Low and Flat: Market Transformation to Reduce Peak Load and Increase Resilience

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ABSTRACT

Utility grids function best when demand loads are low and flat. While energy efficiency lowers demand, peak demand strains grid capacity. To increase resiliency for the utility grid at the building scale, new commercial construction projects can be guided both to lower and to flatten their demand profile through energy efficiency and grid-interactive strategies.

The Energy Trust of Oregon New Buildings Program (New Buildings) launched a suite of incentives and training events in 2025 with a long-term goal of transforming the market toward grid interactive and resilient design. The aim is for all buildings to be energy efficient and to adapt flexibly when and how they use energy to reduce operating costs, function better during disruptive events, and minimize carbon emissions. Oregon's recent 2025 Code update and adoption of ASHRAE 90.1-2022 for commercial buildings puts a higher premium on these Program offerings as projects continue to seek efficiencies beyond code.

Through strategic placement of technical assistance coupled with robust training, New Buildings is leading customers to integrate innovative approaches. Technical assistance incentives support specific analysis of hourly energy consumption profiles so that project design teams and building operators have concrete information about building design loads and peak load periods. Additional incentives directly support further analysis into potential strategies that impact building demand, utility costs, and passive survivability.

From research to program implementation, this paper highlights how utility incentives coupled with customer engagement transform the market, increase grid responsiveness, and bring resilience to the electric grid.

Problem Statement:

The Importance of Low, Flat, and Flexible Demand

Electric utilities serve their customers by being a reliable source of energy delivered through a complex infrastructure of energy production and transmission. As electric demand increases from data center growth and electrification of buildings, industry, and transportation, grid capacity is strained. In addition, regional clean energy legislation imposes carbon emission reduction targets on utilities (80% by 2030 and 100% by 2040 for Oregon), further challenging their ability to meet load growth. Demand response programs help reduce or delay the need for additional generation capacity or distribution upgrades. These programs also promote a clean energy grid by reducing peaks, either when renewable supply dips or when higher emission generation would otherwise be required. As noted on the Oregon Public Utility Commission website, demand response provides benefits including avoiding construction of new power plants, avoiding purchases of high-priced energy, enhancing grid reliability, and reducing power use from fossil fuels to meet peak demand (OPUC 2026).

According to the U.S. Environmental Protection Agency, about 35% of electricity is used by commercial buildings (EPA 2026). Many utility programs for commercial new construction support high performance design. In the not-so-distant past, net zero status was the ultimate goal, where energy consumption over the year is balanced by annual solar production. These high-performance designs included both active and passive design features as well as renewable energy, typically with a solar array. Unfortunately, while these exemplary buildings reduced annual demand, they did not address peak demand. High midday solar production naturally declines as the sun goes down. In Oregon in late summer, when cooling loads are highest, this drop in solar production in the late afternoon coincides with a rise in air conditioning usage that causes sharp peaks in utility demand. As a result, these award-winning projects are unwittingly contributing to strains on grid capacity. Furthermore, these buildings fail to achieve maximum carbon reductions because sources used to meet peak demands are generally high-emission sources such as natural gas. The New Buildings Institute (NBI) has written extensively on this topic showing the complexity of the situation and proposing potential solutions (NBI 2016).

