



*Northwest Solar
Communities*

Making solar simpler, faster, more cost-effective

March, 11 2015

Energy Trust of
Oregon
RAC Meeting

Rob Del Mar
ODOE

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Northwest SEED

Powered by
SunShot
U.S. Department of Energy

CHALLENGE: CUT SOFT COSTS



Permitting



Inter-connection



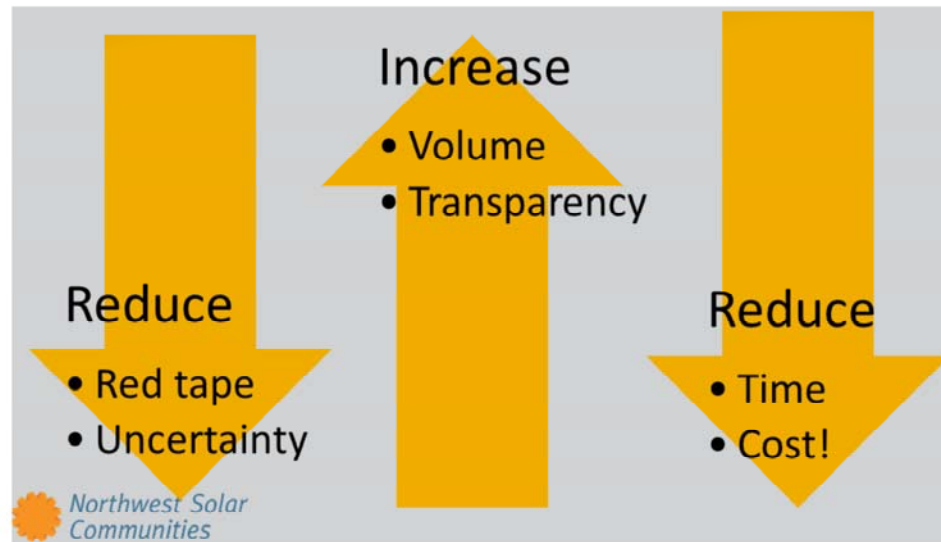
Financing

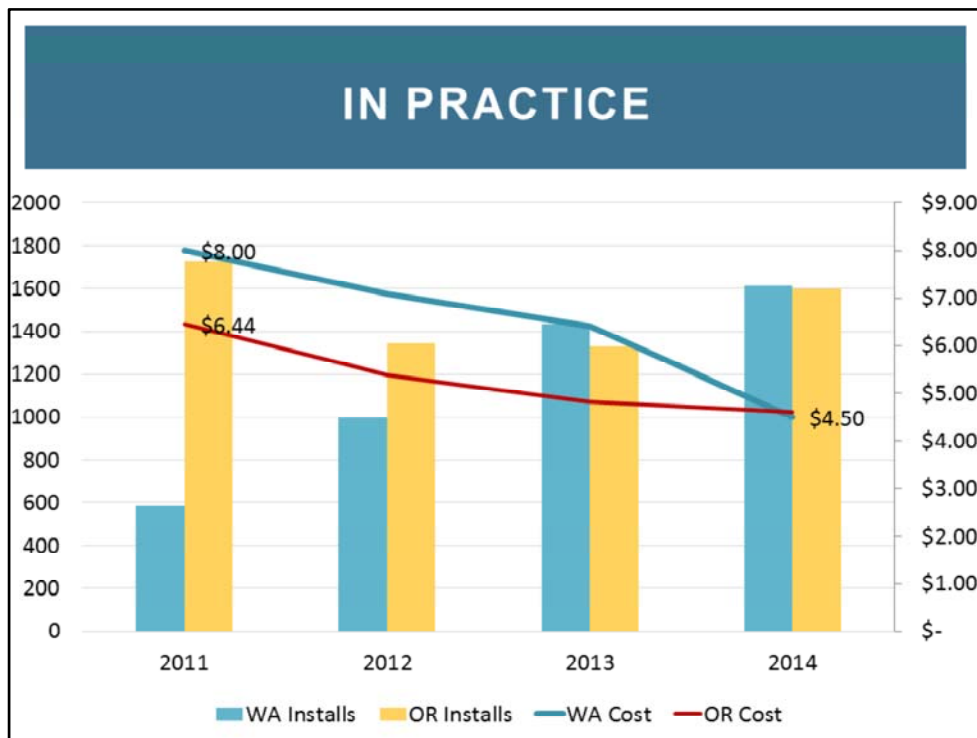


Planning &
Zoning

← National Best Practices - Local Implementation →

IN THEORY...





OUR APPROACH

- Convene Work Groups
- Share Best Practices
- Create Tools & Templates: “Toolkit”
- Support Adoption
- Recognize Progress



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TOOLS & TEMPLATES



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PERMITTING PACKET



Best Practices

Screening Checklists

Standard 1-line diagram



Solar: Simple, Fast, and Cost Effective

Making Solar Permits Easy for Oregon

In Oregon, rooftop solar photovoltaic (PV) installations are growing at a rate of providing an ever increasing number of jobs and becoming a more common sight for homeowners. As residents and businesses increasingly choose to install solar, jurisdictions are searching for new systems to efficiently meet increased out permits. Responding to this challenge, Northwest Solar Communities (NSC) jurisdictions, industry partners, and citizen groups to develop standardized the process of going solar simple, fast, and cost effective for customers and to serve them.

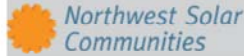
The Solar Permit Packet was developed by the NSC participating jurisdictions work group sessions and consultation with building code officials, solar industry advocates. This packet is intended to present solutions that can be adopted by ensure all of Oregon is open for solar business. Solutions include:

1. Adopt a permit checklist for solar installations
2. Establish reasonable building permit fees
3. Provide solar permit information online
4. Train permit staff in solar
5. Implement online or e-permitting system

Oregon Solar Installation Specialty Code

The Oregon Solar Installation Specialty Code was implemented in October first statewide solar energy code in the nation. The code is intended to reduce inconsistencies in both the technical aspects of installing a solar PV system's aspects of obtaining a building permit. The code defines minimum structural installation of PV components and support systems and prescribes how process building permit applications and determine fees.

1. Residential Bulk Installations



OVER-THE-COUNTER BUILDING PERMIT CHECKLIST FOR RESIDENTIAL SOLAR PHOTOVOLTAIC SYSTEMS: ROOFTOP MOUNTED

Contractors can apply for an Over-The-Counter (OTC) permit where the PV system meets the requirements listed in this Checklist. All project plans and supporting documentation must be provided on site for the inspector.

