



## Small Commercial Efficiency Pilot Development

Brian Lynch - Earth Advantage Institute/Energy Trust of Oregon New Buildings Program  
Nick O'Neil- Energy Trust of Oregon  
Allie Robbins- PEI/Energy Trust of Oregon New Buildings Program



# Agenda

- Small Commercial Efficiency Pilot (SCEP) Concept and Development
  - Earth Advantage Commercial
  - *Core Performance- Oregon Edition*
- Structure: Earth Advantage Commercial and Integration
- Pilot Process
- Our Experience
- Structure: *Core Performance- Oregon Edition*
- Future Plans for Pilot



## SCEP Goals

- ✧ To pilot Core Performance as a prescriptive approach to achieving energy savings in the small commercial market.
- ✧ To pilot Earth Advantage Commercial to test the premise that a green certification can sell greater energy efficiency in the small commercial market.
- ✧ To develop a cost-effective package of energy efficiency measures for small commercial buildings.

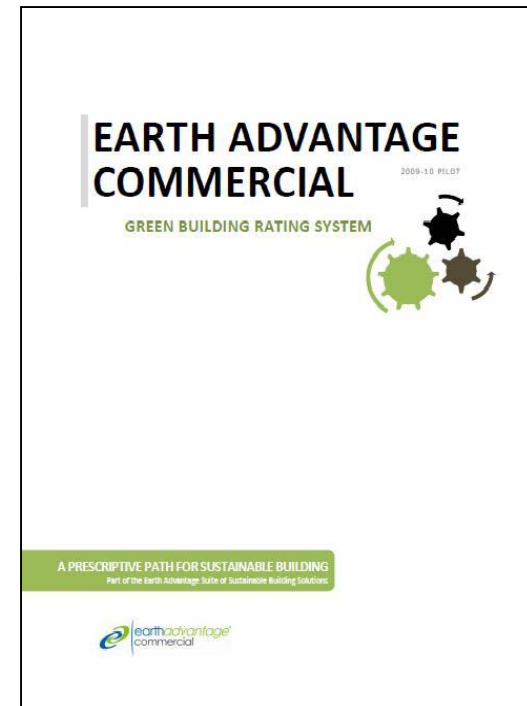
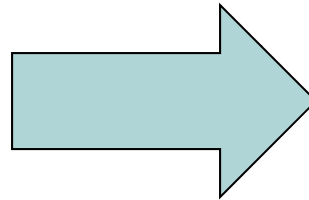
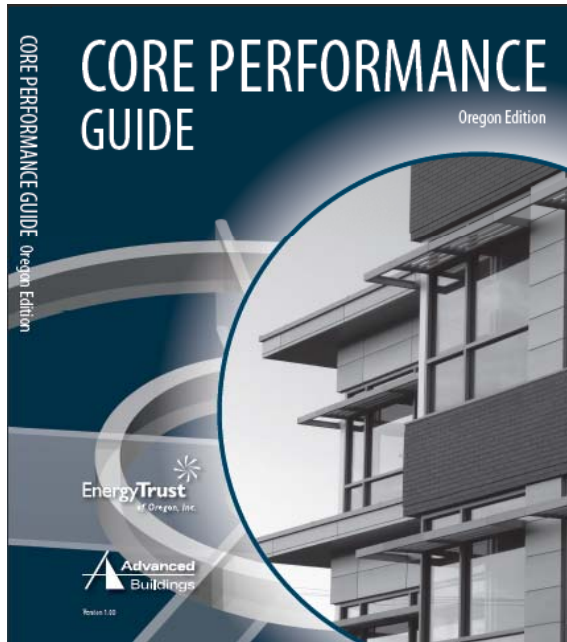


## Importance of Cost-Effectiveness

- Fundamental criteria of Energy Trust
  - Ratepayer dollars should be spent wisely
- Strategies need support from market
  - Strategies with prohibitive costs are typically less common in the small commercial buildings market and less likely to perpetuate
- Provides program support
  - Allows program to deliver initiative in a cost-effective manner



