PACIFIC POWER
A DIVISION OF PACIFICORP

825 NE Multnomah, Suite 2000
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July 30, 2021

VIA ELECTRONIC FILING

Public Utility Commission of Oregon
201 High Street SE, Suite 100
Salem, OR 97301-3398

Attn: Filing Center

RE: UM 2059 – Final Shortlist for the 2020 All Source Request for Proposals and Sensitivity Analysis

PacifiCorp, d/b/a Pacific Power (PacifiCorp) submits the attached highly confidential and redacted presentation covering the Final Shortlist (FSL) for the 2020 All-source RFP and sensitivity analyses as revised and provided to the Independent Evaluator on July 20, 2021. The presentation is an update to the original FSL presentation provided June 8, 2021. Highly confidential information is provided subject to modified protective order 21-202.

Please direct informal inquiries regarding this filing to Cathie Allen, Regulatory Affairs Manager, at (503) 813-5934.

Sincerely,

Shelley McCoy
Director, Regulation

CERTIFICATE OF SERVICE

I certify that I served a true and correct copy of PacifiCorp's **Final Shortlist for the 2020 All Source Request for Proposals and Sensitivity Analysis Presentation** on the parties listed below via electronic mail and/or or overnight delivery in compliance with OAR 860-001-0180.

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UM 2059

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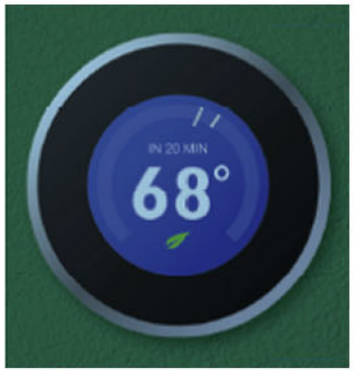
Dated this 30th day of July, 2021.

Katie Savarin
Coordinator, Regulatory Operations

2020 All Source RFP
Final Short List
Revised July 20, 2021



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RFP Modeling Revisions

Issues with the previously filed final shortlist (FSL) analysis were identified as a result of a verification process initiated after developing responses to questions ask by the independent evaluators:

- Net delivery costs and indicative generation values were revised to reflect corrections in annual generation and net capacity factors:
  - Embedded text (rather than values) in provided generation profiles resulted in the omission of hours with no generation in some bidders' 8760 profiles.
  - Solar bids that provided net solar and storage 8760 profiles, instead of the requested solar output.
- Failed uploads to the model resulted in use of proxy resource profiles, rather than bid profiles in some instances.
- The modeled location of one bid was corrected from Utah North to Wyoming East.
- PacifiCorp repeated and expanded its final shortlist analysis after incorporating and verifying these changes.

Key Findings

- FSL bid selections remain unchanged.
- Modeling changes reduce the value of resources in eastern Wyoming; however, the eastern Wyoming bids continue to provide customer benefits.
- Bid selections by price-policy show minimal changes.
  - The low gas, no CO_2 bid-portfolio no longer includes Steel Solar
- After revisions, the LN Bid portfolio appears to be low cost under the base price-policy scenario, but the cost trend is notably unfavorable at end of study horizon.
- SNS bids with proxy resources selected under an LN price-policy scenario (the SNS Bid-LN portfolio) results in lower costs than the LN Bid portfolio when analyzed under the base price-policy scenario (MM).

Introduction

- PacifiCorp issued the 2020AS RFP to the market on July 7, 2020; bidder responses were returned to PacifiCorp for evaluation on August 10, 2020
  - The market responded with over 28,000 MW of conforming bids
  - An additional 12,500 MW of bids were submitted that did not conform with minimum requirements set forth in the 2020 AS RFP
- In October 2020, the initial shortlist was identified, which included 5,453 MW of renewable resource capacity—2,974 MW of solar or solar with storage (1,130 MW of battery storage), 2,479 MW of wind, and 200 MW of standalone battery capacity
- The transition interconnection cluster study process was subsequently initiated, and in April 2021, PacifiCorp began to evaluate best-and-final pricing updates from bidders
- Consistent with the bid evaluation and selection methodology set forth in the 2020AS RFP, PacifiCorp has evaluated a range of potential bid portfolios, reflecting results from the transitional interconnection cluster study process, to select the final shortlist, which includes:
  - 1,792 MW of new wind resources (590 MW as build-transfer agreements and 1,202 MW as power-purchase agreements)
  - 1,306 MW of solar capacity (all power-purchase agreements)
    - After modeling was well underway, Steel Solar I & II withdrew its combined 147 MW Utah solar and storage bids. These bids remained in the modeling effort and were removed from the Final Shortlist total after modeling was complete and not replaced.
  - 697 MW of battery energy storage system capacity—497 MW paired with solar bids (after Steel Solar I & II were removed) and 200 MW as standalone battery storage (power-purchase agreement)
- When using base case market price and CO_2 price assumptions, present-value net benefits of the final shortlist portfolio are $571 million over the best performing portfolio without bids

Resource Need

Calendar Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
System										
Total Resources	10,671	10,646	10,685	10,391	10,334	9,997	9,943	9,043	8,538	8,313
Obligation	9,899	9,985	10,064	10,103	10,162	10,012	10,011	10,044	10,069	10,112
Reserves	1,310	1,321	1,331	1,336	1,344	1,325	1,324	1,329	1,332	1,338
Obligation + Reserves	11,209	11,306	11,395	11,439	11,506	11,336	11,335	11,372	11,401	11,449
System Position	(538)	(660)	(711)	(1,048)	(1,172)	(1,339)	(1,392)	(2,329)	(2,863)	(3,136)

