

Clean Buildings Workgroup Report to the Legislature

A collection of recommendations from building owners and managers and other key stakeholders to ensure successful implementation of the Clean Buildings Law, per the 2023-2025 Washington State Capital Budget

November 12, 2024

Report to the Legislature

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Executive summary

Overview

The Washington State Legislature passed the Clean Buildings Law in 2019 (SHB 1257; Chapter 285, Laws of 2019) to create an energy performance standard for existing large buildings in Washington. The performance standard is designed to secure energy efficiency and reduce greenhouse gas emissions from Washington's existing large building stock. It is a key policy to meet the state's statutory emissions limits established in 2020 and to implement the Washington 2021 State Energy Strategy.^{1,2}

The buildings sector is Washington's second-biggest carbon polluter behind transportation, accounting for 27% of statewide emissions. However, both private and public commercial buildings represent critical infrastructure supporting the economy in every legislative district across the state. Strategic investments to assist building owners and managers to comply with the Clean Buildings Law can help meet climate goals while improving community infrastructure, health, and real estate value.

Legislative mandate

In 2023, the Washington State Legislature passed a proviso directing the Washington State Department of Commerce (Commerce) to convene a workgroup to analyze the financial investments required for owners of Tier 1 covered buildings (that is – commercial buildings greater than 50,000 square feet) to comply with the state's Clean Buildings Performance Standard (CBPS) and to make recommendations to the Legislature to assist building owners in attaining compliance. There are approximately 8,000 tier 1 buildings in Washington.

The proviso can be found in Engrossed Substitute Senate Bill 5200, under Sec. 1017 for the Department of Commerce, 2023-25 Clean Energy Fund Program (40000294). The appropriation in this section is subject to the following conditions and limitations:

- (1)(a) \$500,000 of the appropriation in this section is provided solely for the department to convene a work group to:
 - (i) Analyze the financial investments required for owners of tier 1 covered buildings to comply with the state energy performance standard under RCW 19.27A.210; and
 - (ii) Make recommendations to the legislature to assist building owners in attaining compliance.

The proviso required Commerce to submit two deliverables to the Legislature. An analysis of financial investments was submitted by December 15, 2023, and this final report with recommendations is due by September 1, 2024. To support this process, Commerce contracted with SBW Consulting in partnership with Unrooz Solutions and 2050 Institute ("SBW team") in September 2023 to facilitate a Clean Buildings Workgroup (Workgroup) to review the financial analysis and make the recommendations to the Legislature.

A preliminary analysis of financial investments was conducted and included in the December 15, 2023 memo to better understand costs and other barriers to compliance with CBPS.³ The memo provides insight into the landscape of Tier 1 covered building types in Washington, the percentage of buildings that likely already comply with CBPS energy use intensity targets (EUI), and preliminary analysis of the financial investments required by non-complying buildings to meet their EUIs. This final report builds on the previous analysis

¹ [RCW 70A.45.020](#)

² [State Energy Strategy](#)

³ https://app.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=Preliminary%20Financial%20Impact%20of%20CBPS%20memo%20-%20final_80ad26b8-d3c7-46fd-85df-c38238bf003c.pdf

conducted for the fall 2023 preliminary analysis and presents a prioritized list of Workgroup recommendations, each including the rationale for the recommendation and implementation strategies.

Barriers

Building owners and managers face barriers to reducing energy use and emissions. While many of the barriers relate to implementing retrofits to upgrade their buildings, the Workgroup identified an array of other barriers connected to the whole process of calculating energy use, identifying potential upgrades, acquiring and maintaining internal staff to implement energy management plans and operations and maintenance programs, and recognizing other activities that are integral to delivering low energy, low emissions buildings.

For example:

- Building owners may not have enough data to guide energy efficiency work.
- Timelines may be unrealistic.
- Public institutions have specific budgeting requirements that may not align with CBPS needs.
- Leadership may struggle with compliance due to competing internal priorities, potential disruptions to tenants and key building services.
- The commercial sector market is difficult to predict and manage.
- Owners/managers may lack the internal capacity required to understand and implement the upgrades and maintain energy savings long term.
- Many public and some private institutions may be managing long lists of deferred maintenance, which also require significant resources, and some may face long wait times for equipment, rising prices, and a lack of workforce capacity.

In addition, building owners may lack the internal capacity required to understand and implement the upgrades and maintain energy savings long term. Both public and some private institutions may be managing long lists of deferred maintenance which also require significant resources, and some may face long wait times for equipment, rising prices, and a lack of workforce capacity.

Success factors

To help address barriers, the Clean Buildings Workgroup structured its recommendations around critical compliance success factors: **What are the essential conditions and support that determine whether building owners/managers can successfully comply with CBPS?**

- Key decision makers are aware of the legislation, see the value in compliance, and are supportive of the compliance journey.
- Owners/managers can benchmark their buildings and access energy audits affordably, on-time, and in a way that meets the needs of the legislation.
- Owners/managers can access loans, grants, bonds, and other sources of funding to cover the costs of compliance.
- Owners/managers can plan for and implement energy efficiency measures to meet compliance requirements on time.
- Once buildings are compliant with CBPS, building owners and managers can sustain the savings long term.
- Owners/managers have an appropriate level of staffing to achieve to maintain compliance.
- There is enough capacity in the market to meet both workforce demands and supply equipment.
- The various resources and legislation that impact building energy use in Washington are aligned and easy to access and understand.

Recommendations

Financial support and incentives

To achieve compliance via the EUI pathway or the investment criteria pathway, building owners and managers may need to implement energy saving measures. These capital expenditures will vary significantly from building to building but can be extensive. Energy saving measures will lead to cost savings over time, but some measures have long payback periods and building owners still need capital for the upfront investment. The first four recommendations are focused on unlocking financing for the financial investment required for compliance.

- **Recommendation 1:** Explore creative ways to unlock financing for all sectors.
- **Recommendation 2:** Increase the funds in programs that support CBPS compliance and reduce the barriers to accessing public funding opportunities.
- **Recommendation 3:** Assist utilities to support building owners with CBPS while following the conservation rules and standard practices set by the State Energy Independence Act.
- **Recommendation 4:** Enable funding mechanisms to make energy audits more cost-effective.

Organizational capacity and market development

Compliance requires more than implementing energy saving measures. Building owners and managers need to understand the legislation, measure their energy use, develop EMPs and O&M programs, and maintain savings over time. The following three recommendations aim to ease the challenges of compliance by focusing on building capacity within institutions and in the market, as well as reducing the complexity of navigating the legislation.

- **Recommendation 5:** Ensure public institutions have the human resources necessary for ongoing compliance.
- **Recommendation 6:** Develop a comprehensive CBPS program to holistically support all aspects of compliance.
 - **6a.** Develop comprehensive and interactive support tools.
 - **6b.** Invest in commercial sector market development.
 - **6c.** Expand outreach about CBPS and explore new outreach strategies.
- **Recommendation 7:** Develop the workforce capacity needed to deliver a low energy, decarbonized, grid integrated commercial building stock.

Regulatory and policy alignment

The final recommendations propose strategies to align Washington's existing goals, resources, and programs. These include adjusting CBPS to introduce new compliance pathways and enhance flexibility while maintaining alignment with the state's energy objectives. Additionally, a review of current legislation is recommended to ensure coherence across the regulatory landscape. Finally, the recommendations offer strategies to strengthen long-term grid resilience and create new opportunities for building owners.

- **Recommendation 8:** Adjust CBPS to better match the needs of building owners and managers.

- **8a:** Align and create more clarity on energy efficiency and greenhouse gas (GHG) emission reduction goals.
- **8b:** Develop additional new compliance pathways and tools.
- **Recommendation 9:** Ensure alignment between various pieces of existing legislation and CBPS.
- **Recommendation 10:** Incentivize building owners to transition their buildings and campuses into grid interactive assets.

Introduction

In 2023, the Washington State Legislature passed a proviso directing the Washington State Department of Commerce (Commerce) to convene a workgroup to analyze the financial investments required for owners of Tier 1 covered buildings – that is, commercial buildings greater than 50,000 square feet—to comply with the state’s Clean Buildings Performance Standard (CBPS) and to make recommendations to the Legislature to assist building owners in attaining compliance.⁴ There are approximately 8,000 tier 1 buildings in Washington state.

CBPS is designed to secure energy efficiency and reduce greenhouse gas (GHG) emissions from Washington’s existing large building stock. It is a key policy to meet the state’s statutory emissions limits established in 2020 and to implement the Washington 2021 State Energy Strategy.^{5,6}

The 2023 proviso required Commerce to submit two deliverables to the Legislature. An analysis of financial investments was submitted by December 15, 2023, and this final report with recommendations is due by September 1, 2024. To support this process, Commerce contracted with SBW Consulting in partnership with Unrooz Solutions and 2050 Institute (“SBW team”) in September 2023 to facilitate a Clean Buildings Workgroup to review the financial analysis and make the recommendations to the Legislature.

Preliminary analysis of financial investments was conducted and included in the December 15, 2023 memo to better understand costs and other barriers to compliance with CBPS. The memo provides insight into the landscape of Tier 1 building types in Washington, the percentage of buildings that likely already comply with CBPS energy use intensity targets (EUI_t), and preliminary analysis of the financial investments required by non-complying buildings to meet their EUI_ts.

This final report builds on the previous analysis conducted for the preliminary analysis in December 2023. It describes the Workgroup facilitation process and the financial analysis methodology, which included additional compliance cost analysis, a cost survey of Workgroup members, and case studies of six buildings to improve cost estimates. The report also presents an overview of key barriers to CBPS compliance as well as a list of compliance success factors identified by the Workgroup. The report concludes with a prioritized list of Workgroup recommendations, each including the rationale for the recommendation and implementation strategies. The appendix includes more detailed information on the methodology, results, and Workgroup input.

Background

Buildings are the most rapidly growing source of greenhouse gas emissions in Washington. The buildings sector is the state’s second-biggest carbon polluter behind transportation, accounting for 27% of statewide emissions.

The Washington State Legislature passed the Clean Buildings Law in 2019 (SHB 1257; Chapter 285, Laws of 2019) to create an energy performance standard for existing large buildings in Washington. The purpose of the law is to improve energy efficiency in new and existing buildings and to maximize reductions of greenhouse gas emissions from the building sector.

⁴ [Chapter 474, Laws of 2023](#)

⁵ [RCW 70A.45.020](#)

⁶ [State Energy Strategy](#)

Commerce was charged with establishing the standard through rulemaking and developing the administrative framework for building owners to document compliance with the law. Commerce established the Clean Building Performance Standard (CBPS) energy use intensity targets (EUI_t) in 2020 through a robust public process. The initial CBPS applied to commercial buildings greater than 50,000 square feet. These buildings are now referred to as Tier 1 buildings. Subsequent expansions to the Clean Buildings Law extended it to include Tier 2 buildings, which includes smaller commercial buildings greater than 20,000 to 50,000 square feet and all multifamily buildings greater than 20,000 square feet.

Tier 1 compliance dates are based on Tier 1 building size cohorts and begin in 2026, continuing through 2028. Energy use intensity (EUI) used for compliance must be measured in a 12-month period not to exceed two years prior to the compliance deadline. Compliance is a building owner’s responsibility and must be documented on a five-year compliance cycle. Commerce is required to update CBPS targets every five years. According to this schedule, the second cycle of CBPS targets will be updated in 2029 with compliance dates between 2031 and 2033.

Recommendation and strategy development methodology

The SBW Team, including SBW Consulting Inc., Unrooz Solutions, and the 2050 Institute, facilitated the Workgroup from November 2023 to July 2024. Workgroup members participated in one-on-one interviews, Workgroup meetings, and online and offline feedback tools in order to develop 10 recommendations and 57 strategies to support building owners and managers with CBPS compliance.

Workgroup limitations

Representatives of the public sector composed more than half of the Workgroup, and there was limited private sector representation as directed by the proviso language.⁷ To address this, private sector representatives were given additional opportunities to highlight key challenges and add context to the recommendations.

Phase 1: Understanding the barriers to compliance

The process began with one-on-one interviews to build trust and identify perceived barriers to compliance. These barriers were compiled, discussed, and refined through meetings, feedback, and surveys. The perceived barriers to compliance are presented briefly here, but each barrier has additional complexity which will be presented in the rationale for each recommendation.

Perceived barrier	Explanation
Data	Buildings may not have enough data to guide their energy efficiency work.
Timelines	Completing all the work necessary for compliance in the existing timeline may be unrealistic.
Awareness	Many building owners could still be unaware that the legislation exists.
Budgeting process	Public institutions have specific budgeting requirements that may not align with CBPS needs.
Costs	The costs of compliance may be unreasonable for building owners and managers, particularly amidst the commercial building market downturn.
Legislative overlap	Multiple pieces of legislation regulate building energy use and emissions.

⁷ The original composition of the workgroup included 13 public sector representatives, 5 private sector representatives, 2 utility representatives, and 2 non-profit representatives.

Perceived barrier	Explanation
Unreliable savings	Buildings may not reach the required EUI, even after a retrofit. Energy savings may be negated by the additional costs of compliance or may not appear to leadership due to rising utility costs.
Value proposition	Leadership may struggle with compliance due to competing internal priorities and potential disruptions to tenants and key services, and rising utility costs may make it difficult to account for savings.
Internal capacity	Institutions may lack the internal capacity required to understand and implement the upgrades and maintain energy savings long term.
Deferred maintenance	Many public institutions are managing long lists of deferred maintenance which also require significant resources.
Grant challenges	It may be difficult to access grants and incentives.
Supply chains / inflation	There are concerns about long wait times for equipment, rising prices, and a lack of workforce capacity.
Grid concerns	If electrification is required, there are concerns about grid capacity, energy costs, and resilience.
Old/unique buildings	These types of buildings can be very difficult to bring into compliance.

Phase 2: Identifying compliance success factors

In the second phase, the Workgroup reflected on key compliance challenges and explored existing resources to determine what was still needed to support Tier 1 building owners and managers. The key challenges from the barriers were reorganized into seven key compliance success factors, presented here. Each success factor was the focus of strategy brainstorming workshops.

Compliance success factor	Explanation
Awareness & leadership buy-in	Key decision-makers in buildings are aware of the legislation, see the value in compliance, and are supportive of the compliance journey.
Benchmarking & audits	Building owners and managers can benchmark their buildings and access audits affordably, on-time, and in a way that meets the needs of the legislation.
Financing	Building owners/managers can access loans, grants, bonds, and other sources of funding to cover the costs of compliance.
Retrofits & capital planning	Building owners/managers can plan for and implement energy efficiency measures to meet compliance requirements on time.
Sustained savings	Once buildings are compliant with CBPS, building owners and managers can sustain the savings long term.
Staff & market capacity	Building owners/managers have an appropriate level of staffing to achieve and maintain compliance; there is enough capacity in the market to meet both workforce demands and supply equipment.
Overall resource & legislative alignment	The various resources and legislation that affect building energy use in Washington are aligned and easy to access and understand.

Phase 3: Developing recommendations and strategies for each success factor

In the final phase of the Workgroup process, several workshops led to the development of 57 potential compliance strategies, which were distilled into ten high-level recommendations. These recommendations were refined through engagement with Workgroup members and external stakeholders and informed by the results of the financial analysis. Workgroup members were invited to score the recommendations and strategies; the results of this scoring process are presented in **Appendix B: Detailed Workgroup input**. The final recommendations offer a stakeholder-informed roadmap for supporting building owners and managers in both the public and private sector in compliance with the Clean Buildings Performance Standard.

All strategies and recommendations are intended to be actionable by the Washington State Legislature unless otherwise named within the strategy.

Financial analysis methodology and limitations

Regional

The financial analysis conducted for this work assessed the costs and benefits of energy efficiency measures throughout the lifetime of the measure for Tier 1 buildings. The scope of the analysis was limited to the energy use intensity target (EUI_t) compliance pathway and only included buildings meeting CBPS targets in their current condition or meeting CBPS targets through implementation of cost-effective measures. Assumed savings were amortized over a 20-year measure life for all measures.⁸ Building level data from the City of Seattle was used to estimate typical EUI compliance deficits and costs of compliance, since statewide data will not be available until after the first compliance cycle. Costs assessed included first-cost, operations and maintenance, and interest expenses. The outputs of the analysis provide a list of measures that a building owner could install to comply with CBPS EUI_ts.

Data sources included 2019 City of Seattle Energy Benchmarking data, 2021 Northwest Power Plan, Puget Sound Energy's 2023 Gas Integrated Resource Plan, United States Energy Information Administration (EIA) statewide commercial energy costs, and the Wall Street Journal's trailing 12-month average financing rate. The costs and benefits of measures in the council plan were estimated using the Power Council's ProCost software. All measures used in the analysis are "retrofits" to reflect higher incremental costs of equipment replacement. Retrofit measures do not include baseline costs of a "code equivalent" replacement. This approach does result in reduced savings potential from not including "major renovations/new construction" measures. The 2021 Power plan baseline model includes other regional planning benefits which were removed from this analysis to better reflect a consumer level cost test. Energy benefits were combined into kBtu to allow for both gas and electric measures.

Supply curves were created for buildings that would need to implement measures to comply with CBPS. Supply curves containing all applicable electric measures were created based on building activity types in combination (e.g., a building with a restaurant and an office would receive all measures for both use types). Lifetime costs included a discount of 3.75% based on ProCost Estimates, which includes a 2% inflation rate over the 20 year measure life. Energy costs also inflated at a rate of approximately 2% over the span of a

⁸ Note that the EUI_t compliance pathway is not limited to cost-effective measures while the investment criteria pathway only requires implementation of cost-effective measures. For more detailed information on the compliance pathways, see the materials in the CBPS Document Library, <https://www.commerce.wa.gov/growing-the-economy/energy/buildings-archive-page/clean-buildings-performance-standard-document-library/>

measure life. Measures were applied to each building as needed to meet the EUI for the building starting with the most cost-effective.

Cost survey

Based on Workgroup feedback following the presentation of the regional financial analysis, we developed a questionnaire for building managers and operators about non-retrofit costs, or operational costs. For the purposes of this work, we define “operational costs” to be expenses such as staff time for compliance planning including navigating resources for financial and technical assistance, soliciting and hiring third party service providers, benchmarking, conducting energy audits and measurement and verification (M&V), developing the O&M program and Energy Management Plan, and ongoing efforts to sustain compliance. These costs do not include expenses directly related to the planning, materials, and labor associated with capital retrofit projects being implemented for the purposes reducing energy use to comply via meeting the target or the investment criteria path. The cost survey questionnaire is provided in **Appendix A: Financial analysis under Cost Survey Protocol**.

We assembled a list of approximately 50 benchmarked Tier 1 buildings from the state catalog, exports from Commerce’s Energy Star Portfolio Manager (ESPM) account, and Clean Buildings Accelerator program participants. We sent the cost survey to each of the unique organizations in the list primarily via the Property Data Manager (PDA) provided in Energy Star Portfolio Manager or the Workgroup member. We also sent the cost survey to Workgroup members.

From these responses, we recruited buildings into our case studies and analyzed the operational costs, particularly compared to the retrofit costs and penalties for non-compliance. Anonymized, detailed responses are provided in the **Appendix A: Financial analysis**. It is important to keep in mind the following characteristics of the survey responses:

- The building data available for compiling the list of organizations that the cost survey was sent to is not representative of Tier 1 buildings, and further limiting the representativeness is the disposition of the survey respondents, which were heavily skewed to public sector, particularly community colleges.
- The starting list came primarily from benchmarked buildings, which is likely a small percentage of Tier 1 buildings in the state outside of Seattle. Benchmarked buildings are more likely professionally managed. Buildings that have not been benchmarked and/or are not professionally managed are likely to be farther behind in understanding the costs and resources associated with compliance and may face higher costs than reported through the survey.
- Even among Seattle’s benchmarked buildings, the organizations are often not far along in the process of compliance planning and provided ballpark estimates of costs in most cases.⁹ In many cases these organizations did not provide a response to a question if they had not estimated that cost yet.
- Organizations made different assumptions about what to include in the costs they provided, e.g., whether to include the costs of recruiting or training staff or outsourcing to contractors, ongoing costs in addition to first year costs, etc. Furthermore, we were not able to verify the provided costs, i.e., they are self-reported.

Case studies

The purpose of the case study analyses was to refine our preliminary financial analysis and improve estimates of compliance costs. We identified six buildings across Washington for in-depth analysis, aiming to represent a diverse range of Tier 1 buildings. For this task, the SBW team consisted of SBW engineers and

⁹ An exception is that some of the community colleges are much farther along and were able to provide more realistic cost estimates.

engineers subcontracted for their expertise in conducting energy audits, estimating costs, and aiding customers in CBPS compliance.