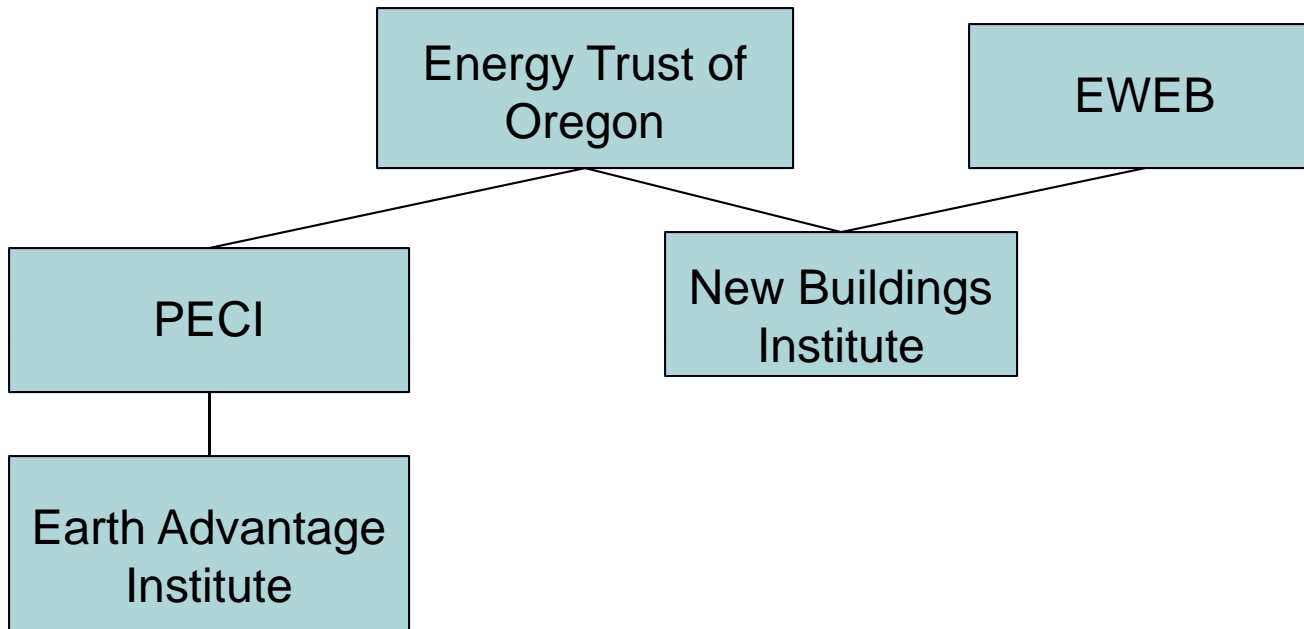
# SCEP Concept



Enroll 3-5 CP only projects, AND Enroll 7-10 CP+EAC projects

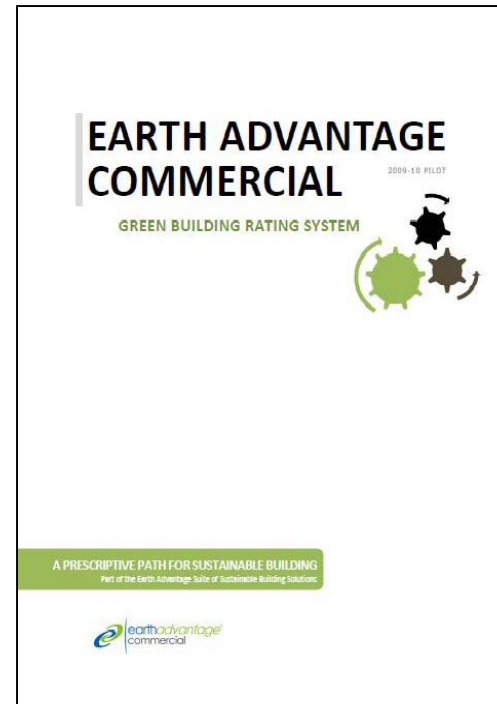


# Roles in SCEP Development



- Energy Trust of Oregon: Lead in funding, development and implementation of Core Performance Guide – Oregon Edition (CP-OR).
- EWEB: Co-funder of CP-OR development.
- New Buildings Institute: Developer of CP-OR and national Core Performance Guide.
- PECEI: New Buildings Program Management Contractor that led the integration of CP-OR into New Buildings Program through the SCEP.
- Earth Advantage Institute: Developer of Earth Advantage Commercial Certification.

