energy Use Intensity}$$

The EUI is calculated by dividing the total annual energy used by the building’s square footage. This is complicated when buildings do not have separate energy bills or individual meters from other buildings. To solve this problem, ESPM groups buildings together based on shared energy bills. Errors occur If data managers do not set up buildings correctly in ESPM based on shared billing.

$$(\text{Total electric energy} + \text{Total natural gas energy}) / \text{Total square footage} = \text{Campus Energy Use Intensity}$$

Standalone and Campus Buildings

Based on how the building’s energy is measured, it is either a **standalone building** or a **campus building**.

If the building’s energy is measured independently, either through energy bills or from independent sub meters, it is a standalone building.

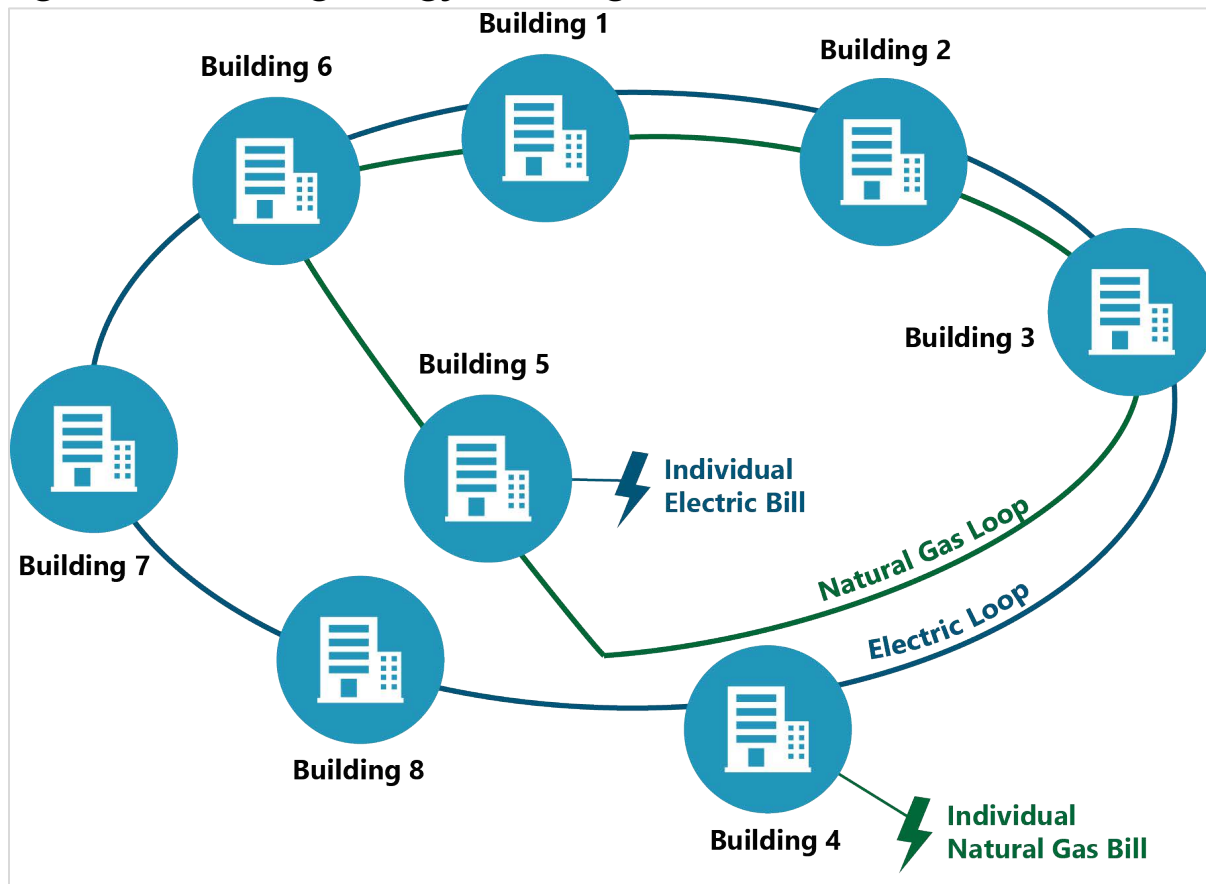
Standalone buildings improve data collection, problem solving, energy saving, and decision-making because they provide building-specific data.