We chose buildings from our cost survey responses, considering geographic region, floor area, percentage EUI over target, and building type. Despite efforts to ensure diversity, this small sample is not comprehensive and is not representative of all Tier 1 buildings.

Of the six buildings, four were recruited from survey responses. With the given budget, we were able to analyze the top three energy-saving measures per site. It is important to note that the three measures may not be sufficient for the sites to meet EUI targets. Due to low survey response rates, an additional two buildings were recruited from Workgroup participants. For the two buildings recruited from the Workgroup, we used existing measure analyses for these sites. For those two sites, one implemented two measures in their building, and the other implemented a single whole-building measure.

For each of the six buildings, we:

- Held initial calls with site staff.
- Conducted on-site data collection visits.
- Identified the top three measures for analysis.
- Estimated energy savings and costs for each measure.
- Estimated non-measure compliance costs.
- Determined the cost-effectiveness of each measure.

We provided regular updates to the Workgroup, culminating in a presentation of findings on June 26, 2024.

Limitations

The limitations of this study should be carefully considered when interpreting the results. Here are some key limitations to highlight:

Sample size and representativeness

The case study sample of six buildings is extremely small and not statistically representative of the broader population of Tier 1 buildings. While efforts were made to select diverse buildings, the results cannot be generalized to all Tier 1 buildings. Each building is unique in terms of its characteristics, energy usage patterns, and potential for improvements. The City of Seattle benchmarking data used for the supply curve retrofit cost analysis also may not be an adequate representation of statewide buildings. Additionally, the number of operational survey respondents was also not a representative sample. Several Workgroup members explained that they were not far enough in their compliance efforts to provide reliable responses to the operational cost survey.

Measure selection and analysis

Only the top three energy-saving measures were identified and analyzed for each case study site due to budget constraints. This limited scope means that the analyzed measures may not be sufficient to bring buildings into compliance with their EUI targets. Additionally, other potentially cost-effective measures were not evaluated.

Data collection challenges

Four buildings were recruited from survey responses, and two were recruited from Workgroup participants due to low customer response. For the two Workgroup participant buildings, existing measure analyses were used, with only one or two measures implemented, further limiting the data.

Cost estimation limitations

Operational costs are one-time costs, not amortized over time. There are inconsistencies in how costs were estimated across sites – some provided full costs while others provided estimated incremental costs.

Public sector bias

The data collected for the financial analysis may have an overrepresentation of public sector buildings, similar to the Workgroup itself, which potentially skews the findings.

Scope of analysis

This study provides indicators and examples of costs and savings, rather than a comprehensive measurement. The results should be viewed as illustrative case studies rather than definitive cost data for compliance.

Inflation rates

Workgroup members expressed concerns about electricity costs rising at a faster rate than 2% inflation. A higher inflation rate for electricity costs would increase the cost saving benefits of energy saving measures. These increased benefits would be somewhat offset by rising costs of materials and labor. Rising electric energy costs could also discourage electrification and mean that building owners and managers see rising overall utility bills even after implementing energy saving measures.

Recommendations: Financial support and incentives

To achieve compliance via the EUI pathway or the investment criteria pathway, building owners and managers need to implement energy saving measures. These capital expenditures will vary significantly from building to building but can be extensive. Energy saving measures will lead to cost savings over time, but some measures have long payback periods and building owners still need capital for the upfront investment. The first four recommendations are focused on unlocking financing for the financial investment required for compliance.

- **Recommendation 1:** Explore creative ways to unlock financing for all sectors.
- **Recommendation 2:** Increase the funds in programs that support CBPS compliance and reduce the barriers to accessing public funding opportunities.
- **Recommendation 3:** Assist utilities to support building owners with CBPS while following the conservation rules and standard practices set by the State Energy Independence Act.
- **Recommendation 4:** Enable funding mechanisms to make energy audits more cost-effective.

All strategies and recommendations are intended to be actionable by the Washington State Legislature unless otherwise identified.

Financial analysis results - Capital costs

Total costs and energy use from the proposed case study projects were analyzed in a modified 2021 NWPPCC Power Plan model and Commerce's LCCA tool (version 3.25.24).

The following summarizes key differences between the two approaches:

2021 Power Plan Model

- Uses a Total Resource Cost Test (TRC).
- Calculates the ratio of lifetime cost benefits to be lifetime incurred costs.
- Considers measures with a cost-benefit ratio of 1.00 or higher as cost-effective.
- Provides a comprehensive view of long-term project value.

Commerce LCCA Tool

- Uses Savings-to-Investment Ratio for cost-effectiveness (both for individual measures developed from audits and for the optimized measure bundle entered into form F).
- Deems an optimized bundle of measures cost-effective if their saving-to-investment ratio is greater than or equal to 1.00.
- Study period is based on longest measure life.

Key findings

Our analysis found the cost-effectiveness metrics between the tools used yielded mostly similar outcomes,¹⁰ namely, that it may be challenging to find cost-effective bundles of measures to achieve adequate EUI reduction. Some measures in both analysis methods were cost effective even if the bundle for the building was not. Even though the EUI pathway does not require cost-effective measures, building owners will likely only implement cost-effective measures or seek financial assistance such as grants, incentives, or tax credits to that will reduce lifetime costs to be in line with lifetime benefits.

¹⁰ Both tools found two projects cost-effective, one they disagreed on, and both tools found three projects not cost-effective.

Figure 1 and Figure 2 show the output of the project cost effectiveness tools. Energy savings and total project upfront costs are on the primary y-axis (blue and red respectively), and cost testing results are on the secondary y-axis (green dots). The horizontal red line on each graph represents cost-effective measures, either above 1.00 for TRC in the first graph or below 12 years payback time in the second graph.

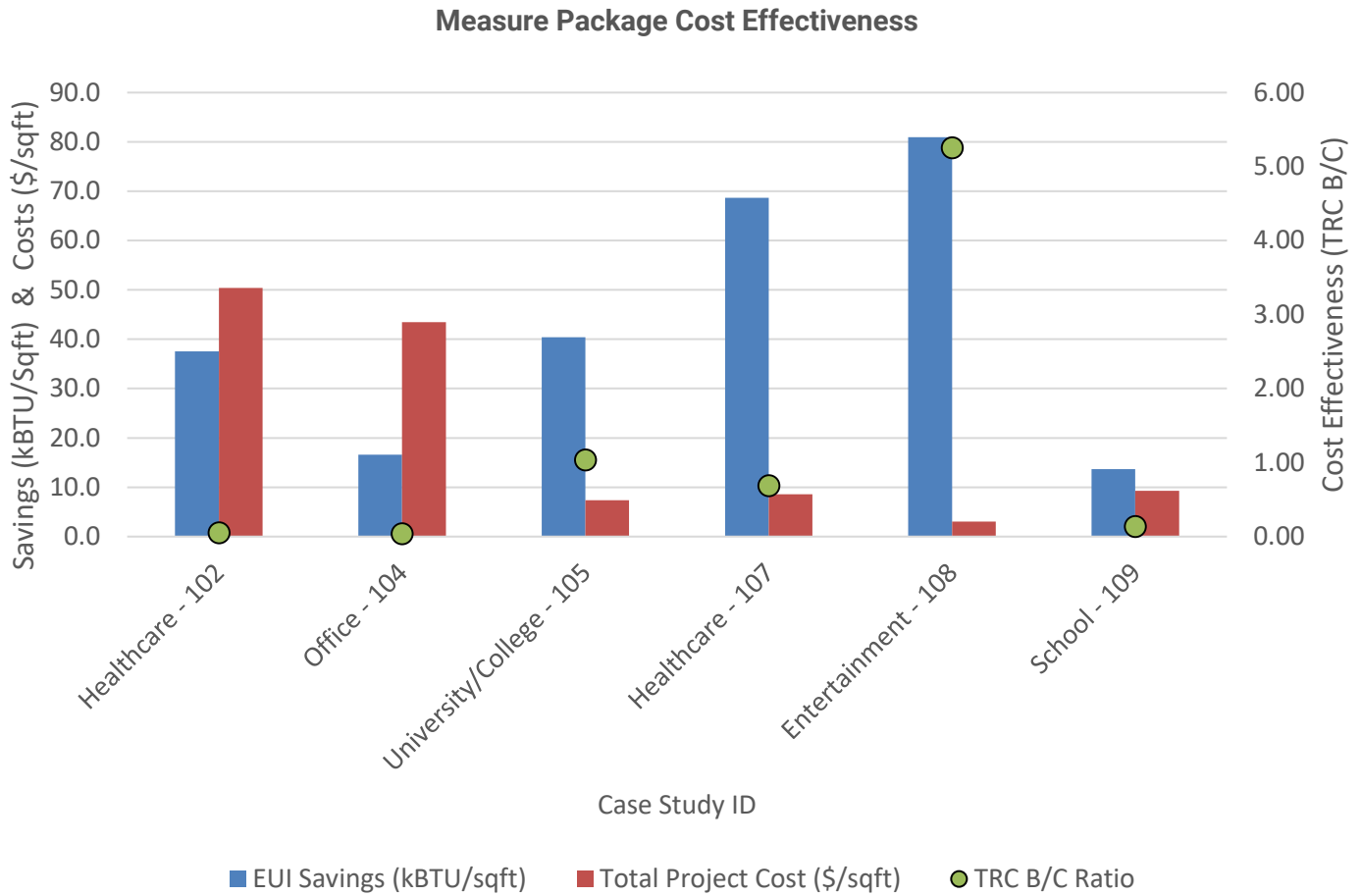


Figure 1: Case study results analyzed with 2021 NWPC Power Plan

Measure Package Cost Effectiveness

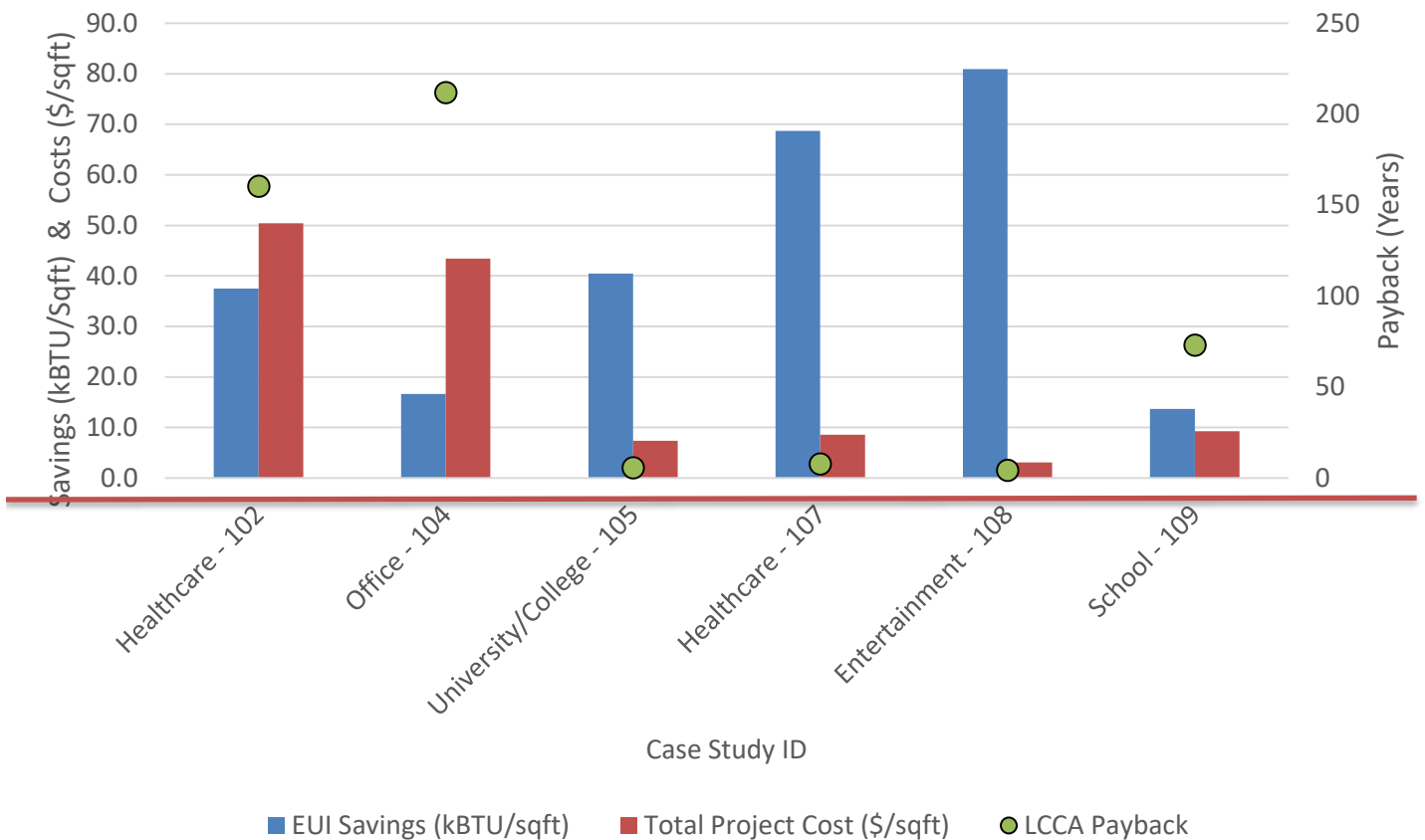


Figure 2: Case study results analyzed with Commerce LCCA tool

Recommendation 1: Explore creative ways to unlock financing for all sectors.

Rationale

Complying with CBPS creates new costs for building owners and managers. Some are one-time costs like developing the O&M plan, or may be required once per compliance cycle, such as energy audits and retrofits. Other costs will be ongoing, such as implementing and maintaining the O&M Program and EMP. The Workgroup proposed several strategies to facilitate both the public and private sector access to new financing tools such as market development, green revolving funds, and clarity on public budgeting processes.

The commercial real estate market is facing a uniquely challenging downturn due to COVID-19 and the ongoing shift to remote work. King County Assessor John Wilson expects commercial building values in downtown Seattle to drop by 35-40% in 2025.¹¹ Nationwide, \$1.5 trillion in commercial loans are due for refinancing before the end of 2025,¹² and in a high-interest rate environment. Long lasting and higher vacancies, lower building values based on lower long-term leases at reduced rates, and the timing of refinancing are all leading

¹¹ <https://www.kuow.org/stories/downtown-seattle-office-values-are-dropping-like-overripe-plums-that-s-not-all-bad>

¹² <https://www.bloomberg.com/news/articles/2023-04-08/a-1-5-trillion-wall-of-debt-is-looming-for-us-commercial-properties?embedded-checkout=true>

to loan defaults and bankruptcies which exacerbate banking turmoil. CBPS is an additional capital expense on top of many competing priorities, and so additional funding sources are needed to support private building owners.

Commercial Property-Assessed Clean Energy and Resilience (C-PACER) and Energy Efficiency as a Service (EEaS) models are examples of innovative financing options, but Workgroup members were clear that there is no one-size-fits-all solution. A combination of strategies should be employed to reach different building types.

While there are cost-saving benefits to energy efficiency, rising utility costs can make it harder to account for savings year over year as utility bills may remain the same or even increase despite reduced energy usage. Additional efforts to increase the value proposition of energy efficiency projects through grant funding, creative financing options, and public sector budgeting guidance can encourage compliance and increase buy-in to CBPS.

In the public sector, public budgeting processes are not well aligned with the pace and scale of funding required for compliance. Budgets are created every two years, along with 10-year capital plans. These timelines provide little flexibility for responding quickly to CBPS requirements, specifically in the first cycle of compliance. The capital management plan included in the EMP lays out the groundwork necessary to manage future budgeting considerations related to CPBS compliance. Retrofit costs are funded from capital budgets, while savings appear in the O&M budget. Auxiliary service buildings will need public funding to cover the costs of compliance. Bond limits can reduce the public sector’s ability to use debt-based financing opportunities. Additional guidance, and direction to the Office of Financial Management (OFM) for approving CBPS related costs, can support public sector compliance.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
1.1	OFM should clarify that green revolving funds are permitted in public institutions, and how they can be structured.	Public sector	Budgeting process
1.2	OFM should clarify payback mechanisms for rebates/grants, and tax incentives such as the 179-D tax deduction, so public institutions know how exactly a grant will impact their budget and know whether funds go to the institution or the state.	Public sector	Grant challenges, budgeting process
1.3	Share successful models of C-PACER to demonstrate the value of this kind of financing for CBPS compliance.	All sectors	Costs
1.4	Educational materials should be developed by the Washington Green Bank and promoted by Commerce to educate building owners about green revolving funds.	All sectors	Budgeting process
1.5	Investigate the potential benefits and barriers of energy as a service for privately owned buildings and recommend pathways to develop the market for energy service agreements to support CBPS compliance.	Private sector	Costs
1.6	Allow non-profits to access the same state-led CBPS funding opportunities as the public sector.	Non-profits	Costs
1.7	Lower the bond approval for schools to 50%.	Public sector	Costs, grant challenges

	Strategy	Potential beneficiary	Barrier(s) addressed
1.8	Accelerate the C-PACER market by promoting market awareness, consistency, economies of scale and interconnectivity with policies and programs such as the energy code, utility programs, and market transformation programs.	All sectors	Costs

Recommendation 2: Increase the funds in programs that support CBPS compliance and reduce the barriers to accessing public funding opportunities.

Rationale

Compliance with CBPS may involve significant spending by building owners and managers. Costs include energy saving measures, but there are also additional compliance costs which are not immediately reflected in energy savings such as measuring energy use, completing paperwork, and undertaking energy audits. While building owners and managers will enjoy the benefits of improved energy efficiency, they must first contend with upfront costs. To maximize compliance, unlock the individual and societal benefits or energy efficiency, and avoid undue burden on individual building owners and managers, existing state funding opportunities should be increased. Public funding opportunities should also be made available to the private sector. Existing resources can be better promoted and made easier to access to reduce the administrative burden for accessing grants and support.

If the costs of compliance are entirely passed on to building owners and managers, there are potential consequences in both the public and private sectors. In the public sector, service delivery may be impacted, or service fees (such as tuition) may rise to cover the costs.

In the private sector, the impacts will vary based on the leasing structure. In buildings with long term triple net leases,¹³ costs will be borne by the tenants who are typically obligated to make repairs to meet government mandates. These costs will affect businesses big and small. For buildings with short-term triple net leases, costs will be borne by in-place tenants, by building owners for vacant spaces, and may be negotiated for new leases. Property value will decline to the extent that the owner is responsible for paying for improvements and to the extent that tenants reduce the rents they will pay for the building because of the required improvements. For buildings with other lease types, the building owner will typically bear the costs. Values may decline commensurate with the investment required. Reduced building values can then affect public sector budgets through reduced property tax revenues.

¹³ "Triple net rent model: The tenants pay all operating expenses, including property taxes, insurance and repairs and maintenance, either directly or by pass-through reimbursement to the landlord" ([NAIOP](#)).

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
2.1	Direct OFM to approve funding requests from public agencies that couple additional upgrades with compliance work in public institutions (ex. simultaneously address deferred maintenance and/or whole building upgrades along with CBPS compliance).	Public sector	Value proposition, deferred maintenance
2.2	Guarantee that public institutions will receive the funding they need to implement required upgrades through the investment criteria pathway.	Public sector	Costs, budgeting process
2.3	Appropriate public funding directly to agencies rather than being awarded as grants by Commerce. Grants for privately-owned buildings should be administered by Commerce.	All sectors	Costs, grant challenges, budgeting process
2.4	Should the public vote to maintain the Climate Commitment Act, revenues should be allocated to support CBPS compliance for both public and private buildings.	All sectors	Costs, value proposition
2.5	Increase the funding in all Commerce programs that support compliance, especially the "Energy Efficiency Retrofits for Public Buildings" program and the "Energy Audit for Publicly-Owned Buildings" program.	All sectors	Costs, value proposition
2.6	Adjust the EUI requirement for the early adopter incentive to encourage applications and set reasonable EUI requirements across different building types.	All sectors	Costs, grant challenges
2.7	Increase the amount of funding in OSPI Small District Energy Assessment Grant program.	Public sector	Costs

Recommendation 3: Assist utilities to support building owners with CBPS while following the conservation rules and standard practices set by the State Energy Independence Act.

