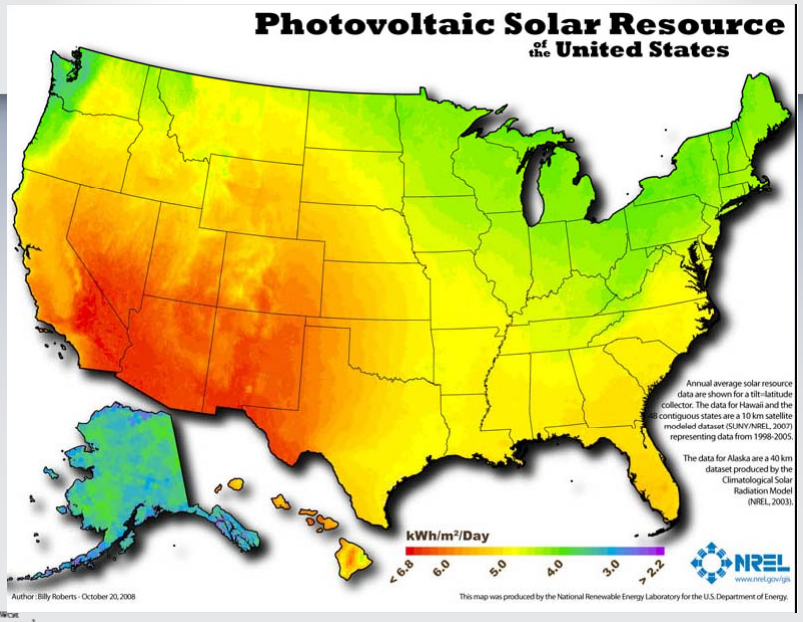
Solar Photovoltaic – Capacity Factors, Performance, and Policy

Generating Resources Advisory Committee

6/18/13

Northwest Power and Conservation Council



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Modeling Assumptions

NREL System Advisor Model (SAM), version 2013.1.15	
Technology:	Solar PV (PVWatts system model)
Location:	WECC Load Resource Areas (16)
Nameplate Capacity:	20 MWac (25,974 kWdc)
DC to AC Derate Factor*:	0.77
Configuration:	Single axis tracking, forced tilt at latitude
Cells:	Crystalline silicon
Performance Adjustment:	100% of annual output (no shading); 0.5% year-to-year decline
Plant life:	25 years
Weather data:	Typical/representative of long-term averages; not one full historical year, but a year comprised of 12 typical historical months (non-cumulative)

* Includes all component derate factors, i.e. inverter, transformer, system availability, etc.

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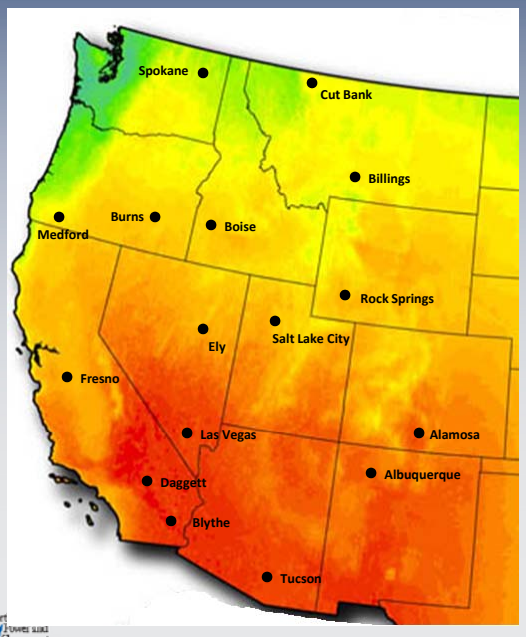

- Selected 16 cities to represent WECC (and 16 AURORA Load Resource Areas)
- For these purposes, we used representative cities from the US for BC and Alberta

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Annual Average Capacity Factors