A building that shares an energy source with one or more buildings and cannot be metered separately from those buildings is considered a campus building.

Example:

Each building in Figure 1 is on at least one energy loop. Some are on both loops, so the buildings become a campus where the EUI is calculated together because none of the buildings can get an EUI without data from the other buildings on the loop.

Figure 1 – Building Energy Metering



In Figure 1, Buildings 1-4 are on the same natural gas and electric loops. Buildings 5 and 6 are on the natural gas loop but not the electric loop and Building 5 has an individual electric bill.

Meanwhile Buildings 4, 7, and 8 are also on the electric loop, but 7 and 8 do not have natural gas. Building 4 has its own individual natural gas meter.

ESPM returns an individual EUI for each standalone building, and an average EUI for all buildings in a campus.

Because each of the buildings in the figure has a shared bill with at least one other building, they are all considered to be campus buildings. However, the individual configurations must be set up in ESPM correctly to return an accurate average.

The agency data manager must know how energy is connected and metered to each building to be able to set the buildings up correctly in ESPM.

Causes of Missing EUIs

There are many factors that could result in a missing building EUI. The following are recurring issues that contribute to missing and inaccurate data, preventing ESPM from generating an EUI, and actions agencies can take to address those issues.

Building Set Up in ESPM

Agencies should identify and fix buildings with missing or incorrect set ups.

There are hundreds of buildings in ESPM with missing or incorrect data, many of which were set up incorrectly when the program was established in 2009 and have not been corrected since then. Additionally, DES found that agencies have not correctly updated ESPM when energy meters or building portfolios changed for many existing buildings.

The agency data manager is responsible for setting up the agency's buildings and meters in ESPM. In addition to updating existing buildings, the data manager must also add new buildings or make any changes to existing buildings.

A closer look into the data shows where information is missing and what data managers can do to fix the problem. Based on the 2021 data:

- **There are 88 campuses without an EUI (1654 buildings).** Of those:
 - 14.3% (236) have no square footage entered in ESPM.
 - 9.4% (155) are managed by a single agency.
- **The largest cause of missing EUI data is having less than 12 months of data.**
 - 983 buildings have less than 12 months of data.
 - More than half of those buildings are managed by two agencies:
 - 40.1% (400) are managed by a single agency.
 - 19.7% (194) are managed by a single agency.
- **Nearly 40% of campus buildings without an EUI are managed by three agencies.**

Missing or Overlapping Data

Agencies with missing or overlapping data should develop and implement internal strategies to address data uploads and ongoing management.

Only 36% of buildings have an EUI for 2021. Fixing missing or overlapping data would greatly increase the number of buildings with an EUI.

Even one missing or overlapping date in ESPM will prevent it from generating an EUI. To address this, responsible agencies should take the following three actions:

- Check accounts to make sure there are a full 12 months of data (this would increase buildings with an EUI to 75%).
- Enter missing square footage data for 236 buildings.
- The top three agencies should prioritize data accuracy, which alone would increase buildings with EUIs to approximately 61%.

Data Accuracy and Usefulness

Qualifying Buildings

Agencies should remove buildings from the report to DES that are no longer in use or are smaller than 10,000 square feet.

Inaccurate data makes benchmarking less useful over time. DES identified 500 buildings within the state portfolio manager master account that are either too small for the benchmarking requirement or no longer in use and should be removed from the report to DES.

Inaccurate Building Profiles

Agencies should verify that building data is accurate, and consistent with the Clean Buildings Performance Standard.

Benchmarking is only accurate when buildings are set up correctly in ESPM.

