Mapping the Future of Electrification in the Context of Evolving Policies and Market Drivers: A Case Study in Seattle, WA

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ABSTRACT

Accelerating electric load growth, through electrification driven by market forces and compliance with policies such as emerging building performance standards, poses major challenges for utility planning. To navigate these challenges, utilities need a detailed understanding of future load growth at multiple levels of granularity (such as the regional, system, and local levels). This paper presents a comprehensive assessment of electrification-driven load growth for the City of Seattle, structured around three analytical dimensions.

First, market and policy drivers are integrated into system-level models to project macro-level energy and peak demand growth over a 25-year horizon. Second, building benchmarking data and EnergyPlus-based prototypes for commercial and residential buildings are employed to estimate peak load growth at the individual building level. These estimates are informed by customized compliance narratives aligned with Seattle's Building Emissions Performance Standard and Washington's Clean Buildings Performance Standard. Third, the combined impacts of building electrification and electric vehicle adoption on distribution infrastructure are visualized by mapping locational load growth.

Together, these three dimensions provide a holistic view of the magnitude, geographic distribution, and timing of load growth as all-electric technologies proliferate under varying adoption scenarios. This integrated approach delivers actionable insights for utilities to prioritize infrastructure investments, strengthen grid resilience, and align long-term planning with evolving policy and market trends.

1.Introduction

Building and transportation electrification are accelerating in response to local and state climate policies and other market drivers. This ongoing shift in energy demand is creating both opportunities and challenges for electric utilities. While electrification can reduce overall energy consumption and greenhouse gas emissions (and by doing so, help meet the goals of a city or state's climate action plan), concerns have been raised regarding load growth, peak demand and its impact on local grid infrastructure, and potential upward electric rate pressure that threatens energy affordability. Rising electric demand may potentially strain utility resources at multiple levels: system-wide generation and transmission, and localized distribution networks. As such, there is a need for a more thorough understanding of (a) the degree to which various policies, and different ways in which they may be implemented, may affect overall electricity demand, (b) the mapping of policy-driven electrification onto localized peak demand impacts, and (c) the spatial interaction of rising electric demand across multiple end uses.

Seattle has adopted citywide decarbonization goals that aim to achieve carbon neutrality by 2050, with interim emissions reduction targets that require substantial changes across buildings, transportation, and energy supply. These goals are supported by a suite of policies that promote electrification, energy efficiency, and the transition away from fossil fuels, including building performance standards, energy codes, and transportation electrification initiatives. Together, these policies are intended to reduce greenhouse gas emissions while reshaping long-term electricity demand, creating new planning challenges for utilities related to load growth, peak demand, and localized grid impacts.

Seattle's Building Emissions Performance Standard (BEPS) establishes a phased compliance timeline that gradually tightens emissions requirements for large commercial and multifamily buildings through mid-century. Initial years focus on policy development, emissions reporting, and planning, followed by successive compliance periods with increasingly stringent emissions intensity targets. Nonresidential and multifamily buildings are required to meet interim emissions targets beginning in 2030, with net-zero emissions required beginning in 2045. In parallel, Washington State's Clean Buildings Performance Standard (CBPS) sets energy use intensity targets that phase in by building size, creating overlapping efficiency and emissions requirements. Together, these policies define a predictable, long-term pathway for building upgrades while allowing flexibility in compliance timing and strategies. While other market and policy drivers such as tax rebates and utility incentives may exist to encourage electrification, the present study focuses on BEPS and CBPS as the main policy drivers of large commercial and multifamily building electrification.

This project assesses how building and transportation electrification driven by market trends and performance-based policies will affect future electric load growth in Seattle. It combines long-term, system-level projections of energy use and peak demand with detailed, building-level analysis informed by benchmarking data and policy-specific compliance pathways. These building impacts are integrated with electric vehicle adoption and mapped geographically to characterize the location, magnitude, and timing of peak load growth. The resulting framework provides municipal and utility staff with planning-relevant insight to support infrastructure investment, distribution planning, and alignment with decarbonization objectives.

This study contributes to the electrification literature by presenting a scalable framework that links top-down electrification scenarios with bottom-up, building-specific load impacts under policy-driven compliance. The analysis operationalizes building performance standards into explicit compliance pathways, enabling empirical estimation of hourly and peak demand impacts using real benchmarking data and prototype energy models. By integrating building and transportation electrification within a common geospatial framework, the study highlights the importance of localized and cumulative peak effects. These contributions extend existing electrification research beyond annual energy and system-level metrics toward planning-relevant, spatially resolved insights.

2.Project Overview and Approach

This project implements a three-pronged approach to provide a holistic overview of policy and market driven electric load growth in the City of Seattle over a time period spanning the next few decades. The three prongs are listed below:

(1) **Top-down Building Electrification Analysis:** The goal of this prong is to understand system level increases in electric load, which may inform resource planning efforts. The Seattle residential and commercial building stocks, technology adoption patterns, and electrification pathways are modeled under multiple scenarios to understand future energy and grid implications. This work builds upon previous work completed by EPRI for Seattle City Light (EPRI, 2022).

