



2019 Whole Building and Path to Net Zero Offering

June 4, 2020



Agenda

- New Whole Building and Path to Net Zero offering (“Whole Building”) overview
- Technical requirements
- Target setting
- Energy Modeling Summary Workbook (EMSW) program form



About us

Independent
nonprofit

Serving 1.6 million customers of
Portland General Electric,
Pacific Power, NW Natural,
Cascade Natural Gas and Avista

Providing
access to
affordable
energy

Generating
homegrown,
renewable
power

Building a
stronger Oregon
and SW
Washington

A clean energy power plant

724 average megawatts saved

129 MW generated

65 million annual therms saved

Enough energy to power **727,000** homes
and heat **129,000** homes for a year

Avoided **29.3** million tons of carbon dioxide

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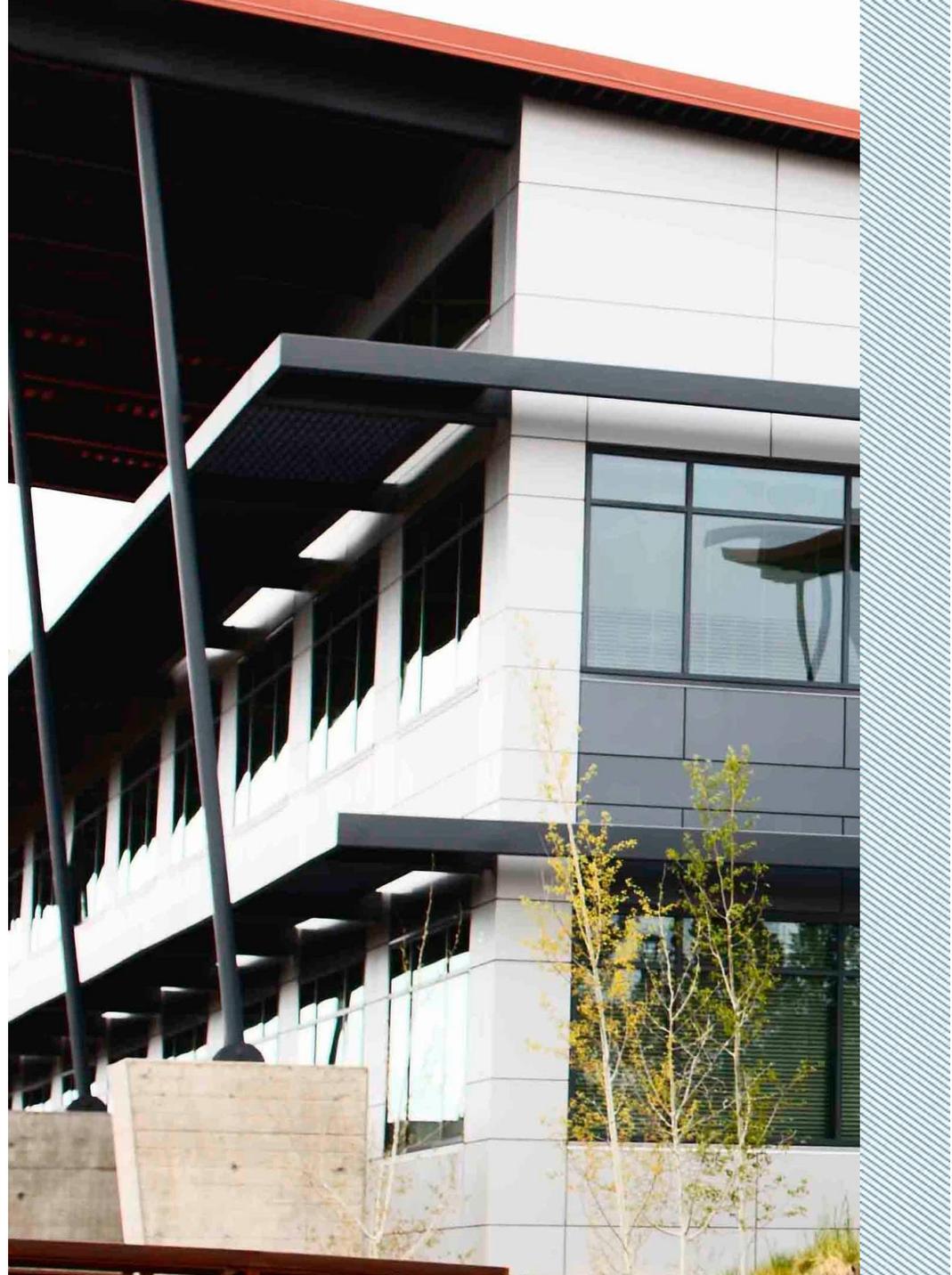
**HOMES,
APARTMENTS
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Eligible projects