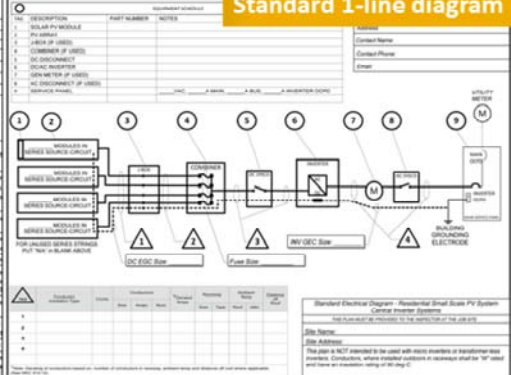
— TO BE COMPLETED BY THE APPLICANT —

Project Information

Property Owner Name:	
Project Address:	
City:	
Day Phone:	
Contractor Name:	
Contractor License #:	
Contractor Day Phone:	

Determine if your project qualifies

1. PV system is designed and proposed for single-family not more than three stories in code compliance to setbacks and height solar modules. [ORC 90A.02]
2. Modules on pitched roofs do not exceed the roof pitch.
3. Roofing is made from lightweight metal, metal roofing, lightweight masonry, or tile.
4. The installation shall comply with the required electrical permit(s) must be all administered the electrical code. [ORC 90A.02]
5. The installation shall meet the requirements by BIA State. [ORC 90A.02]
6. The PV system is designed for the use of the manufacturer's specifications. [ORC 90A.02]
7. The ground snow load does not exceed 30 psf.
8. The ground snow load does not exceed 30 psf.
9. Taper down load of modules, supports, and racking shall not exceed 30 psf.

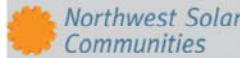


STREAMLINED INCENTIVES



- PowerClerk for Tax Credit
- Next Up: Interconnection Application?

The screenshot shows the Oregon Department of Energy's PowerClerk web application. The header includes the Oregon Department of Energy logo and the PowerClerk logo. A navigation bar contains links for Applications, My Settings, Tax Credit Technician, System Owner, Tax Credit Request, Project Site, Project Components, Application Review, Paperwork Record, Electronic Signatures, and Submit Application. The main content area is titled "New Tax Credit Application" and "Residential Direct Purchase Tax Credit (RDPC-00000000)". A red box highlights a success message: "Application Data Copy Successful". Below this, a yellow box prompts the user to "Enter information about the Tax Credit Technician and Electrical contractor installing the system." The form includes fields for Tax Credit Technician (Domestic Circuits, Smith, Bob), 123 Any Street, San Francisco CA 94102, Company (or name) of the Electrical Contractor (Sunlight Solar Energy, Inc.), Phone Number (5412221910), and License Number (C300).



Saves contractors 2 hours per customer

GRANTS & TRAINING



The 500th Solarize installation in Washington!



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PLANNING SUPPORT



- White Papers
 - Solar in Condominiums
 - Solar & Development Regulations
 - Solar in Comprehensive Plans
 - Solar Ready Construction
- Presentations by Work Group members
 - Regional Planner Meetings
 - Regional Collaborations



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HOMEOWNER ASSOCIATION HELP



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Sample HOA Resolution

HOMEOWNERS ASSOCIATION (DESIGN / ARCHITECTURAL) REVIEW (BOARD/COMMITTEE)
RESOLUTION OF BOARD OF DIRECTORS RECOMMENDING RESOLUTIONS FOR SOLAR ENERGY SYSTEMS
(RESOLUTION NO. _____)

State of _____
County of _____

A. The
need and desire to
photovoltaic ("PV")
technology is
increasing.
B. The
order to balance the
architecture and the
C. The
and that all such are
be necessary or des
D. The
guidelines for the
Community member
NOW, THE
adoption of the following



Official Notice to HOAs

TEL: 503-753-7500
FAX: 503-753-7500
www.oregon.gov/energy

October 18, 2014

Some homeowners have recent guidelines about Home Owners Associations (HOAs) prohibiting
homeowners from installing solar on their homes. This has become a very common problem in Oregon
as most HOAs prohibit solar energy because random solar installations look cheap and professional and
property values decrease as a result of the system.

A study published by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy
(EERE) confirms that solar homes have higher appreciation rates. According to the study homes with
solar energy systems experience faster home sales and faster appreciation rates when compared to non-
solar homes in the same neighborhood. This study can be found on the U.S. Department of Energy Web
site at: <http://ere.eere.energy.gov/ee/pdfs/01323.pdf>

Pursuant to ORS 400.010 (2)(c) it is the policy of Oregon that development and use of a diverse array of
renewable energy resources be encouraged to the highest degree possible to the
private sector of our free enterprise system. In support of that policy, Oregon adopted a statute that
protects a homeowner's right to install a solar energy system on their property, which is set out below.

100,000 Consequence prohibiting use of solar energy systems void. () No person

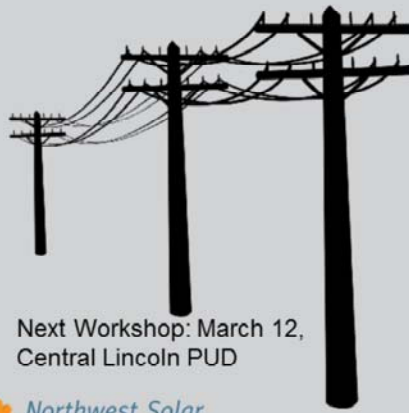
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INTERCONNECTION SUPPORT



Workshops for Engineers



Next Workshop: March 12,
Central Lincoln PUD



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Best Practices

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Solar: Simple, Fast, and Cost Effective

Utility Interconnection and Inspection

Northwest Solar Communities (NSC) maintains a growing list of over 300 utility companies in the Pacific Northwest, providing local data and easily accessible information to utility customers. As residents and businesses increasingly choose to install solar, utilities are searching for new processes to efficiently meet or exceed customer requests for interconnection. Responding to this challenge, Northwest Solar Communities (NSC) continues to work to develop interconnection practices that make the process of going solar as pain-free, and cost-effective for customers and the utilities that serve them.

Best Practices

The following best practices are recommended for interconnection PV systems with a maximum capacity of 20kW or less. Some practices are already in place in Oregon or Washington, in which case we offer each step of the practice in action.