# Earth Advantage Commercial



## Why this Program is Relevant

- Majority of new commercial buildings are SMALL

(source: 2003 CBECS Data)

- 95% < 50,000 sq. ft
- Small percentage of small commercial projects seek certification
- Filling a market niche currently not being met
- Alternative and ***complementary to LEED (and IgCC)***

## Why this Program is Relevant

- Major aspects of sustainability addressed—projects must meet requirements in all categories
- Includes market education and feedback loops
- Local expert peer reviewed and Oregon based
- Avenue for incentive/grant/tax credit money
- As we are moving out of pilot, we will want to align our efforts to greatest extent feasible with the Reach Code



# Mechanics and Format

Measure Overview					
Energy		Instructions Complete all required measures for desired certification level plus those for the preceding certification level(s). In addition, achieve one additional measure for Silver Certification, two additional for Gold Certification, and three for Platinum Certification.			
		Energy Targets			
Level	Measure	Save Energy	Systems Performance	Measure & Manage	Other
Silver	<b>Oregon Core Performance™ Guide, Core Requirements</b> Includes 13 prescriptive strategies addressing design and energy use.	●			
	<b>Oregon Core Performance™ Guide Construction Certification (Acceptance Testing)</b> Installing contractor, engineer of record, commissioning authority or owner's agent reviews the installation of equipment, performs acceptance tests and documents results, and documents the operating and maintenance information and test results on the construction certification.		●		
	<b>ENERGY STAR® Portfolio Manager and Data Sharing</b> Track energy use in ENERGY STAR's Portfolio Manager on a monthly basis to earn the ENERGY STAR and share utility information with Earth Advantage® Institute (EAI). NOTE: EAI to provide participant with annual energy use CO <sub>2</sub> calculation.				●
Gold	<b>Oregon Core Performance™ Guide Enhanced Performance Requirements</b> Includes 4 additional prescriptive strategies addressing design and energy use.	●			
	<b>Oregon Core Performance™ Guide Operator Training and Documentation – AND/OR – Building User Training and Documentation</b> Train building operators and/or building users in how mechanical and electrical systems are intended to operate and provide systems manuals for those operators/users.		●		
	<b>Energy Management Plan</b> Implement a meaningful plan for the operations phase following ENERGY STAR's Guidelines for Energy Management to manage energy performance.			●	
Platinum	<b>Whole Building Energy Modeling and Simulation</b> Demonstrate a savings 5% greater than building using both Oregon Core Performance Required and Enhanced Measures.	●			
	<b>Oregon Core Performance™ Guide Commissioning</b> 3rd party commissioning following the guidance in the Enhanced Measures of the Oregon Core Performance Guide.		●		
	<b>Measure and Monitor Energy Use for Major Systems</b> Install measurement devices to ensure capacity to track HVAC, lighting and plug loads. Create an action plan for annual follow-up with those measures.			●	
	<b>Higher Construction R Values and (Lower U Values)</b> Follow the requirements as explained in the appendices of the Oregon Core Performance Guide for opaque envelope or code whichever is more stringent.	●			
	<b>Grid Source Renewable Energy (100%, 1 year)</b> One year renewable energy contract or REC purchase equal to the building's total annual energy spending.				●
	<b>Phantom Load Management Plan</b> Plan to reduce loading during unoccupied hours due to appliances that are left on or have standby power loads.			●	
Additional Energy Measures	<b>Solar Ready Design</b> Follow prescriptive requirements to ensure that building is solar ready for future installations.				●
	<b>Onsite Renewable Power 2%</b> Install onsite renewable energy that is able to produce at least 2% of total energy use.				●
	<b>Onsite Renewable Power 5%</b> Install onsite renewable energy that is able to produce at least 5% of total energy use.				●



# Mechanics and Format

The Earth Advantage Commercial System has:

- Five **CATEGORIES**
  - Energy, Water, Health, Material, Land
- Three themes, or **TARGETS**, per CATEGORY
- One **MEASURE** per TARGET in each level (MEASURES are prescriptive and *mandatory*)
- One **ADDITIONAL MEASURE** per category, per level (adding flexibility)

## Mechanics and Format

The Earth Advantage Commercial System has:

- Three levels of certification
  - Silver, Gold, Platinum



- Levels of certification are cumulative (e.g., Gold certification requires completion of all Silver measures)

