

Distributed (Solar) Generation

Effect on Utility Costs and Revenues &
Impact of Revenue Recovery on Customers

Northwest Energy Systems Symposium

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The Presentation



There are a variety of distributed generation technologies.

Today, we will consider the effects of:

1. Solar generation on utility costs & revenues; and
2. Alternative revenue recovery mechanisms on certain groups of utility rate payers

The Analysis

Distributed Solar Effects

Capacity Costs

- **Avoided/Delayed generation plant**
- **Avoided/Delayed T&D**

Variable Costs

- **Avoided fuel**
- **Avoided plant O&M**
- Avoided T&D losses
- Added integration
- Avoided carbon emissions

Energy Benefits

- **Wholesale Sales**

Caveats: While I work at Tacoma Power and the data used in this presentation comes from Tacoma Power...

1. The interpretations of that data are mine and mine alone;
2. The effects of DG are utility dependent

Avoided Capacity:

Effects are Utility Dependent

Distributed Solar Effects

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Energy Benefits

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System capacity – generation, transmission and distribution – is sized to meet peak load

Peak Utility Load

Year	Date	Time	Sunrise/Set	Load
2006	28-Nov	17:42	16:21	967
2007	12-Jan	9:28	7:44	967
2008	15-Dec	18:16	16:18	1034
2009	9-Dec	7:26	7:46	1065
2010	23-Nov	18:18	16:25	998
2011	3-Jan	7:28	7:58	944
2012	19-Jan	17:38	16:50	948
2013	9-Dec	7:30	7:46	1003
2014	6-Feb	7:17	7:29	1026
2015	31-Dec	9:35	7:51	888

Avoided Fuel, Plant O&M

Effects are Utility Dependent

Distributed Solar Effects

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Energy Benefits

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Owned and Contracted Resources		
Facility	Energy Production (aMW)	
(Nameplate MW)	Average	Critical
Utility Owned Projects		
Mayfield (162)	83.2	47.1
Mossyrock (300)	127.5	73.2
Alder (50)	27.5	15.2
La Grande (64)	41.1	24.6
Cushman No. 1 (43)	14.3	8.2
Cushman No. 2 (81)	19.4	11.0
Wynoochee (13)	3.8	3.6
Hood St. (0.8)	0.3	0.4
Contracts		
BPA Contract	460.0	408.4
CBH	27.5	25.7
Priest Rapids	2.5	2.0
Total	807.1	619.6

Wholesale Energy Benefits

Effects are Utility Dependent

Distributed Solar Effects

Capacity Costs

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- Avoided/Delayed T&D

Variable Costs

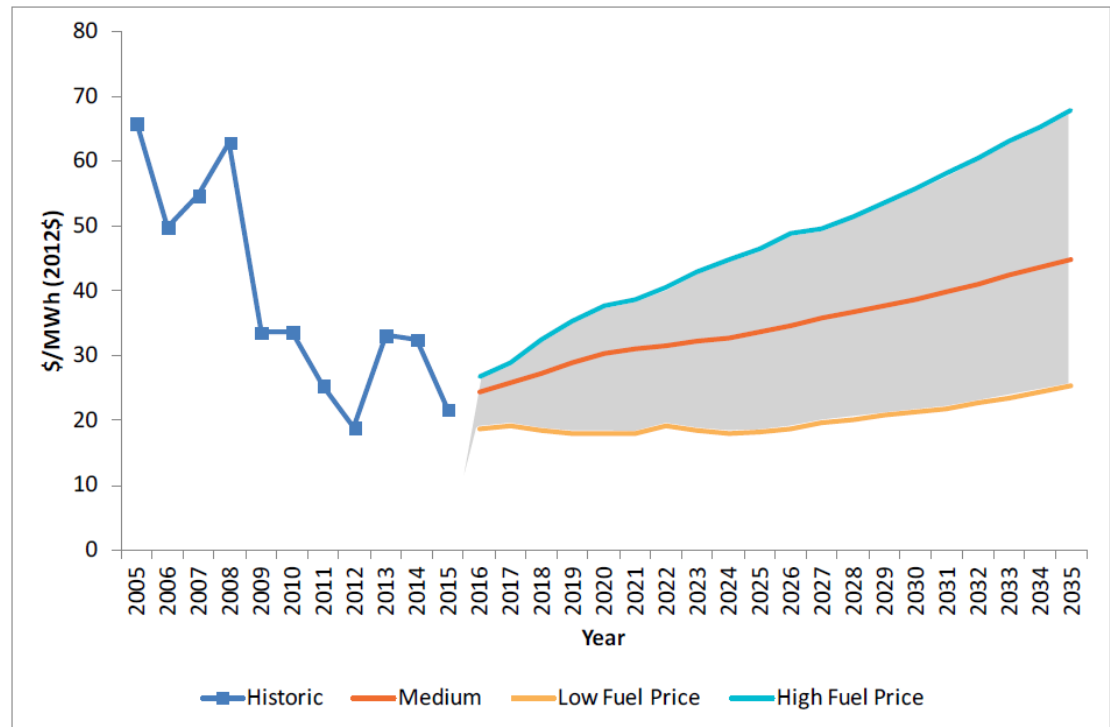
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Energy Benefits