1. Metering Policy

- For utilities that are not already required to do so, consider how the costs of the interconnection are shared with monthly utility fees. If a meter is required, it should be installed at the customer's expense.
- Provide customers with access to their own historical demand and monthly electricity consumption data.
- For metered billing systems, clearly show the interconnection's impact on the utility and any energy or demand credits earned from the interconnection.
- Allow meter aggregation on a per-customer basis (e.g., a residential customer's meter can be aggregated with a commercial customer's meter).
- For systems without meter, a production-based incentive, combine the application for interconnection with the application for a production credit or other net metering.

When Aggregation happens the form:

Some customers have more than one solar system or PV system on multiple properties. When aggregation allows the monthly expense generated from a net meter to be applied to a separate utility meter, it can be applied to a separate utility meter.

Example:

2. Application Process

- Provide an on-line portal for customers to submit a request for interconnection.
- Keep the application simple. For a residential system, the interconnection application should be no more than two pages (for forms and conditions).
- Make the application accessible to all customers.

Download Sample and Request for Fee at: www.nwinterconnection.org



Step 1: Metering

- 1.1. Metering
- 1.2. Metering
- 1.3. Metering
- 1.4. Metering
- 1.5. Metering
- 1.6. Metering
- 1.7. Metering
- 1.8. Metering
- 1.9. Metering
- 1.10. Metering

Step 2: Application

- 2.1. Application
- 2.2. Application
- 2.3. Application
- 2.4. Application
- 2.5. Application
- 2.6. Application
- 2.7. Application
- 2.8. Application
- 2.9. Application
- 2.10. Application

Step 3: Inspection

- 3.1. Inspection
- 3.2. Inspection
- 3.3. Inspection
- 3.4. Inspection
- 3.5. Inspection
- 3.6. Inspection
- 3.7. Inspection
- 3.8. Inspection
- 3.9. Inspection
- 3.10. Inspection

Step 4: Interconnection

- 4.1. Interconnection
- 4.2. Interconnection
- 4.3. Interconnection
- 4.4. Interconnection
- 4.5. Interconnection
- 4.6. Interconnection
- 4.7. Interconnection
- 4.8. Interconnection
- 4.9. Interconnection
- 4.10. Interconnection

Step 5: Production

- 5.1. Production
- 5.2. Production
- 5.3. Production
- 5.4. Production
- 5.5. Production
- 5.6. Production
- 5.7. Production
- 5.8. Production
- 5.9. Production
- 5.10. Production

EXAMPLE: CITY OF HILLSBORO



✓ Checklist for expedited permit

✓ Waived permit fee (since 2007)

✓ Solar specific web page

✓ Piloting MapDwell

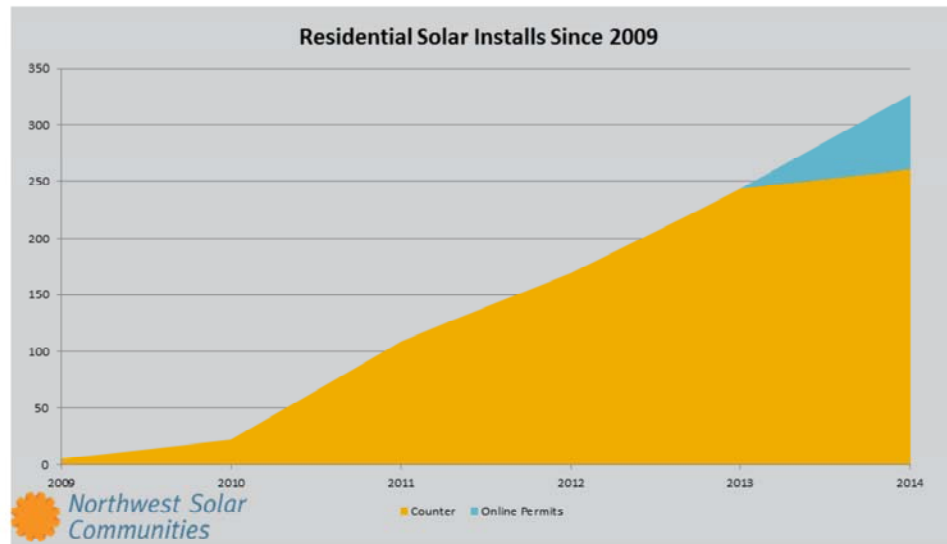
✓ Online permitting



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OVER 300 RESIDENTIAL SOLAR PERMITS!



Slide 14

LI7

This information is from Edmonds, WA. Needs updating

Linda Irvine, 3/4/2015

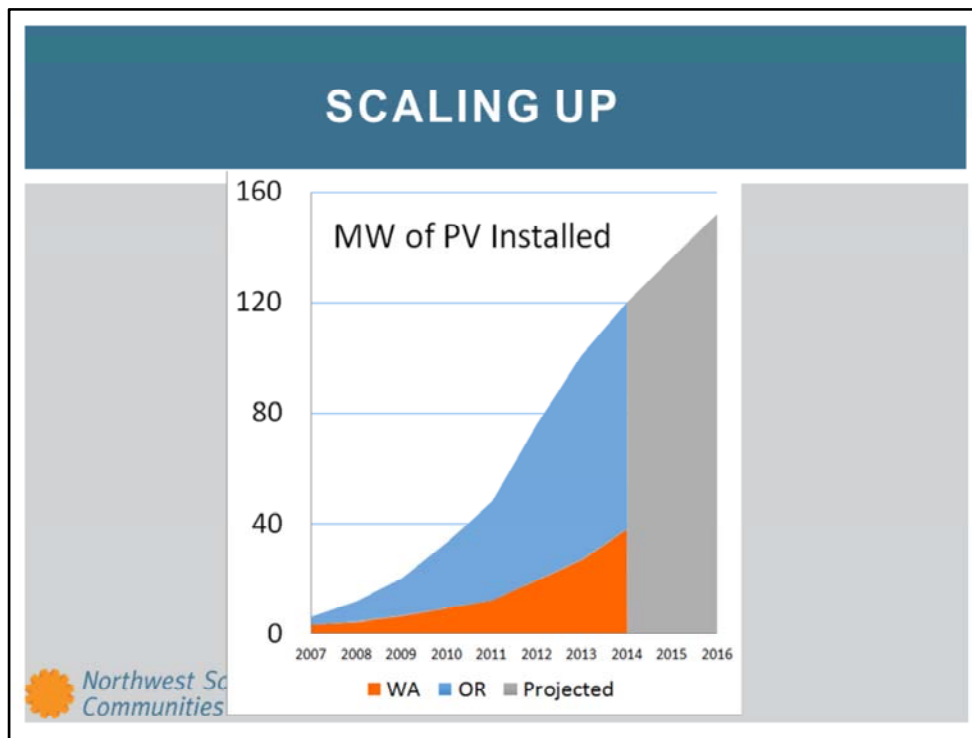


Matt: If your jurisdiction would like to copy Hillsboro, we have the tools to do it, all on our project website, nwsolarcommunities.org, you'll find tools for every area of soft cost reductions.