- Final shortlist bids will help PacifiCorp fill a resource need.
- After accounting for a higher load forecast and recently signed contracts, the company's unmet capacity position is 1,172 MW in 2025—the first summer in which all resources from the 2020AS RFP will be online.
- The final shortlist has an estimated capacity contribution value of 998 MW.
- While the company's 2019 IRP assumed that over 1,400 MW of market purchases could be used to meet its requirements, the capacity position of the western interconnect is much tighter than in past years, with resource adequacy an ongoing concern in California and a growing concern elsewhere.
- The 2021 IRP assumes 500 MW market purchases available in summer and 1,000 MW in winter.

Summary of Bids Evaluated

- 27 projects from 16 bidders can achieve a commercial operation date before the end of 2024 based on signed interconnection agreement or study results and were considered for selection to the final shortlist.

Project Count	East					East Total	West			West Total	Grand Total
Type	East WY	SW WY	Goshen ID	UT North	UT South		Central OR	South OR	Yakima WA		
BESS				1		1					1
Solar				1	1	2	1	1	2	4	6
Solar + BESS				2	6	8		2	1	3	11
Wind	7	1	1			9					9
Grand Total	**7**	**1**	**1**	**4**	**7**	**20**	**1**	**3**	**3**	**7**	**27**

Capacity (MW)	East					East Total	West			West Total	Grand Total
Type	East WY	SW WY	Goshen ID	UT North	UT South		Central OR	South OR	Yakima WA		
BESS				200		200					200
Solar				42	95	137	103	40	340	483	620
Solar + BESS				192	956	1,148		210	94	304	1,452
Wind	1,744	122	151			2,017					2,017
Grand Total	**1,744**	**122**	**151**	**434**	**1,051**	**3,501**	**103**	**250**	**434**	**787**	**4,288**

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2020AS RFP Final Shortlist

Project Name	Bidder	Type	Location	COD	Term/Life (Years)	Resource Capacity (MW)	Battery Capacity (MW)	Battery Duration (Hours)	Net Capacity Factor (%)	Bid PPA Price ($/MWh)	Bid PPA Price (Fixed / Esc)	Battery Price Applied to Battery Capacity ($/kW-mo)
Anticline	NextEra	Wind	WY	12/31/2024	30	100.5	n/a	n/a				
Cedar Springs IV	NextEra	Wind	WY	12/31/2024	30	350.4	n/a	n/a				
Rock Creek I*	Invenergy	Wind	WY	12/31/2024	30	190	n/a	n/a				
Rock Creek II*	Invenergy	Wind	WY	12/31/2024	30	400	n/a	n/a				
Boswell Springs	Innergex	Wind	WY	10/1/2024	30	320	n/a	n/a				
Two Rivers	Blue Earth Renewables LLC & Clearway Renew LLC	Wind	WY	12/31/2024	25	280	n/a	n/a				
Cedar Creek	rPlus Energies	Wind	ID	12/31/2022	25	151	n/a	n/a				
~~Steel Solar I & II~~	~~DESRI~~	~~PVS~~	~~UT~~	~~12/31/2023~~	~~25~~	~~147~~	~~37.5~~	~~2~~				
Rocket Solar II	DESRI	PVS	UT	12/31/2023	25	45	12.5	4				
Fremont	Longroad Energy	PVS	UT	11/30/2023	20	99	49.5	4				
Rush Lake	Longroad Energy	PVS	UT	11/30/2023	20	99	49.5	4				
Parowan	First Solar	PVS	UT	12/31/2024	25	58	58	4				
Hornshadow I	enyo energy	PVS	UT	12/31/2023	30	100	25	2				
Hornshadow II	enyo energy	PVS	UT	12/31/2023	30	200	50	2				
Green River I & II	rPlus Energies	PVS	UT	12/31/2024	20	400	200	2				
Hamaker	ecoplexus	PVS	OR	12/31/2023	30	50	12.5	4				
Hayden 2	ecoplexus	PVS	OR	12/31/2023	30	160	40	4				
Dominguez I	Able Grid	BESS	UT	7/1/2024	15	n/a	200	4				
Glen Canyon	sPower	Solar	UT	12/31/2023	30	95	n/a	n/a				

*BTA bids (additional price information in the next slide). All other bids are PPAs.

- Total wind and solar capacity = 3,098 MW
  - Wind = 1,792 MW
  - Solar = 1,306 MW (Note: this is without Steel Solar, which is in the revised analysis but has since been withdrawn by the developer.)
- Total battery energy storage system capacity (BESS) = 697 MW
  - Paired with photovoltaic (PVS) = 497 MW (excluding Steel Solar I & II, which withdrew from the RFP after being notified it was selected to the final shortlist)
  - Standalone BESS = 200 MW

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Final Shortlist BTA Pricing

Nominal $

Project Name	Bidder	Wind Bid with Direct-Assigned Interconnection Capital Cost	Wind Owner's Capital Cost & AFUDC	In-Service Interconnection Network Upgrade Capital Cost	Total In-Service Capital Cost
Rock Creek I	Invenergy	[redacted]			
Rock Creek II	Invenergy				

- In-service capital costs total $[redacted]m ($[redacted]m for bid capital, $[redacted]m for capitalized owner's costs, AFUDC, and property tax during construction, and [redacted]m for capital associated with interconnection network upgrades).