(2) **Bottom-up building electrification analysis:** This analysis, focused on the locational impacts of the two prevailing building performance standards in Seattle – Seattle's BEPS and the State of Washington's CBPS (with a greater focus on BEPS as the driver of electrification). The goal of this prong is to better understand which specific buildings will experience large load growth from the entry into effect and progressive tightening of these standards. This analysis builds upon a previously published study developed by EPRI and Seattle City Light to assess locational load growth from BEPS-driven electrification across Seattle (Kostic et al, 2024). While the first prong develops multiple BEPS adoption scenarios, this prong assumes that all buildings not subject to an exemption according to the existing law will comply. Furthermore, this paper details the enhanced data cleaning that is being conducted on the utility's side to improve upon the results described in the prior version of the study (Kostic et al., 2024).

(3) **Combined Electric and Transportation Mapping:** The goal of this prong is to understand the convergence of electric and transportation loads, to ultimately understand the extent to which policies enacted by the city government may result in concentrations of peak load when they converge with predicted increases in electric transportation driven load growth. This portion of the work uses EPRI's E-RoadMAP (EPRI, 2025) as a reference for predicting transportation driven electric load growth within Seattle City limits.

2.1 Top-down Modeling

The top-down modeling approach was adapted from the previous system-wide electrification assessment that EPRI jointly completed with Seattle City Light in 2022. The scope of that system-wide model encompassed the entirety of the residential, commercial, and industrial building stocks in the City of Seattle. Given the policies that are the focus of this paper, we focus on commercial and residential buildings as part of our present reporting. We summarize the general methodology here but refer the reader to the publicly available electrification assessment for a more comprehensive account of the methodology and relevant assumptions (EPRI, 2022).

The first step in the system-wide modeling methodology is to establish a representative baseline that properly characterizes the existing building stock in Seattle City Light's service territory (without accounting for growth or redevelopment). Data is collated from several sources including local building stock assessments, national energy surveys, Census data, and utility-provided information. Factors considered include the total floorspace by different building category (such as multi-family, office, healthcare, education, etc.), existing technology saturation, fuel prices, and climate sensitivities. These sources are summarized in Table 1. While we focus on the City of Seattle in the present paper, this methodology is adaptable and has been applied for other geographies.

Table 1 Data Sources used in Study

Release	Source	Spatial Granularity
2025	Annual Energy Outlook (AEO)	National/Census Division
2020	Residential Energy Consumption Survey (RECS)	Census Division
2018	Commercial Buildings Energy Consumption Survey (CBECS)	Census Division
2023	American Community Survey (ACS)	State/County
2023	County Business Patterns (CBP)	State/County
v4.0.0	NREL - National Solar Radiation Database (NSRDB)	Gridded
v4.11	SEDAC - Gridded Population of the World (GPW)	Gridded

The adoption patterns of electric technologies in this modeling approach are dictated by various factors. First, electric technologies, especially those relevant to end-uses such as space heating, water heating, and cooking, are evaluated and assigned to different building types based on applicability. Second, given the policy driven motives of this work, three scenarios are developed to assess different levels compliance with the City's BEPS law. Those scenarios are described in Table 2. Under the baseline scenario, electrification was modeled based on an economic evaluation of electric and non-electric options, with more economically beneficial options gaining market share over time. The three different BEPS adoption scenarios then modeled different degrees of BEPS implementation lag, due to various factors such as noncompliance (e.g., building owners/operators choosing to pay noncompliance penalties rather than electrifying), deferrals, and exemptions.

Table 2 Scenarios Under Consideration

Scenario	Description	Assumptions
Baseline	Natural adoption with no policy considerations	Natural adoption for building segments not impacted by

25% BEPS	Lagging BEPS implementation	CBPS/BEPS Assume 100% CBPS compliance
50% BEPS	Lagging BEPS implementation	
100% BEPS	Full compliance with BEPS	

A preceding study by Kostic et al. (2024) showed that different building types exhibit different projected patterns of electrification in response to the Seattle BEPS. Those patterns are driven by various factors including (a) the emission targets that these buildings must meet per compliance period, (b) their existing emissions and the extent to which different electrification measures may reduce them, and (c) the incremental first costs that building owners would typically incur to implement different electrification measures, such as space or water heating electrification. As such, a staggered BEPS compliance timeline was implemented, whereby it was assumed that building classes would tend to fully electrify around a certain date associated with a critical compliance window. Based on modeled compliance narratives developed by Kostic et al., it was determined that the following dates would be representative of typical full electrification timeline for each large class of buildings:

- 2031: Healthcare
- 2036: Office (Large)
- 2041: Lodging, Warehouse, Assembly, Education, Multi-family
- 2046: Mercantile/Service, Food Sales, Office (Small), Food Service, Other

As part of this system wide modeling effort, it was also important to separate the impacts of widespread electrification on energy use from its impacts on peak electric demand (a metric that is important for various practical purposes including infrastructure sizing, generation planning, among others). As such, the implemented methodology, as described in the original electrification assessment, factors the added efficiency of heat pump systems into the analysis, while also considering hourly electricity demand from electrification.