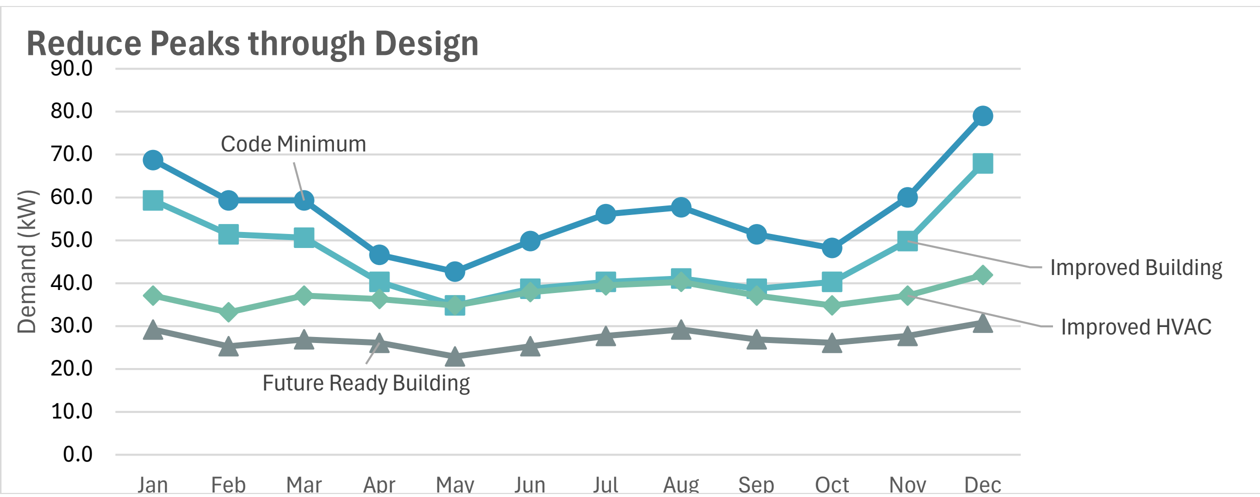

Figure 1. Overall monthly demand is reduced from a minimally code-compliant baseline building when an improved shell is added (Improved Building). HVAC measures such as right-sizing, optimized thermal massing with night flushing, and variable capacity are incorporated to further reduce specific seasonal demand peaks (Improved HVAC). The Future Ready Building utilizes grid interactive control measures such as load shifting and demonstrate a flatter demand profile with fewer peaks (Future Ready Building).

An approach centered on “low, flat and flexible” for commercial buildings becomes the solution. To achieve “low” demand, buildings need to reduce overall energy loads. Passive strategies like natural ventilation and a high-performance envelope coupled with efficient equipment selection for remaining active systems results in load reduction. “Flat” demand is achieved through passive strategies such as increasing thermal mass to modulate indoor air temperatures or by using controls to limit operation during peak periods. Solar plus battery energy storage or thermal energy storage systems also limit the amount of energy that must be pulled from the electric grid during peak periods. And finally, these same controls and storage systems allow for more "flexibility" in how and when energy is used. The graph above of monthly power demand demonstrates how designing a commercial building for the future can lead to "low, flat and flexible".

Design and construction of commercial buildings today does not typically follow a process that considers how the building interacts with the grid. When peak demand is integral to design, grid-responsive buildings become a potential solution to strains on the grid. Developers and owners need to see these grid benefits of lowered energy demand with flatter peaks as also beneficial to them.

Connecting grid benefits to owner benefits involves highlighting attributes of grid responsive buildings such as utility demand response programs, better building resiliency during severe weather conditions, and increased tenant satisfaction with healthier and more comfortable buildings. Architects and engineers experienced with the complex controls systems needed to flexibly respond to grid demand reduction signals are less hesitant about designing for demand response when they are more familiar with these systems. Facility managers who understand and value these increasingly complex control systems will operate their buildings for maximum energy efficiency, optimized demand reduction, and operational cost savings. Stakeholders who see examples of successful grid-responsive buildings will more readily invest in these projects.

Innovative incentive offers under the Energy Trust of Oregon New Buildings Program aim to address these challenges and usher in a new way of designing and constructing buildings to meet the ideal of "low, flat and flexible".

Why Now? Why Oregon?

Two factors position Oregon to bring practical solutions that bridge energy efficiency at the building scale to peak load reduction at the grid scale: mandated energy targets and a robust utility incentive program.

In 1999, Oregon Senate Bill 1149 established requirements creating a system to collect funds to promote energy efficiency leading to the creation of Energy Trust of Oregon (Energy Trust 2026e). Energy Trust is an independent nonprofit dedicated to promoting energy efficiency and renewable energy services for 2.4 million electric and natural gas customers of five investor-owned utilities: Portland General Electric, Pacific Power, NW Natural, Cascade Natural Gas and Avista. Energy Trust's New Buildings Program (New Buildings or Program) provides incentives and technical support to new construction, major renovation, and tenant improvement projects across all commercial building types, including high-rise and garden style multifamily. CLEAResult has served as the Program Management Contractor for New Buildings since 2009.

According to the Oregon Department of Environmental Quality, "in 2021 Oregon State Legislature passed the Clean Energy Targets bill. This bill requires Portland General Electric, PacifiCorp and Electricity Service Suppliers to reduce greenhouse gas emissions from the electricity they provide. The bill also created targets for these companies to reduce the greenhouse gas emissions from electricity sold in Oregon to:

- 80 percent below baseline emissions levels by 2030;
- 90 percent below baseline emissions levels by 2035; and
- 100 percent below baseline emissions levels by 2040" (DEQ 2026)

Recognizing the need to meet these Clean Energy Targets, CLEAResult proposed to Energy Trust to investigate, design, and implement a new approach to the existing New Buildings incentive offerings that would foster grid-interactive buildings in the Oregon commercial market. This proposal was a natural progression from the standard prescriptive incentive measures and the holistic incentives of whole building energy modeling that the Program has been delivering.

At its core, New Buildings is a market transformation program implementing strategic interventions to advance the commercial construction market. Targeted training heightens awareness of innovative design practices. Technical assistance supports design studies so project teams can explore solutions specific to their building. The New Buildings team cultivates relationships with developers, architects, engineers, and other key players in the commercial market. This combination of market penetration with rigorous engineering and outreach efforts places the New Buildings Program in a position to promote grid-interactivity to Oregon.