LOOKING AHEAD

Provide Solutions Online
Replicate
Recognize Success!

Solar
Friendly
Corridor
for 2 M
customers



Linda: As you can see in this graph of cumulative megawatts installed in Oregon (blue) and Washington (orange), we are on track to exceed our goal of doubling installed capacity between 2012 and 2016. Doubling the installed capacity will help bring installations to scale and drive down costs. We're at 120 MW, well on our way to exceed 152 MW by end of 2016.

Baseline 2012: 56 MW in OR and 20 MW in WA. (76 total) Now, 2015: 82 MW in OR and 38 MW in WA (120)

Does not count the industrial (large scale) installations.

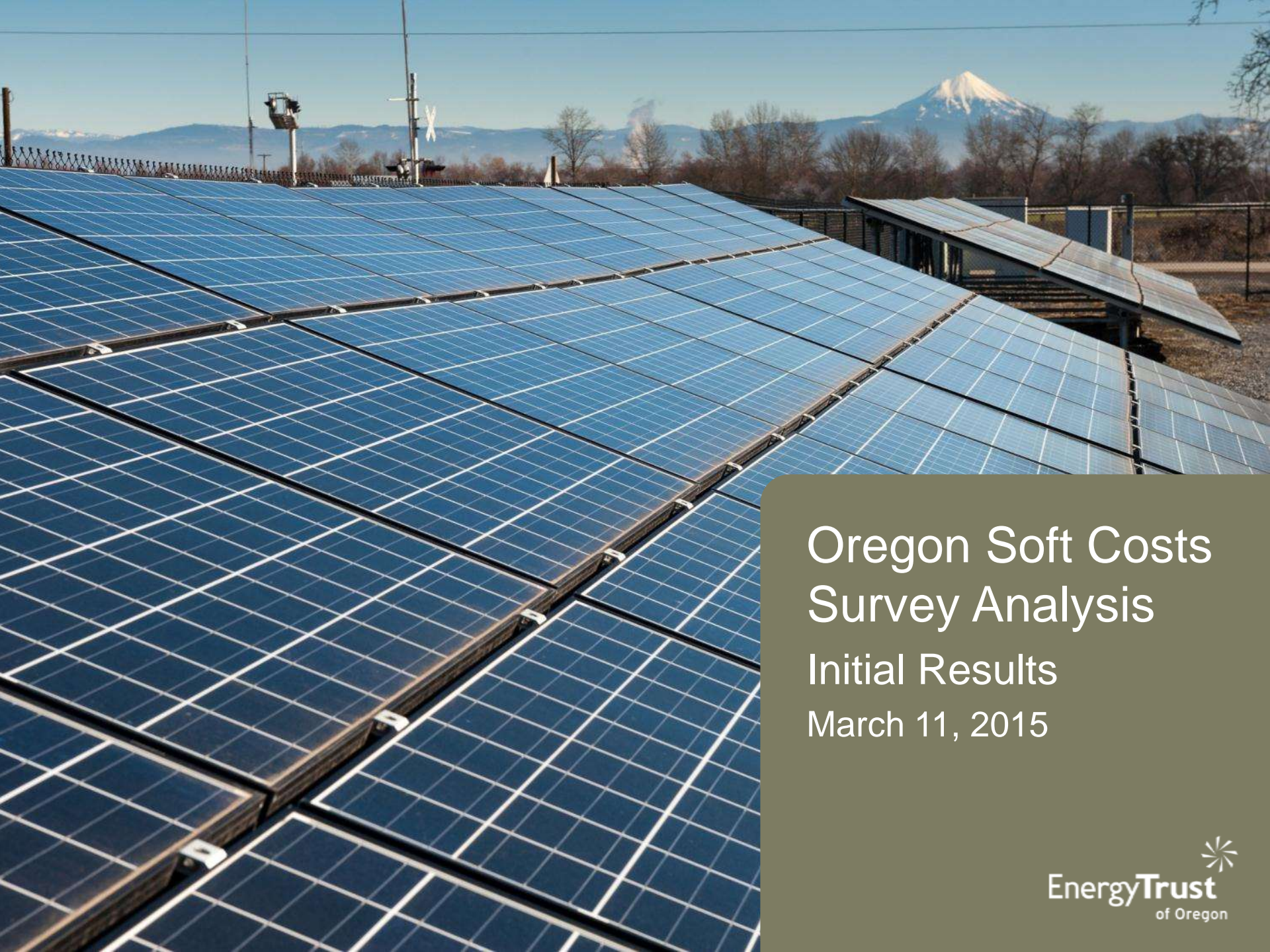
QUESTIONS? THANK YOU!

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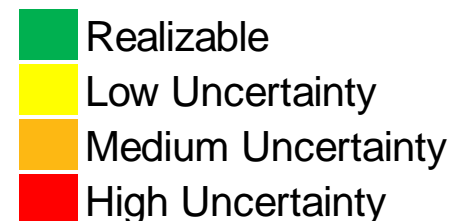
Oregon Soft Costs Survey Analysis

