Technical Conference
Overview of How Solar is Valued for Avoided Costs
May 12, 2015

PacifiCorp

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High Level Overview and History

- Docket 12-035-100 established the method for calculating avoided costs for large solar QFs (Schedule 38 or “large” QFs are >3 MW).
- Order issued August 16, 2013.
- Order requires the use of the Partial Displacement Differential Revenue Requirement model (“PDDRR”) for determining avoided energy costs.
- Order requires the use of the “Proxy” method for determining avoided capacity costs.
- Order requires solar integration charge of $2.83/MWh for fixed and $2.18/MWh for tracking until PacifiCorp files a solar integration study.
- RECs are retained by the QF unless the QF and purchasing utility have agreed by negotiated contract to an alternate REC ownership structure.

How are Solar Avoided Costs Calculated

- The avoided energy cost is based on two GRID energy simulations that calculate the system value of adding a QF resource, taking into account its specific operating characteristics and point of delivery on the Company's system.
- GRID is an hourly production cost dispatch model that dispatches PacifiCorp resources to serve load obligation through the most economic means possible given the constraints of the Company's system.
- GRID is configured to calculate the change in costs between two production cost dispatch model runs.
- The avoided capacity cost is based on the Integrated Resource Plan ("IRP") cost of the next deferrable resource.

Avoided Energy Costs

- The GRID simulation consists of a base case and an avoided cost case where the QF has been added and the proxy resource has been partially displaced (partially removed).
- The QF resource is added with zero cost.
- The change in the revenue requirement is the avoided costs of the QF.
- The GRID simulation accurately reflects the difference in location, generation profile and timing between the QF resource and the partially displaced resource.

Key GRID Model Inputs

Calculated outside of GRID

- Hourly Data
  - Load Forecast
  - Market Prices
  - Short-Term standard product Purchases and Sales
- Non-Hourly Data
  - Contract Energy Price
  - Derate
  - Fuel Cost
  - Heat Rate Coefficient
  - Hydro Weekly Energy
  - Planned Outage

Attributes entered into GRID

- Thermal
  - Resource Characteristics
- Hydro
  - Resource Characteristics
- Non Standard Product, Intermediate-Term, and Long-Term Contracts
  - Contract Term
  - Take Limitations
  - Fixed Costs
- Transmission Capability
  - Firm Transfer Rights
  - Wheeling Charge