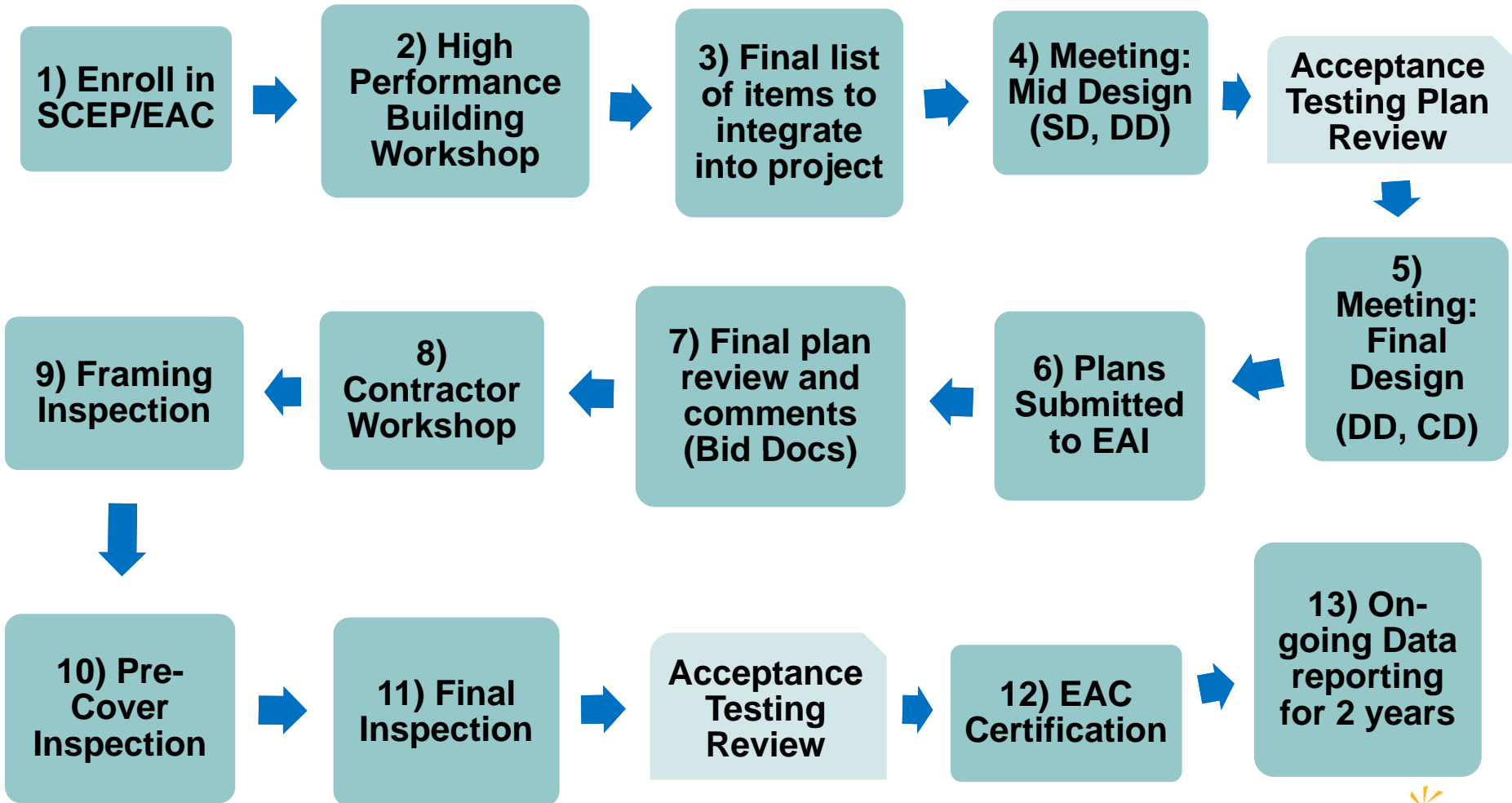


# Energy Measures

Certification Levels	Measures
Silver	<i>Core Performance Guide–Oregon Edition</i> , Design Process Strategies <i>Core Performance Guide–Oregon Edition</i> , Core Requirements <b><i>Core Performance Guide–Oregon Edition</i>, Acceptance Testing</b> Energy Star Portfolio Manager and Data Sharing Plus one elective measure
Gold	<i>Core Performance Guide–Oregon Edition</i> , Enhanced Performance Strategies <i>Core Performance Guide–Oregon Edition</i> , Operator Training and Documentation Energy Management Plan Plus two elective measures
Platinum	Whole Building Energy Modeling and Simulation <i>Core Performance Guide–Oregon Edition</i> , Additional Best Practices Section 4.4 Additional Commissioning Strategies System-level monitoring Plus three elective measures