Initial Results

March 11, 2015

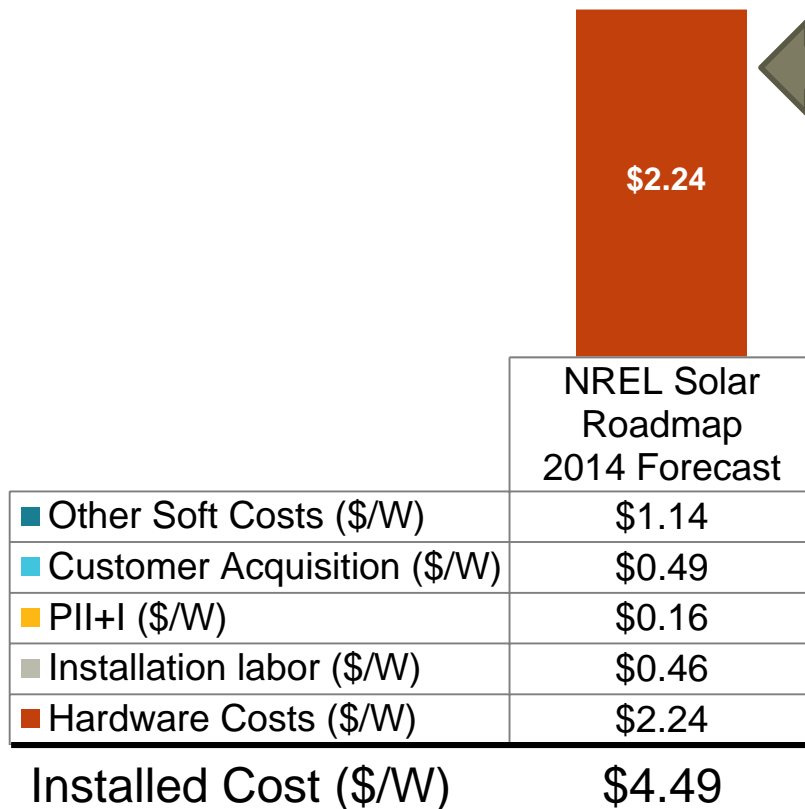
NREL Soft Costs Reduction Roadmap

Charts a pathway to achieve the DOE SunShot targets for installed system prices of \$1.50 per Watt for residential systems and \$1.25 per Watt for commercial systems by 2020. Published in August 2013



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Customer Acquisition (\$/W)	\$0.67	--	\$0.48	\$0.53	\$0.49	\$0.45	\$0.41	\$0.36	\$0.28	\$0.19	\$0.12
PII+I (\$/W)	\$0.20	--	\$0.19	\$0.18	\$0.16	\$0.15	\$0.13	\$0.11	\$0.10	\$0.06	\$0.04
Installation labor (\$/W)	\$0.59	--	\$0.55	\$0.51	\$0.46	\$0.42	\$0.36	\$0.30	\$0.24	\$0.19	\$0.12
Other Soft Costs (\$/W)	\$1.86	--	\$2.10	\$1.30	\$1.14	\$0.97	\$0.82	\$0.68	\$0.56	\$0.48	\$0.37
Total Soft Costs (\$/W)	\$3.32	--	\$3.32	\$2.52	\$2.25	\$1.99	\$1.72	\$1.45	\$1.18	\$0.92	\$0.65
Hardware Costs (\$/W)	\$3.28		\$1.90	\$2.47	\$2.24	\$2.00	\$1.77	\$1.55	\$1.32	\$1.08	\$0.85
Total System Costs (\$/W)	\$6.60	--	\$5.22	\$4.99	\$4.49	\$3.99	\$3.49	\$3.00	\$2.50	\$2.00	\$1.50