In anticipation of increasingly frequent extreme weather events, models were also simulated according to 2024 weather conditions. Martin Luther King Jr. Day 2024 featured abnormally cold weather in the Pacific Northwest, contributing to outsized electric system peaks. As such, it was important to understand how electric demand would look in a situation where electricity is used to meet a substantially larger portion of energy demand in Seattle.

This analysis feeds into City Light' load forecast which then feeds into the Demand Side Management Potential Assessment and the Integrated Resource Plan. These ultimately feed into a 10-year strategic plan which informs staffing and operations plan and rate case.

2.2 Bottom-up Modeling

This portion of the research investigates the localized load impacts of two building performance standards – the Washington State CBPS and the City of Seattle's BEPS.

Building performance standards (BPS) are policies that require existing buildings to meet increasingly strict energy use or greenhouse gas reduction targets over time, substantiated by measured energy use data. Instead of prescribing specific technologies, BPS rely on energy use data (sometimes converted into greenhouse gas data according to guidelines set by the jurisdiction) to assess whether buildings achieve defined performance outcomes, providing owners with some flexibility as far as compliance pathways.

Seattle's two complementary building policies were developed simultaneously to cut emissions from large existing buildings, but they use different metrics and compliance mechanics. Washington's CBPS, established in 2019, sets energy-use intensity (EUI) targets that primarily drive energy efficiency. Seattle's BEPS, established in 2023, sets greenhouse-gas intensity targets (GHGiT) that primarily drive electrification of on-site fossil loads (City of Seattle, 2023). Both policies apply to commercial and multifamily buildings with a floor area greater than 20,000 ft^2, begin with reporting and planning requirements, and then phase into performance targets on a fixed schedule. One important nuance, BEPS requires all buildings greater than 20,000 ft^2 to report and hit GHGIT, whereas CBPS in the initial compliance round requires all buildings greater than 20,000 ft^2 to report on EUIt, but only buildings greater than 50,000 ft^2 need to hit a reduced EUIt.
BEPS uses five-year compliance cycles with progressively tighter emissions limits that ratchet to net-zero by 2050, providing predictable waypoints for owners while allowing flexibility in technology choice and sequencing. CBPS starts with an initial compliance target from 2026-2028 by building size. State policymakers can choose to introduce additional cycles with lower EUI targets in later years, reinforcing continuous efficiency improvements. In practice, the two standards operate in tandem: CBPS reduces total energy use, while BEPS ensures remaining energy use is increasingly served by clean electricity, together reshaping long-term load growth and peak demand profiles across Seattle's large-building stock.

While the earlier Kostic et al. (2024) analysis established the methodology for conducting the peak load forecasting, this newer effort is focused on also improving peak load data quality to improve forecasting accuracy.

2.2.1 Updated Peak Load Data Processing

In the earlier Kostic et al. (2024) analysis, City Light calculated building peak load by pulling the highest recorded peak from each meter's utility bill and adding them together. This produced a **non-coincident** building peak. While simple and efficient, this approach had two major limitations:

1. True building peak load is **coincident** (meters may peak at different times).
2. City Light does **not** calculate peak demand for **residential** meters, so multi-family and condominium unit peaks were missing.

For this updated analysis, City Light is building a more accurate, multi-part script to estimate the **highest coincident kilowatt (kW)** per building each month using three-meter data types:

1) Interval Reads (15-minute or 5-minute data)

All new meters record interval data. Residential meters log 15-minute intervals, while commercial meters log 5-minute intervals. When needed, 5-minute data is rolled up into 15-minute intervals.

For each month:

- The 15-minute interval data is aggregated for a specified time range and specific meters.
- The script identifies the highest 15-minute kWh interval.
- That value is multiplied by 4 to convert it to **coincident peak kW**.
- If a meter uses 5-minute interval data, then we use the peak kWh reading across three continuous intervals and then multiply that by 4. These continuous intervals are aligned with the 15-minute intervals to ensure they are coincident.

2) Scalar Reads (monthly kW)

Some meters record only the highest kW for the month.
The script pulls this value as-is.
This produces a **non-coincident** peak

3) Consumption-Only Reads (monthly kWh)

Some meters record only total monthly consumption.
To estimate peak demand, monthly kWh is divided by the number of hours since the previous read. That hourly average is then divided by 0.3 to estimate peak demand, producing a **non-coincident** peak.