# Certification Process



# SCEP/EAC Pilot Incentive Ranges

Early Design Assistance	Design and Installation Incentives		3 <sup>rd</sup> Party Commissioning (Platinum Level)	Technical Assistance for modeling
\$2,500	Silver	\$0.50- \$0.70 Per sq.ft.	\$0.10 Per sq.ft.	50% of total installation incentive (custom track rules apply)
	Gold	\$0.80- \$1.20 Per sq.ft.		
	Platinum	Per kWh and Therm saved		

# Acceptance Testing vs. Commissioning

Enhanced Commissioning	
Core Performance/ Acceptance Testing	
Documentation of the Owner's Project Requirements and Basis of Design	The CxA must be unaffiliated with the design and construction teams
Functional Acceptance Testing & documentation of the results	Formal Cx Plan and Cx Report
Operational literature (systems manual and/or user's guide)	Inclusion of the commissioning requirements into the project specification <b>(we have pushed projects to do this anyway)</b>
Operator training and building walk through with operations staff	
Detailed design review and back-check	
Review of submittals (Cx) or change orders (AT)	



# Program Verification

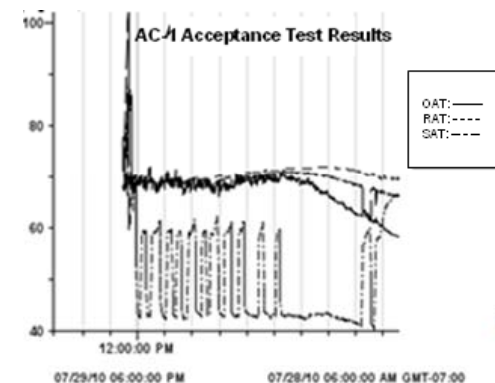
## Pre-installation

- Documentation review

## Post-installation

- Review of site visit report
- Review of acceptance test results

EQUIPMENT SCHEDULE								
TAG	MANUFACTURER & MODEL #	NOM. TON	COOLING CAPACITY (MBH)					EER
			TOTAL	SENS	EADB	EAWB	AMB	
AC-1	CARRER 48PGDM08AA-50-	7.5	86.1	83.6	80	62	85°F	12.5
AC-2	CARRER 48PGDM09AA-50-	8.5	102.2	94.1	80	62	85°F	13



## Experience

1. It has helped to have prescriptive approaches that are also customizable
2. Some projects need a higher-touch approach than others
3. Different projects require a nuanced approach
4. There appears to be a market for green building certification in small commercial buildings
5. Verification process, such as Acceptance Testing protocol, has worked to resolve issues



# Core Performance

## National Guide

- Target 10 unique building types
- Focus on buildings >10,000 sqft and <70,000 sqft
- Baseline ASHRAE 90.1 2004
- 50,000 distinct eQuest modeling runs to identify common energy trends that lead to consistent savings
  - Grouped strategies into Core & Enhanced

Vs.

## Oregon Edition

- Simulate 3 common buildings types
  - Office, School, Retail
- Focus on buildings >10,000 sqft and <70,000 sqft
- Baseline 2007 Oregon Structural Specialty Code
- 12,000 distinct modeling runs
  - 5 CZ; 6 HVAC systems
  - 45 unique baseline cases



## Core Performance – Oregon Edition Guide Development

- Model OR code baseline for each building type
- Model national guide strategies “as is”
- Determine savings over OR Code
  - Evaluate individual strategy savings
  - Evaluate core package savings



## Core Performance – Oregon Edition Guide Development

- Perform cost-effectiveness test on individual strategies
- Engage in roundtable with partners to discuss grouping strategy based on:
  - Building applicability (Type and Climate)
  - Predictable, repeatable savings
  - Implementation viability
  - Cost



# Core Performance – Oregon Edition Guide Development

- Group strategies into sections:
  - **Design Process** – Minimum Program Requirements; unquantifiable benefit or cost
  - **Core** – Easy to implement; consistent among many building variables
  - **Enhanced** – Harder to implement; somewhat specific to certain building variables
  - **Best Practices** – May perform consistently in national model, however highly variable savings and/or cost in Oregon market



## Core Performance – Oregon Edition Guide Development

- Bundled strategies then screened for cost-effectiveness to account for:
  - Interactive effects
  - Cost sharing possibilities
- Result is a package that is cost-effective even if several strategies are only “close” to cost-effective when analyzed individually