Rationale

Utilities have existing expertise in delivering energy efficiency programming, and connections with their customers across the state. They have access to customer data (though there can be challenges in transferring data from the customer level to the building level) and are familiar with state legislation and resources. Overall, utilities are well positioned to offer CBPS support programs. The state can provide additional resources and guidance to expand both the number of utilities which are offering support, and the depth of offerings from each utility, while following the conservation rules and standard practices set by the State Energy Independence Act.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
3.1	Engage with qualifying utilities that are required to provide building owners utility data via ESPM to identify barriers, case studies of successful approaches to providing ESPM data, and to explore methods to provide support to assist utilities in converting their systems.	All sectors	Data
3.2	RCW 19.27A.170 – In section (8) change “For any covered commercial building with three or more tenants” to include “or for any covered buildings required to comply with state or local laws or mandates”.	All sectors	Data

	Strategy	Potential beneficiary	Barrier(s) addressed
3.3	Collaborate with Bonneville Power Administration to help public utilities develop and implement compliance support programs, leveraging economies of scale for greater efficiency and cost-effectiveness.	All sectors	Various
3.4	Study the resources required for utilities to provide ESPM automated upload and the resources available to non-qualifying utilities under RCW 19.27A.170 – Sections (2) and (7), to determine if and how this requirement should be modified. The state should then implement the findings of this study.	All sectors	Data
3.5	Explore methods to reduce the technical and cost barriers of entry to these programs by enabling data sharing between utilities and between utilities and state; encouraging regional organizations like BPA and NEEA to provide services to a wide range of utilities thus reducing cost and risk; and exploring a state-level contract whereby utilities can opt into programs like accelerators, thus reducing cost and risk.	All sectors	Various
3.6	Provide funding to utilities to provide CBPS support, such as accelerator programs and rebates.	All sectors	Various
3.7	Establish a utility grant to establish revolving door loan/financing options.	All sectors	Costs

Recommendation 4: Enable funding mechanisms to make energy audits more cost-effective.

Rationale

An energy audit can be the first step to making smart investment decisions that ensure building owners maximize the benefits of compliance and are able to reach compliance in time. An energy audit is required if building owners and managers choose the investment criteria pathway for compliance; however, a full ASHRAE Level 2 energy audit can be cost prohibitive. Making energy audits more accessible would support not only CBPS compliance in the Tier 1 commercial building sector, but the entire built environment in Washington. The Workgroup suggested some strategies to make audits easier and more cost effective, but additional strategies for market development should be considered.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
4.1	Fund audits for non-profits.	All sectors	Data, costs
4.2	Make the cost of energy audits tax deductible.	All sectors	Data, costs

Recommendations: Organizational capacity and market development.

Compliance requires more than implementing energy saving measures. Building owners and managers need to understand the legislation, measure their energy use, develop O&M and EMP, and maintain savings over time. These aspects of compliance can be expensive and require ongoing human resources, whether from the existing building staff or external hires. The following recommendations are focused on building capacity within institutions and in the market, as well as reducing the complexity of navigating the legislation.

- **Recommendation 5:** Ensure public institutions have the human resources necessary for ongoing compliance.
- **Recommendation 6:** Develop a comprehensive CBPS program to holistically support all aspects of compliance.
 - **6a.** Develop comprehensive and interactive support tools.
 - **6b.** Invest in commercial sector market development.
 - **6c.** Expand outreach about CBPS and explore new outreach strategies.
- **Recommendation 7:** Develop the workforce capacity needed to deliver a low energy, decarbonized, grid integrated commercial building stock.

All strategies and recommendations are intended to be actionable by the Washington State Legislature unless otherwise identified.

Financial analysis results - Operational costs

Figure 3 shows average results from the operational costs of compliance survey. The regional supply curve estimated costs for a year of a commercial EMP are shown in the same chart for comparison to the EMP development cost collected in the survey. The intent of the survey was to estimate annualized compliance costs. When considered over a full compliance cycle, building owners may experience operational costs equivalent in magnitude to capital costs to the building retrofits, such as those observed in our cases studies and BOMA's study as shown in **Appendix A: Financial analysis under BOMA study comparison**. For example, challenges with benchmarking that lead to high costs for that requirement include staff or contractor time to survey the building(s) and identify space types and associated floor area, potential submetering costs, tenant space data collection, data quality review and cleaning, and ongoing maintenance to keep benchmarking data updated.

The full set of survey results can be seen in **Appendix A: Financial analysis**, under Tabulated Results.

Operations Costs

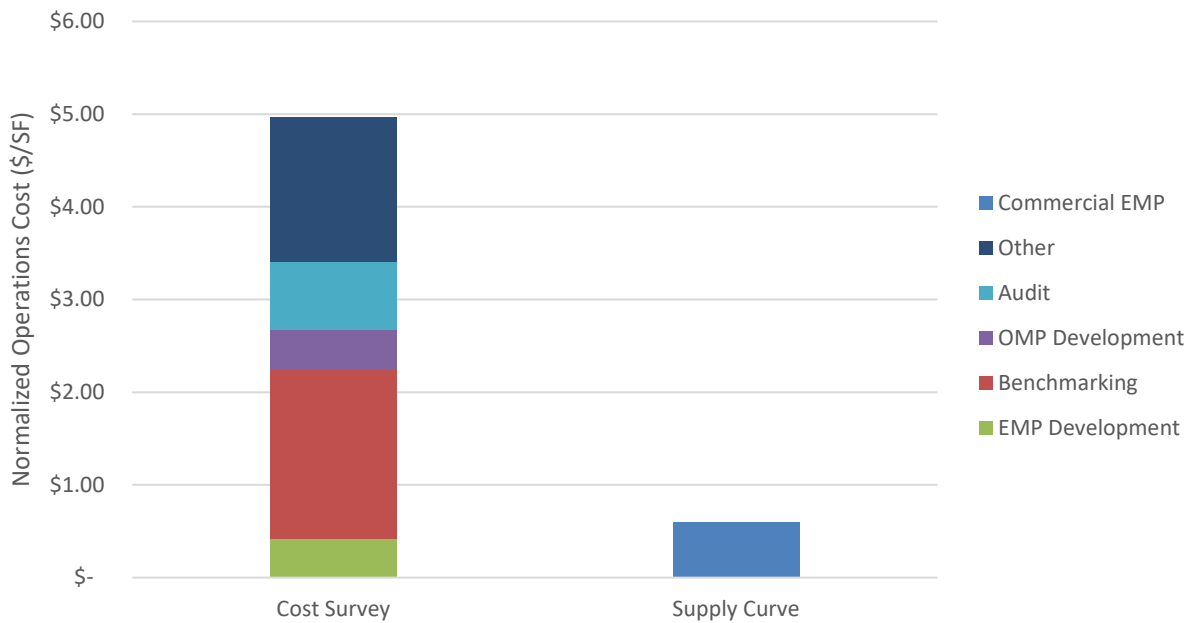


Figure 3: Operational cost data

Recommendation 5: Ensure public institutions have the human resources necessary for ongoing compliance.

Rationale

Compliance and maintaining compliance with CBPS requires more than capital. Obtaining and maintaining a high-performing building long-term requires ongoing capacity and knowledge. Human resources are needed to understand the law, measure, and monitor energy use, develop, and manage energy efficiency projects, submit compliance paperwork, and more. Retrocommissioning¹⁴ was identified as an energy savings opportunity for several buildings in the case study's financial analysis. This reflects the propensity of a building's efficiency to drift over time if not properly managed. However, many organizations lack the capacity to maintain buildings in their intended working order long term. Well-staffed teams to manage building operations and maintenance can lead to greater occupant comfort, improved indoor air quality, energy savings, and more. This can be achieved by both increasing staffing levels, and by reducing unnecessary demands on existing staff.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
5.1	Increase pay scales in public institutions to be competitive with private sector compensation, including pay rates for contractors.	Public sector	Internal capacity

¹⁴ Retrocommissioning is a process that seeks to improve how building equipment and systems function together. Depending on the age of the building, retrocommissioning can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life. [Building Commissioning: Definition \(lbl.gov\)](https://www.lbl.gov/Building-Commissioning-Definition/)

	Strategy	Potential beneficiary	Barrier(s) addressed
5.2	Require that public institutions have an energy manager or resource conservation manager and provide ongoing state funding for the position.	Public sector	Internal capacity, sustained savings
5.3	Provide guidance to public institutions how to budget for CBPS: O&M vs capital budgets, accounting for savings, prioritizing energy efficiency in budgets, grant payback mechanisms, etc.	Public sector	Budgeting processes
5.4	Create dedicated energy teams within each state agency to support energy efficiency work generally and CBPS compliance.	Public sector	Internal capacity, sustained savings
5.5	Review RCW 28A.150.260 to determine if minimum staffing allocations need to be adjusted due to increased staffing needs from CBPS.	Public sector	Internal capacity

Recommendation 6: Develop a comprehensive CBPS program to holistically support all aspects of compliance.

Sub-recommendations:

- A. Develop comprehensive and interactive support tools.
- B. Invest in commercial sector market development.
- C. Expand outreach about CBPS and explore new outreach strategies.

Rationale

The Clean Buildings Performance Standard presents a significant regulatory change for Washington's built environment. The level of knowledge and capacity that each building owner and manager has regarding energy efficiency varies. Commerce should provide a comprehensive and well-resourced support program that addresses all aspects of compliance, such as benchmarking, submetering, data measurement, and developing an EMP and an O&M program.

The first barrier to compliance is becoming aware of the legislation. While Commerce has used several strategies to reach building owners and managers, including physical letters, webinars, and outreach through partners, the Workgroup is concerned that many building owners and managers may still be unaware of their obligations under CBPS. Some building owners and managers may be aware of the requirements but underestimate the importance of compliance and the possible consequences of non-compliance. The Workgroup proposed several new strategies to support outreach to those who may have missed previous communications.

Once they are aware of the legislation, building owners and managers need to understand the law, explore their pathways to compliance, and identify resources available to support them. Commerce has developed guides, a document library, workshops, and more, which already exist to support building owners and managers with compliance. Members of the Workgroup expressed that having even more comprehensive and responsive tools to navigate compliance could ease the compliance burden.

The private market can deliver much of the expertise and demand needed to drive widespread compliance. Making technologies more affordable and accessible, aligning state strategies around CBPS, and creating market demand for energy efficient real estate can all drive resources into energy efficiency. These benefits can also have impacts beyond Tier 1 buildings, and even beyond the commercial sector, by driving widespread investment into energy efficient solutions.

Data access can also be a challenge, particularly in buildings without adequate metering, or buildings where lease arrangements limit the building owners' access to energy use data. Some strategies for supporting submetering are presented. However, submetering is not always the best choice as it requires ongoing maintenance and can be expensive. Other strategies include reducing barriers to accessing energy audits and examining the investment criteria pathway to make it a more appealing option for building owners and managers who do not have the data needed to follow the EUI pathway.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
6.1	Increase funding available to support building owners and managers with metering, including utility meters to measure energy use at the individual building level and submeters to measure separate end uses within buildings.	All sectors	Data
6.2	If support for sub-metering is provided to public institutions, it should be coupled with longer-term funding to maintain the meters and ensure data collection is continuous and accurate.	Public sector	Internal capacity, data
6.3	Create a more robust and comprehensively staffed Help Desk.	All sectors	Internal capacity
6.4	Create a dedicated online tool to help decision-makers navigate CBPS requirements. The tool should cover: specific regional needs, comparison with other requirements such as Seattle's BEPS, and should match the user with any available resources that apply to their building. The tool should also present how resources can be combined, such as with conservation programs, renewable programs or EV supports.	All sectors	Internal capacity
6.5	Target outreach and training about CBPS to tenants and key financial and leadership decision makers.	All sectors	Value proposition, awareness
6.6	Provide leadership and coordination at all levels to align everyone around CBPS: equipment manufacturers, colleges and apprenticeships, utilities, OFM, etc.	All sectors	Various
6.7	Fund large-scale market transformation and cost compression efforts to remove barriers and accelerate adoption of the highest impact commercial retrofit solutions, such as rooftop unit heat pumps, dedicated outside air systems, ERVs, retrocommissioning, onsite solar, strategic sequencing, etc.	All sectors	Costs, value proposition, supply chains
6.8	Develop a cost sharing model for third party benchmarking service.	All sectors	Data, costs
6.9	Expand physical presence for outreach about CBPS.	All sectors	Awareness
6.10	Offer grant funding for cities to hire dedicated staff to promote and educate on CBPS.	All sectors	Awareness

Recommendation 7: Develop the workforce capacity needed to deliver an energy efficient commercial building stock.

Rationale

To achieve widespread compliance, it is essential to have a well-trained workforce capable of implementing energy efficiency measures and maintaining savings. CBPS compliance may require both capital projects to reduce energy use and the development, implementation, and ongoing maintenance of an EMP and an O&M program. Capital projects will require cyclical increases in staffing demands, while the ongoing requirements may increase staffing needs long term. Workgroup members have reported challenges in finding and retaining qualified staff, as well as difficulties in hiring external contractors at reasonable rates across the state. Workforce development efforts must keep pace with the growing demand for energy-efficient buildings.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
7.1	Explore creative strategies to increase the number of BOC 2 certified individuals, such as a scholarship program.	All sectors	Internal capacity
7.2	Fund energy fellows across Washington.	All sectors	Internal capacity, costs

Recommendations: Regulatory and policy alignment

The final recommendations propose strategies to align Washington's existing goals, resources, and programs. These include adjusting CBPS to introduce new compliance pathways and enhance flexibility while maintaining alignment with the state's energy objectives. Additionally, a review of current legislation is recommended to ensure coherence across the regulatory landscape. Finally, the recommendations offer strategies to strengthen long-term grid resilience and create new opportunities for building owners.

- **Recommendation 8:** Adjust CBPS to better match the needs of building owners and managers.
 - **8a:** Align and create more clarity on energy efficiency and GHG reduction goals.
 - **8b:** Develop additional new compliance pathways and tools.
- **Recommendation 9:** Ensure alignment between various pieces of existing legislation and CBPS.
- **Recommendation 10:** Incentivize building owners to transition their buildings and campus into grid interactive assets.

All strategies and recommendations are intended to be actionable by the Washington State Legislature unless otherwise indicated.

Recommendation 8: Adjust CBPS to better match the needs of building owners and managers.

Subrecommendations

- A. Align and create more clarity on energy efficiency and GHG reduction goals.
- B. Develop additional new compliance pathways.

Rationale

There have been ongoing and comprehensive efforts to update CBPS through rulemaking and engagement, resulting in important additions and changes. The Workgroup has expressed that there are still opportunities to better align the needs of building owners and managers with the details and intent of the law. Small adjustments, particularly in the early compliance cycles, can provide options for building owners and managers who intend to comply with the law but need additional time or flexibility.

Additional compliance pathways can offer building owners and managers much-needed flexibility, particularly in early cycles as building owners and managers are learning about the legislation and developing O&M and EMP programs for the first time. For example, building owners and managers in the commercial real estate market may need additional flexibility as they navigate a difficult real estate market due to COVID-19 and high office vacancy rates. Building owners and managers may also need flexibility to ensure that key service delivery is not disrupted, such as housing prisoners securely, students attending classes, and life science and medical research.

The CBPS offers three pathways to compliance, including compliance through exemption, meeting the EUI, and the investment criteria pathway. The Workgroup proposed several new pathways to compliance which could ease administrative burdens, extend deadlines, and recognize unique extenuating circumstances. These changes could bring more buildings into compliance while still maintaining the intent of the law.

Workgroup members also recognize the longer-term state trajectory towards decarbonization which is not currently reflected in CBPS. Building owners and managers would like to have greenhouse gas emissions reductions recognized and supported within their buildings. At the same time, they have concerns about grid capacity and grid resilience which should be addressed to ensure building owners can make thoughtful long-term investments, even in early compliance cycles. In some parts of the state, electricity is currently more expensive than natural gas, so fuel switching may increase ongoing operating costs.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
8.1	Establish future EUIs to provide a clear investment pathway, allow buildings owners and managers to undertake long term planning, and to help drive market innovation.	All sectors	Various
8.2	Allow a building owners to request an extension if they are waiting for equipment with long lead times.	All sectors	Supply chains/ inflation
8.3	Allow building owners to request an extension if they have begun but not completed their upgrade work or their measurement and verification.	All sectors	Timelines
8.4	Streamline and add flexibility to the conditional compliance pathway.	All sectors	Various
8.5	Create specific long-term energy efficiency, GHG reduction, and other performance related goals for CBPS and establish flexible compliance paths that allow buildings to integrate multiple behind-the-meter strategies, not only energy efficiency, to demonstrate CBPS compliance.	All sectors	Legislative overlap
8.6	Allow building owners to set an EUI based on a percentage reduction in their current EUI as an alternative to prescribed EUI targets.	All sectors	Various
8.7	Accept compliance with equivalent legislation.	All sectors	Various
8.8	Allow building owners to request an extension if they can implement the EMP and O&M but need additional time to meet the performance metric.	All sectors	Timelines
8.9	Study the investment criteria pathway to determine how the pathway can be streamlined or improved.	All sectors	Various

Recommendation 9: Ensure alignment between various pieces of existing legislation and CBPS.

Rationale

Workgroup members said that a growing number of policies, laws, and standards are determining how to manage the built environment, but they do not necessarily align and are increasingly difficult to navigate. Building owners are aware of the policies and plans such as the State Energy Strategy, Seattle’s Building Emissions Performance Standard, the Washington Sustainable Schools Protocol, and the Climate Commitment Act. CBPS upgrade work can also trigger compliance with the State Energy Code if the work is considered a substantial alteration. Working towards better alignment between these pieces of legislation can reduce administrative burdens and ensure resources are focused on achieving energy savings.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
9.1	The Department of Ecology should study refrigerant phase-outs to determine whether the pace of phase-outs is impacting CBPS compliance.	All sectors	Overlapping legislation
9.2	Get rid of LEED standard requirement for state buildings (RCW 35.39D).	Public sector	Overlapping legislation
9.3	Fund the Department of Commerce to increase its participation in the energy code development process in order to identify and encourage alignment across the state energy code, CBPS, and utility programs.	All sectors	Overlapping legislation

Recommendation 10: Incentivize building owners to transition their buildings and campuses into grid interactive assets.

Rationale

Treating buildings like grid assets opens opportunities for building owners and managers, utilities, and the future of state energy planning. When buildings can store, share, and generate energy, while also responding in real time to grid demands to reduce energy loads, the grid becomes more resilient and building owners can unlock new revenue streams. Planning projects like this across multiple buildings will increase the load-management potential, making projects more appealing for utilities. However, state leadership is needed to undertake demonstration projects and coordinate the stakeholders needed to unlock these opportunities.

Strategies

	Strategy	Potential beneficiary	Barrier(s) addressed
10.1	Use the newly developing green bank to offer loans for large-scale projects which support buildings as grid assets (local power generation, energy storage and load flexibility).	All sectors	Costs, value proposition, grid concerns
10.2	Recognize and reward building owners who engage in grid-interactive energy planning (local power generation, energy storage and load flexibility) in CBPS compliance process.	All sectors	Costs, value proposition, grid concerns
10.3	Launch a workgroup between the Department of Commerce, the Utilities and Transportation Commission, and other key stakeholders to develop a strategy for grid resilience through interactive and inter-building energy planning (through local power generation, energy storage and load flexibility).	All sectors	Grid concerns
10.4	Work with utilities to undertake demonstration projects to show how buildings can act as grid assets at scale (local power generation, energy storage and load flexibility), to better understand the potential benefits to both building owners and utilities, especially within the context of CBPS compliance.	All sectors	Costs, value proposition, grid concerns

Appendix A: Financial analysis

Case studies

The following table summarizes the sites recruited for the case studies.

Case Study	Building Activity Type	Region	EUI	EUI Bin	Floor Area	Compliance Year
Case Study 1	Office Building	Central Puget Sound Area	72 kBtu/sqft	>50%	>220k sqft	2026
Case Study 2	Entertainment Facility	Western Washington	140 kBtu/sqft	>50%	90k-220k sqft	2027
Case Study 3	Hospital (Site is review)	Eastern Washington	272 kBtu/sqft	>50%	>220k sqft	2026
Case Study 4	Medical Office Building	Western Washington	113 kBtu/sqft	15%-50%	50k-90k sqft	2028
Case Study 5	College Science Building	Western Washington	148 kBtu/sqft	15%->50%	50k-90k sqft	2028
Case Study 6	Primary School	Eastern Washington	60 kBtu/sqft	<15%	50k-90k sqft	2028

The next table summarizes the top measures identified for the case study buildings.