National Context and Putting Research Into Action

To set the stage for this Program work, it is important to note the research being undertaken at the national level. In 2018, the U.S. Department of Energy launched an initiative called "Grid-Interactive Efficient Buildings (GEB)". In May 2021, the Lawrence Berkeley National Laboratory released *A National Roadmap for Grid-Interactive Efficient Buildings* (LBL 2021). As noted on their website, "by combining energy efficiency and demand flexibility, grid-interactive efficient buildings (GEBs) can remake buildings into a clean and flexible resource" (LBL 2021). Also in 2018, NBI and the U.S. Green Building Council launched their own initiative called GridOptimal Buildings Initiative (NBI 2018) that continues today under NBI "by conducting leading research, developing standards, and providing tools and guidance to the building sector" (NBI 2025).

Using information and research from these nationwide initiatives, New Buildings, as early as 2021, introduced GEB concepts into educational materials. The intention was to design an offering appropriate for the Oregon commercial new construction market that blended education with incentives. As with many emerging technologies and initiatives, it took considerable time to understand both the complexity of the topic and how it fit within the context of utility incentives. The first webinar, Pathways to Grid-Interactive Efficient Buildings, was held on October 25, 2023, focusing on demand flexibility and load shifting (Energy Trust 2023).

At the beginning of 2025, the New Buildings Program initiated a five-year plan to research, design, and implement training and incentive offers that incorporate demand flexibility, grid interactivity, and resilience. To determine market readiness, extensive interviews were conducted with national thought leaders in grid interactivity and with design teams working on high-performance buildings. The interviews aimed to better understand both the barriers to grid-interactive capability and what resources might increase adoption by building owners.

Several key findings surfaced from these interviews:

- A desire to avoid overly complex systems that are challenging to construct, maintain, update, and operate and that may be expensive to construct.
- An overall lack of awareness of Oregon utility Demand Response programs and the value proposition demonstrating the potential benefits of DR programs.
- Reluctance from project owners about Demand Response programs due to concerns about losing control of their building's systems to utilities, i.e., tenants would be hot in the summer and cold in the winter because the utility would change HVAC setpoints.
- A lack of clear industry standards for systems operating to meet grid-interactivity goals, and therefore, uncertainty among design professionals about which strategies to pursue.
- Energy resilience concerns in the face of extreme weather and perceived grid instability.

Armed with these insights, the Program team began addressing these barriers. One simple yet fundamental step for the Program was to move away from the term "grid-interactive efficient building" or "GEB". The term was perceived as overly technical, cumbersome, and not easily adopted by the broad commercial building market. As an example, during an Early Design Assistance meeting with a project team, when the discussion moved to GEB topics, the project owner asserted that he "didn't want the grid controlling his building." The problem of market adoption was as much a branding issue as it was access to technology or expertise.

The Solution:

Future Ready Buildings

Shifting the narrative from 'giving up control' to 'gaining control' became an essential strategy. Taking this direct market feedback, the Program realized that any grid-interactive incentive offerings must prioritize owner benefits. The team coined a new term: Future Ready Buildings. The definition centers owner benefits and emphasizes how and when buildings use energy, not just save energy.

A Future Ready Building *is an energy efficient building that flexibly and strategically adapts when and how it uses energy to reduce operating costs, function better during disruptive events, and minimize carbon emissions (Energy Trust 2026c).*

Energy efficiency is a core objective of New Buildings and key to achieving Future Ready Building goals. Passive energy efficient systems, such as thermal mass and a well-insulated envelope, help the building maintain comfortable temperatures in the height of summer and depth of winter when energy use tends to be highest. Building massing, building orientation, and shading work with envelope measures including air tightness to increase efficiency. Passive systems also strengthen the building's capacity for passive survivability, a situation where the building can continue to function within acceptable ranges without energy inputs.

The second component of Future Ready design is integrating efficient, active energy systems, including HVAC, lighting and water heating. Once the loads have been minimized through passive design strategies, the most efficient systems that meet the building occupant needs should be included. These systems contribute to lower energy consumption and lower energy demand. Analysis may also include identifying how buildings will perform under extreme weather conditions and during power disruptions.