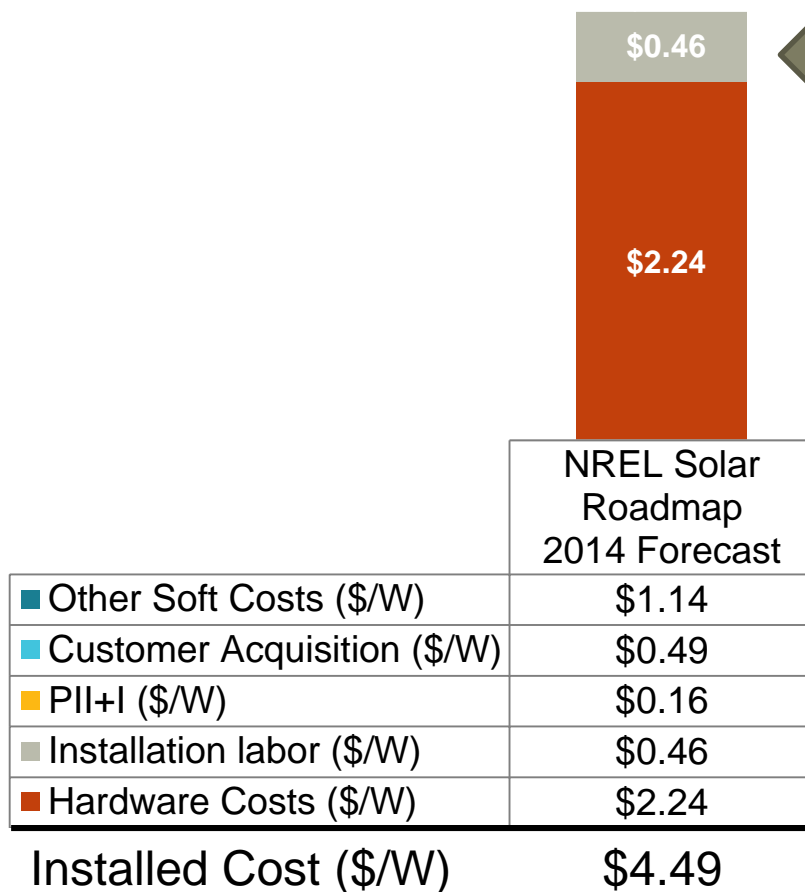
Solar Cost Categories



Hardware Costs

- Modules
- Inverter
- Racking
- Electrical Components

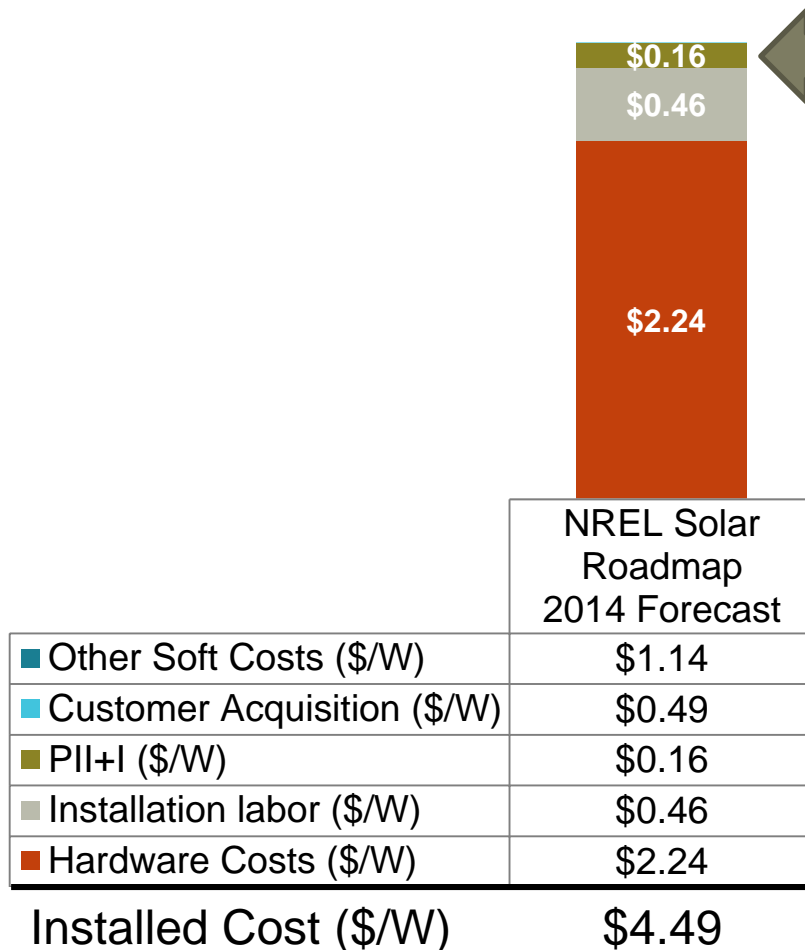
Solar Cost Categories



Installation Labor

- Licensed electrical and non-electrical installation labor hours

Solar Cost Categories



Permitting, Inspection, Interconnection & Incentive (PII+I)

- Preparing install packet
- Submitting packet to utility, ODOE, Energy Trust, and permitting agency
- Meeting inspector, utility technician or solar program verifier

Solar Cost Categories



Customer Acquisition

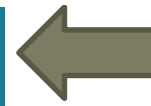
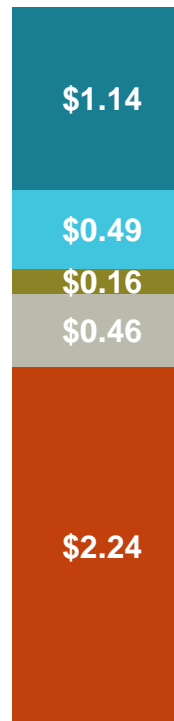
- Marketing & Advertising
- Lead generation
- Sales Calls
- Bid Preparation
- Contract Negotiation
- System Design

NREL Solar
Roadmap
2014 Forecast

■ Other Soft Costs (\$/W)	\$1.14
■ Customer Acquisition (\$/W)	\$0.49
■ PII+I (\$/W)	\$0.16
■ Installation labor (\$/W)	\$0.46
■ Hardware Costs (\$/W)	\$2.24

Installed Cost (\$/W) \$4.49

Solar Cost Categories



'Other' Soft Costs

- Installer Profit
- Installer Overhead
- Transaction Costs
- Supply Chain Costs
- Sales Tax

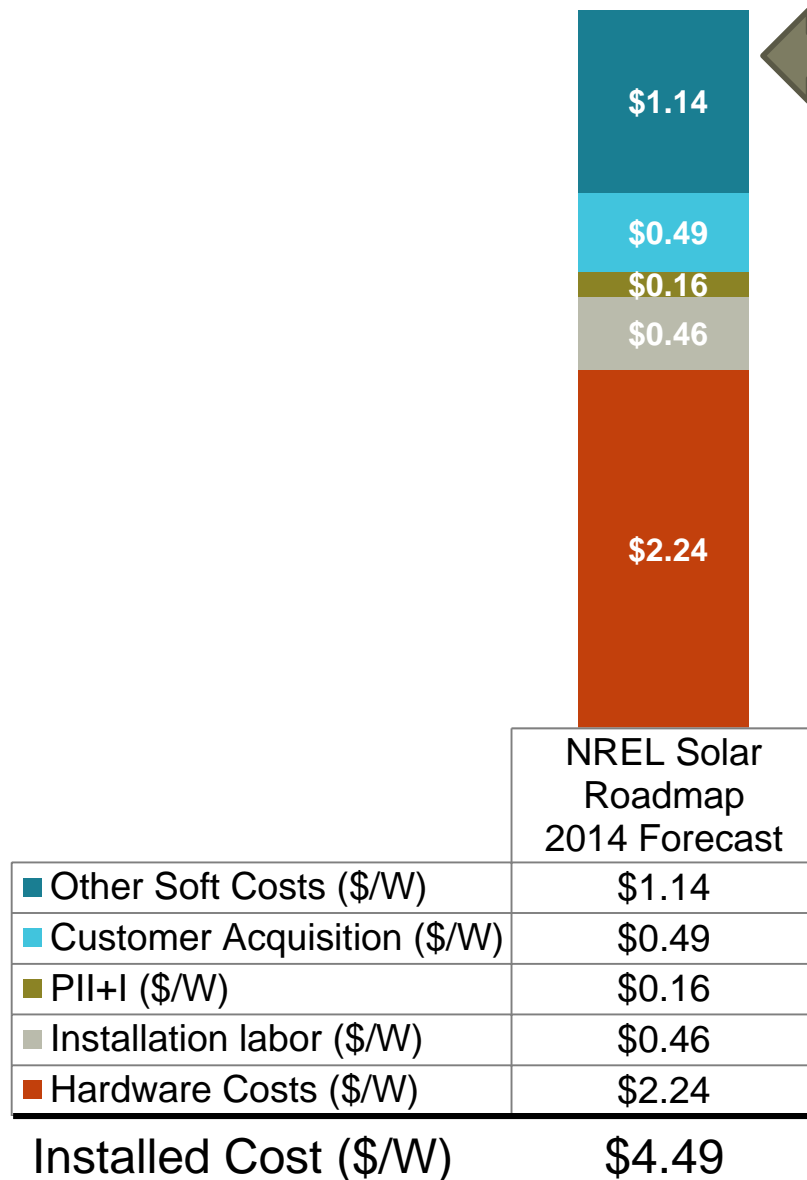
NREL Solar
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Installed Cost (\$/W)