Location	Load Resource Area	Capacity Factor (DC-rating basis)	Capacity Factor (AC rating basis)*
Burns, OR	E. WA/OR (1)	19.8%	25.7%
Fresno, CA	N. CA (2)	21.9%	28.4%
Daggett, CA	S. CA (3)	26.3%	34.2%
Spokane, WA	BC (4)	17.8%	23.1%
Boise, ID	S. ID (5)	20.6%	26.8%
Billings, MT	MT (6)	19.9%	25.9%
Rock Springs, WY	WY (7)	22.9%	29.7%
Alamosa, CO	CO (8)	26.0%	33.7%
Albuquerque, NM	NM (9)	25.1%	32.6%
Tucson, AZ	AZ (10)	25.2%	32.7%
Salt Lake City, UT	UT (11)	20.8%	27.0%
Ely, NV	N. NV (12)	24.3%	31.6%
Cut Bank, MT	AB (13)	20.3%	26.3%
Blythe, CA	Baja (14)	24.4%	31.7%
Las Vegas, NV	S. NV (15)	25.2%	32.7%
Medford, OR	W. WA/OR	18.7%	34.3%

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* AC-DC derate = 0.77

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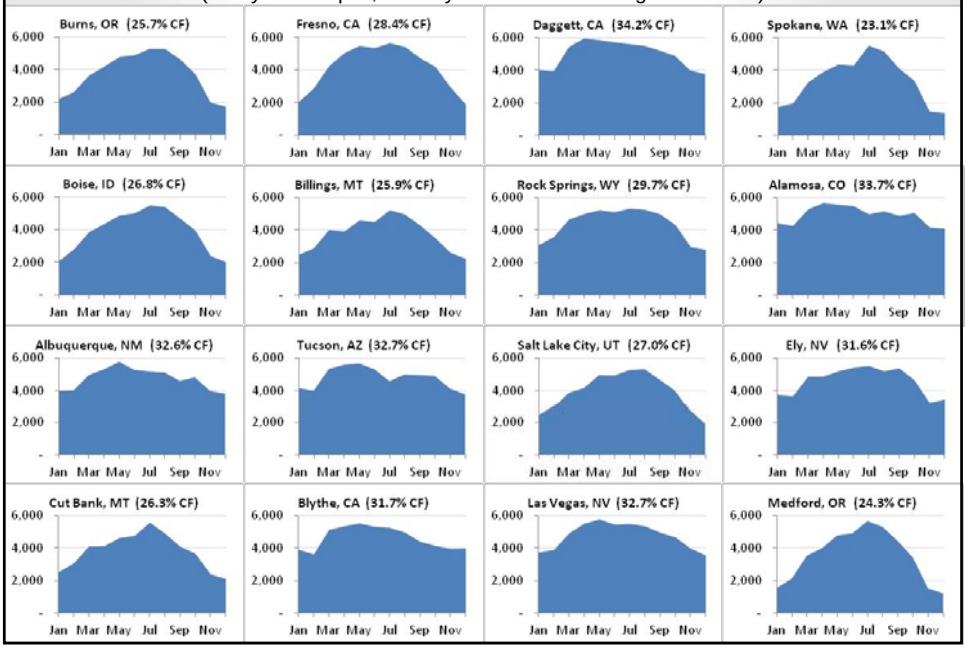
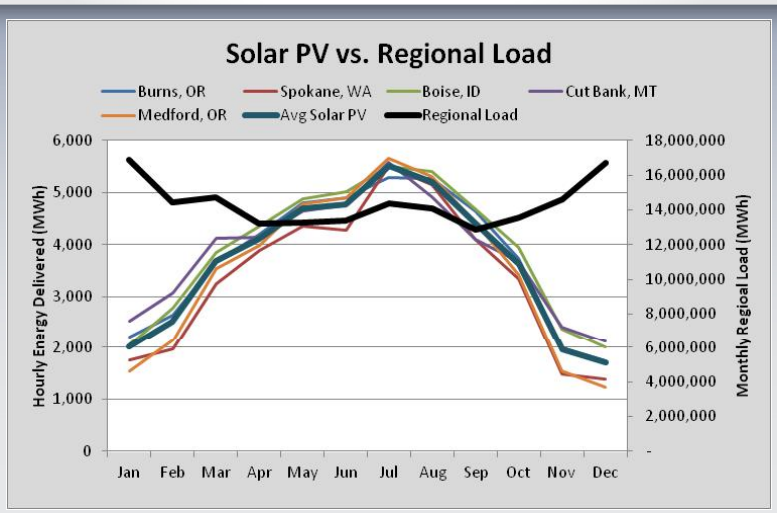
Monthly Annual Energy (MWh)