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NWPCC – 7th Power Plan

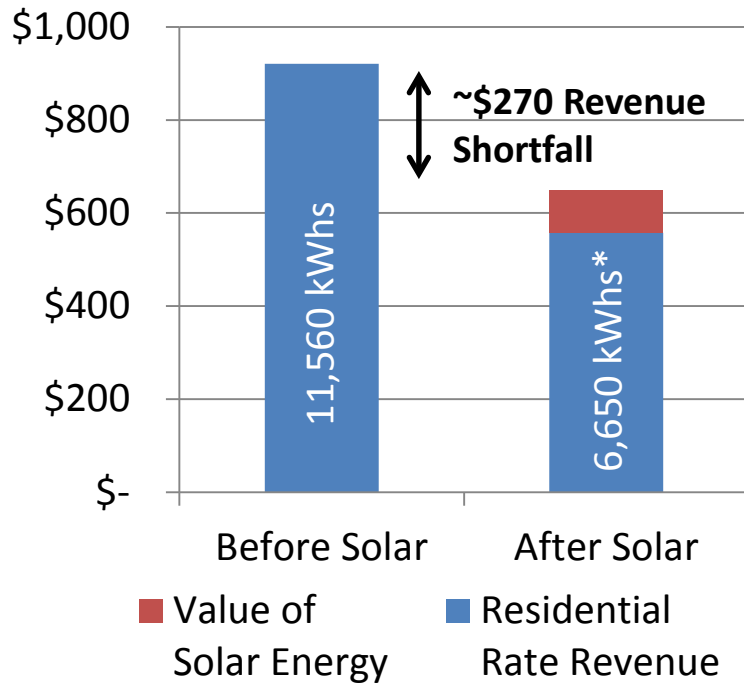
Historic and Forecast Annual Wholesale Power Prices



Financial Implications of DG Solar

Effects are Utility Dependent

Annual Bill Revenue
Residential DG Solar Customer



*With 4kW (14% CF) Solar System producing 4,910 kWhs

In Tacoma, median value* of	
All Residences	\$149,400
Residences with DG Solar	\$237,500

*As of Jan 2015

Illustrative Example - Effect of Alternative Rate Designs

The effects of DG depend on a utility's specific characteristics

Assumes: 10% of Single Family Home Customers install a 4kW DG Solar System
Retail rates adjusted to maintain constant utility revenues

	Current Tariff				
Volumetric Rate* (\$/kWh)	\$0.074				
	Annual Bill <Change in Annual Bill>				
Solar Customer (76%) (11,560 kWhs before) (6,650 kWhs after)					
Med. Home Value Cust. (50%) (11,280 kWhs)					
Low Home Value Cust. (10%) (13,530 kWhs)					

*Tacoma Power volumetric rate includes approximately equal energy and delivery components.

Only covers customers in single family homes – the effects will be different for customers in multi-family residences

Historical Vignette: The Rise of Wind

The NWPCC's 5th power plan (2005) projected the addition of “more than 1,100 MW of wind generation capacity between 2005 and 2014”

That estimate was surpassed in 2007 due to supportive policies in DC, WA, OR & CA

Recent regional discussions suggest that the NW may be at a “2005” moment for solar generation.