- New construction
- Major renovation
- Tenant build-out
- Additions or expansions





Commercial Training And Events

Boost your knowledge with Energy Trust's continuing education opportunities and special training events. Trainings include real-world examples, case studies, and detailed technical information presented by experts from the fields of architecture, engineering, construction and development, as well as specialists in a variety of building types and market sectors. Attendees may be eligible for continuing education units, CEUs.

[Find Upcoming Trainings and Events](#)

energytrust.org/commercial/commercial-training-events

Upcoming trainings

How shared community values can inform design—
two Path to Net Zero case studies

Date: June 17, 10:00 a.m. – 11:30 a.m.

Webinar



Questions?

For more information about:

- Upcoming trainings
- Educational opportunities
- Becoming an Energy Trust New Buildings Ally

Contact Kriya.Kaping@cleareresult.com



2019 Whole Building and Path to Net Zero timeline

SUPPORT AT EVERY STEP



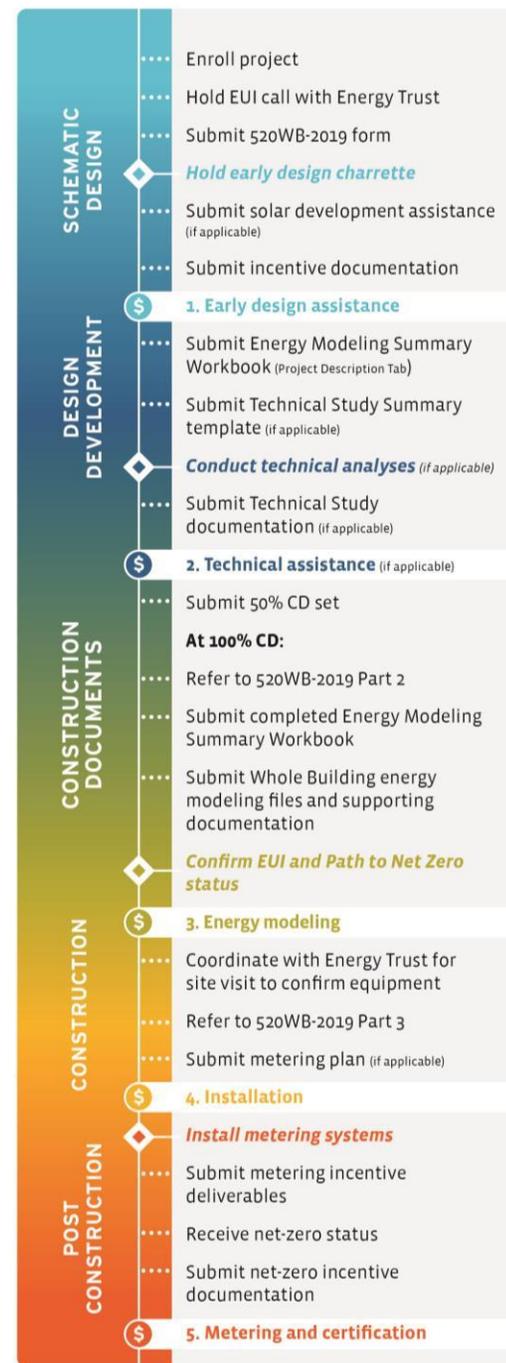
Incentive milestone



Incentive-related activities



Documentation



What's happening

ASHRAE 90.1 Appendix G

- 2019 Oregon Energy Code is different than 2014
- Appendix G is reflective of 2004 prescriptive values
- It removes ability to analyze measure level savings and cost