Building profiles in ESPM include:

- type of building
- address
- floor area
- occupancy
- number of computers being used
- operation hours
- number of people on main shift
- on-site parking, heating, or cooling

Example: The following table shows three real examples of properties that likely have incorrect information in ESPM.

Property	Floor Area (sq. footage)	Site Energy Use	Site EUI
Laborers Hall	5380	10547	2
Clarkston	2026	6310508	3114.8
Lights 1	1	72124.7	72124.7

The first building has a low EUI of two, which might be possible, but it is very unlikely in this type of building.

The second building has an unusually high EUI.

The third building is not a building at all, but a light with one square footage of floor area. This light should not be entered into ESPM.

Example: The following table shows a property that was entered into ESPM as a standalone building, instead of a campus building. This also leads to an incorrect EUI because ESPM will not be able to consider the shared campus billing when calculating the EUI.

Property	Campus	Floor Area (sq. footage)	Site Energy Use	Site EUI
3024616	N/A	474402	364226.2	0.8

Energy Source

Agencies should audit building information, including energy source and occupancy, to make sure accounts are set up correctly.

When the benchmarking program was started over a decade ago, the main sources of energy were electric, natural gas, steam, and oil. Many buildings now use energy from renewable sources like on-site solar panels, however agencies are not consistently setting up those energy sources in ESPM.

There is a difference between *energy efficiency* and use of *renewable energy*. The EUI measures building efficiency, and requires all energy sources, including renewable, to be set up to accurately calculate total energy use. Over time, many factors have changed:

- building occupancy
- building uses
- new energy sources
- old buildings closed or torn down
- new buildings and additions to existing buildings
- meter numbers

These changing issues were not addressed when the benchmarking program was originally established. In addition, over time many agencies have not kept their building data up to date.

The following two charts demonstrate the inconsistencies in data management.