Building Type	Proposed Energy Efficiency Measure	Measure Category	End Use	kBtu/sqft Savings	Measure Cost
Medical Office Building	1. VAV night setback	RCx	HVAC	8.0	\$153,404
	2. High-performance VAV system	RCx/Retrofit	HVAC	8.8	\$574,869
	3. Boiler to ASHP	Retrofit	HVAC	20.7	\$3,583,444
High Rise Office	1. EMS Upgrade	RCx	HVAC	1.7	\$2,700,000
	2. HVAC System VFDs	RCx/Retrofit	HVAC	9.1	\$575,005
	3. Heat Recovery Ventilation	Retrofit	HVAC	5.8	\$8,410,424
University (Lab Bldg)	1. Controls Retrocommissioning	RCx	HVAC	17.1	\$27,878
	2. Lab Fume Hood VFDs	RCx/Retrofit	HVAC	8.5	\$83,225
	3. Lab Demand Controlled Ventilation	Retrofit	HVAC	14.8	\$270,540
Hospital	1. VAV Conversion/Optimization	RCx/Retrofit	HVAC	63.2	\$1,714,933
	2. LED Lighting and Controls Retrofit	Retrofit	Lighting	5.5	\$841,362
Entertainment	1. Kitchen Hood Controls	RCx	HVAC	10.4	\$72,900
	2. Kitchen Hood Night Setback	RCx	HVAC	16.1	\$40,500

Building Type	Proposed Energy Efficiency Measure	Measure Category	End Use	kBtu/sqft Savings	Measure Cost
	3. Controls Retrocommissioning	RCx	HVAC	54.5	\$64,048
K-12 School	1. Boiler Upgrade / Building Controls Upgrade	RCx/Retrofit	Whole Building	13.7	\$495,846

Comparison with penalties

In addition to the results summarized above and described in detail in the case study memos below, the team also considered the penalties each building would face for non-compliance. We observed that the costs of compliance could be multiples of the fines. When the measure costs are combined with estimated operational costs, the total annualized net lifecycle costs are in the range of 2 to 20 times the fines for potential non-compliance penalties.

Also, note that the limited budget and time constraints on conducting the case studies prevented the team from considering financial assistance to offset the measure costs. The measure costs could be offset some if the sites participated in the state Early Adopter Incentive Program and/or utility programs or sought other financial assistance through grants or federal tax credits.

Medical Office Building - 102

To: Building Owner
From: Clean Buildings Team (SBW, Ecotope, UMC)
Subject: Medical Office Building Summary
Date: July 30, 2024

Site description

This Medical Office Building (MOB) is an 85,000 SF medical office building located in Vancouver, Washington. This building is heated year-round, with the baseload for natural gas around 32 kbtu/sf/yr. This is likely a combination of reheating the overcooled zones and domestic hot water (DHW) loads related to hot water usage and temperature maintenance. The electrical baseload is around 68 kbtu/sf/yr, comprised of lighting, plugs, fans, and miscellaneous loads.

The building is simultaneously heated and cooled when outdoor temps are between 54°F and 64°F. Temperatures below 54°F are dominated by reheat which is typical with variable air volume (VAV) systems. The temperatures above 64°F are dominated by cooling.

The controls and heat/cool setpoints in zones are likely causing a lot of simultaneous heating and cooling associated with how the zoning is arranged. The VAV system critical zones are driving the VAV operation to longer hours and reheating of the overcooled zones. There is upgrade work happening at this project, including replacing the aging boiler with a new variable capacity gas boiler.

This building's clean buildings target of 67 kbtu/sf/yr is going to take a lot of measures to get below this target. There is some uncertainty regarding the classification of this building as a medical office building (MOB). To better align the energy targets with actual usage, a weighted average is appropriate. A method for weighting is outlined in Washington State Clean Buildings Performance Standard integrated document section 7.2.3. For this case study, it is an appropriate strategy for building owners to account for spaces with Outpatient Surgery or Lab-like functions such as MRI and light surgery areas.

Current Stats

- Current EUI: 112 kbtu/sf/yr
- Current EUI_t: 67 kbtu/sf/yr
- Heated Floor Area: 85,856 SF

Billing analysis

Medical Office Building

Gas energy use intensity had an inversely proportional relationship with outside air temperature until outside air temperature reached 67 degrees Fahrenheit at which point its relationship with outside air temperature became constant. Electric energy use intensity was constant until outside air temperature reached 54 degrees Fahrenheit at which point its relationship with outside air temperature became proportional. See Figure 4 for billing analysis.

Annual Medical Office Building Energy Use by End Use

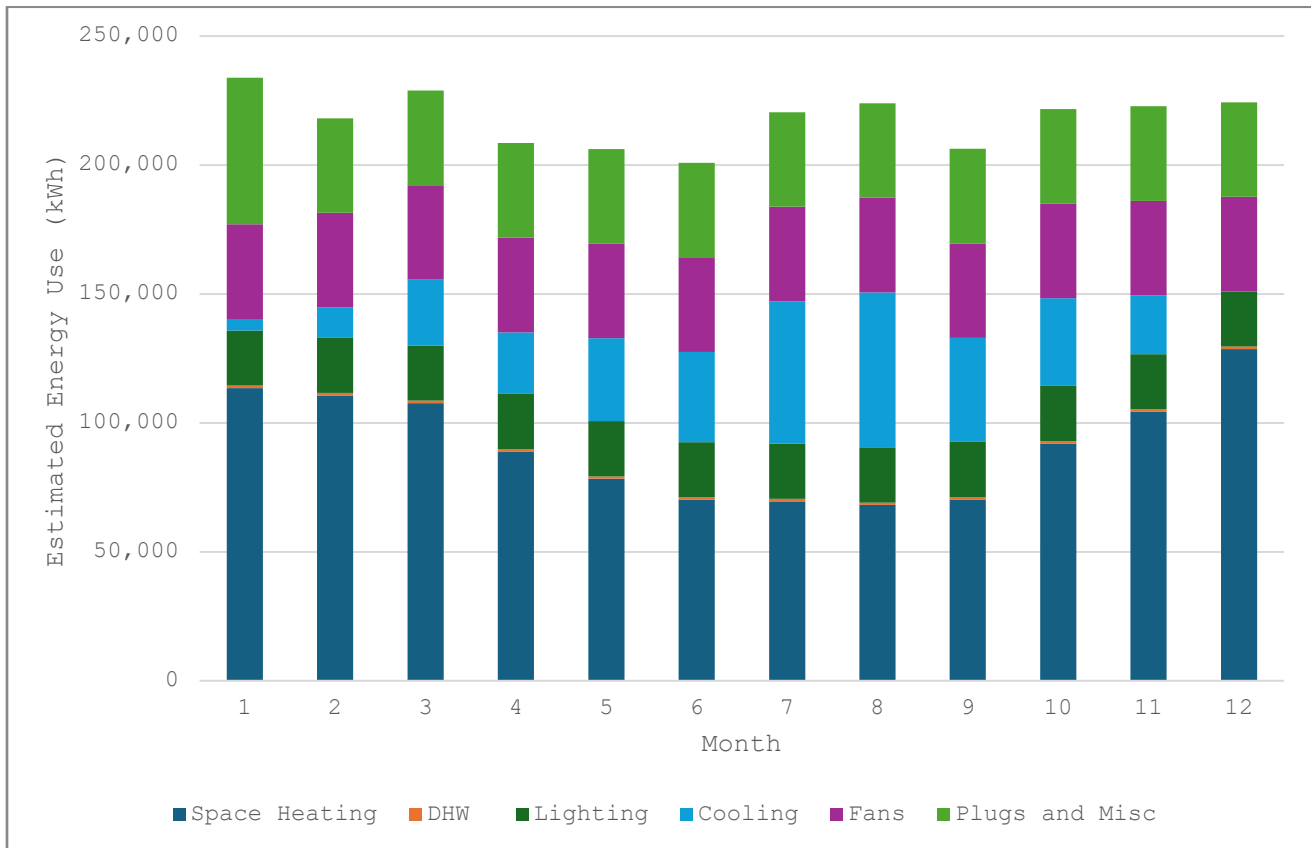


Figure 4: Annual energy use by equipment type for medical office.

Energy reduction measures

MEASURE 1: SETUP VAV MACHINES TO POWER OFF FOR OVERNIGHT SETBACK

- Investigate critical cooling zones for each of the air handling units (AHU's). Decouple VAV from critical cooling zones and install dedicated equipment for those zones. (Removing critical 24/7 cooling zones from central VAV is required in current energy code (WSEC C403.7, requirement 14)). Assume each AHU's critical zone will be reassigned, any zone that is driving cooling usage should add a ductless heat pump to handle cooling dominated zones and reduce primary air to those zones for ventilation.
- Assume four (4) ductless heat pumps are installed in all of the critical zones.
- Set up new critical zone for the AHU cooling system that has similar load profiles.
- Implement VAV temperature reset so that critical zone is not driving overcooling in the other zones and forcing reheating year-round.
- Swap out gas range standing pilots for electronic ignition starters that allows the gas pilots to be turned off overnight. This measure will allow the Type 1 grease fans to powered off during unoccupied hours. This measure shall include adding both CO₂, CO and natural gas detection measurement sensors and alarms to the control system dashboard.

MEASURE 2: IMPLEMENT HIGH PERFORMANCE VAV PER WSEC SECTION C403.7

This measure would implement the current WSEC section on high performance VAV systems. This measure is focused on energy efficiency with supply temperature reset and demand-controlled ventilation, primary air reset, primary ventilation air reset. This measure will require:

- VAV AHU's:
- Calibrate outside air measurement stations and set up programming logic to control the outside air dampers on 4 AHU's as a sum of all of the ventilation demands in the zones.
- Implement supply air temperature reset for current AHU's.
- Implement supply air flow reduction monitoring the zone level calls for heating and cooling.
- Reduce building pressure. The building is positively pressurized, which suggests over supply of ventilation air and one or more return fans not turning on in the sequence.
- VAV Terminals:
- Replace ~50 VAV boxes with ECM fans and reheat coils sized for 120°F hot water.
- Install CO2 level monitoring of each VAV zone with feedback control directly to DDC and OSA damper.

MEASURE 3: REPLACE HOT WATER BOILERS WITH AIR SOURCE HEAT PUMPS (ASHP)

This building has a gas EUI of 44 kbtu/sf/yr. This measure will implement energy efficient ASHP on the primary heat plants at COP's of 2.5. The current hot water reheat system will need to upsize current coils.

- Install new variable capacity ASHP hydronic plant to replace existing gas boilers.
- Assume two, 150 Ton ASHP's to replace current hot water boilers.
- Assume 2,400 gallons of hot water storage between the heat pump and the building distribution loop. This is required to accommodate heat pump defrost downtime.
- Install a variable frequency drive (VFD) on current hot water circulation pumps.

Measure savings

	Base	Measure 1	Measure 2	Measure 3
Electricity	3,800,525	3,610,499	3,074,749	38,836
Gas	5,908,455	5,416,685	5,195,803	6,460,779
Total (kbtu)	9,708,980	9,027,183	8,270,553	6,499,615
EUI	113	106	97	76

Measure costs

Measure	EEM	Low	High	Notes
1	Setup VAV machines to power off for overnight setback.	\$138,063.73	\$168,744.56	includes mark-up, taxes, bonding, construction management, controls (estimate)

Measure	EEM	Low	High	Notes
2	Implement high performance VAV per WSEC section C403.7.	\$517,382.29	\$632,356.13	includes mark-up, taxes, bonding, construction management, controls (estimate)
3	Replace Hot Water Boilers with Air Source Heat Pumps (ASHP).	\$3,225,099.48	\$3,941,788.25	includes mark-up, taxes, bonding, construction management, controls (estimate)

Form-F Lifecycle Cost Assessment Summary

Project Information

Field	Value
Project	Building 102 Retrofit

Lifecycle Cost Analysis Results

Analysis	Baseline	Alternative
Net Present Savings	0	-\$3,243,949
Savings-to-Investment Ratio (SIR)	0	0.08
Internal Rate of Return	NA	NA
First Construction Costs (minus Grants)	\$314,905	\$4,311,717
Present Value of Capital Costs	\$297,442	\$4,279,788
Present Value of Maintenance Costs	\$0	\$0
Present Value of Utility Costs	\$1,472,138	\$1,148,665
Total Life Cycle Cost (LCC)	\$1,769,580	\$5,428,453

CO2 Emissions Reductions over Building Life by Energy Source

Energy Source	Baseline (tons CO2e)	Alternative (tons CO2e)
Electricity	3,565	3,898
Natural Gas	3,028	31
Diesel/#2	0	0
Fuel Oil/#5, #6	0	0
Gasoline	0	0
LPG	0	0
District Heat	0	0

Energy Source	Baseline (tons CO2e)	Alternative (tons CO2e)
Coal	0	0
Biomass	0	0
Total CO2 Emissions	6,593	3,929
CO2 Emissions Reductions	0	2,664
Percent Reductions	0	40%

Cost Summary in 2024 Dollars

Cost Item	Baseline	Alternative
Capital Expenditures	\$314,905	\$4,618,526
Financing Expenses	\$141,053	\$1,931,307
Residual Value at End of Study Period	0	0
CapEx Minus Avoided Costs & Grants	\$6,093,875	\$6,093,875

Annual Costs and Benefits

Description	Baseline	Alternative
Annual Maintenance Expenses	0	0
Annualized Major Maintenance Expenses	0	0
Incremental Total Maintenance Expenses	0	0
Annual Utility Savings	0	\$37,978
Annual Incentives	0	0
Annual Benefits minus Costs (\$/year)	0	\$37,978
Simple Payback (years)	0	160.5
Return on Investment (%)	0	1

Annual Savings Summary

Description	Baseline	Alternative
Water (CCF/year)	0	0
Electricity (kWh/year)	0	-161,829
Natural Gas (therms/year)	0	37,617
Diesel/#2 (gallons/year)	0	0
Fuel Oil/#5, #6 (gallons/year)	0	0
Gasoline (gallons/year)	0	0
LPG (gallons/year)	0	0
District Heat (MMBtu/year)	0	0
Coal (MMBtu/year)	0	0
Biomass (MMBtu/year)	0	0
CO2 Reductions through 2029 (tons/year)	0	133
CO2 Reductions 2030 and later (tons/year)	0	200

* Electricity is assumed to be carbon neutral 2030 and later.

Cumulative Cash Flow Report

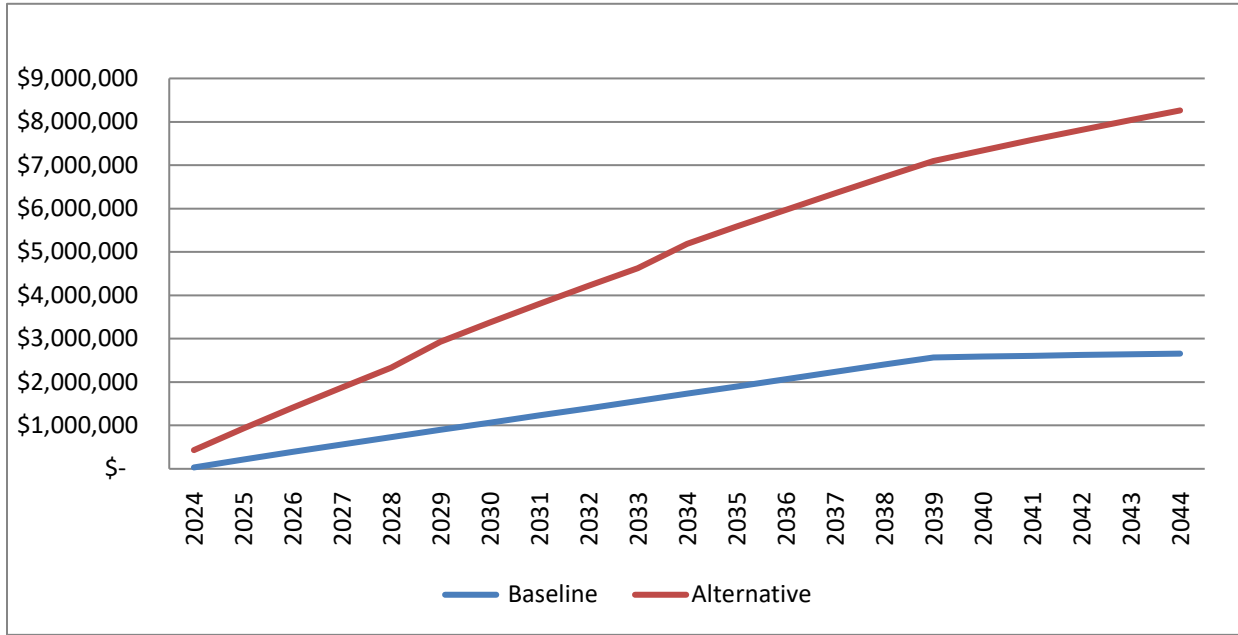
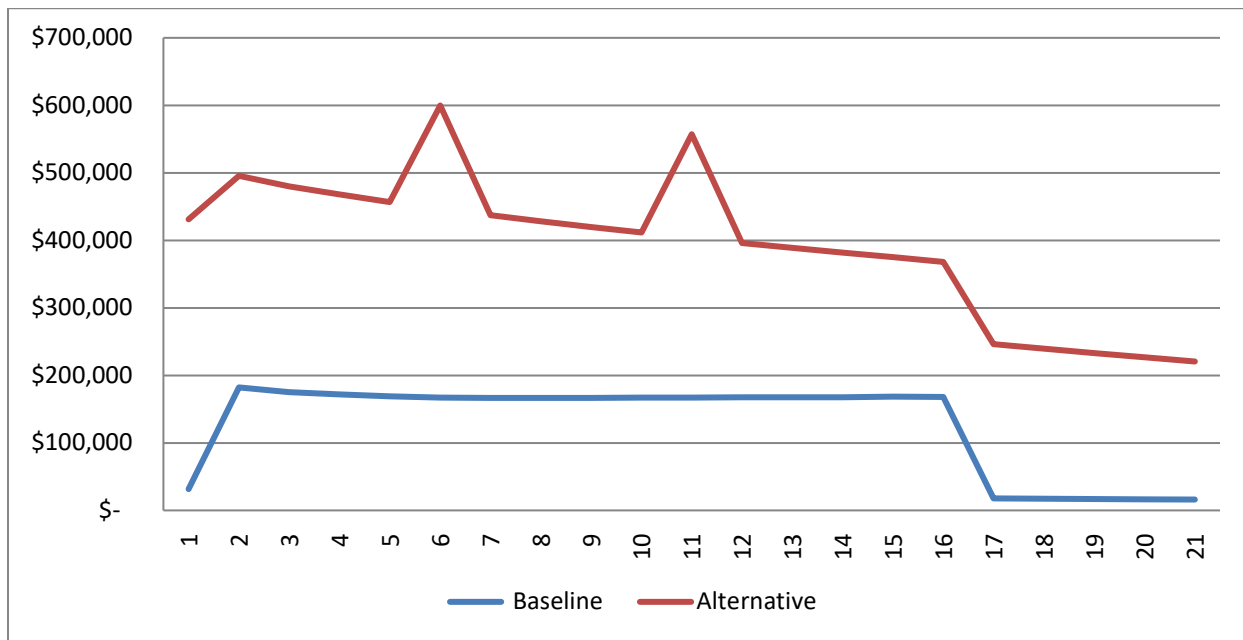


Figure 5: Cumulative cash flow report: baseline vs. alternative (2024-2044)



Annual Cash Flow Report

Figure 6: Annual cash flow report: baseline vs. alternative scenarios (2024-2044)

High-Rise Office Building - 104

To: Building Owner
From: Clean Buildings Team (SBW, Ecotope, UMC)
Subject: High-Rise Office Building Summary
Date: July 30, 2024

Site description

High-Rise Office Building is a high-rise large office building in downtown Seattle. This building is served with a dual duct HVAC system and zoned as 4 cardinal directions and a core zone. This building isn't really set up for partial occupancy so the system has to be turned on to full speed levels to operate. The building is fairly well occupied currently. The building uses gas to heat the hot deck airstream and uses outside air for economizer and chilled water fan coils for the cold side. Ventilation air is ducted in the return side of each of the air handling units (AHU's) and is set at constant volume.

The current building's baseload electrical EUI is operating at around 40 kbtu/sf/yr, which are mostly lights, plugs, fans and domestic hot water (DHW). The rest of the building's EUI are temperature dependent loads, heating, and cooling energy. The heating energy usage is roughly 15x the cooling energy, and economizer cooling provides a lot of the cooling energy.