Introduction to 2019 Energy Code Technical Guidelines

- Topics covered in guideline:
 - Target setting
 - Energy simulation software selection
 - Energy simulation requirements
 - Required documentation



Energy Trust of Oregon New Buildings Program
2019 Energy Code Technical Guidelines

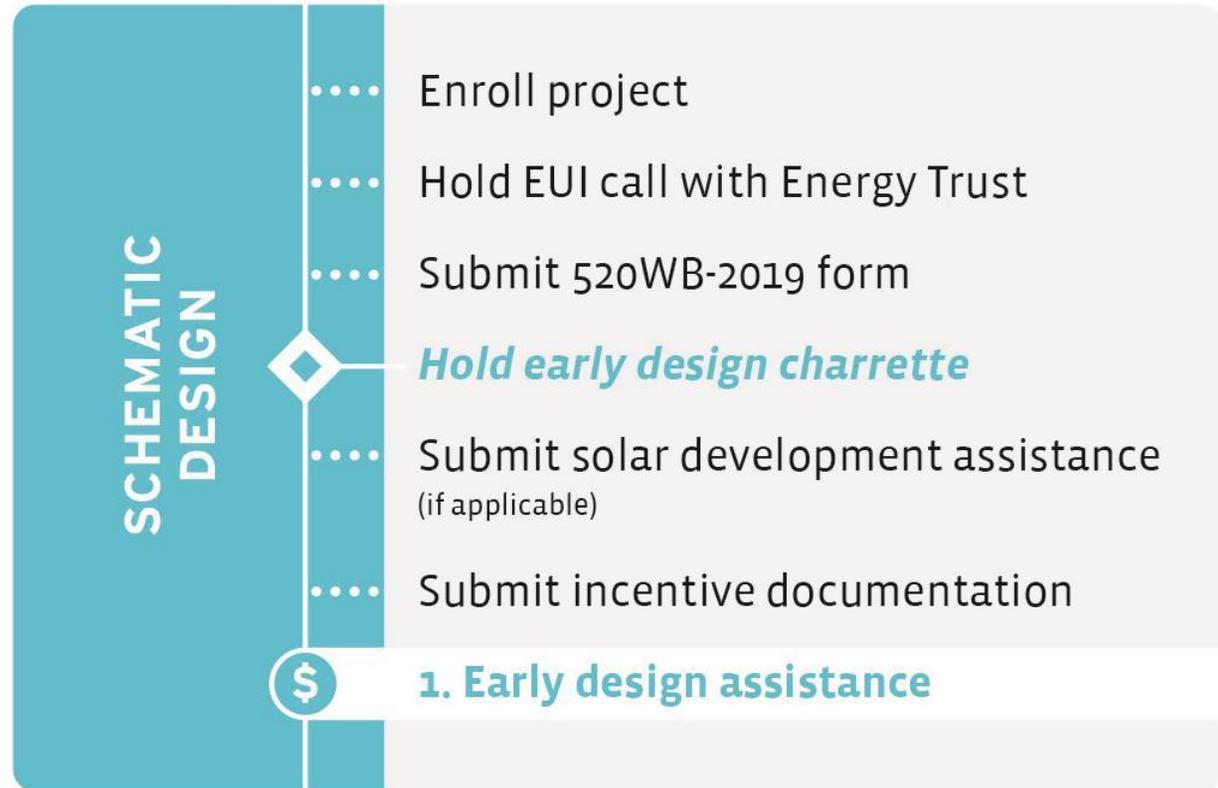
Available on:

<https://www.energytrust.org/commercial/new-buildings-forms-resources/>

Schematic design

SUPPORT AT EVERY STEP

-  Incentive milestone
-  Incentive-related activities
-  Documentation



Target setting—proposed EUI



- Whole Building projects must meet a 5% reduction
 - ZERO Code Energy Tool
- Path to Net Zero (PTNZ) targets follow Architecture 2030
 - Zero Tool

ZERO Code Energy Calculator

- Determines an approximate 2019 OZERCC code baseline EUI based minimal inputs
- Based on 90.1 2016 prototype energy models
- Projects must report results from Zero Code Energy Calculator in their building permit application

The screenshot displays the 'ABOUT YOUR BUILDING' section of the Zero Code Energy Calculator. It features a 'Code Pathway' section with radio buttons for 'Prescriptive' (selected) and 'Performance'. Below this are four input fields: 'Country' (dropdown menu), 'City' (dropdown menu), 'Number of Stories' (text input), and 'Primary Building Use' (dropdown menu). The 'ON-SITE PV SYSTEMS' section includes a gear icon and a heading. It contains a text box explaining the input options, followed by radio buttons for 'Use PVWatts' (selected) and 'Enter Generation Potential'. A 'Set Default Values' link is present. Below are several input fields: 'Estimated Area for Collectors' (text input with a 'delete' button), 'Module Type' (dropdown menu), 'Losses (%)' (text input), 'Array Type' (dropdown menu), 'Tilt (Degrees)' (text input), 'Azimuth (Degrees)' (text input), and 'Inverter Efficiency (%)' (text input). At the bottom of this section is a '+ Add another PV System' link. A 'GENERATE RESULTS' button with a right-pointing arrow is located at the bottom right of the form.

<https://zero-code.org/energy-calculator/>

Zero Tool

- Based on 2003 CBECS data
- Primary tool used by the New Buildings program for setting PTNZ targets
- Provide documentation when changing default values

ABOUT YOUR BUILDING

Building Name

Country

City | State/Prov.

Postal Code

Degree Days [ⓘ] HDD CDD

New construction Existing Building

BUILDING USE DETAILS

In order to provide you with an appropriate comparison for your building, we need to know how spaces in this building will be used. If your building has multiple uses, add them below. [ⓘ]

Commercial Residential

Primary Building Use

ENERGY REDUCTION TARGET

Enter your target expressed as either a percent reduction from baseline EUI, or as a Zero Score. A baseline represents a typical modern building. [ⓘ]

Percent Reduction [ⓘ] Zero Score [ⓘ]

Are you using the Zero Tool to meet 2030 Challenge Targets?

ANNUAL ENERGY PURCHASED

Enter the total annual energy purchased for your building below. For the most accurate results, enter all types of energy purchased including from utilities and off-site renewable energy sources. [ⓘ]

Energy Type	Units	Total Annual Energy Purchased
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

[add another entry](#)

ANNUAL ENERGY GENERATED

Enter the total annual energy generated by your building below. For the most accurate results, enter all types of energy generated. If some of your generated energy was sold back to the grid, enter that amount in the field provided.

Energy Type	Units	Total Annual Energy Generated
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

[add another entry](#)

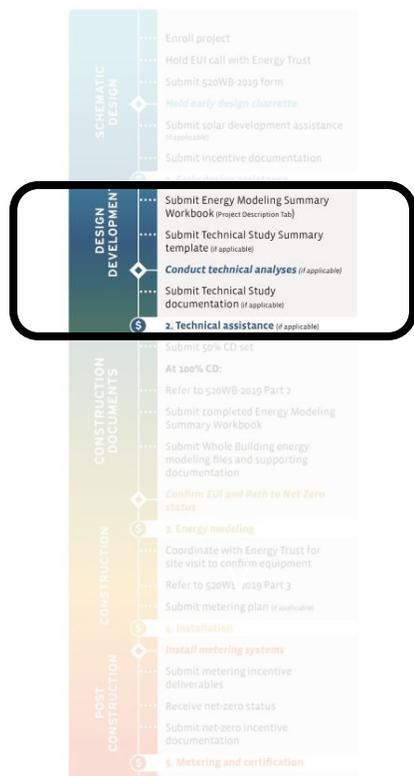
Units	Total Annual Energy Sold
<input type="text"/>	<input type="text"/>

