

Case Study

Community Strategic Energy Management



Credit: City of Tacoma.

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OVERVIEW

Location: Tacoma, WA

City Size: 62 Square Miles

City Population: 211,277 (2016)

Median Income: \$51,269

Average High Temp: 61.5 °F

Average Low Temp: 45.3 °F

Average Annual Precipitation: 39.25 inches

Number of City Facilities: 98



City of Tacoma
WASHINGTON

TACOMA, WASHINGTON

The City of Tacoma has a long-standing commitment to reducing greenhouse gas emissions. This began in April 2005 when the Mayor signed the U.S. Mayors Climate Protection Agreement pledging that Tacoma would strive to cut emissions by 7% from 1990 levels by 2012 as established in the Kyoto Protocol. A Green Ribbon Climate Action Task Force further defined the city's carbon reduction goals, and in 2008 the City of Tacoma formalized a Climate Action Plan which set a greenhouse gas emission reduction target of 40% over 1990 levels by the year 2020.

A 2012 Climate Action Plan report detailed progress made toward the city's emissions goals. It also laid the groundwork to establish a new Tacoma Environmental Action Plan (TEAP) to aggressively pursue actions toward established goals. The plan's categories for action include Buildings and Energy, Transportation, Materials Management, Natural Systems, Air and Local Food, and Climate Resilience.

Building energy represents about 40% of emissions in Tacoma. The electricity procured by the municipal utility provider, Tacoma Public Utilities (TPU), is sourced from regional hydroelectric dams and is about 98% renewable and carbon-free. Initial analysis suggested that building energy usage and related emissions were largely due to natural gas used for heating, so initial actions focused on weatherization retrofits. And while the TEAP mandated the development of a Resource Conservation Plan and general government policy to guide energy efficient investments, operations, and behaviors in city facilities, the city lacked a mechanism to identify inefficient buildings, prioritize upgrades, and guide improvements.

Community Strategic Energy Management (SEM)

is a long-term approach to energy efficiency in public building portfolios. It brings SEM principals to the unique needs of public building decision makers and market actors, providing them with the information they need to turn broader performance and leadership goals into measurable energy savings outcomes in public buildings and schools.

Community Strategic Energy Management (SEM)

With help from the Northwest Energy Efficiency Alliance (NEEA), the City of Tacoma took their commitment to public building energy efficiency to a new level. The NEEA project team partnered with the city and TPU to undertake a comprehensive approach to efficiency in the municipal portfolio. The team, including New Buildings Institute (NBI), EcoEdge, and Maalka, worked with city staff to engage multiple departments, policymakers, the utility, and other stakeholders in meaningful discussions about how to achieve energy goals in public buildings.

Over a series of facilitated meetings, key city staff created an action plan that consolidated the approaches into one working document. This group:

- Established an energy team
- Assigned staff to resource conservation management activities
- Set up a process to automate energy benchmarking
- Developed Energy Use Intensity (EUI) targets for different building types
- Established clear metrics to track energy performance and measure success

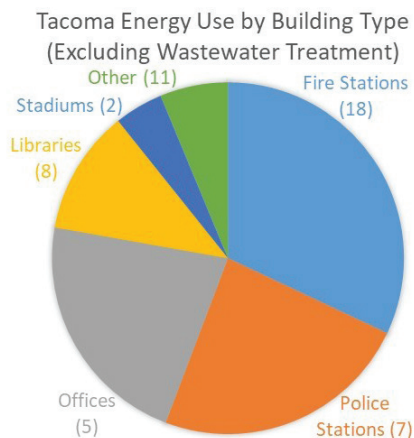
The team focused on ensuring the accuracy of benchmarking data and streamlining the data transfer process. The team developed strategies for engaging stakeholders and ensure that results were communicated back to decision makers in clear and understandable terms. This group was able to establish and strengthen a key cross-departmental relationship between sustainability and facilities.

Benchmarking and Remote Diagnostics

Tacoma Public Utilities was ahead of the curve regarding automated utility data transfer, but the city needed help aligning meters and accounts to buildings. Different documents listed different numbers of city buildings, and the definition of “building” was not universally consistent. Beginning from a list of over 150 accounts, the team inventoried 98 individual facilities and benchmarked 68 in Energy Star® Portfolio Manager. Benchmarking is the practice of tracking, measuring and comparing building energy performance.

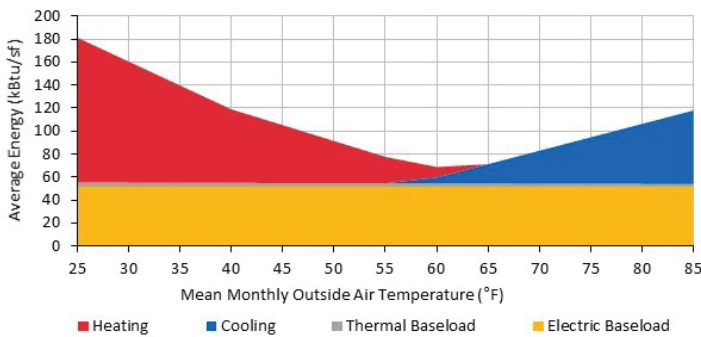
This analysis found that the wastewater treatment plant alone accounted for 52% of all municipal facility energy consumption. Because energy usage in wastewater treatment facilities is highly process-driven and unique, deeper analysis for this effort focused on more traditional building types, as shown in the pie chart.