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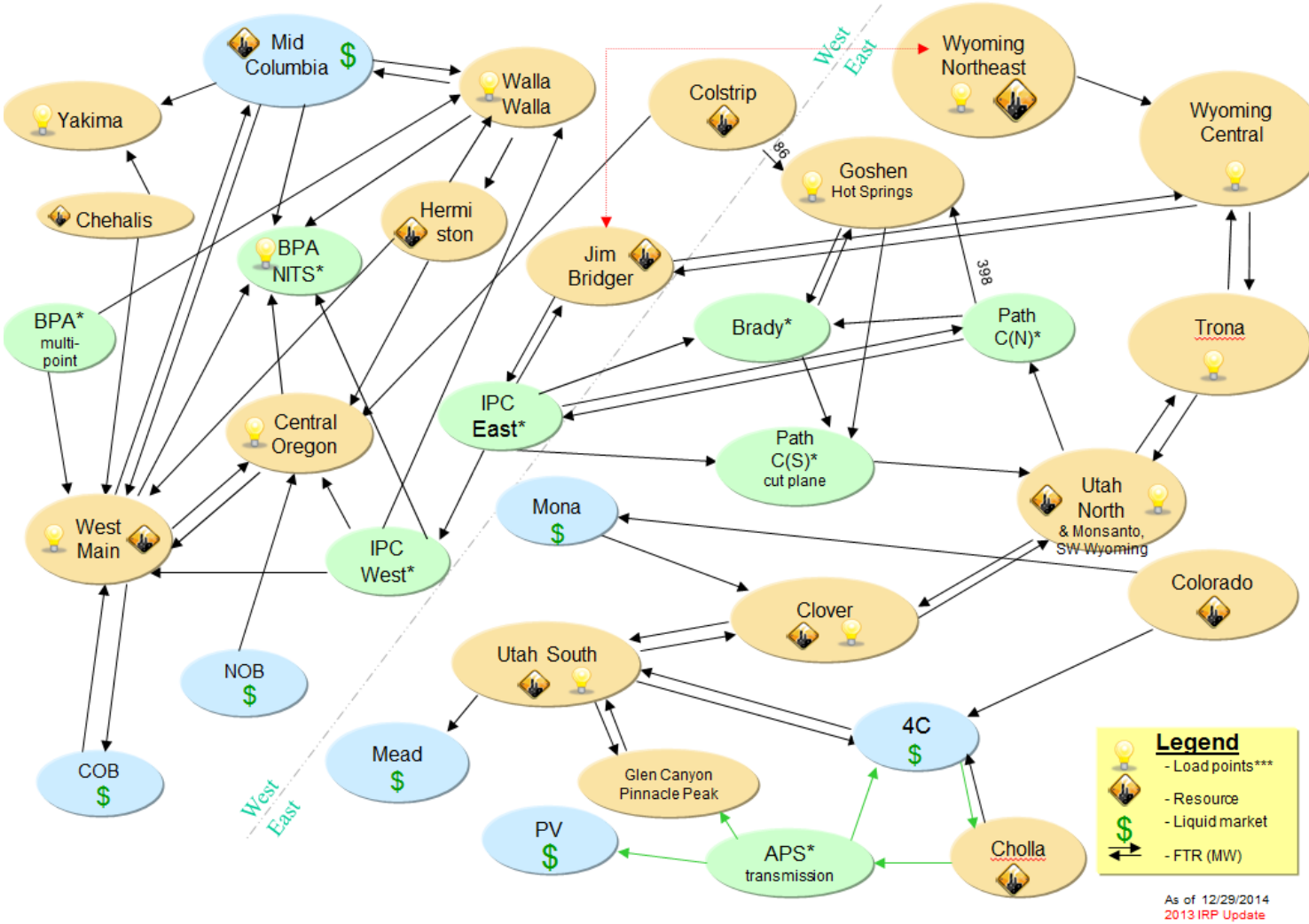
This data list is representative of the data series and attribute data utilized by GRID. It is not intended to be exhaustive.

GRID Transmission Topology



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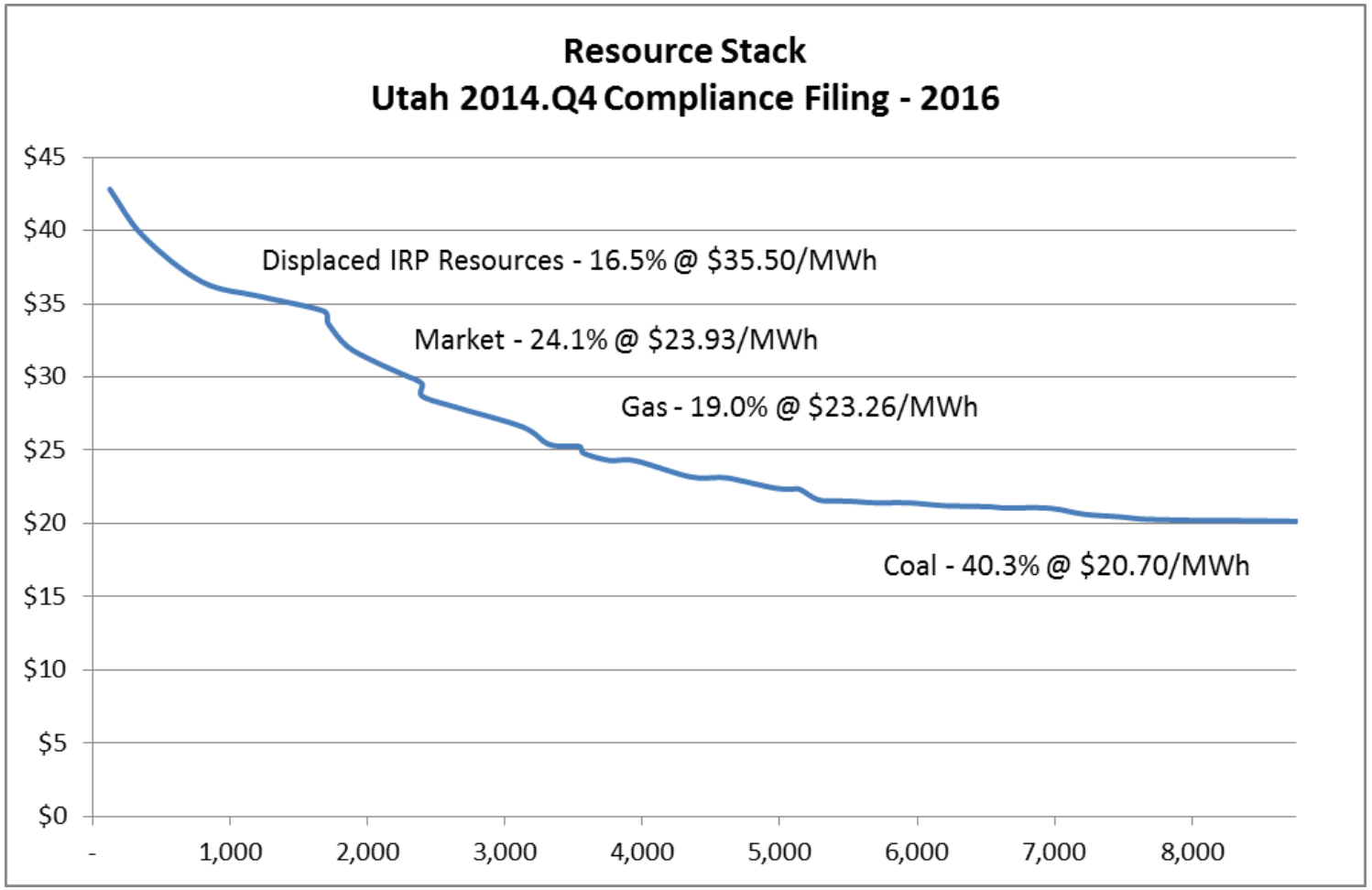
Resource Stack