[CALCULATE BASELINE AND TARGET](#) →

<https://zerotool.org/zerotool/>

Design development

SUPPORT AT EVERY STEP



DESIGN DEVELOPMENT

- Submit Energy Modeling Summary Workbook (Project Description Tab)
- Submit Technical Study Summary template (if applicable)
- Conduct technical analyses** (if applicable)
- Submit Technical Study documentation (if applicable)

2. Technical assistance (if applicable)

Technical Assistance Study Template



- Provide a description of analysis activities and how those influence the final design of the building
- Provide project description
- Separate section for each energy study

Technical Assistance Study Template (cont.)

Technical Study Summary Worksheet



Projects are encouraged to use this worksheet to provide the information required when applying for technical assistance incentives for studies other than whole building energy modeling, per Form 520WB-2019. For whole building energy modeling incentives, please complete the *Energy Modeling Summary Workbook*.

PROJECT DESCRIPTION

Briefly describe the type, use and square footage of the facility.

Identify whether the project is new construction or a major renovation. In the case of a major renovation clearly identify those building components and systems that are part of the renovation, and the extent to which they will be renovated and/or replaced.

Provide the anticipated date for completion of the project Construction Documents and applicable energy code.

Technical Study Summary Worksheet



TECHNICAL STUDY DETAILS : SHOEBOX ENERGY MODEL

Please fill out the following sections for each technical study. Please attach additional information or scopes of work as needed.

Contact information: Provide name and contact information for the firm that will perform the analysis

Description: Provide a description of the analysis work that will be performed, the analytical approach that will be used (i.e. spreadsheet calculations, manufacturer calculation tools, simulation model), and how the results will inform the final energy savings calculations.

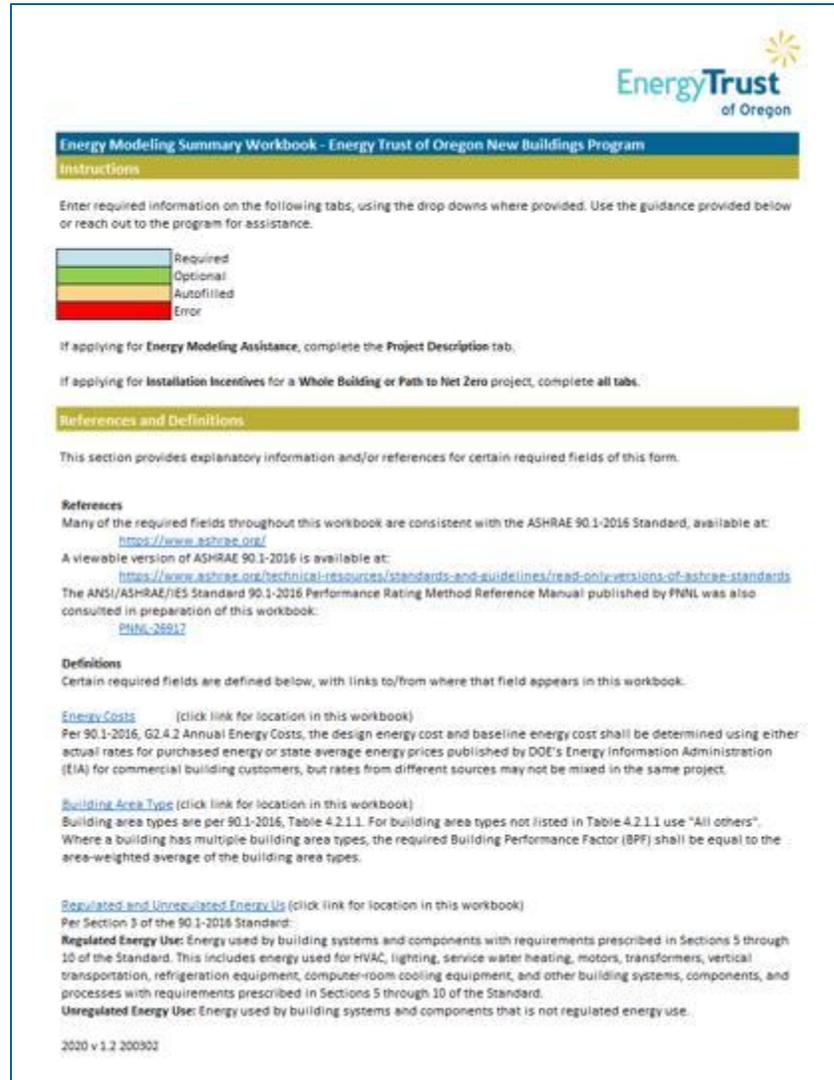
Cost: Provide an estimate of the labor hours required for the needed tasks and the total not-to-exceed cost estimate to perform the work.

