

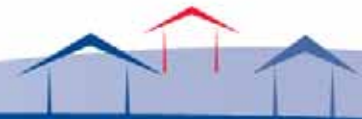
Kindling a Market Transformation in the Pacific Northwest

Building High Performance Houses



Building America Home featuring Solar DHW (Ruhoff Homes, OR)

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May 5, 2008
San Diego, CA



Presentation Overview



1) What is Building America, some context

2) Building Momentum in the PNW

3) What's Here
An Example Community

4) What's Next
Washington's Solar Tariff
Oregon's High Performance Homes
An Example Community



What is Building America?



- The U.S. Department of Energy's Building America program aims to achieve **marketable**, cost-effective net-Zero Energy Homes by 2020.
- Today's near-Zero Energy Homes are built using advanced energy efficiency and solar energy technologies to reach utility bill reductions of at least 60% relative to a local code home
- Building America works with builders committed to improving the resource quality, comfort, and energy performance of their homes



Building Momentum in the PNW



1. Strong Regional support for energy efficiency and solar (e.g. Energy Trust)
2. Strong NW Energy Star Program providing exposure, training and QA
3. Moving HVAC System Inside →
4. NW Energy Star is a Gateway to Building America
 - a) WSU pushed to “tax credit”
 - b) Oregon DOE to High Performance Home (HPH)



What's Here

An Example Community

Builder:

- Quadrant Homes

Number of Homes:

- > 80 underway
(Building America Level)

Solar:

- Not yet, but the model for for success is there



Quadrant Homes – Who are they?



- Puget Sound area builder
- > 1,000 Homes a Year
- Weyerhaeuser Brand
- 60% first-time buyers

- “More Home, Less Money”
Average 2000 sq ft.
- 54 day Production Schedule

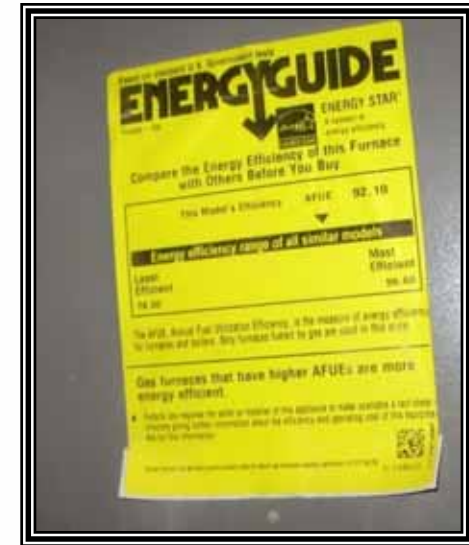


Quadrant Homes – Energy Features



Sound Energy House

- ✓ 2*6 16 ioc, R21 batts
- ✓ R49 Attic
- ✓ R30 under floor (crawl/bonus)
- ✓ Tight Envelope (3.4 ACH 50)
- ✓ .29/.29 windows
- ✓ HVAC System Inside
- ✓ 94 AFUE Furnace
- ✓ 50% CFL
- ✓ Energy Star Appliances
- ✓ .62 EF Tank DHW