Figure 2 – Campus Buildings and EUIs

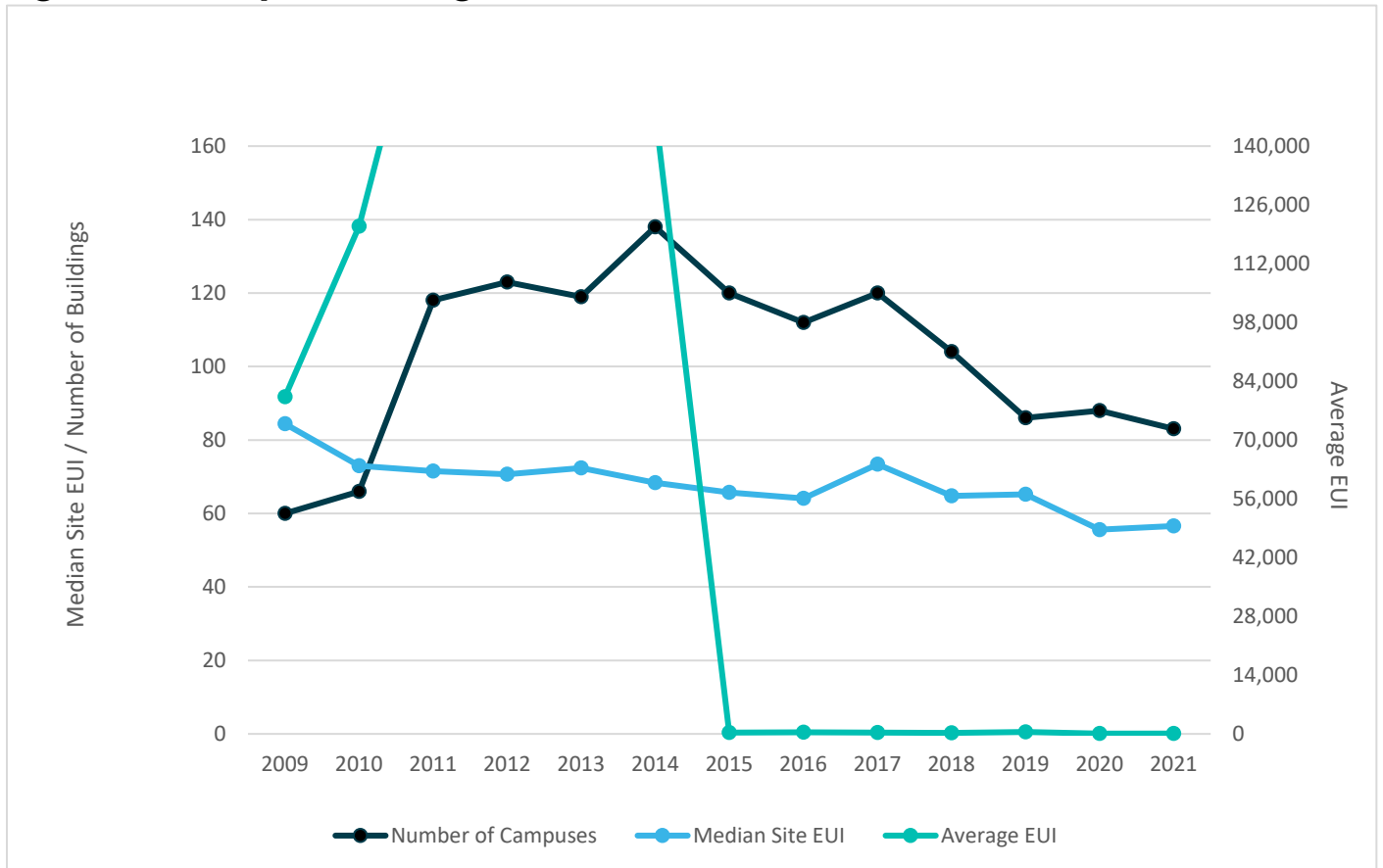


Figure 2 depicts the number of campus buildings, and the average and median EUIs for those buildings.

The data indicates that the state nearly doubled the number of buildings on campuses between 2010 and 2011. The average EUI fluctuates between 188,699 and 69, a variation which is impossible based on the number of buildings.

The median EUI seems more reasonable, but the number of campuses and average EUI clearly demonstrates that the data is inconsistent.