# Future of the Small Commercial Efficiency Pilot

## Measure Package

- Alignment with OR Reach Code
- Updates to Core Performance – OR Edition

## Program Delivery

- Streamline delivery to expand participation
- Update based on pilot experience

## Energy Trust Incentives

- Evaluate cost-effectiveness of program and measures
- Align incentives with 2010 code incentives



# Thank You!

Nick O'Neill, Energy Trust of Oregon

Brian Lynch, Earth Advantage/Energy Trust of Oregon New Buildings Program

Allie Robbins, PECl/Energy Trust of Oregon New Buildings Program



# Appendix

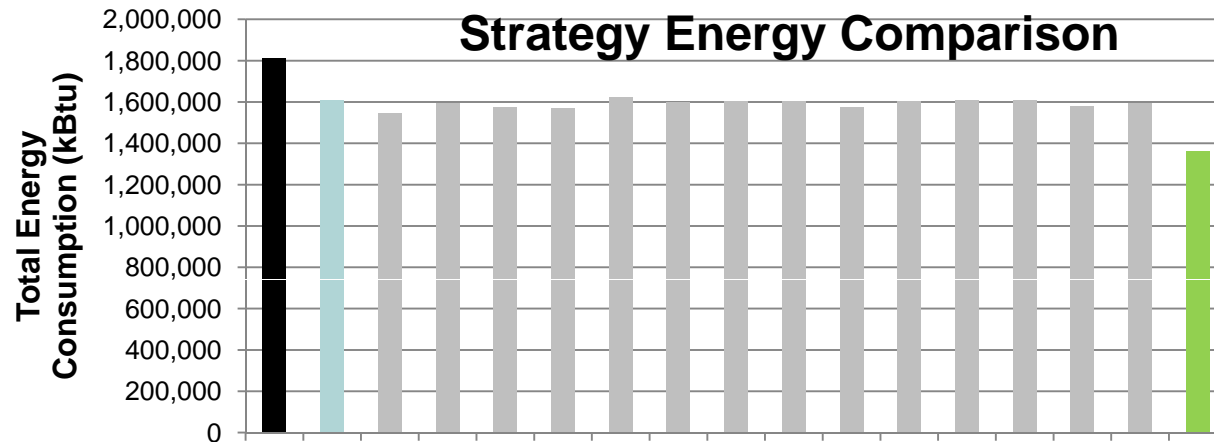
Core Performance Measures  
Modeling Results  
Costs of Certification

# Features and Benefits of SCEP Integration



# Draft Results – Core Package

Strategy	Total Energy Consumption (kBtu)	Savings Over OR Code (%)	Savings Over 90.1 (%)
2007 Oregon Energy Code Baseline	1610712.24	0.00%	11.15%
Oregon Energy Code + Air Barrier	1547396.16	3.93%	14.65%
Oregon Energy Code + Roof Insulation	1595848.07	0.92%	11.97%
Oregon Energy Code + Wall Insulation	1576849.23	2.10%	13.02%
Oregon Energy Code + Slab Insulation	1570134.77	2.52%	13.39%
Oregon Energy Code + Vertical Glazing	1623515.26	-0.79%	10.45%
Oregon Energy Code + Reduced LPD	1598122.70	0.78%	11.85%
Oregon Energy Code + Fan Safety Factor	1606224.69	0.28%	11.40%
Oregon Energy Code + Cooling Efficiency	1603867.77	0.42%	11.53%
Oregon Energy Code + Heating Efficiency	1574037.24	2.28%	13.18%
Oregon Energy Code + Static Pressure	1606010.62	0.29%	11.41%
Oregon Energy Code + Boiler Efficiency	1610712.24	0.00%	11.15%
Oregon Energy Code + Demand Controlled Ventilation	1610712.24	0.00%	11.15%
Oregon Energy Code + DHW Efficiency	1582224.24	1.77%	12.73%
Oregon Energy Code + Economizer Performance	1593160.44	1.09%	12.12%
<b>Advanced Buildings Core Package</b>	<b>1361271.14</b>	<b>15.49%</b>	<b>24.91%</b>