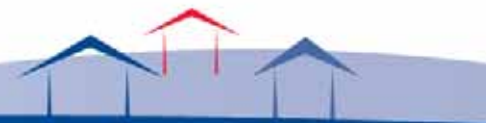
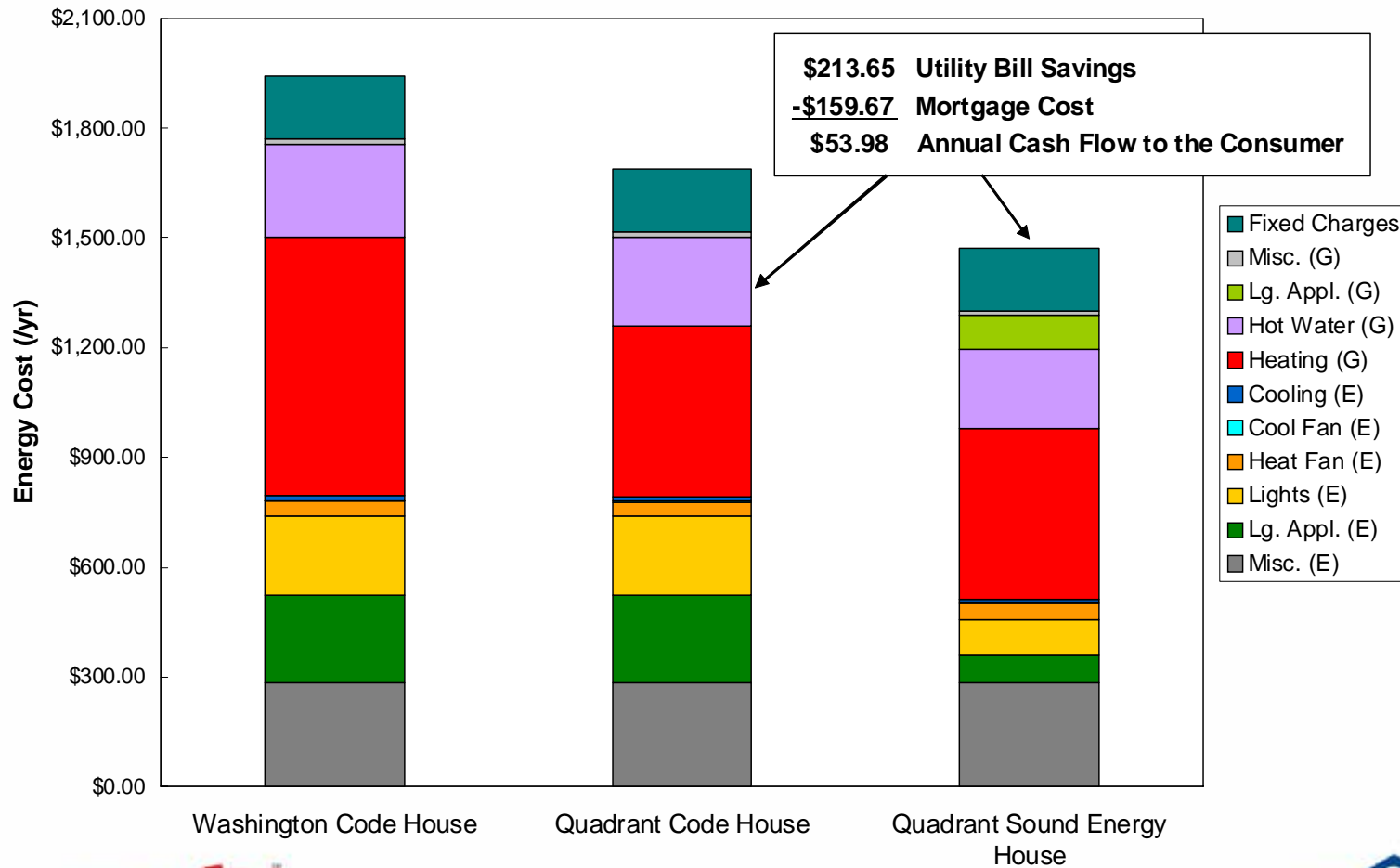


Quadrant Homes – Marketability



- 25-30% of Sales
- Aiming at 300 total

Quadrant Homes Energy Cost



Quadrant Homes – Important Take-a-Ways



Tight Construction using panelized wall system with good sealing



Code Issues with Ducts Under Bonus Room and Above Insulation



Federal Tax Credit

- 1) Costs this year, credit next
- 2) Quadrant pays costs, Weyerhaeuser gets credit



What's Next?



1. Washington's Solar Tariff
2. Oregon's High Performance Home



Washington's Solar Tariff

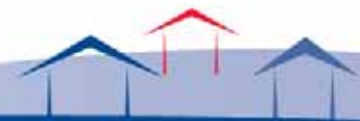


What are the incentive payment rates?