Combining Meter Types

For each building ID, City Light calculates a **combined_demand_sum**, which is the sum of:

- Interval-based coincident peaks
- Scalar kW peaks
- Estimated peaks from consumption-only meters

This provides an estimated monthly building peak

Key Data Considerations

Since 2019, OSE has required benchmarking for buildings over 20,000 sq ft. Benchmarking Building IDs serve as a consistent unique identifier. City Light uses **Service Point IDs (SP_IDs)** rather than meter IDs, because SP_IDs stay consistent even as meters are upgraded. However, City Light's billing system does not define "buildings." Each SP_ID has an address and unit number, and buildings may have multiple addresses (e.g., located at cross streets).To group SP_IDs into buildings, addresses were matched to King County Parcel Identification Numbers

(PINs).This mapping is not always accurate, especially on campuses or large parcels (e.g., one downtown PIN covers 10+ buildings). Therefore, these cases required **manual corrections**.

Duplicate Scalar Reads

Sometimes scalar meters recorded **two peak values within the same month**, which created duplicate or conflicting data. We updated the script so that when this happens, it **selects only the highest scalar peak for that month**, ensuring a single, accurate monthly peak value.

Meter Swap Issues

When a meter is replaced (usually scalar → AMI), the initial query incorrectly calculated peak demand from the old and new meters within the same month. To address this issue, the processing workflow was modified to account for potential overlaps between scalar and interval meter data. During scalar-data processing, interval-meter records associated with the same SP_ID are examined so that scalar readings occurring during months with interval-meter data are excluded. In addition, scalar readings recorded before the 25th day of the month are shifted to the previous month to better align with typical scalar billing cycles, although this adjustment may slightly influence the estimated peak demand for the preceding month. Because these corrections cannot fully eliminate all edge cases, two quality-control indicators—meter_swap and building_has_swap—were introduced to identify locations where potential meter replacement or data continuity issues may still be present.

Anomaly Detection

For each building, a **z-score** is calculated based on the combined monthly peak relative to the building's yearly average. Then, an **anomaly count** records how many months exceed a z-score of +2 or –2. This helps identify months where a peak may be artificially inflated, such as during a meter swap.

It should be noted that the methodology described here is a work in progress but is included as it is an important improvement to the methodology. However, the analysis described in the results section is based on data generated in a similar manner to the Kostic et al. paper (2024).

2.2.2 Load Forecasting and Compliance Narrative Formulation

We developed a five-stage workflow to translate policy requirements into building-level actions, hourly load impacts, and grid-planning metrics through 2050. Note that the bottom-up modeling is consistent with the 100% BEPS compliance scenario used in the top-down modeling. The other scenarios are not modeled. For further information on the workflow, we refer the reader to Kostic et al. (2024).

1) Stock characterization. We began by classifying the covered inventory in Seattle's benchmarking dataset by primary use (for example, office, hospital, multifamily), size, vintage, and fuel mix. This was based on data provided by Seattle's OSE and collected pursuant to Seattle's Energy Benchmarking Law, in effect since in 2019 (City of Seattle OSE, 2026). Specialized occupancies without clearly equivalent models were mapped to proxied models with similar end-use and schedule characteristics to preserve engineering realism while maintaining tractable model diversity.

2) Baseline-load shape synthesis. For each record, we assigned hourly end-use load shapes using U.S. Department of Energy EnergyPlus prototype models aligned to building type (for example, "Large Office," "Primary School," "Hospital") and scaled these shapes to match observed annual consumption from the benchmarking data. These load shapes had originally been developed as part of a study documented by Sheng et al. (2023). This produced composite baseline profiles that retain measured totals while embedding realistic temporal structure and end-use composition.

3) Calibration and fuel splits. Where benchmarking reported electricity, gas, or district energy use, composite profiles preserved those shares; where absent, shares were inferred from the matched prototype and metadata and reconciled to reported totals. Annual energy and seasonal shape checks were used to validate profiles against typology expectations.

4) Measure application and compliance narratives. We applied parameterized energy conservation and electrification measures (such as space-heating heat pumps and heat pump water heaters) to each composite profile, using data from Sheng et al. (2023), and computed resulting greenhouse-gas intensity and energy-use intensity by compliance period. Using Seattle's Building Emissions Performance Standard, we identified building-specific sequences of actions that achieve interim targets and net-zero endpoints, yielding a compliance narrative for every building over successive cycles through mid-century.

5) Grid impact assessment. Post-measure profiles, created through the application of EnergyPlus (Woods et al., 2023) energy conservation measures to individual building peak and energy use characteristics specific to each building, were generated for every building in the data set. We flagged buildings whose non-coincident peak exceeds 500 kW, a threshold identified with more complex service upgrades and potential distribution triggers, and summarized these counts by type and location to inform planning.