Timeline: Estimated start and end dates for the study as well as all deliverable and milestone dates

Available on: <https://www.energytrust.org/commercial/new-buildings-forms-resources/>

Energy Modeling Summary Workbook

- Replaces 520EM and Energy Analysis Report
- Complete Project Description tab required to reserve incentives



The screenshot shows the 'Instructions' page of the Energy Modeling Summary Workbook. At the top right is the Energy Trust of Oregon logo. Below it is a blue header bar with the text 'Energy Modeling Summary Workbook - Energy Trust of Oregon New Buildings Program'. Underneath is a yellow bar with the word 'Instructions'. The main text explains that users should enter required information on the following tabs, using drop-downs where provided, and use the guidance below or reach out to the program for assistance. A legend indicates four field types: Required (blue), Optional (green), Autofilled (orange), and Error (red). It specifies that for Energy Modeling Assistance, the Project Description tab must be completed, and for installation incentives for a Whole Building or Path to Net Zero project, all tabs must be completed. Below this is a yellow bar with the text 'References and Definitions'. The 'References' section states that many required fields are consistent with the ASHRAE 90.1-2016 Standard, available at <https://www.ashrae.org/>, and a viewable version of ASHRAE 90.1-2016 is available at <https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards>. It also mentions the ANSI/ASHRAE/IES Standard 90.1-2016 Performance Rating Method Reference Manual published by PNNL, consulted in preparation of this workbook, with a link to <https://www.pnnl.gov/publications/901-2016>. The 'Definitions' section defines certain required fields with links to their locations in the workbook. It defines 'Energy Costs' (click link for location in this workbook) as per 90.1-2016, G2.4.2 Annual Energy Costs, determined using either actual rates for purchased energy or state average energy prices published by DOE's Energy Information Administration (EIA) for commercial building customers, but rates from different sources may not be mixed in the same project. It defines 'Building Area Type' (click link for location in this workbook) as per 90.1-2016, Table 4.2.1.1, and notes that for building area types not listed in Table 4.2.1.1, 'All others' should be used. It also notes that where a building has multiple building area types, the required Building Performance Factor (BPF) shall be equal to the area-weighted average of the building area types. It defines 'Regulated and Unregulated Energy Use' (click link for location in this workbook) as per Section 3 of the 90.1-2016 Standard. It defines 'Regulated Energy Use' as energy used by building systems and components with requirements prescribed in Sections 5 through 10 of the Standard, including energy used for HVAC, lighting, service water heating, motors, transformers, vertical transportation, refrigeration equipment, computer-room cooling equipment, and other building systems, components, and processes with requirements prescribed in Sections 5 through 10 of the Standard. It defines 'Unregulated Energy Use' as energy used by building systems and components that is not regulated energy use. At the bottom left, the version number '2020 v 1.2 200902' is displayed.

Available on:

<https://www.energytrust.org/commercial/new-buildings-forms-resources/>

Energy Modeling Summary Workbook (cont.)