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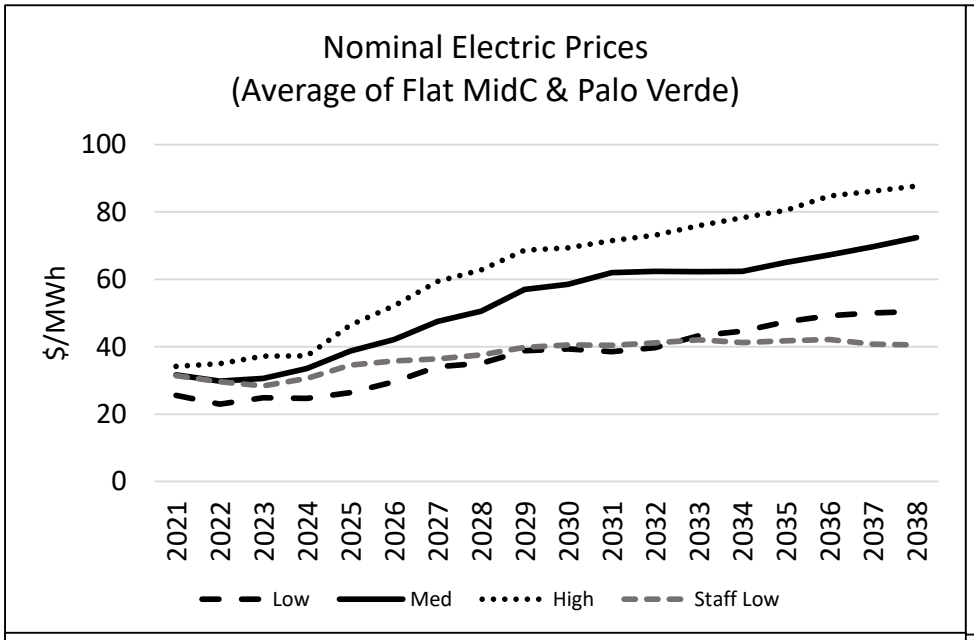
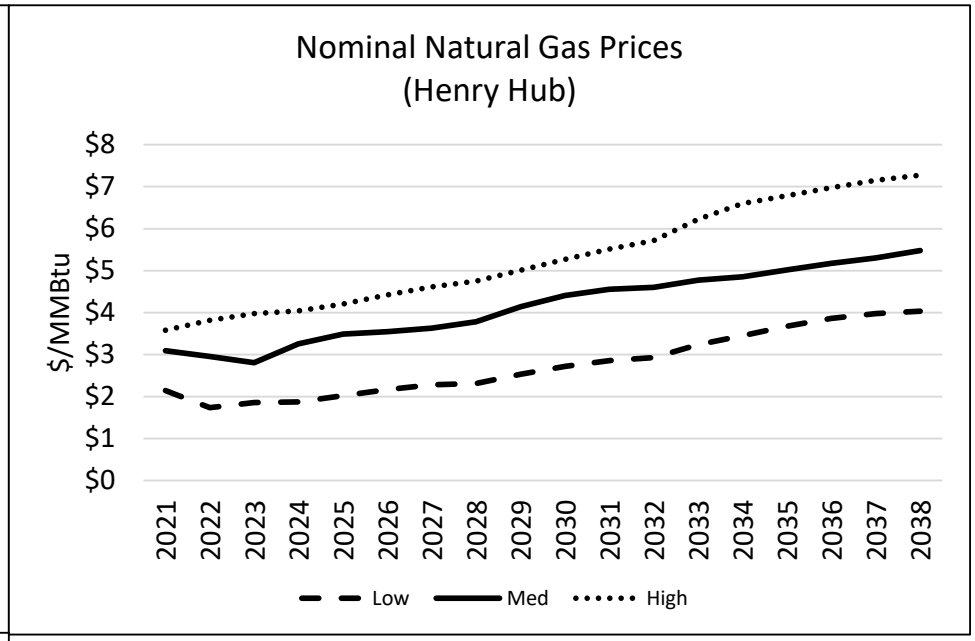
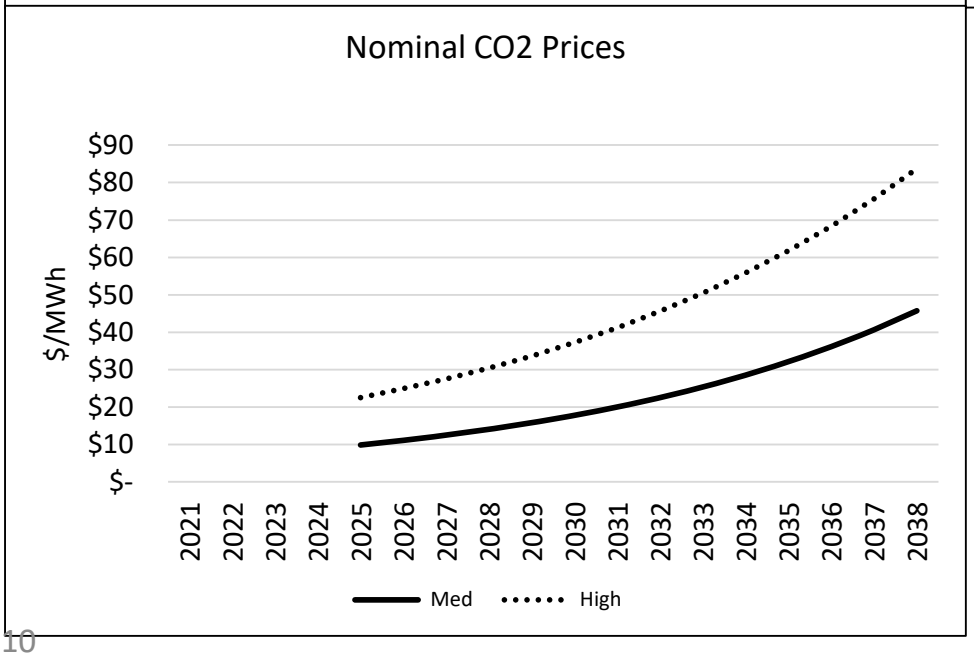
Portfolio-Selection Scenarios