Figure 3 – Standalone Buildings and EUIs

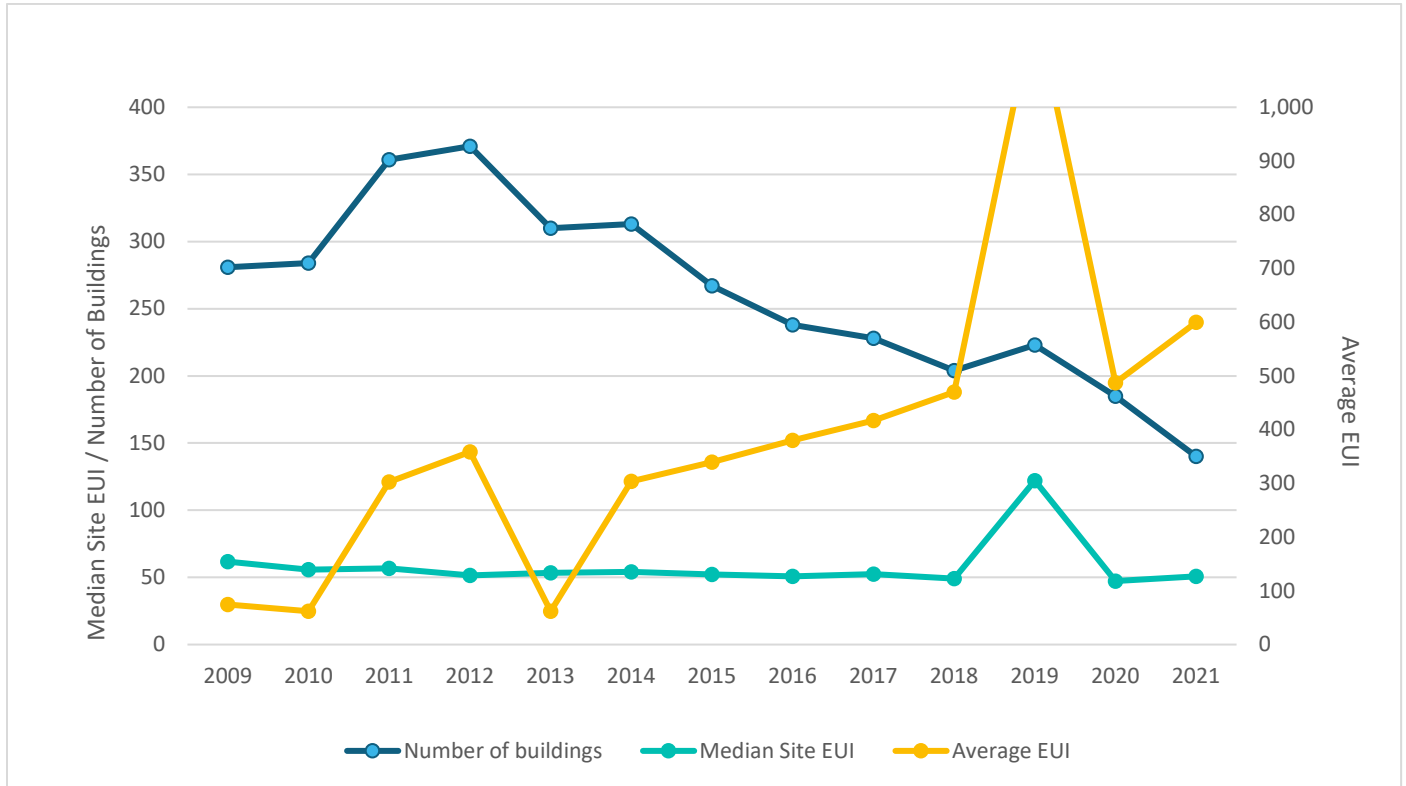


Figure 3 shows the same information for standalone buildings, clearly illustrating that the data is not reliable. The number of buildings drops by half over the years while the average EUI increases, and the median EUI stays relatively stable.

Both examples indicate that many agencies have gaps in their building data management. The inconsistency in data and lack of training for data managers will likely create issues for agencies when the compliance period for the Clean Buildings Law begins.

The ESPM data will be used to audit compliance with the Clean Buildings Law, and agencies must demonstrate at least 12 months’ worth of data by the Clean Buildings Law deadline in 2026.

Discussion

Over the last two years, DES has worked with state agencies and organizations to make significant improvements in data entry and management. Through increased training, one-on-one RCM Program support, and automated data uploads by utilities benchmark reporting has substantially improved.

However, around half of agency buildings over 10,000 square feet are still not receiving an EUI. DES will continue to offer individualized training and support, and agencies need to make a

concerted effort to improve data accuracy and management, including appropriately training their data managers, to meet the requirements under state law and provide useful data.

Agencies must take action to eliminate data gaps and inaccuracies and should prioritize the regular use of ESPM as a powerful tool to help them plan for and improve energy efficiency in their managed buildings.

Finally, agencies will struggle to meet their reporting requirements under the Clean Buildings Law if their building portfolios and account set ups in ESPM remain inconsistent, which could result in significant penalties.

Recommendations

The Benchmarking Law does not hold agencies accountable for keeping account information up to date and does not account for the changing landscape of energy use and generation.

Without clean data, benchmarking reports are not effective tools to track building energy use or to assess Washington state government's building energy efficiency.

These data gaps and inconsistencies will make it difficult for agencies to comply with the Clean Buildings Law beginning in 2026. To meet the 2026 deadline, agencies must begin tracking compliance in 2025 to be able to provide 12 months of reported data in 2026.