Once energy data was centralized and a deep data cleansing process was completed, including ensuring that every meter was properly aligned to its building, the team was able to move from benchmarking to deeper building performance analysis. Using only monthly utility bills and basic building inputs (building location, type, and size) added to the building inventory list, the team used NBI’s FirstView® software tool to remotely diagnose energy performance in a subset of 51 buildings. The analysis found that the fire and police stations together accounted for most non-wastewater municipal building energy use. In comparison, libraries use half as much energy as office buildings overall.

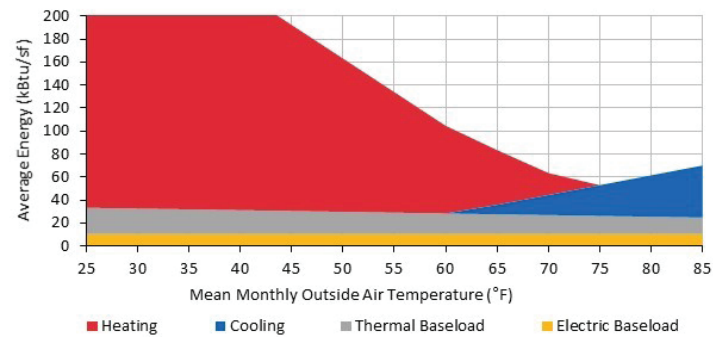


Based on this assessment, four buildings stood out as priority targets for field assessments. More specifically, the analysis identified specific aspects of building performance in these four facilities that deserve further attention. For example, in the Police Headquarters (left), plug loads may represent a significant opportunity for energy savings, as seen by the height of the electric baseline (yellow) in the energy signature (an energy signature is a plot of building energy performance at various outside temperatures). The energy signature for the Beacon Senior Center (right) clearly diagnoses heating and control problems, as indicated by the extensive heating load (red) which overlaps significantly with cooling energy use (blue).

Police Headquarters



Beacon Senior Center



Outcomes

The Community SEM process has helped the City of Tacoma take important steps toward meeting its carbon reduction goals. The analytical outcomes and diagnostic recommendations have helped identify the subset of buildings that are good candidates for energy assessments and upgrades. Staff can now more easily identify significant energy users and buildings with performance out of line with comparable facilities – and set performance targets for those key facilities.

Bridging the gap between community carbon goals and stakeholder drivers is another important outcome of the Community SEM process. The team helped Tacoma staff identify drivers and key messaging for communicating plans and results to decision-makers. One compelling message was the fact that a 10% reduction in their energy bill could save the city about \$860,000 per year.

The partnership with the utility is another positive outcome of the Community SEM process in Tacoma. The utility benefited in two important areas: (1) energy efficiency savings and (2) customer satisfaction. Tacoma Public Utilities engineers and account representatives have not only helped make utility data available for benchmarking, they can now use that information effectively to target opportunities and fill the pipeline with savings.

Lessons Learned

“Working with the City of Tacoma and the CBR team allowed us to clearly define our benchmarking goals and methodology. It helped to go beyond just tracking energy use to also focusing on how this effort translates across the City of Tacoma and at Tacoma Power.”

-Jessica Rose, Senior Account Executive at Tacoma Public Utilities

- Dedicating a Resource Conservation Manager or Energy Manager can make Community SEM a more effective and streamlined process. This staff member is typically responsible for the building inventory, mapping meters to buildings, data validation, data updating, and ongoing performance monitoring.
- Community SEM is a process that can be replicated for any portfolio owner. In this case, TPU was inspired to perform an analysis of their own buildings so they could be appropriately represented in the municipal portfolio.
- Establishing a formal mechanism for conversations and communications among city departments and staff in the context of energy performance can lead to strong, regular connections and establish accountability for energy efficiency policies, projects, and strategies. By strengthening relationships between these departments, this helps establish better understanding, better communication, identifies key drivers for success, and standardizes performance reporting.
- City Council and other stakeholders have many responsibilities and competing priorities. Staff turnover can also be a challenge, so defining a clear plan with reportable metrics and a defined approach to communicating results is critical to successful implementation.
- Analyzing the city portfolio, both overall and for particular departments, is helpful in planning and priority setting. This helps the city uncover the most promising financial investments across the city, but lays the groundwork for department-specific plans necessary for successful implementation.
- Setting energy performance targets at the building level, usually defined in terms of Energy Use Intensity (EUI), is a key tool to bridge the gap between broad carbon reduction goals and day-to-day building management. Benchmarking is fundamental to understanding current baseline performance and how this relates to energy targets.
- Proactive utility involvement was a huge asset to the Community SEM process. TPU staff familiar with Energy Star Portfolio Manager were able to proactively identify and quickly overcome system limitations, saving time and money. The utility was able to create a framework for automated benchmarking and serve as an example for other utilities.