- Portfolios were selected under a range of price-policy scenarios, plus others recommended by staff of the Public Utility Commission of Oregon:
  - LN: low gas/market price, no carbon price
  - MM: medium gas/market price, medium carbon price
  - HH: high gas/market price, high carbon price
  - SL: Staff's low market price sensitivity that assumes high renewable penetration in the WECC, medium gas price, and medium carbon price
  - SNS (MM): medium gas/market price, medium carbon price, but no wholesale market sales allowed
  - SNST (MM): the same as SNS (MM), plus PTC/ITC assumed extended through 2030
  - SNS Bid (LN): bid selections from the SNS (MM) case with proxy resources selected under LN price-policy assumptions (note, this case was not in the initial FSL evaluation, but added in this update to further analyze drivers to system cost differences between the SNS and LN bid portfolios)
- Portfolios with no RFP bids were also prepared—these scenarios are compared to the final shortlist bid portfolio to calculate net customer benefits.

Price-Policy Assumptions







- The assumptions for electricity prices, gas prices, and CO_2 prices summarized here were applied to the portfolio-selection scenarios summarized on the previous slide.

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Bid Selections by Scenario

Location	Company	Project / Facility Name	Resource type	Contract Type	Generating Asset (MW)	BESS Capacity (MW)	BESS Duration (Hours)	LN	MM	HH	SL	FSL SNS (MM)	SNST (MM)	Type
East WY	NextEra	Cedar Springs IV	Wind	PPA	350.4	0	0	0	350.4	350.4	350.4	350.4	350.4	Wind
East WY	Innergex Renewable	Boswell Springs	Wind	PPA	320	0	0	0	320	320	320	320	320	Wind
East WY	BluEarth/Clearway Renew	Two Rivers Wind Project	Wind	PPA	280	0	0	0	280	280	280	280	280	Wind
East WY	NextEra	Anticline	Wind	PPA	100.5	0	0	0	100.5	100.5	100.5	100.5	100.5	Wind
East WY	Invenergy	Rock Creek I BTA	Wind	BTA	190	0	0	0	190	190	190	190	190	Wind
East WY	Invenergy	Rock Creek II 400	Wind	BTA	400	0	0	0	400	400	400	400	400	Wind
[redacted]														
Goshen ID	rPlus	Cedar Creek	Wind	PPA	151	0	0	0	151	151	151	**151**	151	Wind
[redacted]														
UT South	Enyo Renewable Energy	Hornshadow II	Solar + BESS	PPA	200	50	2	200	200	200	200	200	200	Solar and/or Battery
UT North	Able Grid Energy Solutions	Dominguez I	BESS	BSA	0	200	4	200	200	200	200	200	200	Solar and/or Battery
UT South	rPlus	Green River Solar I & II	Solar + BESS	PPA	400	200	2	400	400	400	400	400	400	Solar and/or Battery
~~UT North~~	~~DESRI~~	~~Steel I 80 + Steel II~~	~~Solar + BESS~~	~~PPA~~	~~147~~	~~37.5~~	~~2~~	0	~~147~~	~~147~~	~~147~~	~~147~~	~~147~~	Solar and/or Battery
UT South	Long Road Energy	Rush Lake	Solar + BESS	PPA	99	49.5	4	99	99	99	99	99	99	Solar and/or Battery
UT South	Long Road Energy	Fremont	Solar + BESS	PPA	99	49.5	4	99	99	99	99	99	99	Solar and/or Battery
UT North	DESRI	Rocket II	Solar + BESS	PPA	45	12.5	4	0	45	45	45	45	45	Solar and/or Battery
UT South	Enyo Renewable Energy	Hornshadow I	Solar + BESS	PPA	100	25	2	100	100	100	100	100	100	Solar and/or Battery
UT South	AES Clean Power (sPower	Glen Canyon A	Solar	PPA	95	0	0	0	95	95	95	95	95	Solar and/or Battery
UT South	First Solar (now Leeward	Parowan	Solar + BESS	PPA	58	58	4	58	58	58	58	58	58	Solar and/or Battery
[redacted]														
South OR	ecoplexus	Hayden Mountain 2	Solar + BESS	PPA	160	40	4	0	160	160	0	160	160	Solar and/or Battery
South OR	ecoplexus	Hamaker	Solar + BESS	PPA	50	12.5	4	0	50	50	0	50	50	Solar and/or Battery
[redacted]														
							Total Maximum Capacity (MW)	1,156	3,722	4,247	3,235	3,445	3,445	
							Total Capacity Contribution (MW)	575	1,081	1,148	924	998	998	