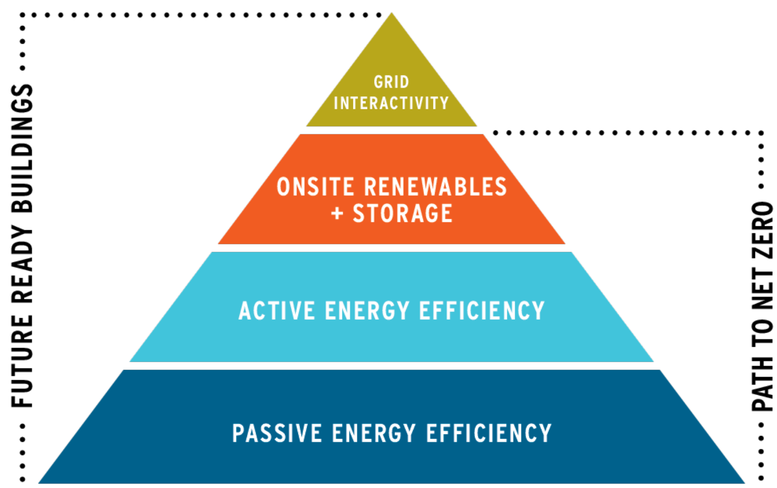

Figure 2. Clear graphics communicate the message: Start with a foundation in passive energy efficiency. Add active efficient components. Then incorporate onsite renewables and if feasible add thermal or energy storage. Top off your building design with systems capable of interacting with the grid.

After building loads have been minimized and efficient systems designed, the project team looks to the benefits of renewable energy systems as the third feature of a Future Ready Building. Photovoltaic arrays paired with battery storage bring on-site generation capacity which bolters flexible decision-making about how and when building loads are satisfied and provide greater resiliency during power outages. Once critical building loads are identified, designers specify controls and size solar arrays and batteries to ensure critical loads are supported during utility power disruption.

The fourth element of a Future Ready Building is grid interactivity. Using smart technology, the building owner has the flexibility to operate building systems in response to price or carbon signals from the grid. This two-way, grid-to-building communication for an individual building can have positive collective impact across the community by, for example, avoiding the need to deploy power generation from power plants with high carbon emissions. While current technology exists, these control systems are complex and are still experiencing ongoing development. Additionally, the commercial sector in Oregon has not been embracing grid interactive systems or demand response programs.

Connecting Owner Values to Grid Benefits

This continuum from efficiency to on-site power generation with storage to grid interactivity is the essence of Future Readiness. Success with communicating this multi-tiered vision for Oregon involves the New Buildings Program utilizing its existing outreach network. Energy Trust of Oregon has been educating and transforming the market to realize aspirational goals for decades. The commercial new construction sector is familiar with incentives for energy efficiency and generally views representatives of Energy Trust as reliable resources for information. As shown in Figure 2 above, the Future Ready offer ties directly to the previous 15 years of success with the New Buildings Path to Net Zero offer. Energy efficiency and renewable energy are the base on which a Future Ready Building is made.

To convince a developer or building owner to explore Future Ready Building objectives, the Program must understand and acknowledge what the owner values most and prioritizes in their building project. Stemming from those values, incentive offers guide the project team from energy efficiency to grid interactivity. As noted previously, the key to engaging owners is to clearly articulate benefits to the building owner and building occupants.

The primary, and obvious, benefit is energy savings where energy consumption is reduced overall and during peak periods when energy is more expensive. Lower energy usage also helps future-proof buildings as utility rates increase. Reducing energy usage during certain times of day may avoid demand charges, particularly in schedules where peaks occurring in one time period may dictate minimum demand charges for future periods.

High performance buildings, with passive features and solar plus storage systems, support the functionality of core building services during power outages and contribute to resilience. Passive buildings, with lower energy demand and reduced peaks, tend to have more stable temperatures, leading to greater occupant satisfaction and fewer tenant complaints. Owners have more flexibility, agency, and energy resilience in building operations.

Reductions in peak demand reduce the need for high-emission power sources and help meet carbon reduction targets. Demand response programs are available from two investor-owned electric utilities serving Oregon, Portland General Electric and Pacific Power, for building owners who have qualifying equipment to shift building energy usage. Some projects may be able to utilize other financing mechanism such as C-PACE by demonstrating additional financial advantages of Future Readiness through pro forma calculations. Collectively, these strategies create flexibility that reduce and mitigate owner risk.

Finding the Impact Points Where Intervention Produces Results

The Program serves utility customers with commercial buildings of all sizes with a range of construction budgets and differing concerns about optimizing energy efficiency. The Program is implemented through a team of Outreach Managers who are geographically dispersed across Oregon. Outreach Managers specialize in a particular market sector such as multifamily or K-12 schools. Their responsibility is to foster connections with developers, architects, and engineers, and to be a conduit for information about Energy Trust incentives and energy efficiency strategies. To effectively engage with this varied market, the Program selected key intervention points from the early conceptual design stage through building occupancy.

Conceptual Phase

Owner Project Requirements (OPR) are the first place where the owner's specific priorities are articulated as targets or requirements for the building systems. Infusing the OPR with Future Readiness bodes well for those strategies surviving any value engineering that may occur as budgets get reconsidered. Recommended language for Owner Project Requirements will be tested in the Oregon market in late 2026.