\$4.49

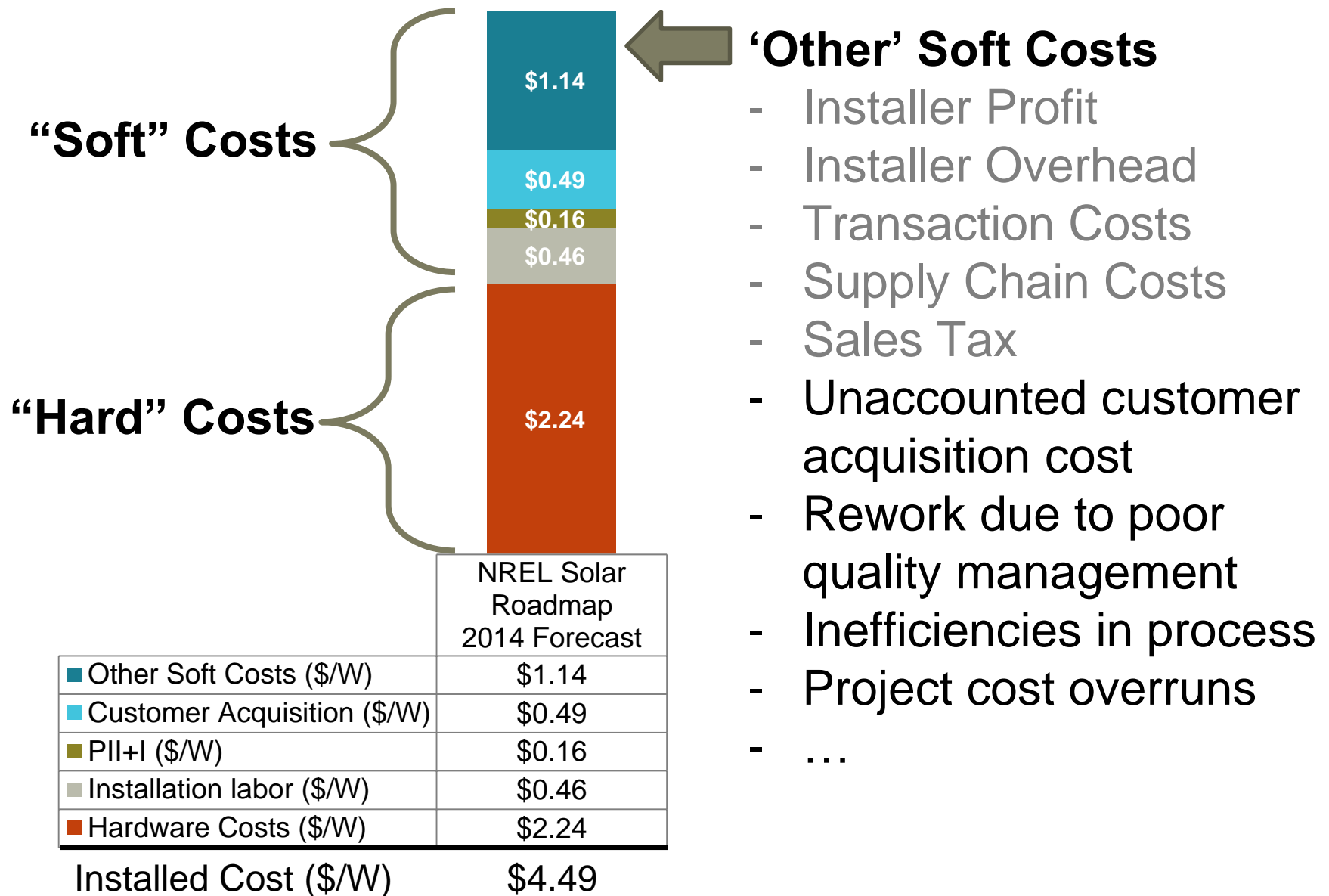
Solar Cost Categories



‘Other’ Soft Costs

- Installer Profit
- Installer Overhead
- Transaction Costs
- Supply Chain Costs
- Sales Tax
- Unaccounted customer acquisition cost
- Rework due to poor quality management
- Inefficiencies in process
- Project cost overruns
- ...

Solar Cost Categories

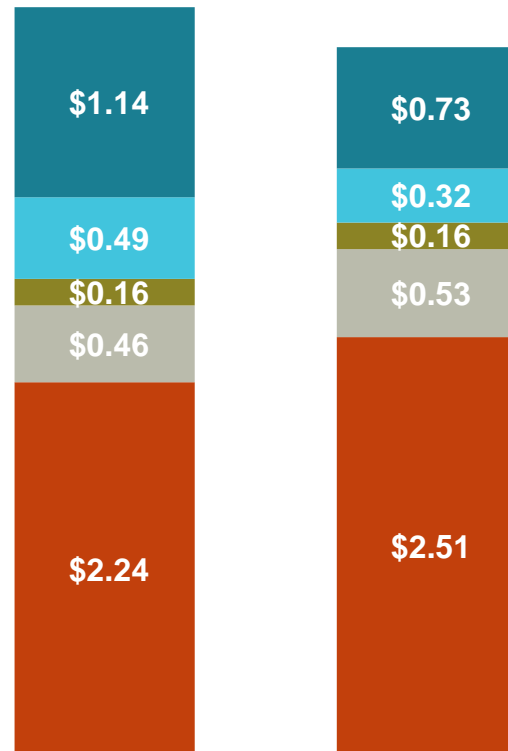


Oregon Solar Soft Costs Survey

- Modelled after NREL installer surveys
- Surveyed period - Q1 & Q2 2014
- 15 Trade Ally contractors responded
- 566 Installations over 26 Oregon counties
- Average survey completion time = 1 hour
- Support provided by Green Energy Institute, ODOE, and NREL throughout the process