* Change from June 8, 2021 RFP Presentation – selection made by model, not due to withdrawn bid
* FSL = final shortlist
* Note, the Energy Gateway South transmission line was selected in all but the LN portfolio

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Demand Response Selections

- Each 2020AS RFP bid portfolio includes bids submitted into the 2021DR RFP as a resource alternative (as selected by the System Optimizer model).
- Demand response selections are incremental to existing programs.
- Demand response selections vary by portfolio-selection scenario.
- Selected programs begin in 2022 and grow over the first ten years.
- The ability to ramp quickly into the full capacity identified starting in 2022 in any scenario below may be limited by program selection, design, and delivery requirements.
- Commitments to specific programs will be made as part of ongoing or new procurement processes, and in some instances regulatory approvals.

DR Bid Selections (MW)	2022				2030			
	MM	SNS	LN	SNS Bid-LN	MM	SNS	LN	SNS Bid-LN
Rocky Mountain Power	59	75	75	43	229	245	245	198
Pacific Power	12	46	46	45	91	316	316	260
Total	71	121	121	88	320	561	561	458

Portfolio Costs – MM Scenario

Revised Analysis

PaR Stochastic Mean PVRR and Change From LN Bids Portfolio ($ millions)

	Portfolio							
Price-Policy	**LN Bids**	**MM Bids**	**HH Bids**	**No Bid LN**	**No Bid MM**	**No Bid HH**	**SNS Bids**	**SNS Bids-LN**
MM	23,828	23,968	24,408	24,306	24,345	24,959	23,893	23,735
Delta	0	139	580	477	517	1,131	65	(94)

- Of the scenarios considered previously, the LN Bid portfolio has the lowest cost under MM price-policy conditions.
- However, taking the SNS bids and selecting future proxy resources under LN conditions has an even lower cost—additional details are provided on the following slides.
- Portfolios with bids provide several hundred million dollars in benefits relative to portfolios without bids.

June 8, 2021 Analysis

PaR Stochastic Mean PVRR ($ millions)

	Portfolio						
Price-Policy	**LN Bids**	**MM Bids**	**HH Bids**	**No Bid LN**	**No Bid MM**	**No Bid HH**	**SNS Bids**
MM	23,903	23,898	24,594	24,306	24,345	24,959	24,022
Change from MM Portfolio	5	0	696	408	447	1,061	124

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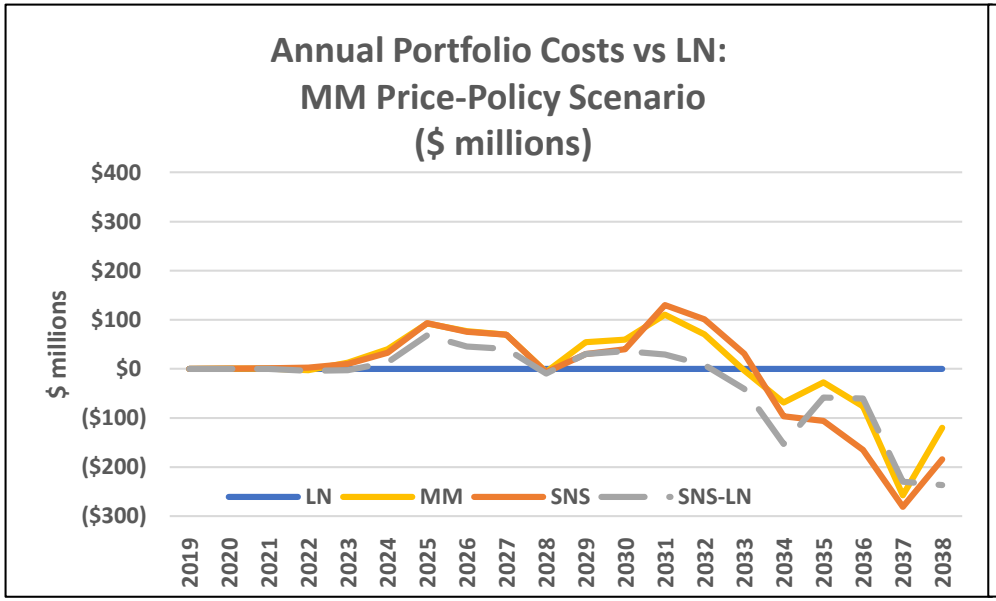
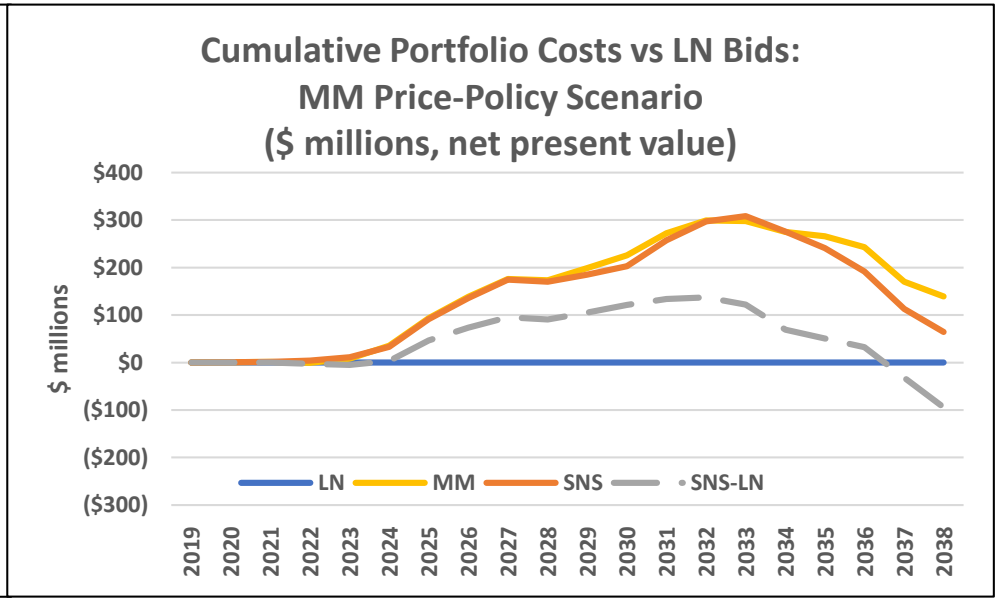
Annual Portfolio Costs