Early Design and Schematic Phase

The New Buildings Program incentivizes Early Design Assistance (EDA) meetings with the owner and their design team. During this meeting, also known as a sustainability charrette, the project team discusses resilience goals and energy use intensity (EUI) targets. A recommended agenda guides key decisions from building orientation to mechanical systems and solar potential. In 2025, a bonus incentive was added for project teams to explore grid-interactivity topics and appropriate strategies for their project. Uptake has been increasing as awareness of the importance of grid-interactivity grows in the Oregon market.

Design Development

Technical Assistance incentives for whole building energy modeling foster an iterative design process. In 2025, Future Ready Technical Assistance incentives were introduced to facilitate a project team understanding the operational cost savings potential of demand response programs and to reinforce design features not getting value-engineered out of the project during construction. Future Ready TA guides participants to evaluate peak demand, demand flexibility strategies, or other Program-approved studies related to Future Ready Buildings; see detailed section below.

Construction

In addition to technical assistance incentives, projects are eligible for installation incentives for qualifying energy efficient equipment. Additional incentives for controls and equipment integral to Future Ready operational strategies are under consideration.

Occupancy and Operations

The Program is exploring commissioning incentives that examine the performance of grid communication capabilities and whether these complex grid-responsive systems are operating as intended. Standard commissioning does not analyze the nexus of building operations, utility bill rates, and building-to-grid communication.

Researching, designing, and launching this suite of incentives from conceptual design to building occupancy is not enough to move the market. A concerted outreach and education effort brings Future Ready concepts and strategies to project decision makers.

Creating Awareness:

Preparing the Market

The New Buildings Market Engagement team has a long-established history of providing high-quality training and education courses for trade and design professionals, sharing knowledge across markets, and encouraging early adopter projects to integrate new strategies. A multimodal approach to learning reaches architects, engineers, energy modelers, and project developers in a variety of settings including in-person, live online, and on-demand. Courses are developed in collaboration with the industry’s top thought leaders and also satisfy professional licensing continuing education requirements.

The primary format is live, online webinars that are recorded for free, on-demand viewing with content delivered by subject matter experts in topics applicable to Future Ready Buildings. The following webinars have been presented as of June 15, 2026.

- October 2023 Pathways to Grid-Interactive Efficient Buildings.
- March 2024 Grid-interactive efficient building (GEB) strategies: Tools, resources and expertise for every member of your project team (133 attendees).
- September 2024 Design and Control Strategies for Implementing Grid-Interactive Efficient Buildings (48 attendees).
- October 2024 Grid-Interaction Energy Modeling for Informed Decision Making, cohosted with NBI and San Diego LEARN (159 attendees).
- August 2025 Building Energy Simulation Forum: Microgrids for a Resilient Renewable Future.
- March 2026 Building Energy Simulation Forum: Making the most of energy load management strategies (134 attendees).

Two additional trainings are planned in 2026: a panel discussion in June on C-PACE financing and Energy Trust incentives, and an advanced-level training in September focusing on energy modeling for Future Ready Buildings.

Feedback from these events highlights a range of familiarity with grid-interactivity and varying degrees of market readiness. Some participants indicate sessions were too detailed for those newer to the topic while others wanted more solutions-oriented scope. Interest remains high while the range of knowledge is broad.

Driving Participation

To increase the depth of understanding among practitioners, the Program publishes collateral and webpages explaining complex concepts. The vocabulary, definitions, and graphics are a teaching tool and spark further conversation during in-person presentations and lunch-and-learns where New Buildings Outreach Managers engage directly with project design teams to foster a greater understanding of Future Ready Buildings concepts.

- Future Ready Buildings 101 (Energy Trust 2026b)
    - Educational collateral
    - Definition of key terms
    - Graphics illustrating design strategies
    - Questions to explore organized by design phase
- Webpages devoted to Future Ready Buildings (Energy Trust 2026c)
    - Overview
    - Eligibility
    - How It Works
    - Incentive Details
- Case studies exploring challenges, successes, and lessons learned, coming in late 2026
- Short, informative videos as another outreach tool, coming in 2027

In parallel with the educational offerings, the New Buildings team develops incentives to support building owners incorporating Future Ready design features into their projects.

Offer Development:

Technical Assistance

The New Buildings Program has a successful legacy of providing technical assistance incentives for investigating efficient design strategies. The Whole Building offer, which includes a Path to Net Zero track for exceptionally high performing projects, requires and incentivizes creation of whole building energy models by a project energy analyst. Project teams use the models to inform design decisions from initial design development to final construction documents. The Whole Building pathway incorporates Technical Assistance (TA) for energy modeling and energy-related studies such as daylight analysis, computational fluid dynamics (CFD), and energy life cycle analysis. TA incentives are offered on a cost share basis, with incentives for up to 60% of final invoiced modeling or study costs. These TA incentives complement installation incentives which are based on annual, whole building kWh and therm savings as demonstrated through the model.