DES makes the following recommendations to help improve account management and data reliability:

- **Ensure that data collection and management for the benchmarking program is consistent with data collection for the Clean Buildings Law.**
Policies and procedures, especially data management, for the Clean Buildings Law should be consistent with the benchmarking program.
- **Give clear expectations to state agencies on account maintenance.**
Each agency is responsible for governance of its ESPM program and must maintain its ESPM account and keep building information up to date.
- **Require a qualified RCM at each agency to manage the ESPM account.**
Each agency should have a qualified and trained Resource Conservation Manager (RCM) as the agency's data manager. While agencies can use vendors or administrative support from other staff to input data and make routine updates, a non-specialized data manager cannot replace the knowledge of a trained RCM familiar with the agency's buildings. The RCM should have in-depth knowledge of the agency buildings, building systems, energy systems, data management, and energy reduction plan. There is a substantial risk of misinterpretation of data and reports when relying on vendors or staff not trained in understanding building energy systems. Agencies without a qualified RCM can procure fee-based RCM services from DES.

Conclusion

While DES has made significant strides in helping agencies improve their ESPM knowledge of account management and building set up, training and data management clearly vary from agency to agency.

Washington state is currently implementing state energy performance standards under the Clean Buildings Law, and the benchmarking report reflects a starting point for state agencies when they start reporting performance standards. However, inaccurate data entry and building set up leads to inaccurate benchmarking making it difficult to truly track or improve building energy efficiency.

These same accounts will be the source of data used for the Clean Buildings Law; therefore, success will rely on having an accurate starting point.

Acknowledgements

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Washington Department of Enterprise Services

References

- Washington State Benchmarking Law:
 - [Finding \(RCW 19.27A.130\)](#)
 - [Definitions \(RCW 19.27A.140\)](#)
 - [Strategic plan – Development and implementation \(RCW 19.27A.150\)](#)
 - [Residential and nonresidential construction – Energy consumption reduction – Council report \(RCW 19.27A.170\)](#)
 - [Energy performance score – Implementation strategy – Development and recommendations \(RCW19.27A.190\)](#)
 - [Qualifying public agency duties – Energy benchmark – Performance rating – Reports \(RCW 19.27A.200\)](#)
 - [State energy performance standards – Definitions \(RCW 29.27A.210\)](#)
- [U.S. Energy Use Intensity by Property Type](#)

Glossary

Benchmark

The energy used by a facility as recorded monthly for at least one year and the facility characteristics information inputs required for a portfolio manager.

Data Manager

Staff member responsible for accessing, updating, and maintaining an agency's ESPM account.

Energy Consumption Data

Monthly amount of energy consumed by a customer as recorded by the applicable energy meter for the most recent twelve-month period.

Energy Star Performance Manager (ESPM)

The Environmental Protection Agency's free energy management tool allowing users to securely track and assess energy consumption across a building or campus portfolio.

Energy Use Intensity

Measurement that normalizes a building's site energy use relative to its size. A building's energy use intensity is calculated by dividing the total net energy consumed in one year by the gross

floor area of the building, excluding the parking garage. It is reported as a value of thousand British thermal units per square foot per year.

National Energy Performance Rating

Score provided by the Energy Star program, to indicate the energy efficiency performance of the building compared to similar buildings in that climate as defined in the United States Environmental Protection Agency "ENERGY STAR® Performance Ratings Technical Methodology."

Portfolio Manager

United States Environmental Protection Agency's Energy Star Portfolio Manager or an equivalent tool adopted by the Department of Enterprise Services.

Resource Conservation Manager (RCM)

Data manager focused primarily on conserving natural resources (water, electricity, natural gas, and all other energy sources) through infrastructure efficiency improvements, maintenance and operations, and behavior change campaigns.

Resource Conservation Manager Program (RCM Program)

Program at the Department of Enterprise Services that provides education and trouble-shooting support to agency ESPM data managers.

Appendices

Appendix A

Energy Use Intensity and Energy Star Score for Buildings over 10,000 square feet