# Groupings – Design & Core

	Section	Designation in CPG	Strategy	Description	B/C Ratio	Cost
Design	Design	1.4	Static Pressure	Fan and system ducting pressure drop values changed to reflect more careful design, analysis and fabrication of system ducting	0.7	\$2,500
Core Package	Core	2.2	Air Barrier	Reduction in uncontrolled infiltration at perimeter zones	0.7	\$1,045
	Core	2.6	Vertical Glazing	upgrade to specific glass types (see glass performance information in cost documents)	6.9	\$1,082
	Core	2.8	Reduced LPD	LPD reductions vary by building type; office reduction is 10%	47.2	\$238
	Core	2.9	Cooling Efficiency	see efficiency tables	1.1	\$5,588
	Core	2.9	Boiler Efficiency	see efficiency tables	0.9	\$7,212
	Core	2.12	DHW Efficiency	various measures; demand hot water modeled	1	\$750
	Core	2.13	Fundamental Economizer Performance	see measure description in CP, and modeling description in supporting materials	0.7	\$3,850
	Core	2.11	Demand Control Ventilation	add DCV capability to system	0.8	\$3,993
	Core	3.5	Enhanced Supply Reset	warmest zone reset, beyond OR code requirements	23.8	\$30
	Core	3.10	VFD Pumps	VFD on all hot water system pumps	0.8	\$220



# Groupings – Enhanced and BP

	Section	Designation in CPG	Strategy	Description	B/C Ratio	Cost
Enhanced Package	Enhanced	3.3	Aggressive LPD	LPD reductions to EAct05	7.5	\$2,851
	Enhanced	3.4	Reduced Plug Loads	10% reduction in unregulated loads	0.8	\$5,500
	Enhanced	3.8	Night Ventilation	use nightoutside air for pre-cooling	0.7	\$3,550
Best Practices	No	3.2	Daylighting-Overhead	add skylights and daylight controls for zones under skylights	0.7	\$18,788
	No	2.5	Roof Insulation	upgrade roof insulation from R-20 to R-25 (deck)	0.1	\$21,384
	No	2.5	Wall Insulation	climate specific upgrade; to R-13+5 rigid in metal studs	0.3	\$8,769
	No		NWB Insulation	R-30 roof, R-19+R-12 rigid walls	0.1	\$17,634
	No	3.1	Cool Roof	'white' roof	0.8	\$750
	No	3.2	Daylighting-Side lighting	add daylight controls for sidelit zones; no design response.	0.4	\$12,018
	No	3.6	Evaporative Cooling	Indirect evaporation on mixed air stream	0.1	\$81,092
	No	3.7	Heat Recovery	enthalpy wheel heat recovery	0	\$43,692
	No	3.9	Enhanced Economizer	See CP description	0.6	\$1,100
	No	-	GSHP	require ground source heat pump	0.7	\$3,000



# Final Results

Savings from OR Core Performance Package							
		Core Savings			Core + Enhanced Savings		
System type	Location	Retail	Office	School	Retail	Office	School
PSZ-Furn	PDX	26%	14%	14%	28%	22%	18%
PSZ-Furn	Bend	30%	11%	17%	31%	18%	18%
PSZ-Furn	Medford	29%	14%	14%	31%	22%	18%
PVAV-HW	PDX	-	19%	16%	-	27%	20%
PVAV-HW	Bend	-	14%	15%	-	20%	18%
PVAV-HW	Medford	-	19%	16%	-	27%	20%
PVAV-ELEC	Bend	-	9%	-	-	16%	-
PVAV-ELEC	Medford	-	13%	-	-	21%	-
PHP	PDX	29%	13%	16%	34%	22%	22%
PHP	Bend	31%	10%	16%	35%	18%	20%
PHP	Medford	30%	14%	17%	35%	23%	22%
WPHP	PDX	-	17%	20%	-	25%	24%
WPHP	Bend	-	15%	22%	-	22%	26%
WPHP	Medford	-	18%	21%	-	26%	25%
PSZ-Elec	PDX	27%	13%	-	30%	22%	-
PSZ-Elec	Bend	30%	10%	-	32%	18%	-
PSZ-Elec	Medford	29%	13%	-	32%	18%	-
PSZ- Furn	PDX	27%	14%	14%	29%	22%	17%
PSZ- Furn	Bend	30%	11%	17%	31%	18%	18%
PSZ- Furn	Medford	29%	14%	14%	30%	22%	18%



# Costs of Certification

- LEED            \$2.50 to \$5.50 per sq. ft.
- EAC            \$0.70 to \$2.50 per sq. ft.  
(inclusive of certification fees \$0.50 to \$0.90 per sq. ft.)
  - Small straightforward projects, most work can be done without additional consultants
    - Facilitation, Administration, Verification
  - Large complex projects, third-party assistance may be required
    - Ecologists, Lighting Specialists, Energy Modeler, Commissioning Agent, Building Sciences