Energy measures should focus on reducing the heating energy with heat recovery ventilation and demand-controlled ventilation (DCV) on the outside air. Further reductions can be had swapping out boilers for air source heat pumps.

Current stats

- Current EUI: 68 kbtu/sf/yr
- Current EUI_t: 43 kbtu/sf/yr
- Heated Floor Area: 269,000 SF; 17 stories

Billing analysis

High Rise Building

Gas energy use intensity had a steady inversely proportional relationship with outside air temperature. Electric energy use intensity was constant until outside air temperature reached 54 degrees Fahrenheit at which point its relationship with outside air temperature became proportional. See Figure 7 for billing analysis.

Annual High-Rise Office Building Energy Use by End Use

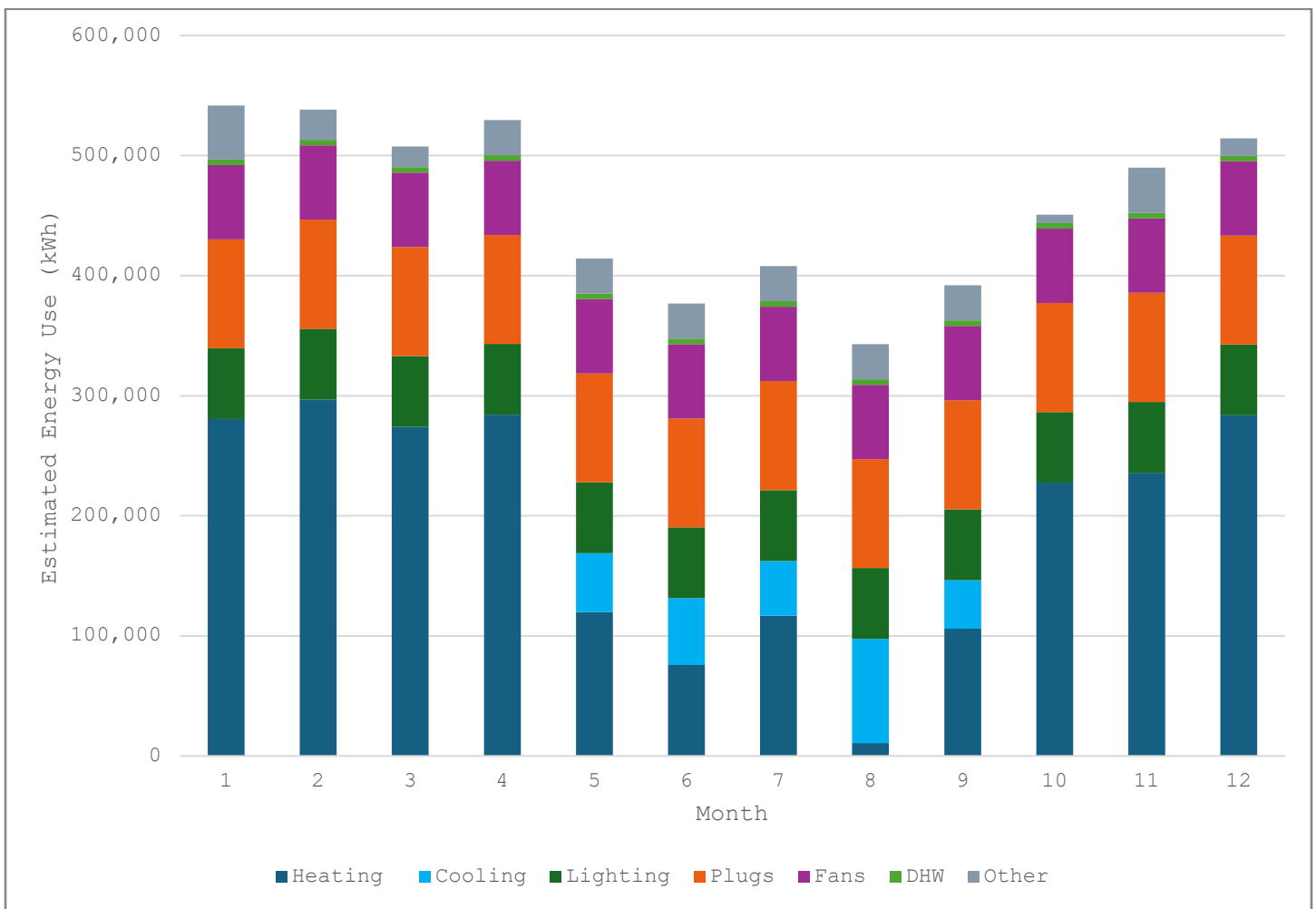


Figure 7: Annual energy use by equipment for a high-rise office building

Energy reduction measures

MEASURE 1: UPDATE CURRENT BMS TO FULL DDC CONTROL AND PROVIDE END USE MONITORING FOR HEATING, COOLING AND VENTILATION ENERGY USAGE.

This update modernizes the current control systems to allow for full system monitoring. Assume the following scope:

- Assume half of the building’s HVAC controls require upgrade.
- Demo current pneumatic system and replace it with modern direct digital control (DDC) systems.
- Add energy monitoring to all motors (fan and pumps) as well as speed feedback.
- Add temperature monitoring to all variable air volume (VAV) boxes and dual duct mixing fans.
- Reprogram current BMS and add in new control points.
- MEASURE 2: ADD VFD’S TO PRIMARY PERIMETER DUAL DUCT FANS AND PUMPS.
- Add VFD’s to current fans and pumps serving office heating and cooling. Set the hot water distribution and primary AHU’s on temperature and pressure reset.
- Replace 6 primary AHU fan motors with new motors and VFD’s; assume 20 HP fans each.

- Replace 2 primary heating pumps used for perimeter heating loop control with VFD's (10 HP each).
- Implement pressure reset for the primary VFD AHU's and VFD pumps.
- Implement outdoor reset supply air and supply water temperatures for the building.
- Reprogram BMS to monitor and display new VFD monitoring.

MEASURE 3: ADD HEAT RECOVERY VENTILATION TO ALL OF THESE AHU ZONES. USE DOAS VAV WITH HEAT RECOVERY WHEEL TO SUPPLY ALL EXISTING AHU ZONES.

Assume this system is sized at peak ventilation flow for the building, roughly 100,000 CFM. Economizer dampers in this dedicated outdoor air system (DOAS) supply shall be added to allow the AHU's that feed the tower to use economizers.

- Add energy recovery ventilation (ERV) DOAS unit with VAV zoning and setup to feed each of the 5 primary zones.
- 100,000 CFM DOAS unit with heat wheel (75%).
- Re-program controls to setup pressure control for the DOAS unit as well as existing economizer control.

Measure savings

	Base (2023 bills)	Measure 1	Measure 2	Measure 3
Electricity	10,904,023	10,685,942	9,806,065	10,023,560
Gas	7,889,423	7,652,742	6,074,872	4,299,768
Total (kbtu)	18,793,445	18,338,684	15,880,937	14,323,328
EUI	72.3	70.5	61.1	55.1

	Base	Measure 1	Measure 2	Measure 3
Gas (therms)	78,894	76,527	60,749	42,998
Electricity (kwh)	3,194,850	3,130,953	2,873,151	2,936,877

Measure costs

Measure	EEM	Low	High	Notes
1	Update current BMS to full DDC control and provide end use monitoring for heating, cooling, and ventilation energy usage.	\$2,430,000.00	\$2,970,000.00	includes mark-up, taxes, bonding, construction management, controls (estimate)
2	Add VFD's to primary perimeter dual duct fans and pumps.	\$517,504.94	\$632,506.04	includes mark-up, taxes, bonding, construction management, controls (estimate)
3	Add heat recovery ventilation (HRV) to all of these AHU zones.	\$7,569,381.97	\$9,251,466.85	includes mark-up, taxes, bonding, construction management, controls (estimate)

Form-F Lifecycle Cost Assessment Summary

Project Information

Field	Details
Project	Building 104 Retrofit

Life Cycle Cost Analysis Results

Category	Baseline	Alternative (HVAC boiler upgrades and RCx)
Net Present Savings	0	-\$7,883,818
Savings-to-Investment Ratio (SIR)		0.06
Internal Rate of Return		NA
First Construction Costs (minus Grants)	\$2,295,000	\$11,685,429
Present Value of Capital Costs	\$5,267,304	\$14,683,956
Present Value of Maintenance Costs	\$0	\$0
Present Value of Utility Costs	\$2,814,885	\$2,256,908
Total Life Cycle Cost (LCC)	\$8,082,189	\$16,940,864

CO2 Emissions Reductions over Building Life by Energy Source

Energy Source	Baseline (tons CO2e)	Alternative (tons CO2e)
Electricity	6,579	6,048
Natural Gas	6,286	3,426
Diesel #2	0	0
Fuel Oil/#5, #6	0	0
Gasoline	0	0
LPG	0	0

Energy Source	Baseline (tons CO2e)	Alternative (tons CO2e)
District Heat	0	0
Coal	0	0
Biomass	0	0
Total CO2e Emissions (tons)	12,865	9,473
CO2e Emissions Reductions (tons)		3,391

Error! Not a valid link. **Error! Not a valid link.** **Cost Summary in 2024 Dollars**

Category	Baseline	Alternative (HVAC boiler upgrades and RCx)
Capital Expenditures Over Study Period	\$6,885,000	\$17,085,429
Financing Expenses	\$1,027,978	\$5,234,145
Residual Value at End of Study Period	\$0	\$0
CapEx minus Baseline Avoided Costs		\$14,406,596
Grants	\$0	\$0
CapEx Minus Avoided Costs & Grants		\$14,406,596

Annual Costs & Benefits (\$ per year)

Category	Baseline	Alternative (HVAC boiler upgrades and RCx)
Annual Maintenance Expenses	\$0	\$0
Annualized Major Maintenance Expenses	\$0	\$0
Incremental Total Maintenance Expenses	\$0	\$0
Annual Utility Savings		\$67,914
Annual Incentives		\$0
Annual Benefits minus Costs (\$/year)		\$67,914

Category	Baseline	Alternative (HVAC boiler upgrades and RCx)
Simple Payback (years)		212.1
Return on Investment		0%

Annual Savings Summary

Description	Alternative (HVAC boiler upgrades and RCx)
Water (CCF/year)	0
Electricity (kWh/year)	257,973
Natural Gas (therms/year)	35,897
Diesel/#2 (gallons/year)	0
Fuel Oil/#5, #6 (gallons/year)	0
Gasoline (gallons/year)	0
LPG (gallons/year)	0
District Heat (MMBtu/year)	0
Coal (MMBtu/year)	0
Biomass (MMBtu/year)	0
CO2e Reductions through 2029 (tons/year)	297
CO2e Reductions, 2030 and later (tons/year)	191

Note: Electricity is assumed to be carbon neutral 2030 and later.

Cumulative Cash Flow Report

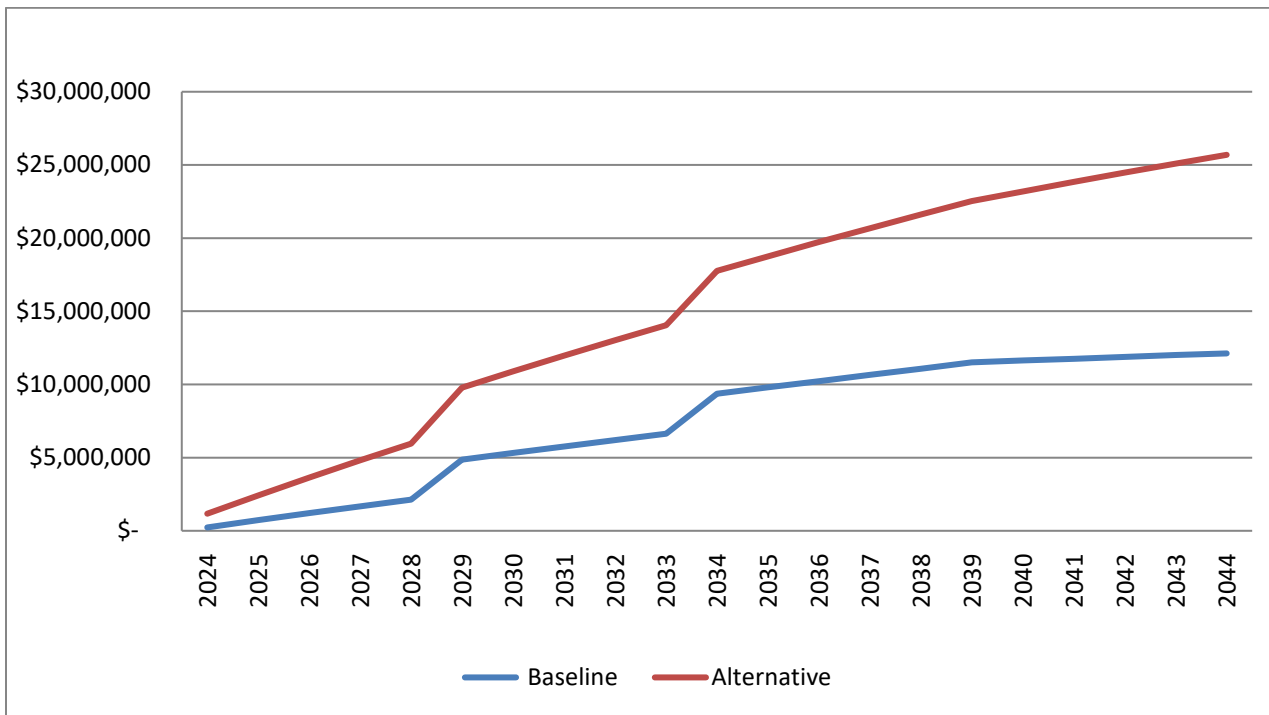


Figure 8: Cumulative cash flow report for a high-rise office building (2024-2044) comparing baseline and alternative scenarios

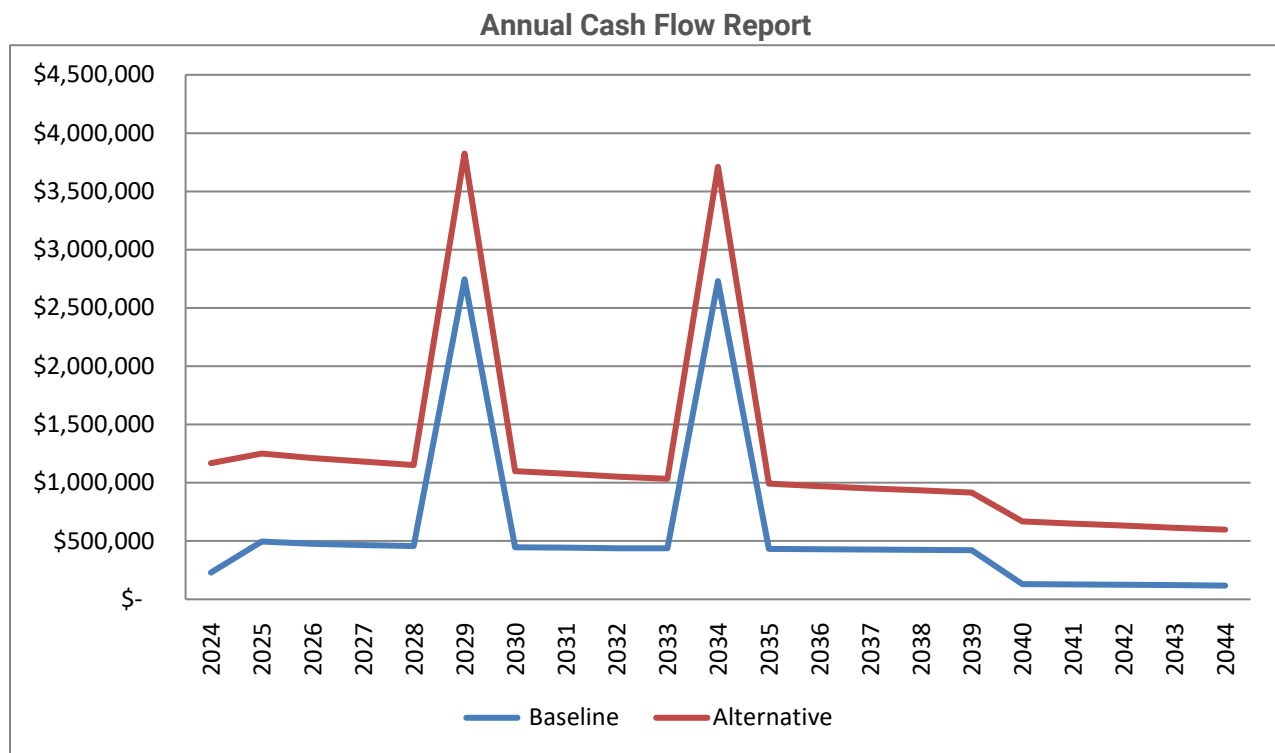


Figure 9: Annual cash flow report for a high-rise office building (2024-2044) comparing baseline and alternative scenarios

Indoor Recreation Building - 108

To: Building Owner
From: Clean Buildings Team (SBW, Ecotope, UMC)
Subject: Indoor Recreation Building Summary
Date: July 30, 2024

Site description

This Indoor Recreation building includes bowling, an arcade, and dining. The building's HVAC design is a ground coupled heat recovery chiller (HRC). The ground loop has trimming with gas boilers. The internal piping is a 4 pipe, all waste heat from cooling is used for heating by way of the HRC. There are also three Type 1 hoods in the commercial kitchen as well as several other rooftop exhaust fans running 24/7. The building appears to be over-ventilating (likely still using COVID-19 protocol), exhaust fans are running full speed, zone CO2 level control is set very aggressively.

It appears that the ground loop is not operating optimally. The ground loop should be a much lower temperature for this time of year. Ventilation systems appear to be over-ventilating. The 4 pipe-HVAC is also not working optimally. The heating and cooling loads may be feeding each other, deadband temps across zones should be optimized. This building should be in heating during the winter and cooling in the summer if setup optimally for this climate.

This building needs a thorough retro-commissioning update to get all of the systems operating together as intended and to turn off systems where possible.

Current stats

- Current EUI: 140 kbtu/sf/yr
- Current EUI: 78 kbtu/sf/yr
- Heated Floor Area: 58,000 SF

See Figure 10 for billing analysis.

Billing analysis

This project's energy usage bills for 2022 are shown in the following graph. The baseloads for electricity and for gas are both quite high for this type of space. The building is heating and cooling year-round.

Indoor Recreation Building

Gas energy use intensity had an inversely proportional relationship with outside air temperature until outside air temperature reached 55 degrees Fahrenheit at which point its relationship with outside air temperature became constant. Electric energy use intensity had an inversely proportional relationship with outside air temperature until outside air temperature reached 50 degrees Fahrenheit at which point its relationship with outside air temperature became constant.

Indoor Recreation Building Energy Use by Month

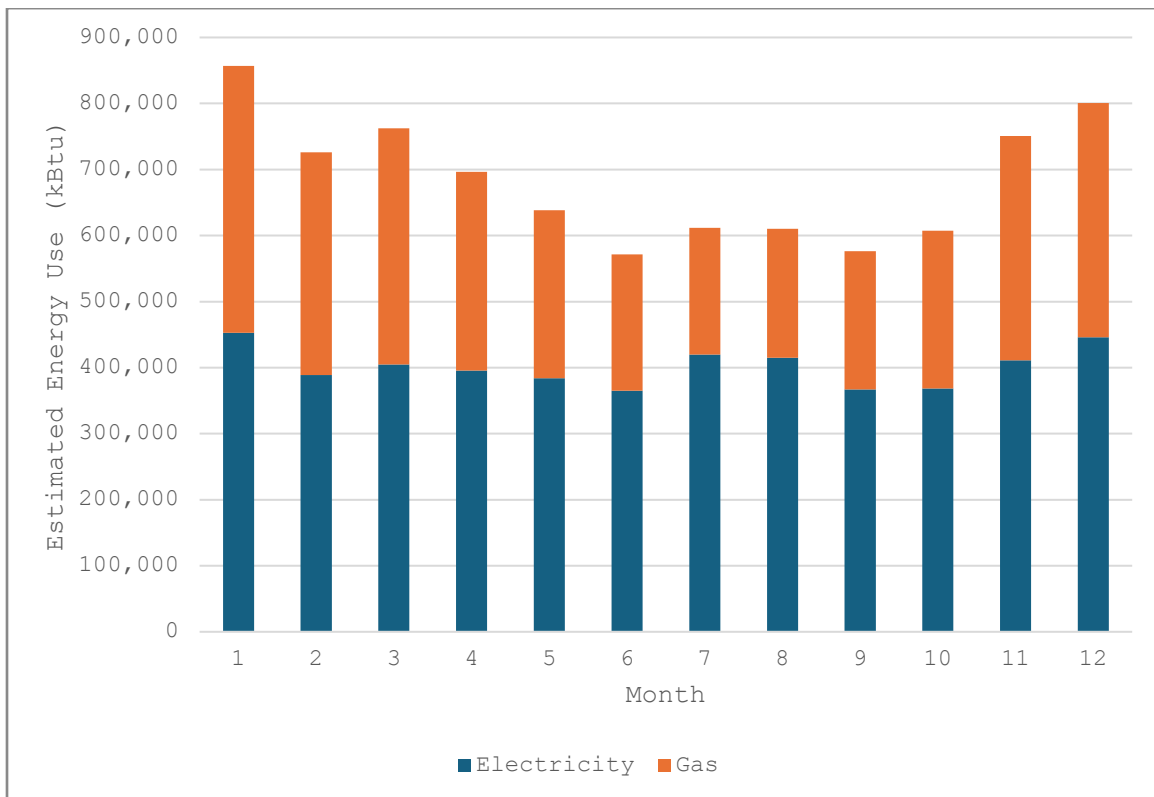


Figure 10: Annual energy use by fuel type for indoor recreation building.

