



WHOLE BUILDING APPROACH INSTRUCTIONS
July 1, 2010 (v1.0)

1. Overview of WBA Process

This document explains the requirements for use of the Whole Building Approach (WBA) to demonstrate compliance with Section 506 of the 2010 Oregon Energy Efficiency Specialty Code (OEESC). The code allows an alternative calculation method for demonstrating compliance with the code on a Whole Building Approach (WBA.) Compliance with the WBA requires an applicant demonstrate that the simulated whole building energy consumption cost for the proposed design will not exceed that of a similar minimum code-compliant building using similar forms of energy designed in compliance with the prescriptive requirements of the OEESC.

The unit of measure of energy consumption is annual energy cost in dollars. Applicants must utilize the energy costs specified in Table 1. Compliance with the WBA is demonstrated utilizing the modeling requirements of Chapter 11, Energy Cost Budget Method, of the 2007 ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low Rise Residential*.

The WBA is intended to provide flexibility in complying with the OEESC. The applicant must demonstrate the accuracy and reliability of their WBA calculations as outlined and defined in this document and *ASHRAE Standard 90.1*. Companion documents necessary to demonstrate compliance under the WBA include:

- 2010 OEESC
- ASHRAE Standard 90.1 2007

Table 1: Statewide Average of Energy Prices (2010)

Energy source	Units	Btu/Unit	Price (\$)
Electricity	kWh	3413	0.069
Natural Gas	Therms	100,000	1.142
Diesel Oil (#2)	Gallons	1,000,000	19.60
Fuel Oil (#6)	Gallons	1,000,000	13.53
Steam	Thousands of lbs	960,000	8.16
LPG	Gallons	100,000	2.615
Biomass	BoneDryTons	12,300,000	50.00

Note. These prices will be updated with the standard code change cycle, or if significant changes in relative energy prices occur.

2. Definitions

“Applicant” means the person or organization submitting construction documents for a proposed design utilizing the Whole Building Approach.

“Budget Building Design” means a computer representation of a hypothetical design based on the actual proposed building design. This representation is used as the basis for calculating the energy cost budget.



“Certified Energy Modeler” means an individual who holds current certification as an energy modeler from a nationally recognized professional certification organization acceptable to the Building Codes Division.

“Mandatory Requirements” means those requirements contained in the Oregon Energy Efficiency Specialty Code (OEESC) that are not available for trade-off under the WBA. Mandatory measures must be modeled the same in the Budget Building Design and Proposed Building Design.

“Proposed Building Design” is a computer representation of the actual proposed building design or portion thereof used as the basis for calculating the design energy cost.

“Budget Building Design” means a design of a similar building using similar forms of energy to the proposed design, designed in compliance with the prescriptive requirements of the OEESC.

“Thermal Zoning Diagram” means a diagram consisting of an overlay or marked-up set of floor plans clearly showing the thermal zoning scheme for the computer models of both the budget and proposed building designs.

3. Mandatory Requirements

Mandatory Requirements, not available for trade-off under the WBA, will either not be modeled, or be modeled the same in the Budget Design and Proposed Design. The mandatory requirements in both the Oregon Energy Efficiency Specialty Code must be met when using the WBA.

The mandatory requirements in the OEESC are in: Sections 502.4, 503.2, 504, 505.1, 505.2, 505.3, 505.4, and 505.6, 505.7.

Clarifications of equivalent OEESC sections to apply under Chapter 11 of ASHRAE 90.1 may be found at the end of this document.

4. WBA Requirements Checklist

The following provides a step-by-step overview of the WBA process.

- a. **Submit Code Compliance Package to Building Official.** To show compliance, at time of submitting for the building permit, the applicant must submit a separate Whole Building Analysis document package to the Building Official for review and approval. These documents include, but may not be limited to:
 1. Project drawings and specifications
 2. COMcheck forms, to show which elements passed or failed.
 3. Thermal zoning diagram.

4. Documents demonstrating compliance with ASHRAE 90.1 11.1.5, signed and sealed by a registered Oregon engineer or Certified Energy Modeler.
 5. A description of those building or system elements that do not comply with the prescriptive requirements of the code; elements exceeding requirements; and a description of those building elements or systems modeled to provide additional energy savings to offset the non-complying elements. List net energy cost savings/penalty for the offsetting elements/systems.
 6. Additional documentation as requested by the Building Official per OSSC Section 107.
- b. **Perform Updated Calculations as Requested by Building Official.** The applicant is responsible for keeping the Building Official informed of changes to the proposed design. An updated compliance submittal package, reflecting proposed changes to the project, must be prepared upon the request of the local code official. Applicants may be required to update compliance calculations and energy simulations if:
1. The local code official discovers erroneous calculations during the review of the compliance submittal package.
 2. Changes occur in the proposed design that require compliance calculations and simulations be updated.
 3. Requested by the local code official for specified reasons.
- c. **Verification Process:** Jurisdictions will perform inspections and field verifications as needed to verify compliance with the code and the adherence to the submitted plans.
- d. **Submittal of Documentation to Building Codes Division:** Once the local jurisdiction has approved the WBA, the applicant will submit a copy of all the materials submitted to the local jurisdiction, the applicable electronic files from the energy modeling software, and the local jurisdiction's letter of approval, to Building Codes Division, Attention Mark Heizer, PE, Building Codes Division, P.O. Box 14470 Salem, OR 97309-0404.