- The LN bid portfolio has the lowest annual costs through 2032 in the MM price-policy scenario, but costs climb quickly thereafter.
- Reported present value results are for 2019-2038, consistent with the 2019 IRP study horizon.
- The LN bid portfolio costs in 2039 and beyond are expected to continue to be higher than other portfolios, suggesting the results would worsen over a longer study horizon.





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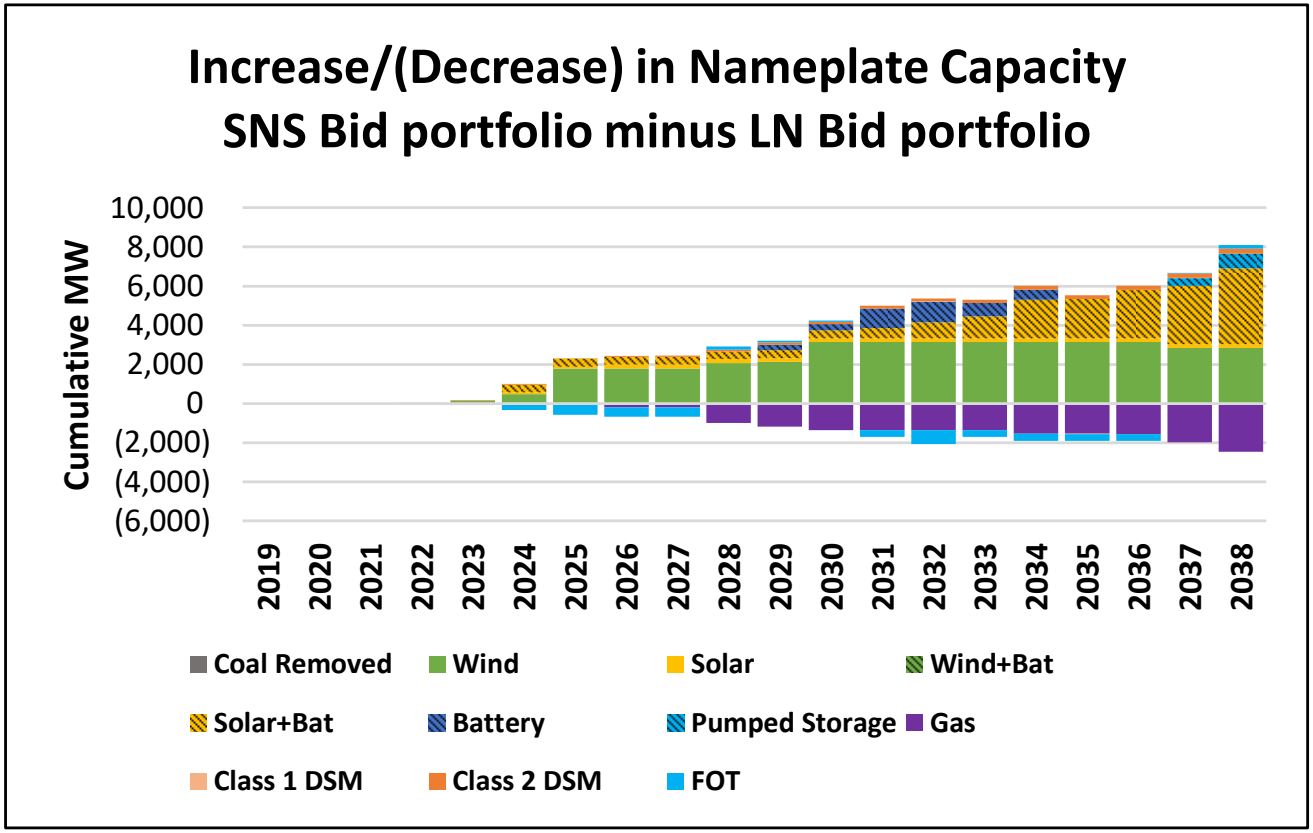
Portfolio Compare SNS Bid vs LN Bid

- The SNS bid portfolio has less gas and a lower open position (depicted with FOTs) relative to the LN bid portfolio.
- In addition, to these changes, the SNS bid portfolio adds more wind in 2030, battery capacity in 2031, and solar and storage thereafter.
- Annual cost results indicate some of the LN bid portfolio selections for proxy units in the intermediate timeframe are more cost-effective than proxy resource selections in the SNS bid portfolio.