In 2025, an additional incentive was launched - the Future Ready Technical Assistance incentive. This TA is the primary instrument used to encourage investigation into demand reduction strategies and impacts. This incentive has two parts: Preliminary Demand Analysis and In-Depth Demand Analysis. These analyses require 8,760-hour energy consumption profiles that are typically generated through energy modeling, so Future Ready TA is limited to projects participating in the Whole Building pathway. However, the timing and specific topics eligible for investigation are not limited. Studies may be conducted at any stage of design on topics related to demand reduction, including financial analysis.

Future Ready Buildings Technical Assistance	Incentive Amount
Preliminary Demand Analysis	**$3,000**
In-Depth Demand Analysis	**60% cost share up to $10,000 per project**

Figure 3. The Future Ready Building Technical Assistance incentive offer includes two tiers with the Preliminary Demand Analysis setting the foundation for the In-depth Demand Analysis.

Preliminary Demand Analysis

The Preliminary Demand Analysis incentive is a flat-rate, $3,000 offer used by the design team to compare the project's baseline 8,760-hour energy consumption profile against at least two alternate demand scenarios. The baseline profile is expected to come from the project's model, and the other demand scenarios may come from any source as long as sufficient rationale are provided to explain their derivation. This analysis is an initial investigation into demand reduction strategies which can be highly specific to the project owner's interests and project requirements. This first-tier analysis is a "gateway" offering designed as a relatively easy assessment of readily available energy modeling data to help a project owner understand utility demand response programs, TOU (Time-of-Use) rate structures, and demand charge schedules.

In addition, a memo must be submitted summarizing the study's process, outcome, and any impact on project design decisions. This required memo becomes the vehicle to communicate key findings from the analysis to the project owner and decision makers.

The Preliminary Demand analysis is intended not only to encourage owners to consider building demand, but also to broaden their knowledge about demand and how it can be reduced. Below is a general list of acceptable study topics for a Preliminary Demand study.

- Battery or thermal energy storage systems impact on building demand.
- Investigation of demand reduction to satisfy the new Energy Credits portion of ASHRAE 90.1-2022 (adopted in Oregon as of January 1, 2026).
- Demand impacts related to value engineering options.
- Advanced control strategy impacts on demand reduction.
- Assessment of utility TOU (Time-of-Use) or demand charge cost differences from efficiency or demand reduction strategies.
- Investigation of financial aspects of utility DR program participation.

In-Depth Demand Analysis

The In-Depth Demand Analysis builds on the Preliminary Demand study or may be used as a stand-alone incentive. Acceptable study topics are broad, ranging from technical to financial. The In-depth study incentive is a 60% cost share up to $10,000 which is in addition to the Preliminary Demand Analysis $3,000 incentive.

Required Program submittals for the In-Depth Demand Analysis include a final report documenting analysis methods, relevant project information, and detailed study findings. Final analysis files such as building energy models and other analysis tools or spreadsheets must also be submitted. A final invoice is required to determine the incentive amount. Topics appropriate for the In-Depth Demand study include the following.

- Utility DR program participation: financial, and other specific impacts.
- Custom demand response for lighting or HVAC or other significant system.
- Dispatchable Battery Energy Storage Systems (BESS) deployment or sizing.
- Interaction of Solar and Battery Energy Storage Systems.
- Operations, maintenance, and capital costs associated with demand reduction.
- Investigation of building resiliency during utility outage or disruptions.

Demand Calculator Tool

In addition to assembling the Future Ready Buildings Preliminary and In-Depth Demand Analysis offerings detailed above, the Program developed an Excel-based, 8,760-hour demand analysis tool that may be used to satisfy the hourly analysis requirements for both Future Ready TA incentives. This Demand Calculator tool gives project teams a streamlined way to examine demand changes and other impacts between analysis scenarios. The tool is specific to Energy Trust of Oregon territory in that it includes utility-specific information on utility energy charges, demand charges, and TOU schedules and rates. In addition to hourly electrical consumption profile inputs for a baseline case (Case A) and two additional proposed profiles (Case B and

Case C), the calculator has capacity to receive profile inputs for natural gas consumption (Case A, B and C), and a single input for a PV generation profile.