This integrated approach links top-down policy drivers to bottom-up peak impacts, generating planning-ready outputs for forecasting, IRP inputs, and distribution studies

While the previous study, presented by Kostic et al. (2024), focused on characterizing load growth by building type and neighborhood, the present study leverages the same data to understand the utility's operational needs over the course of the building performance standards' compliance horizons. Towards this end, our approach used more precise specificity to define (a) potential exemptions and deferrals that may delay a building's implementation of electrification measures, and (b) the actual year that a measure would have to be implemented (i.e., specifying that the measure would have to be implemented by 2033 rather than the 2031-2035 timeframe). This added specificity provided more precise load growth timelines and building-by-building compliance narratives, which can then feed into utility resource planning, distribution infrastructure assessments, staffing requirements, and other operational needs. It should be noted that the specific year that a building must come into compliance within a given five-year compliance cycle is dictated by its floor area, as specified in the BEPS law.

As such, for this paper, we define a "project" as any electrification upgrade conducted by a building each year between 2030 and 2050. Seattle City Light's modeling assumes that projects resulting in more than a 30 percent increase in peak load will require an electric service upgrade. The projected average number of service upgrades per year is being used to inform future staffing plans—not only for utility service-upgrade support, but also for The Lab at City Light (Lighting Design Lab, 2026). The Lab's staff will play a critical role in helping building professionals adopt efficient electric technologies and reduce peak load. This work can limit the amount of system upgrading required across the grid—from individual buildings all the way through generation infrastructure.

2.3 Transportation Mapping

The final prong of the project combines the bottom up, building specific peak load growth data generated through the methodology described in Kostic et al (2024) with data from eRoadMAP, an EPRI dataset which identifies the timing and magnitude of transportation-driven electric load growth nationwide (EPRI, 2025).

At this time, the transportation mapping prong of the project is still a work in progress, therefore, results are not reported in this paper, but will be included in future reporting.

3. Results and Discussion

3.1 Top-down Modeling

Figues 1 and 2 show projected total energy use in Seattle from 2023 to 2050 for residential and commercial buildings, respectively. It should be noted that these results include buildings that are not subject to BEPS, notably single-family homes (roughly half of all natural gas usage).

Under the baseline scenario (with no policy considerations), estimated load growth is 543,247 MWh (62 aMW) through 2050 (driven by beneficial economic conditions for electric end-uses) across the two broad building sectors, spread across the sectors in the following manner:

- Residential Buildings: 305 GWh
- Commercial Buildings: 239 GWh

Under the 100% BEPS scenario, estimated load growth increases to 828,766 MWh (95 aMW) across the building sector as buildings work to comply with policies:

- Residential Buildings: 439 GWh
- Commercial Buildings: 390 GWh

Together, these two scenarios cover the spectrum of the prospective impact on BEPS on electricity demand and annual peak load between now and 2050, under various levels of BEPS adherence. Depending on the level of compliance, BEPS implementation could account for an additional 70 to 289 GWh of building load through 2050.