(First year output, each year thereafter degrades 0.5%)



Shape of PNW Solar PV Not Quite Congruent to Average Regional Load



* Regional load is an average of 1995-2009 actual loads

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Improved Modeling of Solar

- Sixth Power Plan
  - AURORAXMP – Selected the second week of each month as representative for the full month (time series weekly)
  - Analyzed 6 locations, modeled 2 in AURORA
- Seventh Power Plan
  - AURORAXMP – Use full 8760 hourly time series (time series annual)
    - Consistent with how we currently model wind
  - Analyze and model 16 locations – one for each AURORA load resource area

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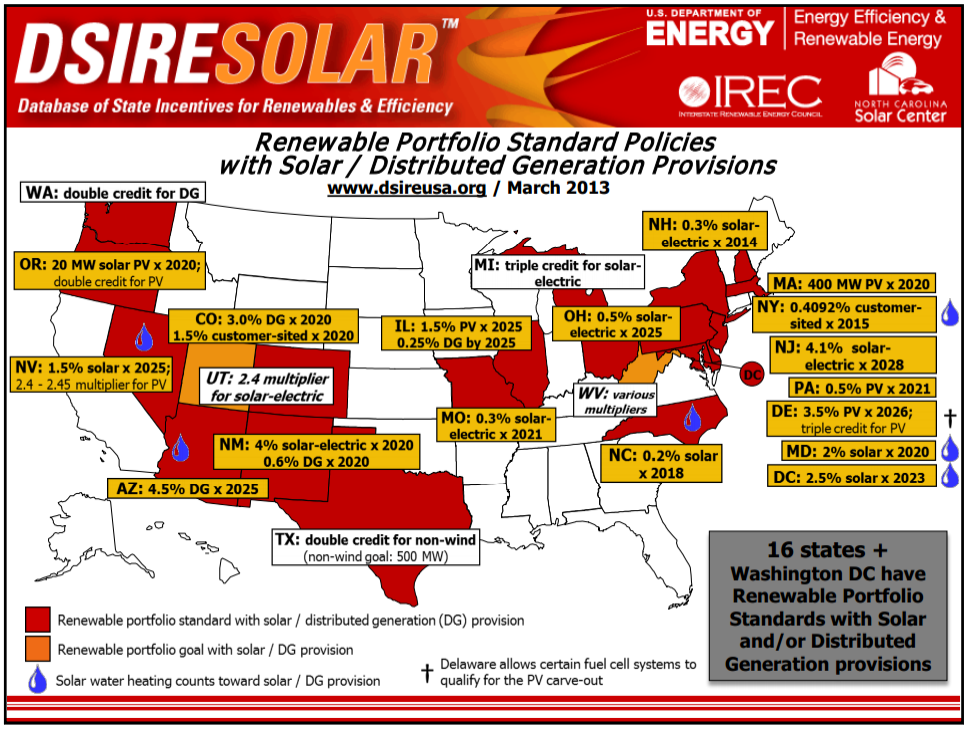

Solar Investment Tax Credit

- 30% investment tax credit for commercial and residential solar energy systems
- Under current law, ITC to remain in effect until end of 2016 at 30%; Post-2016, credit drops to 10% (for solar)
- Provides market certainty → increasing deployment and efficiency and lowering costs of solar energy

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Solar PV in the PNW (Utility Side)

- **9.2 MW* MW installed** solar PV capacity
  - Bellevue Solar (1.7 MW)
  - Black Cap Solar (2.0 MW)
  - Outback Solar I (5.0 MW)
  - Wild Horse Solar (0.5 MW)
- **177 MW proposed**** capacity
  - Grand View Solar PV 1-4 (20 MW each)
  - Murphy Flats (20 MW)
  - Outback II and III (5 MW each)
  - Teanaway (75 MW)
  - Sunergy Boise Airport (10 MW)

* The Council does not include most projects under 2 MW in its project database
** Proposed projects include various stages of the licensing and approval projects. Does not necessarily mean that projects will be developed.

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