# Measures

Measure Overview		Land Targets				
Level	Measure	One Building	Community Transportation & Bicycles	Other	Other	Other
Silver	<b>Silver Native and Adaptive Plants</b> Plant at least 25% of common areas and general landscape areas from an approved local or local plant list that identifies native and low-water (xeriscape) plant materials. No invasives may be planted.	●				
	<b>Stockpile Topsoil (Greenfield sites)</b> Stockpile disturbed topsoil during construction and re-use on the site after construction.	●				
	<b>Minimum Bike Storage</b> Install at minimum levels of bike parking as designated by space type <i>NOTE: EAI to provide participant with Walk Score™.</i>			●		●
	<b>Gold Native and Adaptive Plants</b> Plant at least 75% of common areas and general landscape areas from an approved local or local plant list that identifies native and low-water (xeriscape) plant materials. No invasives may be planted.	●				
Gold	<b>Transportation Plan with Survey/Commuter Information</b> Install a dedicated space within the building for the provision of public transportation information, carpool sign-up information, car share, cycling paths and walking paths.		●			
	<b>Gold Minimum Walk Score™ — OR — Show Score Improvement</b> Must meet minimum Walk Score of 50, or show that the project will improve community connectivity and place making by bringing needed services to a community. <i>NOTE: EAI to provide participant expected commuter carbon footprint.</i>			●		●
	<b>Enhanced Site Ecology</b> Preserve and restore native wildlife habitat, encourage relevant biodiversity.	●				
Platinum	<b>Bicycle Shower and Changing Facilities</b> Provide covered, secure bicycle parking for 10% of permanent building occupants and provide shower and changing facilities.			●		
	<b>Enhanced Placemaking</b> Must meet minimum walk score of 68, or show that the project will improve community connectivity and place making by bringing needed services to a community.			●		
	<b>Heat Island: Roofs</b> Install a roof that meets the ENERGY STAR reflective roof requirement or Cool Roof Rating Council Requirements. If 50% of total roof area is covered in Vegetated Roof, the requirement is also met.	●				●
	<b>Vehicle Sharing/Program-Employee Incentive</b> Enter into a contract with a vehicle sharing program to provide at least one shared vehicle within 1/4 mile of building entrance. — OR — Provide a carpooling incentive program to employees such that carpoolers are rewarded for participating in carpool.			●		
	<b>Dark Sky</b> Eliminate unprotected uplighting on walls and features. Lighting that is not fully under the cover of a roof, awning or overhang must be dark sky compliant labeled or meet luminous intensity requirements.	●				
	<b>Preserve Existing Trees</b> Develop a comprehensive tree protection plan that identifies how all mature trees are to be protected to the extent practicable during construction. Mature trees must be present to qualify.	●				
	<b>Open Space for Social Interaction</b> Provide an interior or exterior area of usable size for building occupants to gather that is accessible, private and not susceptible to disturbance.			●		

Level	Measure	One Building	Community Transportation & Bicycles	Other	Other	Other
Silver	<b>Silver Native and Adaptive Plants</b> Plant at least 25% of common areas and general landscape areas from an approved local or local plant list that identifies native and low-water (xeriscape) plant materials. No invasives may be planted.	●				
	<b>Stockpile Topsoil (Greenfield sites)</b> Stockpile disturbed topsoil during construction and re-use on the site after construction.	●				
Gold	<b>Minimum Bike Storage</b> Install at minimum levels of bike parking as designated by space type <i>NOTE: EAI to provide participant with Walk Score™.</i>			●		●
	<b>Gold Native and Adaptive Plants</b> Plant at least 75% of common areas and general landscape areas from an approved local or local plant list that identifies native and low-water (xeriscape) plant materials. No invasives may be planted.	●				
	<b>Transportation Plan with Survey/Commuter Information</b> Install a dedicated space within the building for the provision of public transportation information, carpool sign-up information, car share, cycling paths and walking paths.			●		
	<b>Gold Minimum Walk Score™ — OR — Show Score Improvement</b> Must meet minimum Walk Score of 50, or show that the project will improve community connectivity and place making by bringing needed services to a community.			●		●

- Prescriptive activities done by a project to achieve Earth Advantage Commercial certification
- Measures include detailed requirements for compliance