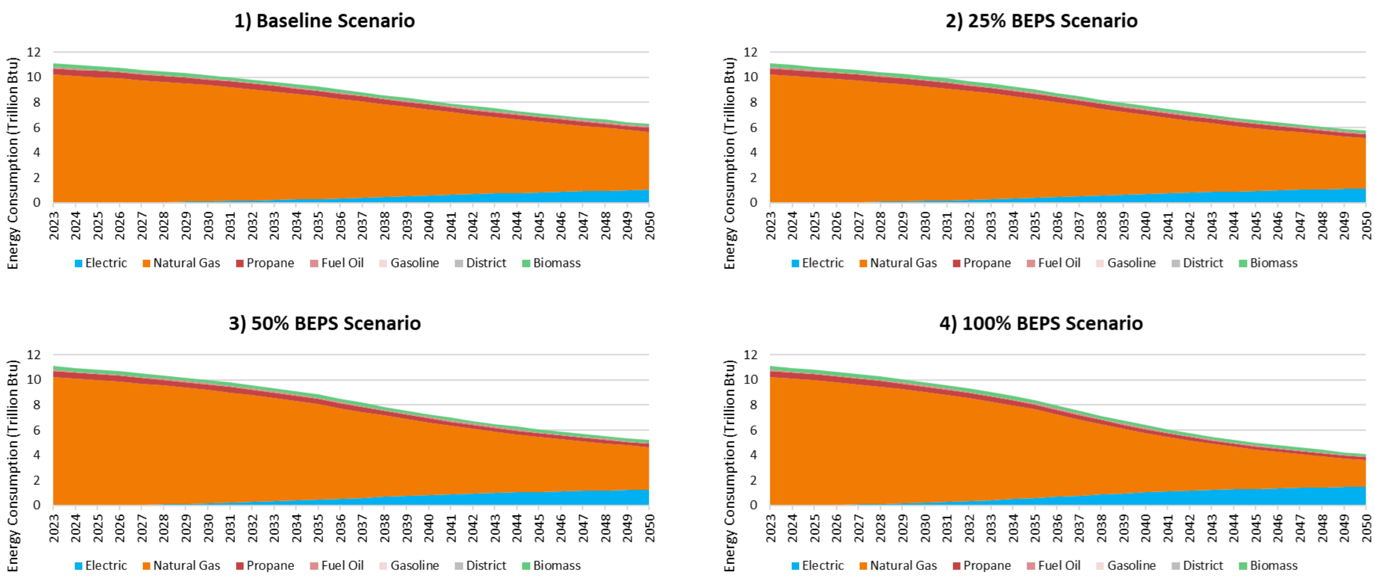

Figure 1 Residential Building Results

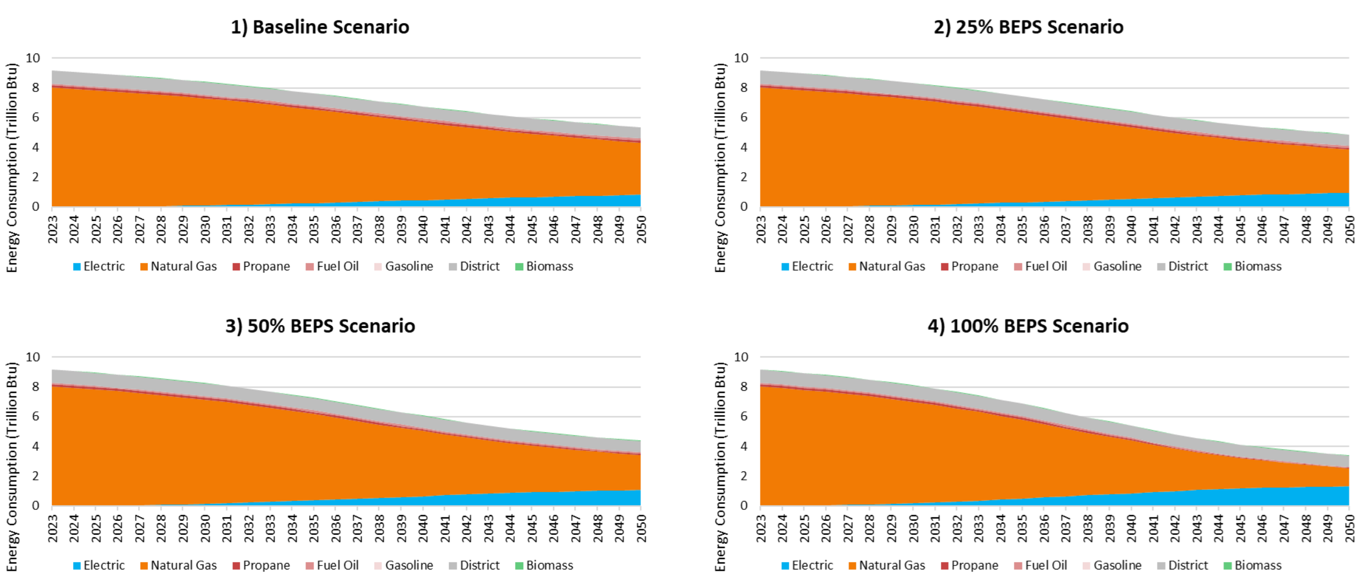

Figure 2 Commercial Building Results

Observing system peaks under 2024 weather conditions is particularly informative for understanding the prospective peak impacts on BEPS. Figure 3 shows these results. Note that these also include industrial loads. Martin Luther King Jr. Day, in January, stands out as an extreme weather event with particularly low temperatures, as observed in Figure 3. The corresponding incremental peak due to electrification (i.e., excluding technologies which are already electrified) goes from nearly 350 MW to over 800 MW when going from the baseline to the 100% BEPS scenario (all other parameters held equal to isolate the effect of BEPS), underscoring the increasing importance of extreme weather readiness in an environment where market adoption of electric space heating technologies reaches 30% in the residential (both single and multi-family) sector and 65% in the commercial sector, where BEPS applicability is much higher.