Avoided Capacity Costs

- Avoided capacity costs are in addition to the avoided energy costs that are calculated with the GRID model.
- *"When PacifiCorp's IRP planned resources include a cost-effective renewable resource of the same type as the QF, avoided cost capacity payments under Schedule 38 shall be based on the capital costs of the next deferrable resource of the same type in PacifiCorp's IRP planned resources."*
- *"When PacifiCorp's IRP planned resources do not include a cost-effective renewable resource of the same type as the QF, avoided cost capacity payments under Schedule 38 shall be based on the capital costs of the next deferrable thermal resource in PacifiCorp's IRP planned resources."*

2015 IRP Preferred Portfolio

		Capacity (MW)													
	Resource	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
East	**Expansion Resources**														
	CCCT - DJohns - F 1x1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	CCCT - DJohns - J 1x1	-	-	-	-	-	-	-	-	-	-	-	-	-	423
	CCCT - Utah-N - F 2x1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DSM, Class 1, UT-DLC-RES	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DSM, Class 1 Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DSM, Class 2, ID	4	4	5	5	5	4	4	4	5	5	5	5	5	5
	DSM, Class 2, UT	69	78	84	86	92	81	84	90	91	93	75	76	80	80
	DSM, Class 2, WY	6	8	10	12	14	12	13	14	15	16	13	13	14	15
	DSM, Class 2 Total	79	90	99	102	111	97	101	108	110	114	92	94	99	99
	FOT Mona Q3	-	-	-	-	-	-	-	-	-	-	-	-	-	161
West	**Expansion Resources**														
	Oregon Solar Capacity Standard	-	7	-	-	-	-	-	-	-	-	-	-	-	-
	DSM, Class 1, OR-Curtail	-	-	-	-	-	-	-	-	10.6	-	-	10.6	-	-
	DSM, Class 1, OR-Irrigate	-	-	-	-	-	-	-	5.0	-	-	-	-	-	-
	DSM, Class 1 Total	-	-	-	-	-	-	-	5.0	10.6	-	-	10.6	-	-
	DSM, Class 2, CA	1	2	2	2	2	1	1	2	2	2	1	1	1	1
	DSM, Class 2, OR	44	39	36	33	29	27	25	25	23	23	21	22	22	22
	DSM, Class 2, WA	8	9	10	10	11	9	10	10	11	11	9	9	9	9
	DSM, Class 2 Total	54	49	47	44	42	38	36	36	36	35	31	32	32	32
	FOT COB Q3	-	62	29	-	60	104	-	-	-	-	-	-	-	268
	FOT MidColumbia Q3 - 2	227	375	375	370	375	375	269	291	261	254	271	292	335	375
	Total Annual Additions	860	1,084	1,050	1,016	1,088	1,113	906	941	917	903	893	928	965	1,859

The 2015 IRP was prepared using a 13% planning reserve margin. See 2015 IRP, page 81.