**2010 OEESC AMENDMENTS TO ASHRAE STANDARD 90.1-2007 SECTION 11
ENERGY COST BUDGET METHOD (updated July 2010)**

This table is for use with the Whole Building approach and methodology set out in ASHRAE chapter 11. Where ASHRAE cites to particular provisions the appropriate Oregon Energy Efficiency Specialty Code (OEESC) provision should be substituted.

Instructions: Replace the specific ASHRAE citation referenced in the appropriate ASHRAE Section with the language contained in the OEESC Substitution column.

ASHRAE Section	ASHRAE Citation	OEESC Substitution
11.1.2 Trade-Offs Limited to Building Permit	5.5, 6.5, 7.5, and either 9.5 or 9.6	502.1, 502.2, 502.3, 503.3, 503.4, 507.1, and either 505.5.2 or 505.5.2.1
11.1.4 Compliance	5.4, 6.4, 7.4, 8.4, 9.4, and 10.4	502.4, 503.2, 504, 505.1, 505.2, 505.3, 505.4, 505.6, and 505.7
11.2.1.1 (a)	“1400 hours per year”	“8760 hours per year”
11.2.1.3	6.4.2	503.2.1
Table 11.3.1 Column A 1. Design Model (c)	Sections 5 through 10	502, 503, 504, 505, and 507
Table 11.3.1 Column A 2. Additions and Alterations (a)	Sections 5 through 10	502, 503, 504, 505, and 507
Table 11.3.1 Column A 3. Space Use Classification	9.5.1 or 9.6.1	505.5.2 or 505.5.2.1
Table 11.3.1 Column A 5. Building Envelope	Exception (c)	<i>Delete Exception (c) in its entirety</i>
Table 11.3.1 Column B 5. Building Envelope (a)	5.5, 5.1.3	502.1.2, 101.4.2
Table 11.3.1 Column B 5. Building Envelope (c)	5.5.4.2, 5.1.3	502.3 and Table 502.1.3, 101.4.2
Table 11.3.1 Column B 5. Exception	4.2.1.2	101.4.2
Table 11.3.1 Column A 6. Lighting (c)	9.1.3 and 9.1.4	505.5.1
Table 11.3.1 Column B 6. Lighting	9.5 or 9.6	505.5.2 or 505.5.2.1
Table 11.3.1 Column A 10. HVAC Systems	6.4.1	503.2.3
Table 11.3.1 Column B 11. Service Hot Water Systems	Exception (a)	<i>Delete Exception (a) in its entirety</i>
Table 11.3.1 Column B 11. Service Hot Water Systems	6.5.6.2	503.4.5.4

Exception (b)		
Table 11.3.1 Column B 11. Service Hot Water Systems	N/A	<i>Add:</i> Exceptions: c. Water use must be identical in both models (no credit for low-flow fixtures).
Table 11.3.1 Column A 13. Modeling Exceptions Exception (b)	5.5, 6.5, 7.5, and either 9.5 or 9.6	502.1, 502.2, 502.3, 503.3, 503.4, 507.1, and either 505.5.2 or 505.5.2.1
11.3.2 HVAC Systems (a) Exception	6.4 and 6.5	503.2, 503.3, and 503.4
11.3.2 HVAC Systems (b)	6.4 and 7.4	503.2 and 504
11.3.2 HVAC Systems (d)	6.5.6.1	503.2.6
Table 11.3.2A footnote a	6.5.2.1	503.4.5 Exception 5
Table 11.3.2A footnote b	<i>Delete in its entirety</i>	VAV with reheat: Setpoints for VAV reheat boxes shall be per 503.4.5.1, 503.4.5.2, and 503.4.5.3. Supply air temperature shall be reset based on zone demand per 503.4.5. Design airflow rates shall be sized for the reset supply temperature.
Table 11.3.2A footnote d	<i>Delete in its entirety</i>	The fan in the VAV system of the budget building design shall be modeled assuming a variable speed drive per 503.4.2. For smaller fans, a forward-curved centrifugal fan with inlet vanes shall be modeled.
Table 11.3.2A footnote e	6.5.4.3, 6.5.4.1, 6.5.5	503.4.3, 503.4.3.4.4, 503.4.4
Table 11.3.2A footnote f	6.5.4.3, 6.5.4.1	503.4.3.4, 503.4.3.4
Table 11.3.2A footnote g	6.5.5.2, 6.5.4.4, 6.5.4.1	503.4.2, 503.4.3.3, 503.4.3.4
Table 11.3.2A footnote g	N/A	<i>Add following sentence at end of “...temperatures between 60F and 90F.”</i> Activation of heating and cooling rejection devices per 504.3.3.1 in Budget and Proposed.
11.3.2 HVAC Systems (e)	6.5.1	503.3.1 or 503.4.1
11.3.2 HVAC Systems (h)	6.5.3.1, 10.4	503.2.10, ASHRAE 90.1
Table 11.3.2D Economizer Type – Air; High Limit Shutoff	Table 6.5.1.1.3B	When its operation will no longer reduce HVAC system energy