Energy reduction measures

MEASURE 1: ACTIVITY SENSING CONTROLS INSTALLED ON TYPE 1 HOODS.

Install [MeLink](#) or equal, activity sensing (smoke and heat) controls on existing Type 1 hood exhaust fans and make-up air system. This measure will install a retrofit controller and sensor array to monitor both heat and smoke presence under the three Type 1 hoods in the cooking space and ramp up and down fan speeds for the exhaust and make-up air systems. This activity sensing system should be tied into the control system so that building engineers can monitor the fan speeds and overall system operation. Alarms shall also be tied into the main BMS controller. This system will need to be coordinated with the other exhaust systems and make-up air systems to optimize the pressure relationships.

MEASURE 2: ELECTRONIC IGNITION STARTERS.

Swap out gas range standing pilots for electronic ignition starters that allows the gas pilots to be turned off overnight. This measure will allow the Type 1 grease fans to be powered off during unoccupied hours. This measure shall include adding both CO₂, CO and natural gas detection measurement sensors and alarms to the control system dashboard.

MEASURE 3: RETRO COMMISSIONING OF EXISTING SYSTEMS AND EXISTING CONTROLS.

This measure will aim to understand the current sequence of operations and set a new sequence that is focused on reducing energy usage and run time of equipment. The retro-commissioning scope would include:

- Exhaust Systems: Current building is exhausting more air than it is making up air back into the space. This is causing excessive negative pressure inside the building. Rebalance airflows so that most spaces are neutral to slightly positive pressure while the kitchen area remains slightly negative to keep smells and smoke flowing out through the grease hoods. Setup fan systems so that they power off during unoccupied hours.
- Current demand controlled ventilation (DCV) controls are not optimized. Currently, each zone's CO2 levels are nearly the same as outside air (~450ppm). This control setpoint could be moved up to 1000 ppm to reduce outside air to be conditioned. Each zone shall be set up to deliver Ra ventilation component min ventilation air during occupied hours and off during unoccupied hours. DCV- Once CO2 levels hit 1000ppm, open the damper to full Ra+Rp position and reduce damper position back to Ra levels. Setup damper position stops at Ra, Ra+600ppm, Ra+700ppm, Ra+800ppm, Ra+900 ppm, Ra+1000ppm, Ra+Rp, Economizer.
- Economizer mode should be optimized for the dedicated outdoor air systems (DOAS). When any zone enters cooling mode, economizer, via the DOAS, should be moved to Stage 1 with temperature band widened, cool with up to 64°F air. Ventilation zone damper for each room will then revert to DCV sequence above.
- The commercial kitchen variable speed exhaust rates will need to be integrated with the building exhaust and supply rates. Set the variable speed exhaust fans operating as the primary exhaust and make-up air system. The rest of the building air exchange will need to keep pressure in the slightly positive side and respond to hood fluctuations. The goal is to maintain positive flow of air in the adjacent spaces towards the kitchen.
- Disable outdoor radiant heating loop.
- Add timer controls to the gas fireplace. Control on a crank timer switch, (2-hour countdown). Even more efficient would be to replace with an electric fireplace ([OptiMyst](#) or other).
- Experiment with disabling indoor radiant heating system. This system could be causing a false cooling load. Re-program radiant floor operation when the outside temperature is < 45°F. Further, experiment with turning this off.
- Optimize supply air setback for all AHU's.
- Scheduling update: All AHU's should be powered off overnight. Plugs turned off. Process loads turned off, and fans turned off where possible.
- This building appears to be simultaneously heating and cooling itself based on the observation during our interview. Cooling and heating hydronic pumps were running 75% full speed and there was very little activity in the building and the outside temps were 55°F.
- Fan coil 21 needs to be checked, the controller seems a little off.
- Ground coupled heat pump: This building location is a heating climate, heat/cool energy should be 8:1. The current controls for the loop are reporting a warmer ground loop going into the ground and coming back cooler, this would mean the building is heating the ground, this should be investigated. The ground loop should be supplying all of the heat for this building. The gas boiler could be doing most of the building's heating, currently installed to trim the ground loop prior to entering the HRC. High performance buildings connected to ground loops in the Pacific Northwest operate at temperatures in the 30°F-40°F range year-

round. Investigate HRC and see what the minimum entering water temperature is. Recalibrate the ground loop controls and sensors; this loop should be running as cold as is possible without freezing it.

Measure savings

	Base	Measure 1	Measure 2	Measure 3
Electricity	4,466,000	4,407,325	4,289,976	2,230,788
Gas	3,654,000	3,111,132	2,296,829	1,194,351
Total (kbtu)	8,120,000	7,518,457	6,586,805	3,425,139
EUI	140	130	114	59

Measure costs

Measure	EEM	Low	High	Notes
1	Activity sensing controls installed on Type 1 Hoods.	\$ 72,900.00	\$89,100.00	includes mark-up, taxes, bonding, construction management, controls (estimate)
2	Swap out gas range standing pilots for electronic ignition starters.	\$36,450.00	\$44,550.00	includes mark-up, taxes, bonding, construction management, controls (estimate)
3	RetroCx of existing systems and existing controls.	\$57,643.49	\$70,453.15	includes mark-up, taxes, bonding, construction management, controls (estimate)

Form-F Lifecycle Cost Assessment Summary

Project Information

Field	Details
Project	Building 108 Retrofit

Life Cycle Cost Analysis Results

Metric	Baseline	Alternative
Net Present Savings	\$274,971	\$274,971
Savings-to-Investment Ratio (SIR)	1.84	-

Metric	Baseline	Alternative
Internal Rate of Return	304%	-
First Construction Costs (minus Grants)	\$0	\$177,448
Present Value of Capital Costs	\$0	\$272,392
Present Value of Maintenance Costs	\$0	\$0
Present Value of Utility Costs	\$897,271	\$395,980
Total Life Cycle Cost (LCC)	\$897,271	\$668,372

CO2 Emissions Reductions over Building Life by Energy Source

Energy Source	Baseline (tons CO2e)	Alternative (tons CO2e)
Electricity	2,695	1,346
Natural Gas	1,941	634
Total CO2e Emissions (tons)	4,635	1,980
CO2e Reductions (tons)	-	2,655
Percent Reductions	-	57%

Cost Summary in 2024 Dollars

Metric	Baseline	Alternative
Capital Expenditures Over Study Period	\$0	\$314,397
Financing Expenses	\$0	\$79,483
Residual Value at End of Study Period	\$0	\$0
CapEx Minus Baseline Avoided Costs	\$0	\$393,879

Annual Costs & Benefits

Description	Amount
Annual Maintenance Expenses	\$0
Annualized Major Maintenance Expenses	\$0
Incremental Total Maintenance Expenses	\$0
Annual Utility Savings	\$83,256
Annual Incentives	\$0
Annual Benefits minus Costs	\$83,256
Simple Payback (years)	4.7
Return on Investment (%)	21

Annual Savings Summary

Description	Alternative
Electricity (kWh/year)	654,911
Natural Gas (therms/year)	24,596
CO2e Reductions through 2029 (tons/year)	400
CO2e Reductions, 2030 and later (tons/year)	131

Note: Electricity is assumed to be carbon neutral 2030 and later.

Cumulative Cash Flow Report

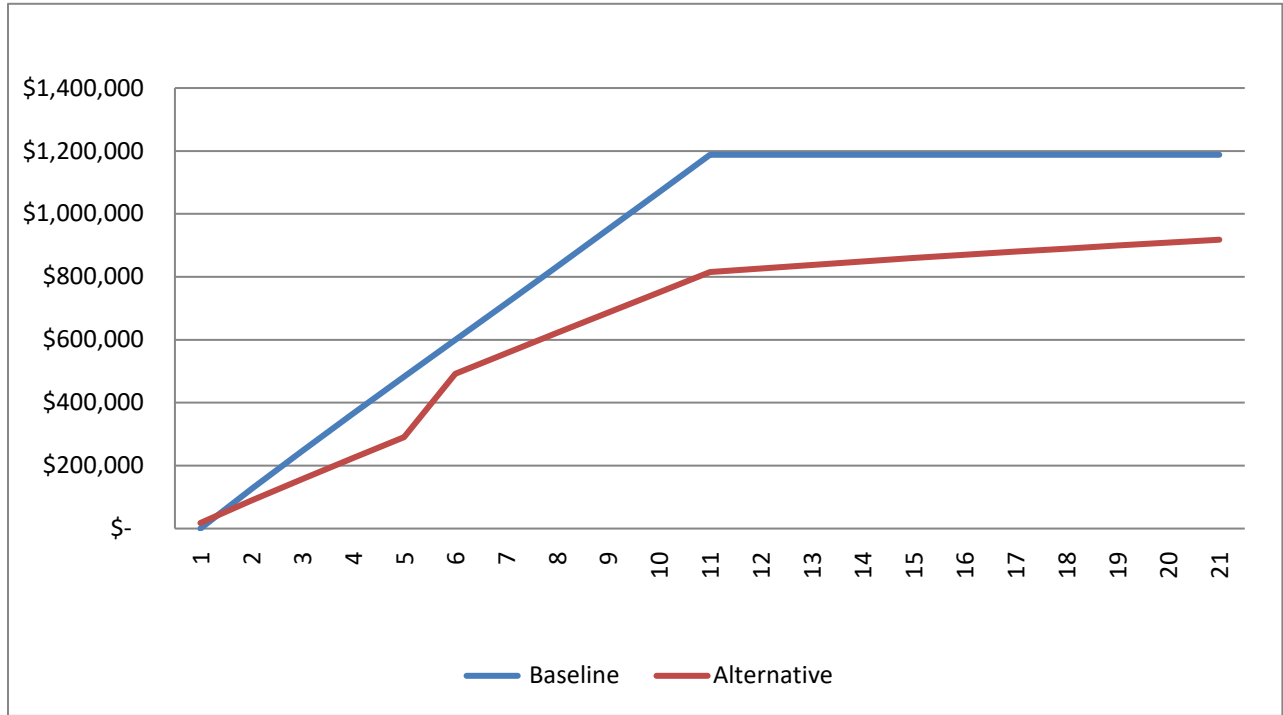


Figure 11: Cumulative cash flow report for an indoor recreation building (2024-2044) comparing baseline and alternative scenarios.

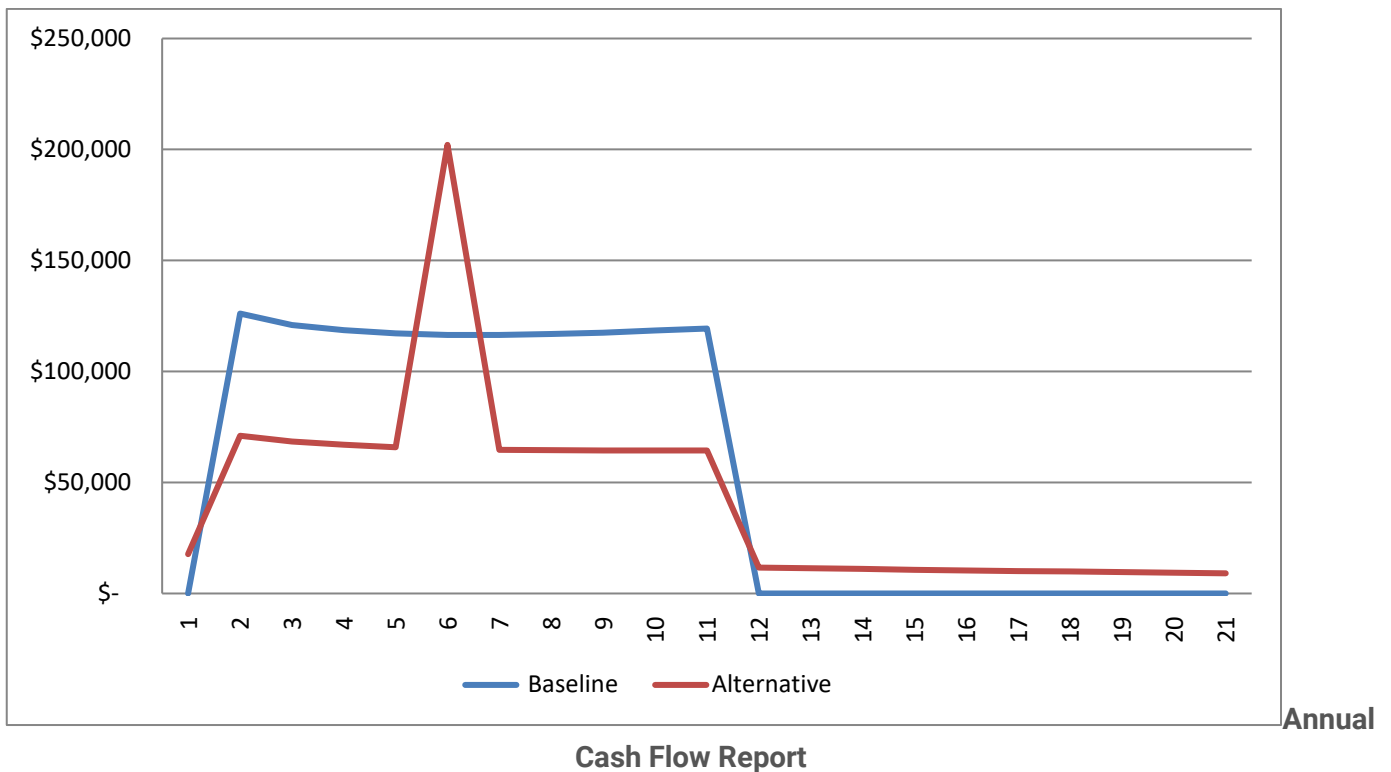


Figure 12: Annual cash flow report for an indoor recreation building (2024-2044) comparing baseline and alternative scenarios

Community College Science Building - 105

To: Building Owner
From: Clean Buildings Team (SBW, Ecotope, UMC)
Subject: Community College Science Building Summary
Date: July 30, 2024

Site description - pending live graphics

The science building in the Community College Science Building contains classrooms, staff offices and science labs, including 17 fume hoods. The fume hood system running 12,000 CFM 24/7 is driving a lot of the gas usage. The fans are also running extensively. The radiant cooling system is not working, which is causing overheating in the classrooms. The variable frequency drives (VFD's) are installed on the make-up air system but not being used.

This building's gas usage is high and is the primary target for reductions. Implementing systems to allow demand controlled ventilation (DCV) of the primary fume exhaust and make-up air systems using air sampling controls is a cost effective measure for this building.

Current stats

- Current EUI: 140 kbtu/sf/yr
- Current EUI_t: 107 kbtu/sf/yr
- Heated Floor Area: 51,884 SF

See Figure 13 for billing analysis.

Billing analysis

Community College Science Building

Gas energy use intensity had an inversely proportional relationship with outside air temperature until outside air temperature reached 62 degrees Fahrenheit at which point its relationship with outside air temperature became constant. Electric energy use intensity was constant until outside air temperature reached 54 degrees Fahrenheit at which point its relationship with outside air temperature became proportional. Electric solar energy use intensity remained constant across all outside air temperatures.

CC Science Building End Use Energy Estimates

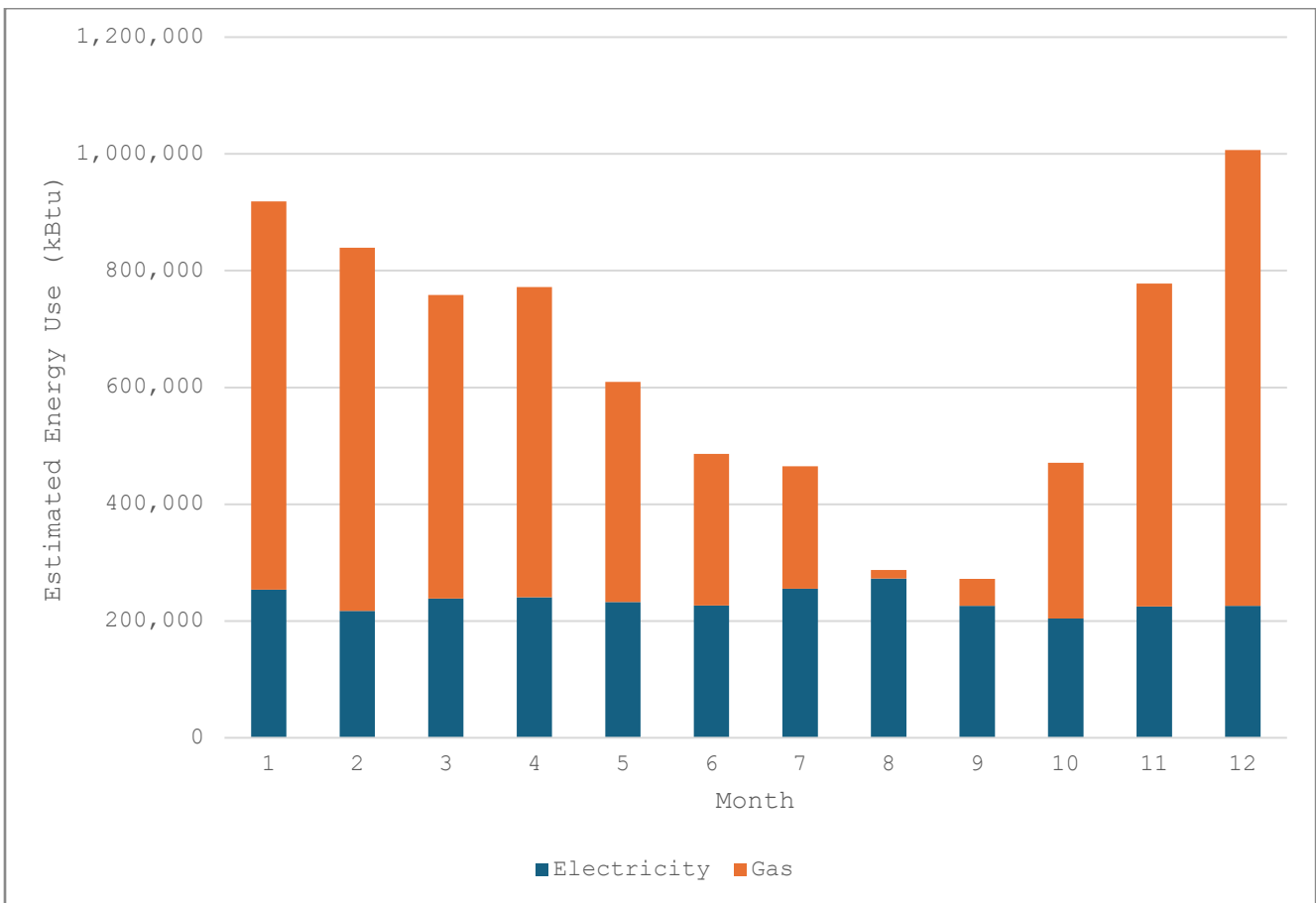


Figure 13: Annual energy use by equipment for community college science building

Energy reduction measures

MEASURE 1: RETRO-COMMISSIONING OF EXISTING SYSTEMS AND EXISTING CONTROLS.