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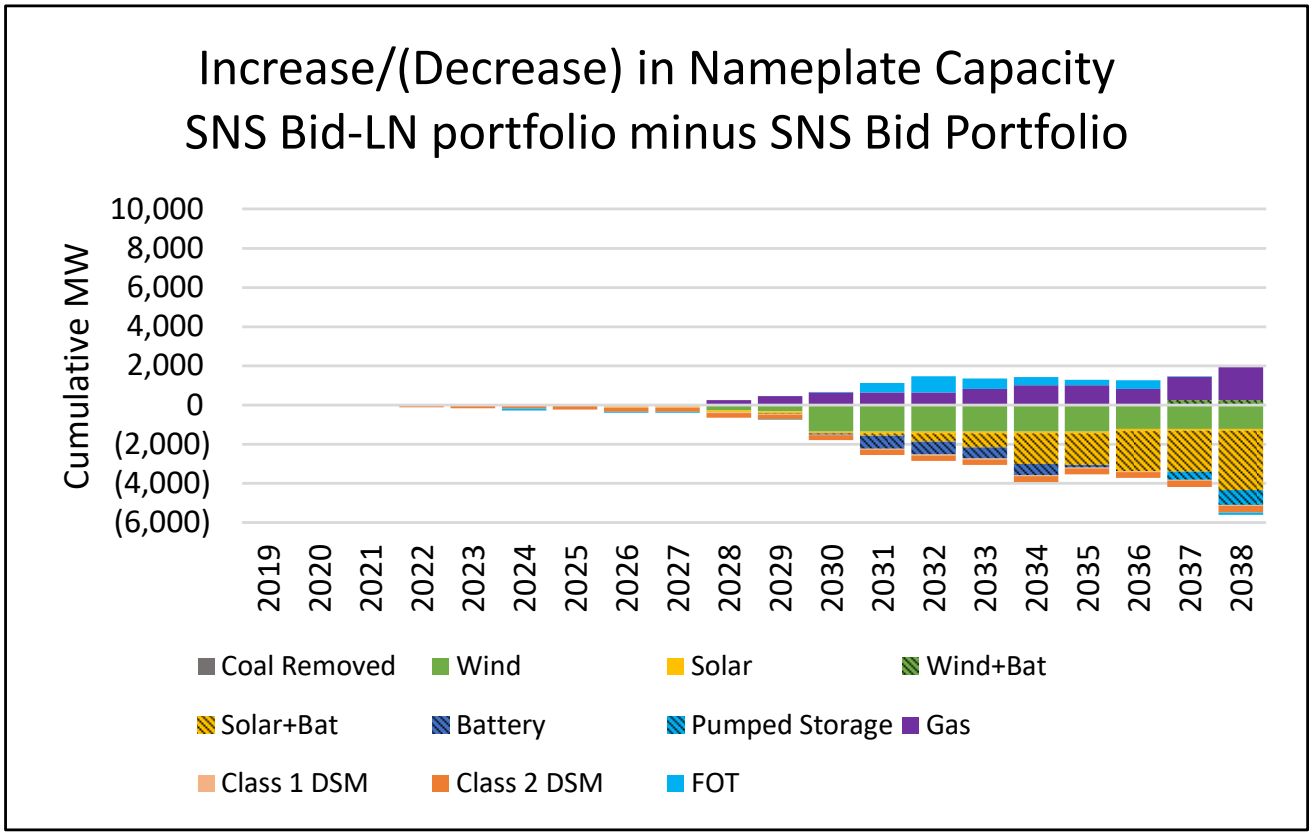
SNS Bid-LN Portfolio

- Considering these portfolio cost trends, the company looked for a way to combine the best aspects of the SNS and LN portfolio selections to better isolate value drivers associated with bids from value drivers associated with future proxy resources.
- The SNS portfolio was developed using the MM price curve, but with no market sales allowed.
- An alternate portfolio (SNS Bid-LN) was developed with:
  - The bids selected in the SNS portfolio
  - SO model selections of additional proxy resources for the remainder of the study period under LN price-policy conditions.
  - As in the LN bid portfolio, market sales were allowed.
- This portfolio's performance was evaluated under the same price-policy conditions as the other portfolios.

Portfolio Compare
SNS Bid-LN vs SNS Bid

Relative to the SNS Bid portfolio, the SNS Bid-LN portfolio has:

- Wind: 1,297 MW lower in 2028-2030
- Solar w/ storage: 3,000 MW lower in 2031-2038
- Stand-alone battery: 675 MW delayed 3-5 years
- Gas peakers: 589 MW higher in 2028-2030, plus 379 MW in 2033-2034, and more thereafter.



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Portfolio Costs – LN Scenario

Revised Analysis

PaR Stochastic Mean PVRR and Change From LN Bids Portfolio ($ millions)

	Portfolio							
Price-Policy	**LN Bids**	**MM Bids**	**HH Bids**	**No Bid LN**	**No Bid MM**	**No Bid HH**	**SNS Bids**	**SNS Bids-LN**
LN	18,578	20,106	21,124	18,744	20,064	21,099	20,096	19,299
Delta	-	1,528	2,546	166	1,486	2,521	1,518	721

- Under LN price-policy conditions, the LN Bid portfolio, SNS Bid portfolio, SNS Bids-LN portfolio, and the LN and MM portfolios without bids, outperform the MM portfolio.
- The MM Bid and SNS Bid portfolios produce similar results.
- The SNS Bid-LN portfolio results are midway between the LN Bid and MM Bid portfolio results.