Future Ready Buildings Demand Calculator

Data Inputs

Electric Utility Input	Gas Utility Input
Portland General Electric	NW Natural

Required
Optional
Calculated & Result
Error
References and Dat

Hourly Index	Sample DateTime (Sunday Start to match grid data)	Case A Whole-Building Electricity Demand (W)	Case A Whole-Building Gas Demand (W)	Case B Whole-Building Electricity Demand (W)	Case B Whole-Building Gas Demand (W)	Case C Whole-Building Elecricity Demand (W)	Case C Whole-Building Gas Demand (W)	Solar Energy Production (W)
1	1/1/17 0:00	15,693	0	20,234	0	19,036	0	-
2	1/1/17 1:00	15,693	0	20,234	0	19,036	0	-
3	1/1/17 2:00	15,693	0	20,234	0	19,036	0	-
4	1/1/17 3:00	15,693	0	20,234	0	19,036	0	-
5	1/1/17 4:00	15,693	0	20,234	0	19,036	0	-
6	1/1/17 5:00	15,693	0	20,234	0	19,036	0	-
7	1/1/17 6:00	15,693	0	20,234	0	19,036	0	-
8	1/1/17 7:00	18,111	0	24,336	0	23,109	0	-
9	1/1/17 8:00	18,111	0	24,144	0	22,997	0	7,853.92
10	1/1/17 9:00	18,111	0	23,774	0	22,723	0	31,273.41
11	1/1/17 10:00	18,111	0	23,761	0	22,725	0	9,197.72
12	1/1/17 11:00	18,111	0	23,761	0	22,712	0	13,584.96
13	1/1/17 12:00	18,111	0	23,761	0	22,729	0	6,729.49
14	1/1/17 13:00	18,111	0	23,761	0	22,746	0	8,994.26
15	1/1/17 14:00	18,111	0	23,761	0	22,721	0	5,383.90
16	1/1/17 15:00	18,111	0	23,761	0	22,705	0	21,162.75
17	1/1/17 16:00	18,111	0	23,761	0	22,722	0	-

Figure 4. This excerpt from the Demand Calculator Tool shows the input tab for hourly consumption and PV production profiles for an example project.

Outputs from the tool include tabular peak winter and summer electrical demand, demand charges, annual energy costs, annual GHG (Greenhouse Gas) emissions for both electricity and natural gas, and changes in all parameters from Case A to Case B, and from Case B to Case C. Graphs reflecting peak summer and winter days are also presented in the tool. Because the tool is offered in a fully unlocked, unprotected format, project teams are able to customize the tool to their project-specific analysis needs. Carbon emission estimates are determined using Oregon statewide long-run marginal carbon emissions rate (LRMER) from NREL CAMBIUM Standard Scenarios mid-range 2025 dataset (NREL 2026).

Metric or Parameter	Case A Building	Case B Building	Case C Building	Improvement Case A to Case B	Improvement Case A to Case C	Improvement Case B to Case C
Building Summer Maximum Peak Demand (kW)	301	177	167	123	134	10
Building Winter Maximum Peak Demand (kW)	787	149	133	638	654	16
Coincident Summer Maximum Peak Demand (kW)	301	172	133	129	168	39
Coincident Winter Maximum Peak Demand (kW)	726	133	115	593	611	18
Annual Electricity Cost ($)	$117,307	$59,910	$50,835	$57,397	$66,472	$9,075
Annual Demand Charge	$86,111	$31,167	$28,402	$54,945	$57,709	$2,765
Annual Gas Cost ($)	$0	$0	$0	$0	$0	$0
Annual Energy Cost ($)	$117,307	$59,910	$50,835	$57,397	$66,472	$9,075
Annual Gas GHG Emissions (Metric Ton CO2e)	0	0	0	0	0	0
Annual Electric GHG Emissions (Metric Ton CO2e)	316	168	144	149	173	24
Annual GHG Emissions (Metric Ton CO2e)	316	168	144	149	173	24

Figure 5. Sample output from the Demand Calculator Tool illustrates the various metrics in the report.

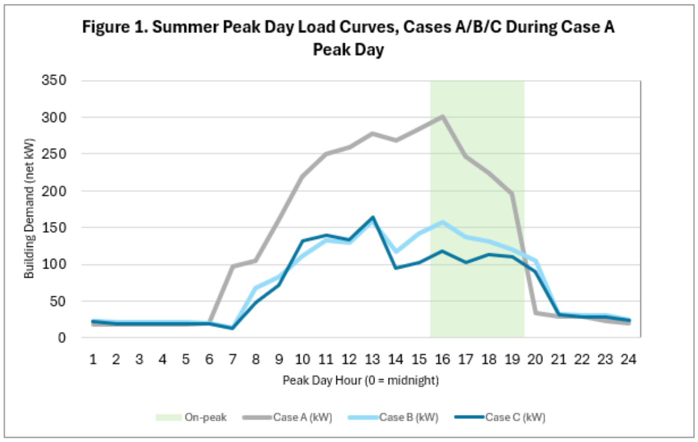

Figure 6. Graph of Summer Peak Day Load Curves from the Demand Calculator Tool.

Technical Assistance for Future Readiness steers the project team toward incorporating sophisticated control systems capable of participating fully in demand response situations.