This scope will aim to retro-commission the current building controls and schedules for the lab spaces and office/education spaces.

- Outside air requirements shall be recalculated and rebalanced.
- Schedules shall be tightened up to current usage. The goal is turning equipment off.
- Radiant cooling system shall be activated and/or diagnosed.
- Fume hood flow alarms setpoints shall be made adjustable to prepare for demand-controlled lab air exchange.
- Fix hot water loop setpoints, install outdoor reset controls. Turn pumps off when not needed.
- Turn boilers off in the summer months, turn both boilers and pumps off when outside air is above 65°F.

MEASURE 2: INSTALL VFD'S ON LAB FUME HOOD EXHAUST FANS.

Install VFD's on lab fume hood exhaust fans.

- Install VFD on current exhaust hoods, 6000 CFM per fan. Assume 10 HP motors.
- Make changes to BMS controls to add this monitoring to the primary controls interface.

MEASURE 3: IMPLEMENT DEMAND-BASED FRESH AIR EXCHANGE SYSTEM.

Install [Aircuity](#) sensing and control system to enable variable speed fume hood exhaust flow rates.

- The lab is currently exchanging 12,000 CFM of fresh air exchange, (10 ACH, 104 CFM/Hood). The goal is to reduce the reheating costs and fan energy of this system.
- Implement supply air temperature and pressure reset controls on make-up air unit, AHU-301.
- Implement demand-based zone air sampling system (Aircuity) and take control of both the exhaust and make-up air flows.
- Added BMS programming to install the Aircuity BACnet control interface.

Measure savings

	Base	Measure 1	Measure 2	Measure 3
Electricity	4,844,824	4,300,876	4,300,876	3,811,324
Gas	2,818,545	2,474,301	2,034,084	1,753,770
Total (kbtu)	7,663,369	6,775,177	6,334,961	5,565,093
EUI	148	131	122	107

	Base	Measure 1	Measure 2	Measure 3
Gas (therms)	-	5,439	-	4,896
Electricity (kwh)	-	100,863	128,982	82,131

Measure costs

Measure	EEM	Low	High	Notes
1	Retro-Cx of existing systems and existing controls.	\$25,090.37	\$30,666.01	includes mark-up, taxes, bonding, construction management, controls (estimate)
2	Install VFD's on lab fume hood exhaust fans.	\$74,902.67	\$91,547.71	includes mark-up, taxes, bonding, construction management, controls (estimate)
3	Implement demand based fresh air exchange system.	\$243,486.00	\$297,594.00	includes mark-up, taxes, bonding, construction management, controls (estimate)

Form-F Lifecycle Cost Assessment Summary

Project Information

Field	Details
Project	Building 105 Retrofit

Life Cycle Cost Analysis Results

Description	Baseline	Alternative (HVAC boiler upgrades and RCx)
Net Present Savings	\$0	\$250,263
Savings-to-Investment Ratio (SIR)	0	2.11
Internal Rate of Return	0	195%
First Construction Costs (minus Grants)	\$0	\$111,103
Present Value of Capital Costs	\$0	\$202,199
Present Value of Maintenance Costs	\$0	\$0
Present Value of Utility Costs	\$1,461,423	\$1,034,926
Total Life Cycle Cost (LCC)	\$1,461,423	\$1,237,124

CO2 Emissions Reductions

Energy Source	Baseline CO2e (tons)	Alternative CO2e (tons)
Electricity	1,701	1,058
Natural Gas	3,860	3,037
Diesel/#2	0	0
Fuel Oil/#5, #6	0	0
Gasoline	0	0
LPG	0	0

Energy Source	Baseline CO2e (tons)	Alternative CO2e (tons)
District Heat	0	0
Coal	0	0
Biomass	0	0
Total CO2e Emissions	5,561	4,095
Percent Reductions		26%

Cost Summary in 2024 Dollars

Capital Expenditures

Description	Baseline	Alternative (HVAC boiler upgrades and RCx)
Capital Expenditures Over Study Period	\$0	\$166,859
Financing Expenses	\$0	\$49,765
Residual Value at End of Study Period	\$0	\$0
Grants	\$0	\$0
CapEx Minus Baseline Avoided Costs & Grants	\$0	\$216,624

Annual Costs & Benefits

Description	Baseline	Alternative (HVAC boiler upgrades and RCx)
Annual Maintenance Expenses	\$0	\$0
Annualized Major Maintenance Expenses	\$0	\$0
Incremental Total Maintenance Expenses	\$0	\$0
Annual Utility Savings	\$0	\$37,809
Annual Incentives	\$0	\$0
Annual Benefits minus Costs (\$/year)	\$0	\$37,809

Description	Baseline	Alternative (HVAC boiler upgrades and RCx)
Simple Payback (years)	-	5.7
Return on Investment	-	17%

Annual Savings Summary

Description	Alternative HVAC boiler upgrades and RCx
Water (CCF/year)	0
Electricity (kWh/year)	311,976
Natural Gas (therms/year)	10,335
Diesel/#2 (gallons/year)	0
Fuel Oil/#5, #6 (gallons/year)	0
Gasoline (gallons/year)	0
LPG (gallons/year)	0
District Heat (MMBtu/year)	0
Coal (MMBtu/year)	0
Biomass (MMBtu/year)	0
CO2e Reductions through 2029 (tons/year)	183
CO2e Reductions, 2030 and later (tons/year)	55

Note: Electricity is assumed to be carbon neutral by 2030 and later.

Cumulative Cash Flow Report

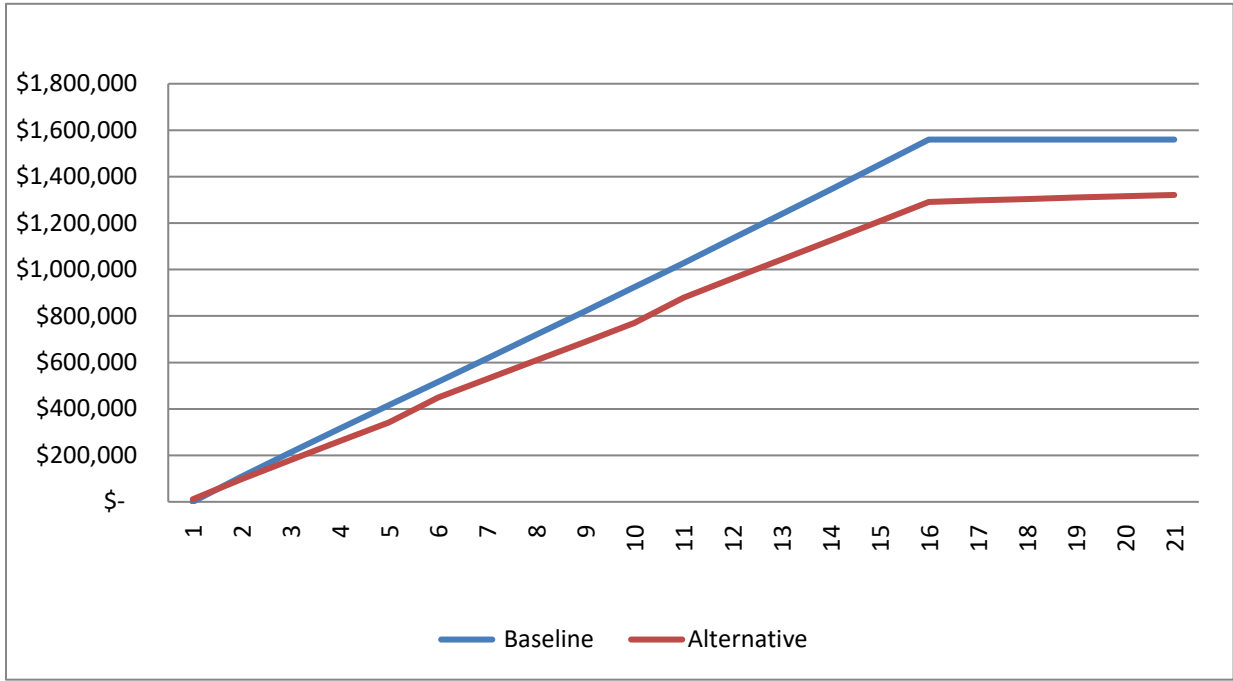
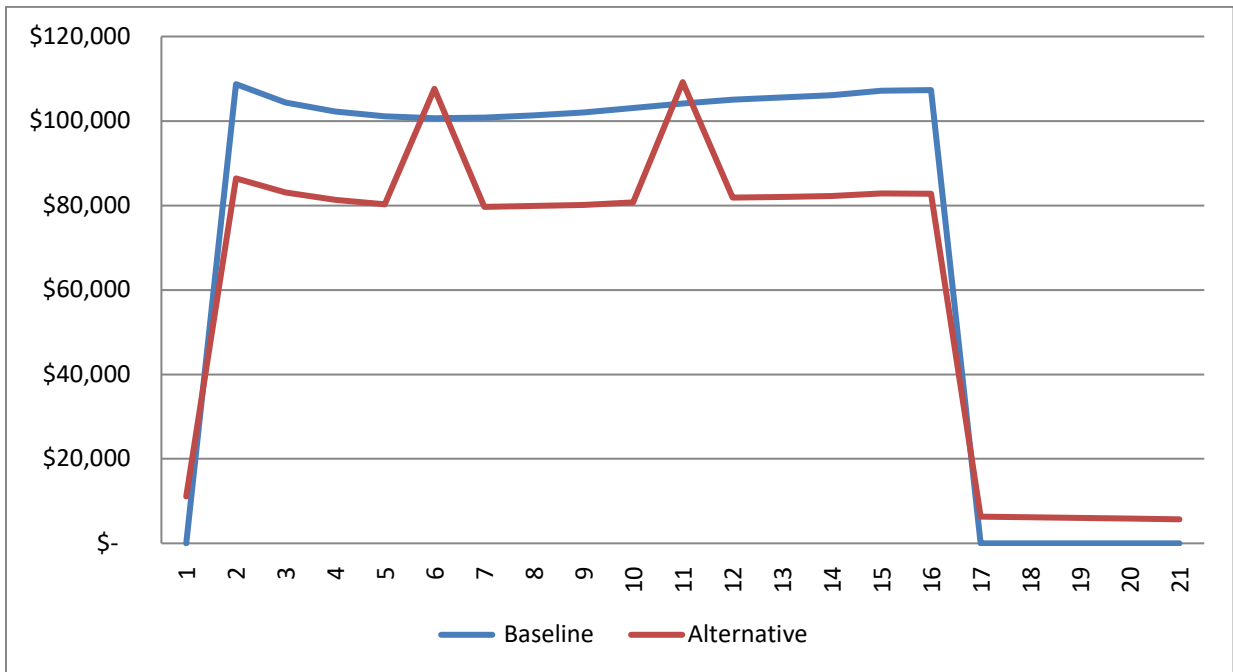


Figure 14: Cumulative cash flow report for an indoor recreation building (2024-2044) comparing baseline and alternative scenarios.



Annual Cash Flow Report

Figure 15: Annual cash flow report for an indoor recreation building (2024-2044) comparing baseline and alternative scenarios.

BOMA study comparison

The Building Owners and Managers Association (BOMA) conducted a study of 16 buildings to assess the costs of complying with Building Performance Standards policies in Washington state and Seattle. BOMA provided the study report to the SBW team so the results could be compared with results from our studies. The figures below present the results of the financial analysis conducted for Commerce ("Commerce Case Studies" and "Supply Curve Study") along with the BOMA case studies. Figure 16 shows the full context of all three sets of analyses. Each point represents a building, the vertical axis is the measure cost per square foot¹⁵ and the horizontal axis is the measure savings per square foot. The supply curve data aggregates the energy savings and costs for all energy efficiency measures in the portfolio across building types for all buildings in WA. This is regardless of whether their EUI being greater than EUI_t since it represents the potential for all buildings. When measures are examined individually, they tend to cluster around the chart axis since their potential is divided by statewide floor areas. Commerce and BOMA case studies likely contain higher costs per measure than the supply curve buildings because these cost studies analyze costs closer to full costs rather than the incremental nature built into the supply curve. The supply curve analysis assumes that any equipment past its full typical life would be replaced as part of its normal lifecycle.

Figure 17 shows average cost per unit of energy saved for each study. Buildings with higher than average cost per unit of energy must implement more expensive measures to meet their EUI goals. Figure 18 shows average cost per square foot of building. Buildings with higher than average costs per square foot likely have more fixed costs needed to implement a package of energy efficiency measures. A key takeaway from these comparisons is that there is a broad range of results within each set of analyses and across all three analyses, i.e., it is difficult and unadvisable to pin down a single average measure cost to extrapolate for estimating total cost of retrofitting all Tier 1 buildings.

¹⁵ As noted above, the measure costs and savings from the supply curve are based on averages of across all buildings in Washington state, regardless of their starting level of energy efficiency, and only include retrofit measures thus incremental cost and savings above standard equipment replacement.

Capital costs and Savings (normalized by sqft)

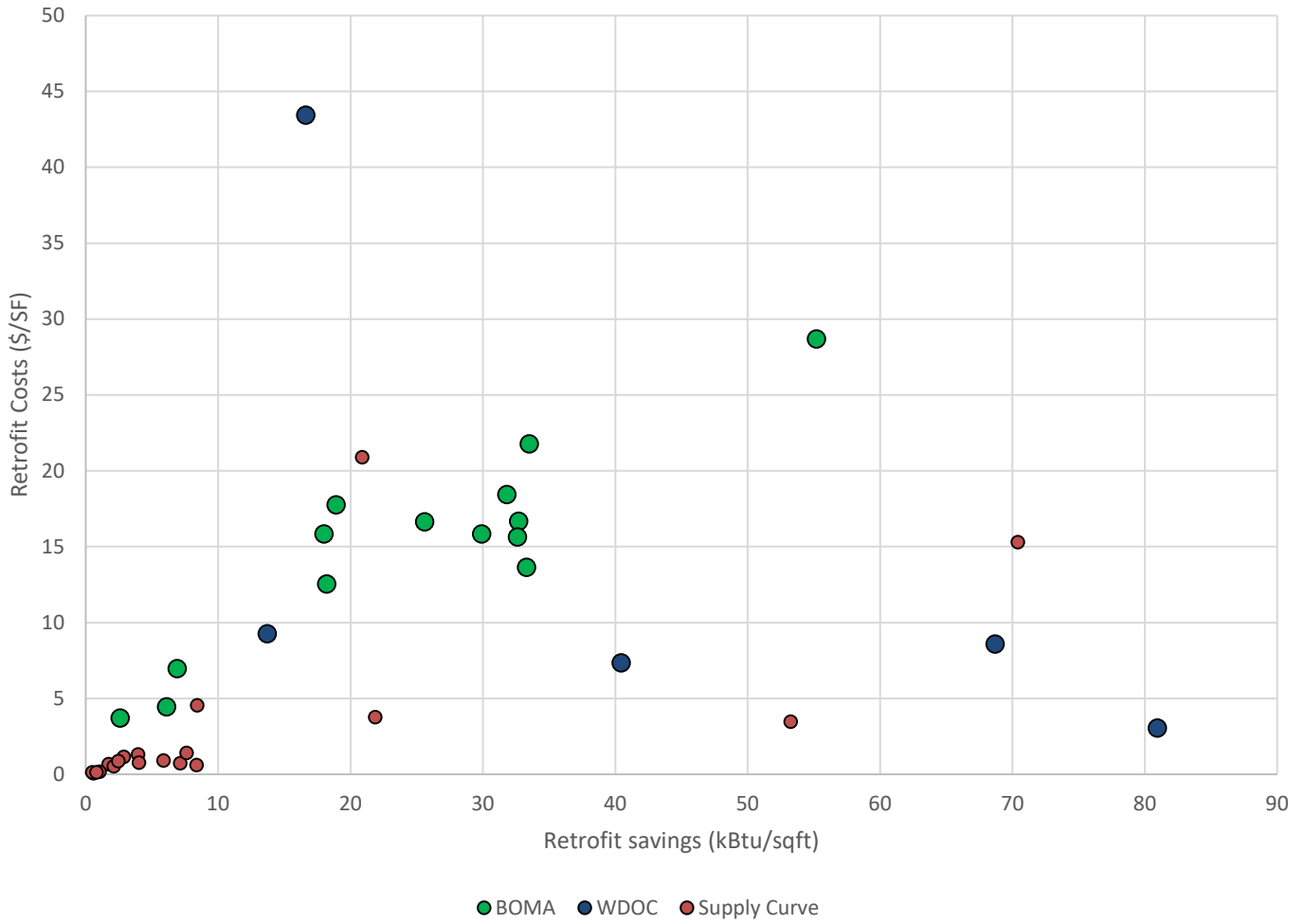


Figure 16: First year measure costs and savings normalized by floor area

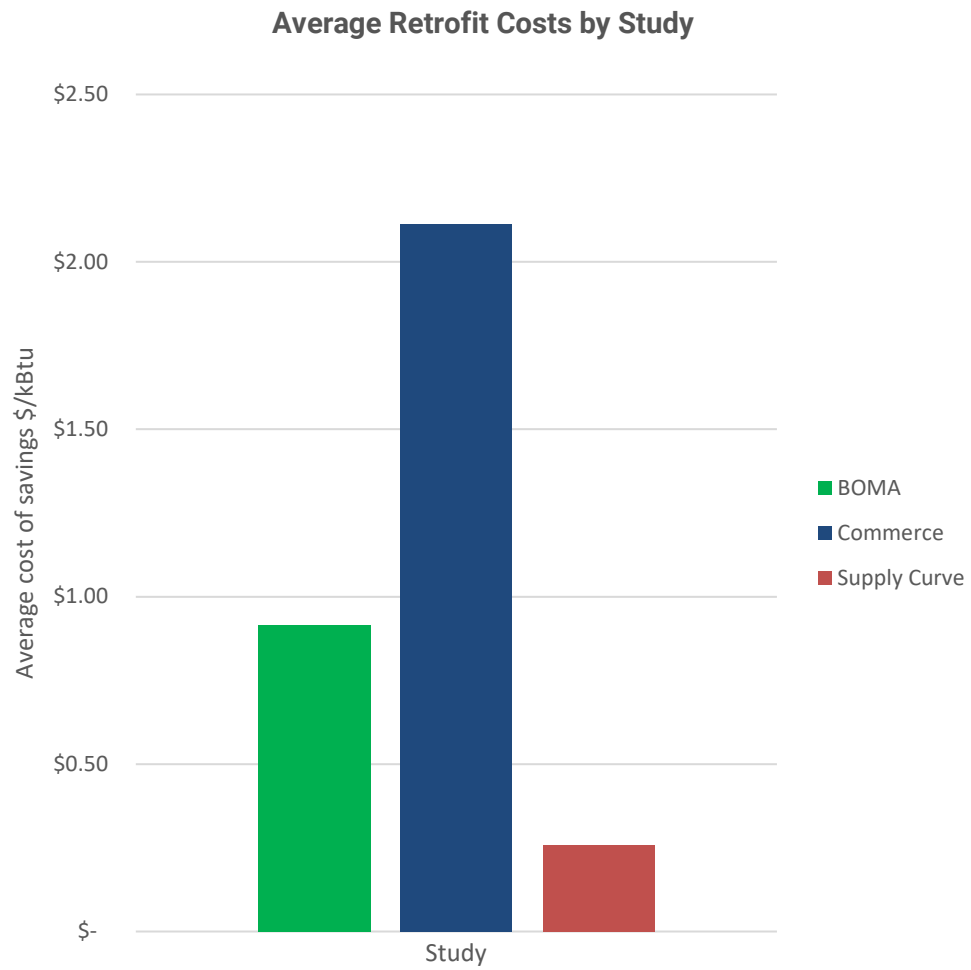


Figure 17: Average first year measure cost per unit energy saved

Operations Costs Survey & Case Study Retrofit Costs

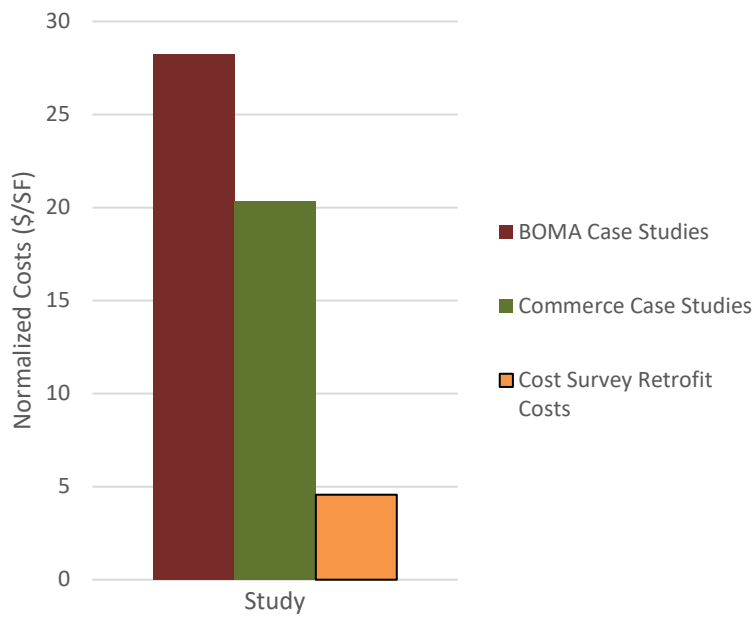


Figure 18: Average first year measure cost per sf of building

Tabulated Results

Table of standardized results from supply curve analysis, case studies including from BOMA's report, and cost survey