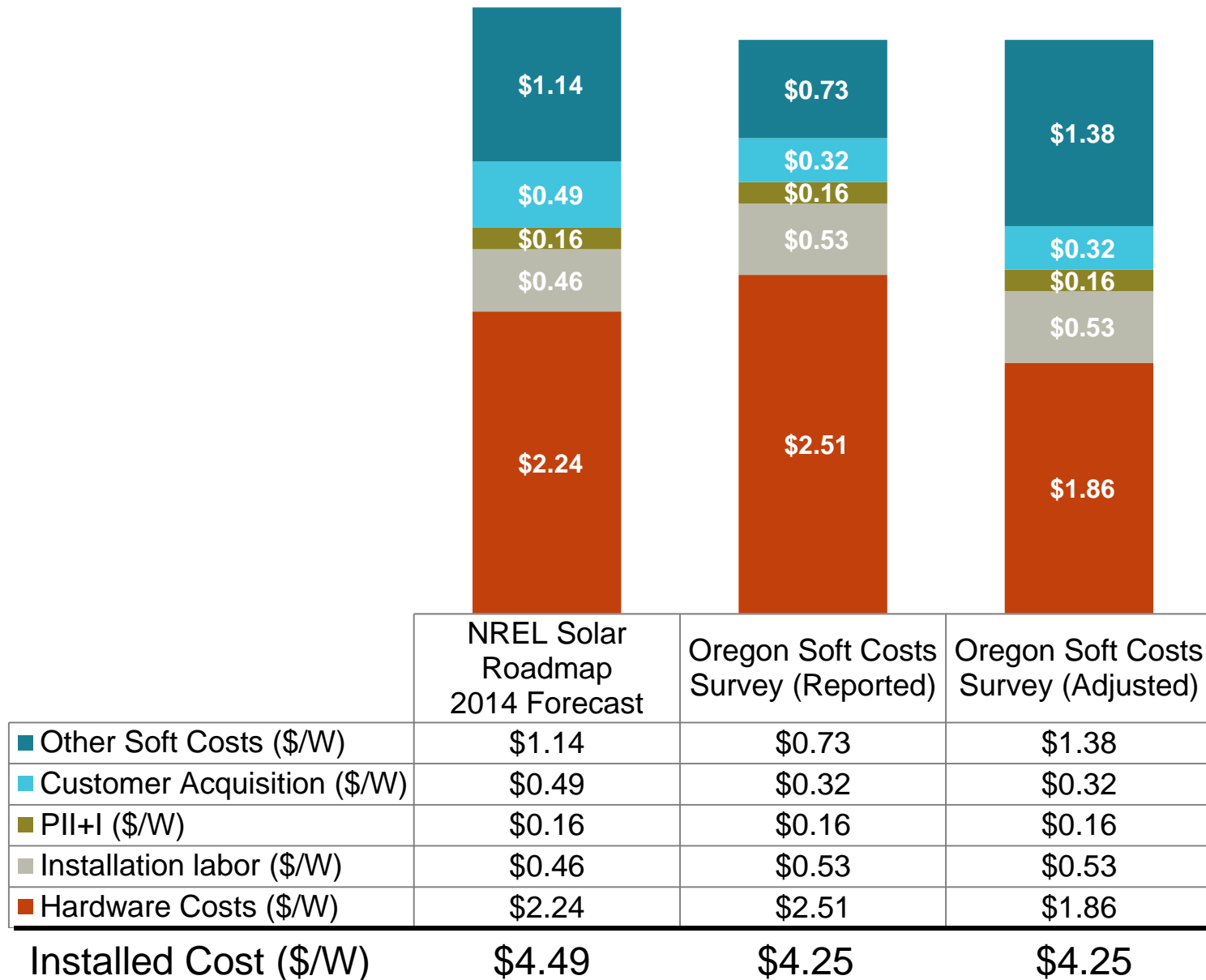


Survey data as reported



	NREL Solar Roadmap 2014 Forecast	Oregon Soft Costs Survey (Reported)
■ Other Soft Costs (\$/W)	\$1.14	\$0.73
■ Customer Acquisition (\$/W)	\$0.49	\$0.32
■ PII+I (\$/W)	\$0.16	\$0.16
■ Installation labor (\$/W)	\$0.46	\$0.53
■ Hardware Costs (\$/W)	\$2.24	\$2.51
Installed Cost (\$/W)	\$4.49	\$4.25

Survey data once adjusted



Key Takeaways

1. Oregon PII+I is in line with NREL forecast
2. Customer acquisition is the next largest defined category with realizable cost reduction opportunities
3. “Other” soft costs are not well understood or well defined
4. Individual solar cost categories may not be the best metric with which to gauge success



Next Steps

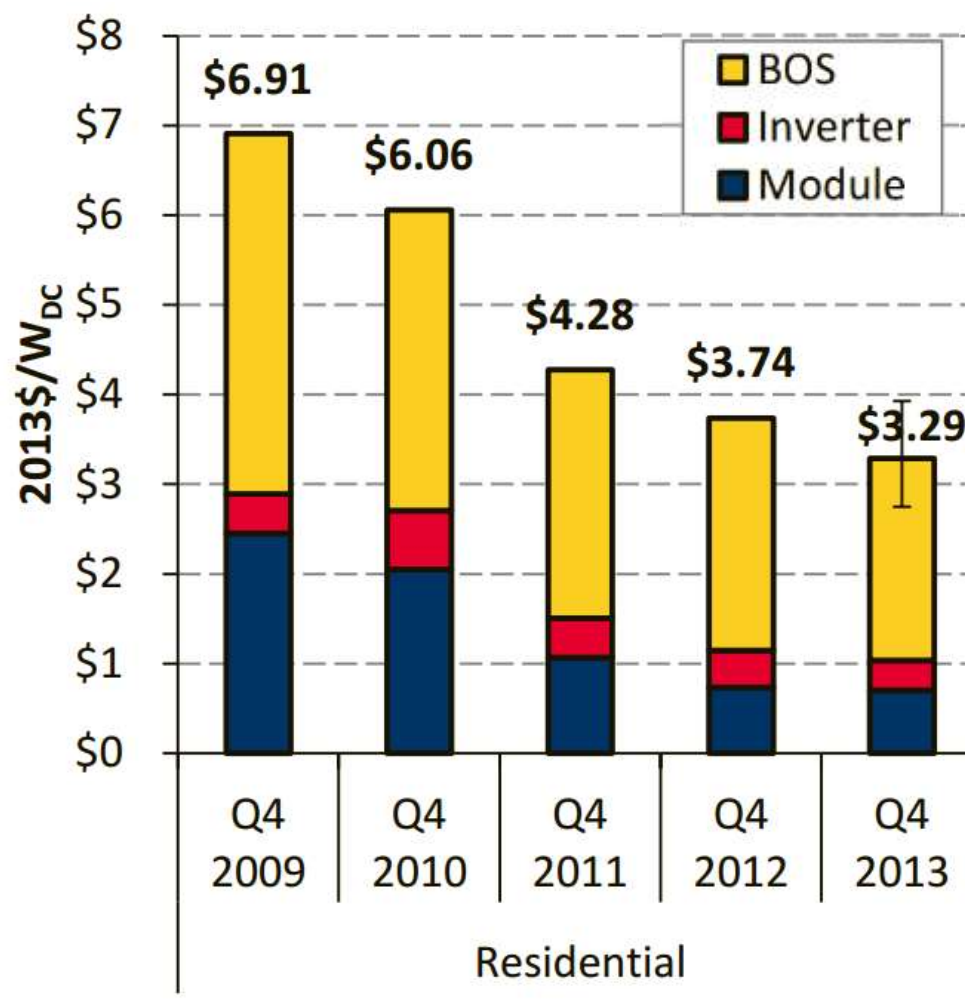
1. Continue working to decrease soft costs
2. Finalize analysis and publish survey report
3. Work with Green Energy Institute to compare Oregon solar market to other states
4. Advertise RFP for an Oregon specific Solar Soft Cost Roadmap





Questions?

Bottom-up Modeled System Price



- Since Q4 2009 modeled system prices have fallen between 16%-19% per year. (Largely due to module price reduction)
- Modeled PV system prices quoted in Q4 2013 and expected to be installed in 2014.