The investment cost recovery incentive equals \$0.15 per economic development kilowatt-hour multiplied by the following rates:

Customer-generated Power	Rate
Solar modules manufactured in Washington state	2.4 (two and four-tenths)
Solar or wind generating equipment with an inverter manufactured in Washington state	1.2 (one and two-tenths)
Anaerobic digester or other solar equipment or wind generator equipped with blades manufactured in Washington	1.0 (one)
All other electricity produced by wind	0.8 (eight-tenths)

- Up to \$.54 kWh
- \$2,000 annual limit (individual, business, government)
- Expires 2014



Quadrant's Energy Smart Home + Solar



- Marketing Choice
- Marketing Value
 - NW Energy Star
 - Energy Smart Home
 - Solar PV



"It's the only feature that pays for itself!"



Oregon High Performance Homes



- New Program: Oregon Department of Energy
- Energy Efficiency
 - Exceed Fed Tax Credit Requirements (w/gas)
 - Improved Shell Insulation
 - Energy Star Certified
 - Ducts Inside, or no Ducts
- Renewable Energy (1kWh/yr/ft²)
 - Passive Solar and Daylighting
 - Solar Water Heating
 - Solar Electric
 - Geothermal
 - Wind



Oregon High Performance Homes



Oregon Tax Credits:

- Shell and HVAC **\$3,000**
- Up to **\$9,000** for Renewables (\$.60/kWh saved)



Oregon's High Performance Homes



A High Performance Home Case Study

Builder:

- Ruhoff Home Builders

Number of Homes:

- 10 (w/solar)

Solar:

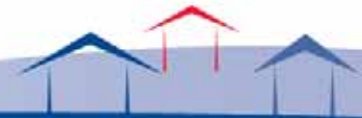
- Solar Thermal (DHW)