Source	Building ID	Building Type	EUI Reduction (kBtu/SF)	Cost (\$/kBtu)	Cost (\$/SF)
Commerce	102	Healthcare	37.5	\$ 1.34	\$ 50.39
Commerce	104	Office	16.6	\$ 2.61	\$ 43.44
Commerce	105	University/College	40.4	\$ 0.18	\$ 7.36
Commerce	107	Healthcare	68.7	\$ 0.13	\$ 8.60
Commerce	108	Entertainment	80.9	\$ 0.04	\$ 3.06
Commerce	109	School	13.7	\$ 0.68	\$ 9.26
BOMA	Bldg 1	Office	33.5	\$ 0.65	\$ 21.78
BOMA	Bldg 2	Office	6.1	\$ 0.73	\$ 4.45
BOMA	Bldg 3	Office	32.7	\$ 0.51	\$ 16.68
BOMA	Bldg 4	Office	55.2	\$ 0.52	\$ 28.70
BOMA	Bldg 5	Office	18.2	\$ 0.69	\$ 12.56

Source	Building ID	Building Type	EUI Reduction (kBtu/SF)	Cost (\$/kBtu)	Cost (\$/SF)
BOMA	Bldg 6	Office	18.9	\$ 0.94	\$ 17.77
BOMA	Bldg 7	Office	18.0	\$ 0.88	\$ 15.84
BOMA	Bldg 8	Hotel	29.9	\$ 0.53	\$ 15.85
BOMA	Bldg 9	Health Club	33.3	\$ 0.41	\$ 13.65
BOMA	Bldg 10	Hotel	31.8	\$ 0.58	\$ 18.44
BOMA	Bldg 11	Hotel	32.6	\$ 0.48	\$ 15.65
BOMA	Bldg 12	Convention Center	39.2	\$ 3.98	\$ 156.02
BOMA	Bldg 13	Industrial Office	29.1	\$ 3.01	\$ 87.59
BOMA	Bldg 14	Industrial Office	2.6	\$ 1.43	\$ 3.72
BOMA	Bldg 15	Industrial Office	25.6	\$ 0.65	\$ 16.64
BOMA	Bldg 16	Industrial Office	6.9	\$ 1.01	\$ 6.97

Segment	Total Savings Potential (kBTU/SF)	Cost (\$/KBTU)	Total First Cost (\$/SF)
Other	7.14	9.77	0.73
Large Off	8.43	1.85	4.56
All	1.74	2.55	0.68
Residential Care	2.12	3.90	0.54
University	21.86	5.78	3.78
Small Ret	2.87	2.46	1.17
School K-12	5.88	6.45	0.91
Small Off	3.95	2.98	1.33
Medium Ret	4.03	5.23	0.77
Lodging	2.46	2.77	0.89
Large Ret	0.59	7.41	0.08
Warehouse	0.49	3.66	0.13
Hospital	8.38	13.46	0.62
MiniMart	7.63	5.35	1.43
Medium Off	20.88	1.00	20.90
Assembly	1.03	6.09	0.17
Restaurant	53.25	15.30	3.48
XLarge Ret	0.82	6.07	0.14
Supermarket	70.42	4.60	15.32
WA Total	223.95	3.89	57.63

Building	Building Count	Square Footage (million sqft)	Benchmarking \$/SF	EMP Development \$/SF	O&M Development \$/SF	Audit \$/SF	Other \$/SF	Total Cost \$/SF	Total Cost
Healthcare_1	20	10.98	0.01	0.01	0.01	0.00	0.92	0.96	\$524,442
ComCol_1	1	0.23	0.35	0.03	0.03		0.21	0.63	\$343,431
ComCol_2	7	0.46		0.77	0.77			1.53	\$840,117
School_1	16	1.45	0.02	0.01	0.01	0.01	0.28	0.34	\$187,791
ComCol_3	18	1.39	0.52	0.01	0.02	0.51	10.00	11.06	\$6,073,003
ComCol_4	1	0.83	0.05	0.05	0.25	0.17	6.50	7.02	\$3,854,655
ComCol_5	8	0.65	1.00	0.25	0.25	0.25	7.00	8.75	\$4,804,591
University_1	74	9.80	2.00	0.50	0.50	0.50		3.50	\$1,921,836
ComCol_6	5	0.50	0.84	0.20	0.20	0.05	0.20	1.49	\$818,153
ComCol_7	5	0.73	0.11	0.02	0.02		0.01	0.16	\$87,855
ComCol_8	6	0.67	0.38	0.20	0.20		0.22	1.00	\$549,096
ComCol_9	3	0.21	1.00	0.02	0.02		0.24	1.28	\$702,843
Assembly_1	1	0.08				1.20		1.20	\$658,915
ComCol_10	5	0.32	0.20	0.02	0.02	1.00		1.23	\$675,388
Warehouse_1	1	0.14	1.00					1.00	\$549,096
Warehouse_2	1	0.19	1.30	0.10	0.05	0.03	1.48	2.96	\$1,625,324
School_2	15	1.61	0.02	0.02	0.03	0.25		0.32	\$175,711
Assembly_2	2	0.14	0.04	0.04	0.07	0.55	0.14	0.83	\$455,750
Assembly_3	1	0.06	0.07	0.02	0.02	0.02		0.12	\$65,892
School_3	54	5.05	10.90	2.30	2.30	2.30	2.00	19.80	\$10,872,103
Office_1	56	7.62	0.03	0.04	0.11	1.50	0.37	2.05	\$1,128,322
Office_2	1	0.10	0.02	0.11	0.04		0.32	0.49	\$268,179

Building	Building Count	Square Footage (million sqft)	Benchmarking \$/SF	EMP Development \$/SF	O&M Development \$/SF	Audit \$/SF	Other \$/SF	Total Cost \$/SF	Total Cost
	Total Buildings	Total Square Footage (million sqft)	Average Benchmarking \$/SF	Average EMP Development \$/SF	Average O&M Program Development \$/SF	Average Audit \$/SF	Average Other \$/SF	Average Total Cost \$/SF	Average Total Cost per Building
	301	43.22	1.83	0.42	0.43	0.74	1.56	4.45	\$123,530

Cost Survey Protocol

The table below presents the questions in the cost survey.

Question	Survey question
1	Enter name of person completing this questionnaire.
2	Enter employer of the person completing this questionnaire.
3	Enter the name of the organization that owns the Tier 1 properties represented in this response.
4	Select this organization's property ownership type.
5	Select the top 3 most common nonresidential property types of this organization.
6	Enter the count of Tier 1 properties in this organization.
7	Enter total estimated floor area of the organization's Tier 1 properties.
8	Enter the total estimated annual energy use in kBtu of the organization's Tier 1 properties.
9	Enter your estimate of total cost per square foot (\$/sq ft) to benchmark the organization's Tier 1 properties, including costs for submetering, hiring, and training staff or outsourcing to third parties.
10	Enter your estimate of total cost per square foot (\$/sq ft) to develop the Energy Management plan for the organization's Tier 1 properties, including costs for hiring and training staff or outsourcing.
11	Enter your estimate of total cost per square foot (\$/sq ft) to develop the O&M program for the organization's Tier 1 properties, including costs for hiring and training staff or outsourcing to third parties.
12	Enter your estimate of total cost per square foot (\$/sq ft) to conduct audits on the organization's properties to determine which measures must be implemented to comply with CBPS.

Question	Survey question
13	Enter your estimate of total cost per square foot (\$/sq ft) to retrofit the organization's properties to bring them into compliance with CBPS regardless of path (Meet EUI or Investment criteria).
14	Describe other costs the organization faces to comply with CBPS that are not captured above.
15	Enter your estimate of total cost per square foot (\$/sq ft) of other costs associated with achieving CPBS compliance for the organization's properties.

Appendix B: Detailed Workgroup input

The Workgroup was asked to rate each recommendation and strategy on a scale of 1 through 5. The overall scores from members in the public sector are presented in the second column. Overall scores from the private sector, utility, and non-profit sector representatives are presented in the third column. Some strategies were added after the ranking survey was complete, and so have a score of NA. Note that the strategies are designed for implementation by the Legislature unless otherwise specified.

Strategy	Public Sector Score / 5.00	Private Sector, Utility, Non-profit Score / 5.00
Explore creative ways to unlock financing for all sectors.		
The Office of Financial Management (OFM) should clarify that green revolving funds are permitted in public institutions, and how they can be structured.	4.11	4.00
The OFM should clarify payback mechanisms for rebates/grants, and tax incentives such as the 179-D tax deduction, so public institutions know how exactly a grant will impact their budget and know whether funds go to the institution or the state.	4.22	3.67
Share successful models of C-PACER to demonstrate the value of this kind of financing for CBPS compliance.	3.86	4.00
Educational materials should be developed by the Washington Green Bank and promoted by Commerce to educate building owners about green revolving funds.	3.70	3.71
Investigate the potential benefits and barriers of energy as a service for privately owned buildings and recommend pathways to develop the market for energy service agreements to support CBPS compliance.	3.00	4.00
Allow non-profits to access the same state-led CBPS funding opportunities as the public sector.	3.22	4.14
Lower the bond approval for schools to 50%.	3.60	4.00
Accelerate the C-PACER market by promoting market awareness, consistency, economies of scale and interconnectivity with policies and programs such as the energy code, utility programs, and market transformation programs.	3.43	4.00
Increase the funds in programs that support CBPS compliance and reduce the barriers to accessing public funding opportunities.		
Direct the Office of Financial Management to approve funding requests from public agencies which couple additional upgrades with compliance work in public institutions (ex. simultaneously address deferred maintenance and/or whole building upgrades along with CBPS compliance).	4.44	4.67
Guarantee that public institutions will receive the funding they need to implement upgrades which are required through the investment criteria pathway.	4.44	3.67
Public funding should be appropriated directly to agencies rather than being awarded as grants by Commerce. Grants for privately-owned buildings should be administered by Commerce.	4.40	3.71
Should the public vote to maintain the Climate Commitment Act, revenues should be allocated to support CBPS compliance for both public and private buildings.	4.00	4.29
Increase the funding in all Commerce programs which support compliance, especially the "Energy Efficiency Retrofits for Public Buildings" program and the "Energy Audit for Publicly-Owned Buildings" program.	4.30	3.67
Adjust the EUI requirement for the early adopter incentive to encourage applications and increase equity across different building types.	3.90	3.71
Increase the amount of funding in OSPI Small District Energy Assessment Grant program.	3.67	4.00

Strategy	Public Sector Score / 5.00	Private Sector, Utility, Non-profit Score / 5.00
Assist utilities to support building owners with CBPS while following the conservation rules and standard practices set by the State Energy Independence Act.		
Engage with qualifying utilities which are required to provide building owners utility data via ESPM to identify barriers, case studies of successful approaches to providing ESPM data, and to explore methods to provide support to assist utilities in converting their systems.	4.20	4.67
RCW 19.27A.170 - In section (8) change "For any covered commercial building with three or more tenants" to include "or for any covered buildings required to comply with state or local laws or mandates".	3.67	4.83
Collaborate with Bonneville Power Administration to help public utilities develop and implement compliance support programs, leveraging economies of scale for greater efficiency and cost-effectiveness.	4.10	3.71
Study the resources required for utilities to provide ESPM automated upload and the resources available to non-qualifying utilities under RCW 19.27A.170 – Sections (2) and (7), to determine if and how this requirement should be modified. The state should then implement the findings of this study.	3.78	4.17
Explore methods to reduce the technical and cost barriers of entry to these programs by enabling data sharing between utilities and between utilities and state; encourage regional organizations like BPA and NEEA to provide services to a wide range of utilities thus reducing cost and risk; and explore a state-level contract whereby utilities can opt into programs like accelerators thus reducing cost and risk.	3.80	3.86
Provide funding to utilities to provide CBPS support, such as accelerator programs and rebates.	3.80	3.71
Establish a utility grant to establish revolving door loan/financing options.	3.67	3.67
Enable funding mechanisms to make energy audits more cost-effective.		
Fund audits for non-profits.	3.63	4.00
Make the cost of energy audits tax deductible.	3.33	4.00
Ensure public institutions have the human resources necessary for ongoing compliance.		
Increase pay scales in public institutions to be competitive with private sector compensation, including pay rates for contractors.	4.89	4.33
Require public institutions to have an energy manager or resource conservation manager and provide ongoing state funding for the position.	4.33	4.00
Provide guidance to public institutions how to budget for CBPS: O&M vs capital budgets, accounting for savings, prioritizing energy efficiency in budgets, grant payback mechanisms, etc.	4.00	4.00
Create dedicated energy teams within each state department to support energy efficiency work generally and CBPS compliance.	4.00	4.00
Review RCW 28A.150.260 to determine if minimum staffing allocations need to be adjusted due to increased staffing needs from CBPS.	N/A	N/A
Develop a comprehensive CBPS program to holistically support all aspects of compliance.		
Increase funding available to support building owners and managers with metering, including utility meters to measure energy use at the individual building level and submeters to measure separate end uses within buildings.	4.30	3.86
If support for sub-metering is provided to public institutions, it should be coupled with longer-term funding to maintain the meters and ensure data collection is continuous and accurate.	4.78	4.25
Create a more robust and comprehensively staffed Help Desk.	3.80	4.29

Strategy	Public Sector Score / 5.00	Private Sector, Utility, Non-profit Score / 5.00
Create a dedicated online tool to help decision-makers navigate CBPS requirements. The tool should cover: specific regional needs, comparison with other requirements such as Seattle's BEPS, and should match the user with any available resources that apply to their building. The tool should also present how resources can be combined, such as with conservation programs, renewable programs or EV supports.	3.90	4.00
Target outreach and training about CBPS not just to operation and facilities, but also to the key financial and leadership decision-makers, and tenants.	3.90	4.14
Provide leadership and coordination at all levels to align everyone around CBPS: equipment manufacturers, colleges and apprenticeships, utilities, OFM, etc.	3.80	4.00
Fund large-scale market transformation and cost compression efforts to remove barriers and accelerate adoption of the highest impact commercial retrofit solutions, such as rooftop unit heat pumps, dedicated outside air systems, ERVs, retrocommissioning, onsite solar, strategic sequencing, etc. Implement to ensure access across WA.	3.44	3.83
Develop a cost sharing model for third party benchmarking service.	3.40	3.83
Expand physical presence for outreach about CBPS.	3.30	3.67
Offer grant funding for cities to hire dedicated staff to promote and educate on CBPS.	3.00	3.57
Develop the workforce capacity needed to deliver an energy efficient commercial building stock.		
Explore creative strategies to increase the number of BOC 2 certified individuals, such as a scholarship program.	3.60	4.57
Fund energy fellows across Washington.	3.50	3.83
Adjust CBPS to better match the needs of building owners and managers.		
Establish future EUIs to provide a clear investment pathway, allow buildings owners and managers to undertake long term planning, and to help drive market innovation.	4.30	4.71
Allow a building owners to request an extension if they are waiting for equipment with long lead times.	4.60	4.14
Allow building owners to request an extension if they have begun but have not completed their upgrade work or their measurement and verification.	4.40	4.14
Streamline and add flexibility to the conditional compliance pathway.	4.20	4.33
Create specific long-term energy efficiency, GHG reduction, and other performance related goals for CBPS and establish flexible compliance paths that allow buildings to integrate multiple behind-the-meter strategies, not just energy efficiency, to demonstrate CBPS compliance.	4.10	4.29
Allow building owners to set an EUI based on a percentage reduction in their current EUI as an alternative to prescribed EUI targets.	4.20	3.86
Accept compliance with equivalent legislation.	3.80	3.83
Allow building owners to request an extension if they can implement the EMP and O&M but need additional time to meet the performance metric.	3.90	3.43
Study the investment criteria pathway to determine how the pathway can be streamlined or improved.	N/A	N/A
Ensure alignment between various pieces of existing legislation and CBPS.		
The Department of Ecology should study refrigerant phase-outs to determine whether the pace of phase-outs is impacting CBPS compliance.	4.00	3.67
Get rid of LEED standard requirement for state buildings (RCW 35.39D).	3.78	4.00

Strategy	Public Sector Score / 5.00	Private Sector, Utility, Non-profit Score / 5.00
Fund the Department of Commerce to increase their participation in the energy code development process in order to identify and encourage alignment across the state energy code, CBPS, and utility programs.	4.00	3.29
Incentivize building owners to transition their buildings and campuses into grid interactive assets.		
Use the newly developing green bank to offer loans for large-scale projects which support buildings as grid assets (local power generation, energy storage and load flexibility).	3.67	4.29
Recognize and reward building owners who engage in grid-interactive energy planning (local power generation, energy storage and load flexibility) in CBPS compliance process.	3.50	4.17
Launch a workgroup between the Department of Commerce, the Utilities and Transportation Commission, and other key stakeholders to develop a strategy for grid resilience through interactive and inter-building energy planning (through local power generation, energy storage and load flexibility).	3.60	3.86
Work with utilities to undertake demonstration projects to show how buildings can act as grid assets at scale (local power generation, energy storage and load flexibility), to better understand the potential benefits to both building owners and utilities, especially within the context of CBPS compliance.	3.80	3.57

Appendix C: Eliminated strategies

Throughout the process, the Workgroup considered several strategies that were not included in the final report. They are included below along with the reason for removal.

Strategy	Reason for Removal
Allow buildings that came into compliance after 2019 but before the EAI program began to apply for EAI funds, only if the money will be used for additional EE upgrades.	Low scoring strategy with Workgroup objections
Allow for a longer window for building use planning, so that buildings which will be very difficult to bring into compliance can instead be scheduled to be decommissioned.	Buildings scheduled for demolition have an exemption pathway
Allow identical buildings to submit once for all buildings.	Low scoring strategy with Workgroup objections
Allow more flexibility in determining which buildings comply first.	Not specific enough about how this would work in practice
Cap measure life at 10 years for cost-effectiveness calculations for investment criteria pathway.	Low score in survey and vetoed by Workgroup members
Commerce should provide free models and templates for O&M and energy management, and create case studies of good examples of compliance paperwork.	Already underway
Develop an energy manager training program.	Already underway
Develop models and clarify whether Energy as a Service is permitted for public institutions.	Already underway
Extend the application period for the Early Adopter Incentive.	Extension would extend the application period beyond the first compliance cycle
Fund market development in the finance and real estate sectors to standardize and integrate performance reporting into real estate valuations, transactions, and leasing agreement.	Low score in survey and vetoed by Workgroup members
Increase the one-time base incentive payment in the Early Adopter Incentive Program.	Already underway
Invest in apprenticeships for energy efficiency professionals.	Already underway
Offer pre-performance incentives as loans, which are converted to grants once work is complete.	Would create too much risk for state
Offer a yearly workshop to update all stakeholders on any changes to CBPS in the previous year.	Already underway
Promote the 50001 ready program as a free tool for developing leadership alignment around energy efficiency.	Already underway
Recalibrate EUIs that building owners flag as inaccurate as new data comes in.	EUIs will be updated in 2029 as new building data becomes available
Remove the O&M and EMP requirement for buildings pursuing the investment criteria pathway or buildings that have met their EUI.	Low score in survey and vetoed by Workgroup members
Share examples of RFPs which ensure companies who are doing energy audits are not also able to bid on the required EEMs (avoiding a false incentive to require additional work).	Low score in survey and vetoed by Workgroup members
Subsidize paid internships for students in the energy efficiency sector, especially linked to CBPS work.	Already underway
Train the consultant community to be champions for energy efficiency.	Already underway
Utilities should increase grid capacity and resilience to support electrification.	Already underway