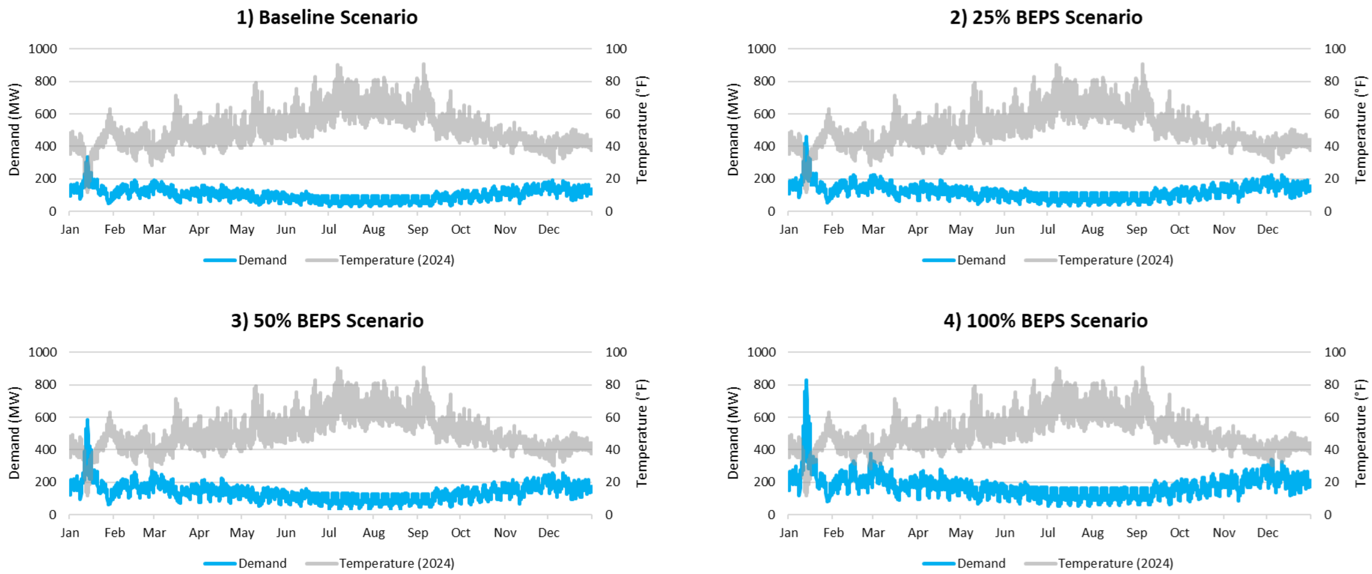

Figure 3 Hourly Load Patterns

3.2 Bottom-up Modeling

Figure 4 shows incremental load growth by year for the database of 1800 buildings included in the Benchmarking Data and which are not subject to any exemptions (including already being all-electric). Note that the bottom-up modeling is consistent with the 100% BEPS compliance scenario used in the top-down modeling. The other scenarios are not modeled. Some patterns emerge when analyzing year over year load growth:

(a) Within a given compliance cycle (five year increments from 2031 through 2050), the first year appears to dominate load growth: This pattern does not come as a surprise, as larger buildings are required to come into compliance with new greenhouse gas emission targets sooner within the five-year cycle (with the year of compliance governed by building floor area). However, the fact that the first year of a compliance cycle "front loads" load growth is informative for purposes of infrastructure planning and provides more granularity than the five-year bands shown in our previous paper (Kostic et al., 2024).

(b) The 2041-2045 compliance cycle is pivotal: This finding is also to be expected, as this is the compliance cycle when most buildings are required to reduce their scope 1 emissions to zero. Our previous study had shown that a large portion of buildings would comply with the first cycles (2031-2040) without any upgrades. As such, this cycle is the first in which efficiency may not necessarily suffice. In contrast, the 2046-2050 cycle, which chiefly covers multifamily buildings, sees much less steep increases in peak load.

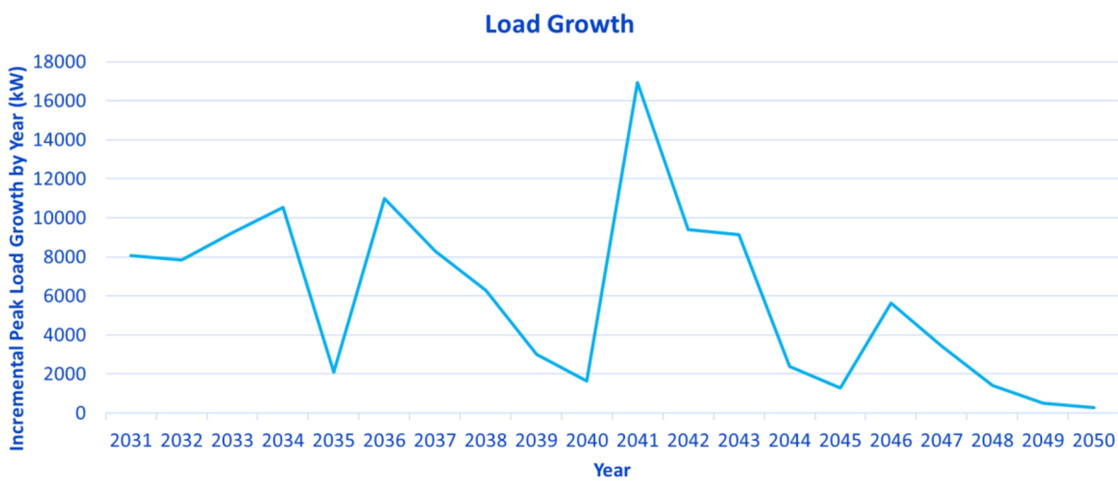

Figure 4 Load Growth by Year

Figure 5 shows the number of projects (i.e., buildings that will implement an electrification retrofit) by year. Comparable patterns to those observed in load growth emerge, though with some important differences:

(a) Counting by project rather than incremental load eliminates "front loading": in general, the first year of a compliance cycle is not the most "project-intensive", even if it may witness the largest load growth. This pattern suggests that we see more load intensive projects in the early years of a compliance cycle, followed by a larger number of less load intensive projects. This pattern tracks well with the structure of BEPS compliance timelines, as larger buildings are required to come into compliance sooner.

(b) Consistent retrofit demand: After 2031, there is a consistent rhythm of at least 100 BEPS-related retrofit projects per year in the buildings included in the benchmarking dataset.

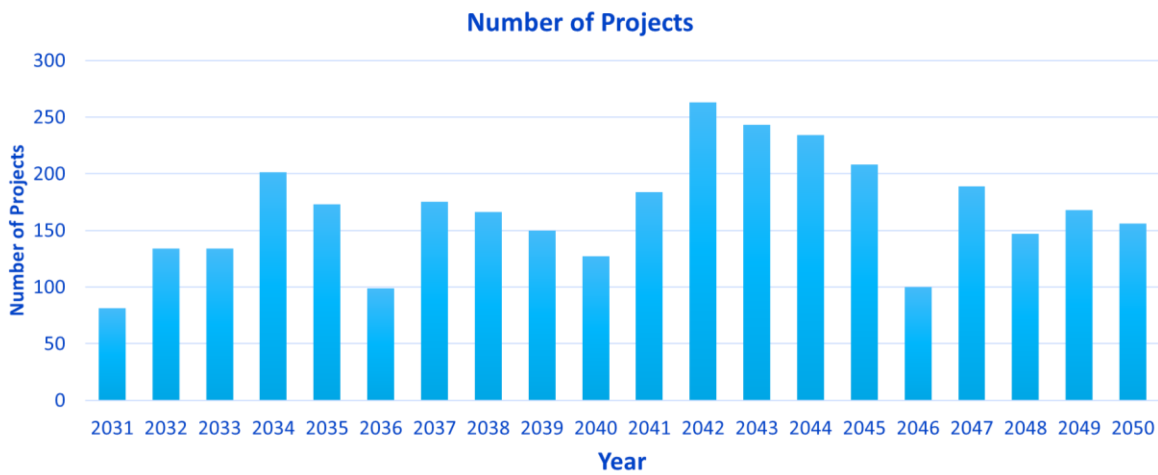

Figure 5 BEPS Retrofit Projects by Year

4. Conclusion

The modeling and mapping exercises described in this paper provide valuable conclusions for utility planning in an environment of increasing electrification, driven both by market drivers and state and local policies. We list the primary conclusions at this stage of the project below:
(1) **Variability in BEPS compliance may result in a broad range of system peak outcomes:** In particular, the 100% BEPS compliance scenario, as described in prong 1 of this analysis, estimates a greater than twofold increase in peak load (350 MW in the baseline scenario compared to 800 MW in the 100% BEPS compliance scenario). Intermediate scenarios predict system peaks in the range of 400 to 600 MW. While this breadth of potential outcomes allows planners to better understand the relationship between BEPS compliance and load growth, it also suggests that a better understanding of the outcomes of BEPS exemptions and noncompliance rates may be needed for more accurate system peak modeling. This study aims, in its ongoing phase, to refine BEPS forecasts to properly account for those events.
(2) **Load Growth is likely to be front-loaded across the different BEPS compliance cycles:** Results discussed under prong 1 of this analysis suggest that the first year of the latter compliance cycles (2036, 2041, 2046) are likely to see the largest incremental peak load growth across the city. This pattern suggests that load growth will be driven by larger buildings, which will be required to comply with their BEPS target in the first year of the compliance cycle. As such, infrastructure upgrades will need to be planned with this tendency in mind, especially ahead of the years that are likely to see the largest incremental load growth (the 2041-2045 compliance cycle).
(3) **High volume demand will persist for the duration of the BEPS compliance horizon:** Project results show that after 2031, there will consistently be at least 100 projects a year. As described, Seattle City Light's lab will assist in providing guidance on service upgrades, as well as energy conservation and peak mitigation strategies. The high volume of projects expected to be undertaken a year underlines the substantial staffing needs that will be needed to adequately support commercial and multifamily building owners in complying with BEPS.

Additional work is currently underway to refine the underlying building performance data as described in this paper, and to complete the mapping of building and transportation loads so as to provide a comprehensive mapping of load growth throughout the City of Seattle.

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