Ruhoff: Features & Costs



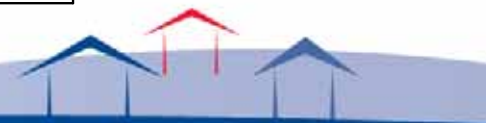
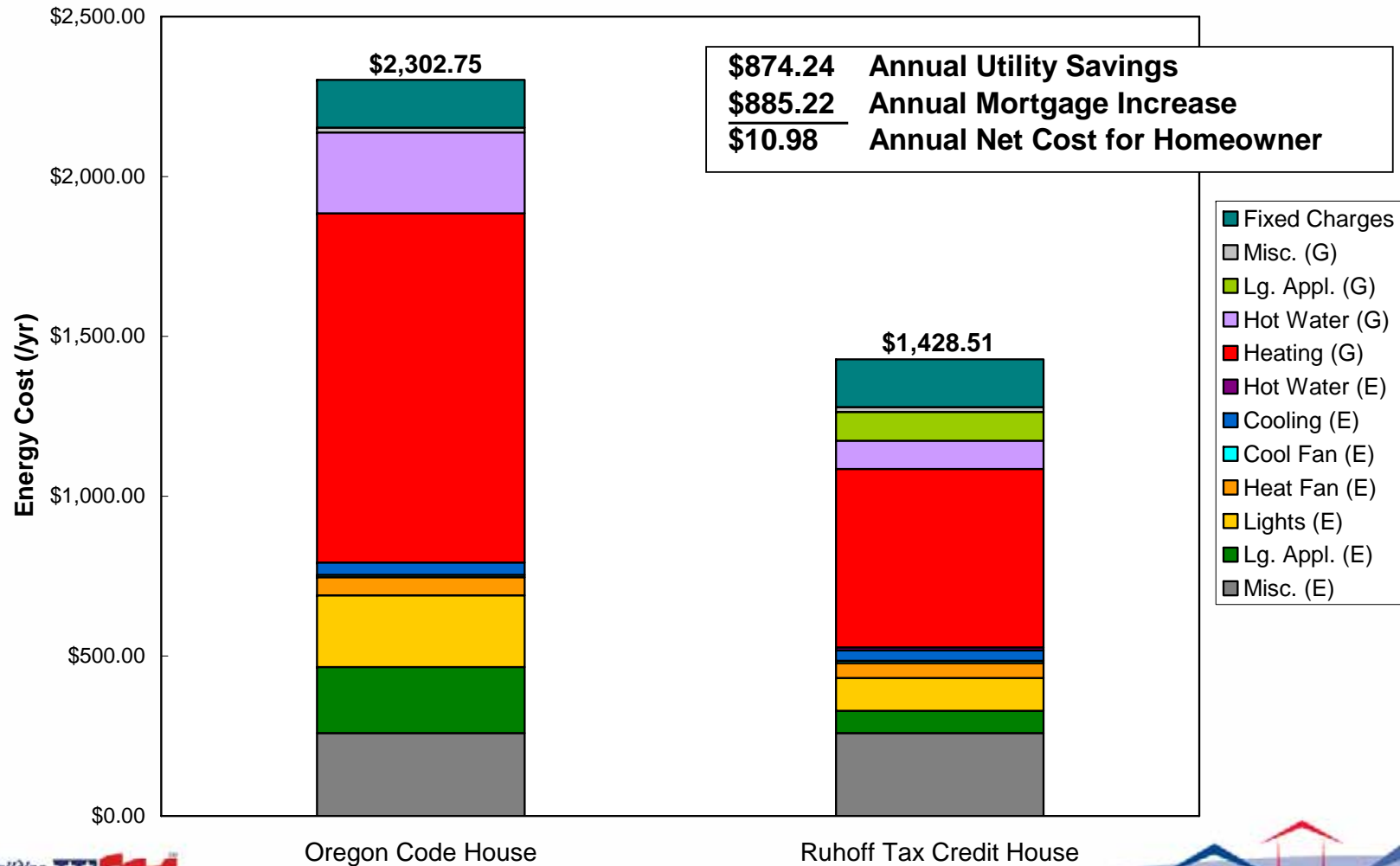
Energy Feature	Builder Cost	10% Markup	Total	Monthly Cost	Annual Cost
Energy Star Appliances	\$240.00	\$24.00	\$264.00	(\$1.76)	(\$21.08)
50% CFL Lighting	\$120.00	\$12.00	\$132.00	(\$0.88)	(\$10.54)
R40 Attic Insulation (Vaulted)	\$320.00	\$32.00	\$352.00	(\$2.34)	(\$28.10)
Improved Duct Sealing, Envelope Sealing, and Testing	\$1,200.00	\$120.00	\$1,320.00	(\$8.78)	(\$105.38)
64 sq ft Closed Loop Solar DHW	\$6,500.00	\$650.00	\$7,150.00	(\$47.57)	(\$570.83)
94% AFUE Furnace	\$800.00	\$80.00	\$880.00	(\$5.85)	(\$70.26)
R37 Crawl Space Ceiling	\$100.00	\$10.00	\$110.00	(\$0.73)	(\$8.78)
R23 BIBS, 2x6, 24"o.c.	\$800.00	\$80.00	\$880.00	(\$5.85)	(\$70.26)
Totals	\$10,080.00	\$1,008.00	\$11,088.00	(\$73.77)	(\$885.22)



Ruhoff: Homeowner Cash Flow



Ruhoff Home Builders Energy Cost



Ruhoff: Homeowner Cash Flow...



38% Energy Savings @

Net cost of \$10.98 before:

\$2,000 builder federal tax credit (EE)

\$1,950 homeowner federal tax credit (solar)

\$4,500 builder HPH tax credit (EE/solar)

\$2,000 builder Energy Trust (EE/solar)



Conclusions



Washington and Oregon's building industries are developing the expertise to build super energy efficient homes with solar that produce positive cash flow for buyers and higher profits for builders

We're on the ground floor, but don't be surprised when both Oregon and Washington become national leaders in efficient residential new construction with on-site generation



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