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2015 IRP: Avoided Capacity Costs

- Current capacity costs are the fixed costs of the next deferrable CCCT as defined by the 2015 IRP.
- The first deferrable resource in the 2015 IRP preferred portfolio is added in 2028, one year later when compared to PacifiCorp's 2013 IRP Update and four years later relative to the 2013 IRP preferred portfolio.
- The "amount" of the CCCT that is deferrable is determined after a review of other potential QFs that are in the pricing queue.
- Fixed costs include capital costs, fixed and variable O&M costs and fixed pipeline costs needed to deliver fuel to the plant.
- The partial displacement and thus the capacity payment reflect the capacity contribution of the QF resource.
- Capacity contribution percentages are applied for wind and solar QFs.

Capacity Contribution Percentages

- "Capacity contribution" represents the percentage of a generator's nameplate capacity PacifiCorp can reliably use to satisfy the system peak load requirement.
- *"When PacifiCorp's IRP planned resources do not include a cost-effective solar resource and pending PacifiCorp's filing of the results of the ELCC or CF study, PacifiCorp shall apply a 68 percent capacity contribution for Fixed Solar QFs and an 84 percent capacity contribution for Tracking Solar QFs for the purpose of determining Schedule 38 capacity payments."*
- *"PacifiCorp is directed to perform and file a study calculating capacity contribution for wind and solar resources for the Proxy/PDDRR method using either the ELCC method or CF method considering LOLP."*

Capacity Contribution Percentages

- PacifiCorp filed its capacity contribution study October 9, 2014.
- The study recommends values of 34.1% for fixed solar and 39.1% for tracking solar compared to interim values of 68% and 84% respectively.
- A hearing is scheduled for June 18-19, 2015.

Major Avoided Cost Drivers

- QF Potential Resource
  - Resource type – solar vs wind
  - Resource location
  - Resource generation profile
- Official Forward Price Curve
  - Gas prices
  - Market prices
  - Spark spread
- Retail Load
- Resource Stack
  - Avoidable resources
  - QF queue – signed and potential QFs

Current Solar Avoided Costs

- To provide an illustration of current solar avoided costs, the table below summarizes pricing that has been recently provided to prospective QFs.

Location	Size	Online Date	20 Year Levelized Price
Mona	80.0	06/01/2016	$34.52
Mona	80.0	06/01/2016	$34.22
Mona	80.0	06/01/2016	$32.71
Mona	80.0	06/01/2016	$33.03
Mona	80.0	06/01/2016	$31.64
Mona	80.0	06/01/2016	$31.29
Price	80.0	12/31/2015	$29.58
Cedar City	80.0	12/31/2015	$28.50

- Current pricing is influenced by the large pricing queue (i.e. number of QFs requesting pricing).
  - 43 prospective Utah QF projects
  - Total nameplate capacity of 2,394 MWs

Recently Executed Solar QF Contracts

- PacifiCorp executed 10 large (between 50 MW and 80 MW) solar QF contracts in the past approximate two years.
- The average price was approximately $53 per MWh for a 20 year levelized term.
- Projects are expected to come online by end of 2016.

Utah Schedule 37 Prices

- Commission approved Schedule No. 37 avoided cost methodology prescribed in Docket No. 94-2035-03, modified by Docket Nos. 03-035-T10 and 12-035-T10.
- Avoided cost are calculated in two periods: (1) the resource sufficiency period and (2) the resource deficiency period.
- During the resource sufficiency period, the avoided energy cost is based on two GRID energy simulations that calculate the system value of adding a QF resource.
- During the resource deficiency period, avoided costs are the all-in-cost of the next deferrable CCCT.