Continuous Improvement:

Market Capacity Development for a Skilled Workforce

One barrier to full implementation across the Oregon market that emerged during the initial research phase was a lack of a skilled and knowledgeable workforce to design, construct, operate, and maintain these complex buildings. Knowledgeable facility managers, building operators, custodians, and maintenance staff are a significant factor needed to deliver Future Ready Buildings. According to Climate Jobs Oregon, "in order to lower Oregonians' utility bills and meet Oregon's clean energy targets, including 100% clean electricity by 2040, the state needs hundreds of thousands of workers on clean energy projects" (Baumhardt 2026). Energy Trust provides incentives for Building Operator Certification for operations and maintenance staff working in public or private commercial and multifamily buildings (Energy Trust 2025a).

New Buildings hosts two annual events, Meeting of the Mentors and the Green Energy Engineering Career Event, to connect emerging professionals with mid-career and senior career professionals. These events partner with community-based organizations including the National Society of Black Engineers Portland Professional Chapter (NSBE PRO-PDX), National Association of Minority Architects Portland Chapter (NOMA PDX), the Society of Hispanic Professional Engineers Oregon Chapter (SHPE Oregon), and the American Institute of Architects Oregon Committee on the Environment (AIA Oregon COTE) to assure that diverse students participate and have deeper discussions about how to navigate the challenges, barriers, and possibilities in their career journey.

To more directly grow the number of practitioners with technical knowledge in high-performing buildings, New Buildings pinpointed Oregon academic programs in architecture, engineering, construction management, and real estate development. The intention is for students pursuing careers in these fields to gain exposure to mentors and participate in internships in a supportive university-based cohort setting. Studio 2050 launched in 2026 with over 50 applicants for the initial 15-student cohort. This Market Capacity Development effort encourages first-generation college students and students from rural areas to pursue these careers.

Ongoing Incentive Development to be Deployed in 2026 and 2027

Additional incentives and design resources are being created to provide entry points for every building owner, depending on where they are in the design and construction process.

- Key strategies for grid integration by market sector such as multifamily, office, or K-12.
- Examples of how to implement grid responsiveness targeted for design teams who have not considered grid interoperability.
- Owner Project Requirements (OPR) template with Future Ready Building concepts.
- Resources for energy modelers including best practices and strategies for modeling and analysis of demand reduction scenarios.
- Guidance on using future weather files to promote resilient design in energy modeling.
- Resiliency-focused questions to prompt investigation by project teams.
- Introduction of passive survivability concepts so that buildings have capacity to function within acceptable comfort ranges with no energy inputs, such as increased insulation and air tightness to slow the rate of heat loss during extreme cold weather events.

Challenges, Next Steps, and Conclusions

Challenges remain even as market engagement grows, especially around assuring that grid interactivity features function as expected. Potential incentives to address these concerns include scenario planning to "stress test" the building design against potential disruptive events; commissioning of building controls and grid communication protocols; and financial pro forma calculations incorporating operational expense reductions based on demand response.

Audience participation at events has been high and the Program team is excited by Future Ready Buildings, however uptake of these new incentives has been slow. To date, only one project has initiated an application for Future Ready Technical Assistance. To determine where the Program is having an impact, market intelligence and data will be collected to evaluate Program effectiveness in generating market transformation. Two sets of metrics are being considered. One set assists the building owner in measuring demand reduction and demand flexibility of their building. Additional metrics for the owner assess the financial savings from demand response and potential operational functionality based on targets for building resilience.

Defining Success for Building Owners: Future Ready Metrics

- Peak demand reduction compared to average building peak demand.
- Peak EUI (Energy Use Intensity) reduced as compared to a code-minimum baseline.
- Capacity to shed or shift building load measured as kW/SF net building electricity demand shed or shift at a point in time or over time.
- Resilience Targets for hours or days that critical building services can function and a reduction in those time periods, or a capacity to flexibly adjust those time periods.
- Estimated operational cost savings through demand response programs.

At the Program level, broader metrics are being explored to accurately assess if the efforts to engage the market are being successful. These metrics reveal the extent that Future Ready Buildings concepts are reaching the target audience of commercial new construction practitioners and being integrated into their buildings.

Measuring Program Effectiveness: Engagement and Adoption Metrics

- Quantity of projects engaging at the Early Design Assistance incentive stage.
- Quantity of projects using Future Ready Buildings Technical Assistance incentive.
- Variety of market sectors implementing Future Ready Buildings concepts.
- Diversity of locations in Oregon designing toward Future Readiness.
- Number of case studies published highlighting Future Ready Buildings.
- Demographics of event and Studio 2050 participants to identify Program expansion into new markets as defined by occupation or profession and by firm association.

The concept of Future Ready Buildings is inspiring, and the New Buildings Program is poised to see transformational results with long-term impact in Oregon. Analysis of data from the metrics above will inform the next iterations. As this offering evolves, the team looks forward to reporting progress, highlighting successes, and sharing actionable insights.

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