	A	B	C	D	E	F	G	H	I	J	K	L
1			Energy Modeling Summary Workbook - Energy Trust of Oregon New Buildings Program									
2			Project Information									
3												
4												
5			Project Name	<input type="text"/>								
6			Energy Trust Project ID Number	<input type="text"/>								
7												
8			Project Contacts									
9			Project Owner	<input type="text"/>								
10			Architect	<input type="text"/>								
11			Mechanical Engineer	<input type="text"/>								
12			Electrical Engineer	<input type="text"/>								
13			General Contractor	<input type="text"/>								
14			Energy Consultant	<input type="text"/>								
15												
16			Building Location									
17			ZIP Code	<input type="text"/>								
18			County	<input type="text"/>								
19			ASHRAE Climate Zone	<input type="text"/>								
20												
21			Energy Costs*									
22			Electricity**	<input type="text" value="0.089"/>	<input type="text" value="S/kWh"/>							
23			Natural Gas**	<input type="text" value="0.833"/>	<input type="text" value="S/therm"/>							
24			<i>*Default statewide average energy prices may be overridden with actual purchased energy rates used in the simulations.</i>									
25			<i>**Source: https://www.oregon.gov/bcd/codes-stand/Documents/energy-CPU-modeling-path.pdf</i>									
26												
27			Target EUI	<input type="text"/>	<input type="text" value="kBtu/SF"/>							
28			Is this a PTNZ Project?	<input type="text"/>								
29												
30			Energy Modeling Timeline and Effort									
31												
32			Modeling Start Date	<input type="text"/>								
33			Modeling Completion Date	<input type="text"/>								
34												
35			Not-to-Exceed Cost of Modeling	<input type="text"/>								
36			Labor Hours for Modeling	<input type="text"/>								

★ Introduction **Project Description** Modeling Results Utility Savings and Incentive Scratch Pad

Available on: <https://www.energytrust.org/commercial/new-buildings-forms-resources/>

Construction documents

SUPPORT AT EVERY STEP



CONSTRUCTION DOCUMENTS

..... Submit 50% CD set

At 100% CD:

..... Refer to 520WB-2019 Part 2

..... Submit completed Energy Modeling Summary Workbook

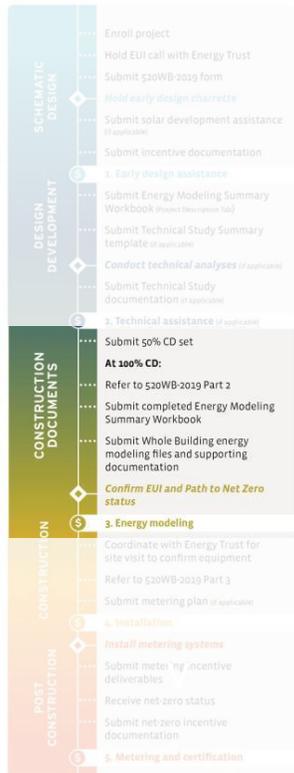
..... Submit Whole Building energy modeling files and supporting documentation

..... **Confirm EUI and Path to Net Zero status**

..... Submit metering plan (if applicable)

..... **3. Energy modeling**

Whole Building simulation



- Submit:
 - Whole Building's energy model files
 - Supporting documentation
 - Completed EMSW



Energy Modeling Summary Workbook—the backend

- Appendix G baseline modified to develop program baseline
 - Appendix G is based on cost, not energy
- Modifications:
 - Appendix G fuel mix adjusted to match proposed fuel mix
 - End-use factors in place of one building performance factor

End-use factors

- Recognizes code advancement by end uses
- Similar approach as ASHRAE Building Performance Factor (BPF)
 - Ratios between the 2004 and 2016 PNNL prototype model results for each energy end use calculated on a kBtu/sq. ft. basis



Fuel mix adjustments

- Appendix G uses a fixed baseline fuel mix
- Adjust the fuel mix to be consistent between the proposed and baseline



Thank you

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