June 8, 2021 Analysis

PaR Stochastic Mean PVRR ($ millions)

	Portfolio						
Price-Policy	**LN Bids**	**MM Bids**	**HH Bids**	**No Bid LN**	**No Bid MM**	**No Bid HH**	**SNS Bids**
LN	18,713	20,179	21,287	18,744	20,064	21,099	20,192
Change from MM Portfolio	(1,465)	-	1,109	(1,435)	(114)	920	14

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Portfolio Costs – HH Scenario

Revised Analysis

PaR Stochastic Mean PVRR and Change From MM Bids Portfolio ($ millions)

	Portfolio							
Price-Policy	**LN Bids**	**MM Bids**	**HH Bids**	**No Bid LN**	**No Bid MM**	**No Bid HH**	**SNS Bids**	**SNS Bids-LN**
HH	28,653	27,351	27,455	29,419	28,307	28,559	27,367	27,799
Delta	1,302	-	104	2,068	956	1,208	16	448

- The MM Bid portfolio is top-performing in the HH price-policy scenario, followed closely by the SNS Bid portfolio
- The SNS Bid-LN portfolio results are slightly closer to the MM Bid portfolio than the LN Bid portfolio.
- Note, the difference between the SNS Bid portfolio and the SNS Bid-LN portfolio is entirely driven by differences in proxy resources (and not bids).

June 8, 2021 Analysis

PaR Stochastic Mean PVRR ($ millions)

	Portfolio						
Price-Policy	**LN Bids**	**MM Bids**	**HH Bids**	**No Bid LN**	**No Bid MM**	**No Bid HH**	**SNS Bids**
HH	28,675	27,315	27,673	29,419	28,307	28,559	27,493
Change from MM Portfolio	1,361	-	358	2,104	992	1,244	178

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Marginal Bids

- Appendix A includes an indicative assessment of the net benefit or cost for each bid.
- This information helped identify which bids in the SNS portfolio might be marginal in terms of customer benefit.
- PacifiCorp further evaluated these bids to ensure their potential inclusion in the final shortlist would provide value for customers. Based on the nature of the revised inputs, the revised analysis focused on the lowest value eastern Wyoming bids: Rock Creek 1 and Rock Creek 2.
- Removing Rock Creek 1 or 2 results in higher costs, so these bids remain in the final shortlist.

Revised Analysis

PaR Stochastic Mean PVRR vs SNS Bids-LN Portfolio

($ millions) Portfolio Price-Policy	SNS Bids-LN	Remove Rock Creek 1	Remove Rock Creek 2
MM	23,735	23,760	23,893
Delta	0	26	159

June 8, 2021 Analysis

PaR Stochastic Mean PVRR ($ millions)

Portfolio Price-Policy	SNS	Remove Glen Canyon	Remove Hamaker	Remove Rock Creek 1	Remove Rock Creek 2
SNS	25,857	25,943	25,896	25,986	26,067
Change from SNS Portfolio	0	86	38	129	210

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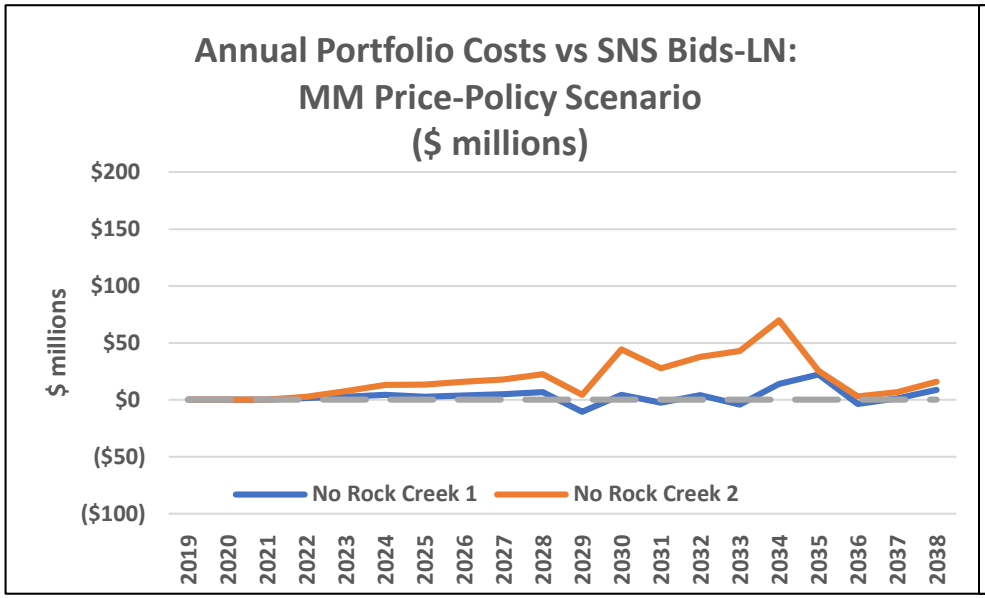
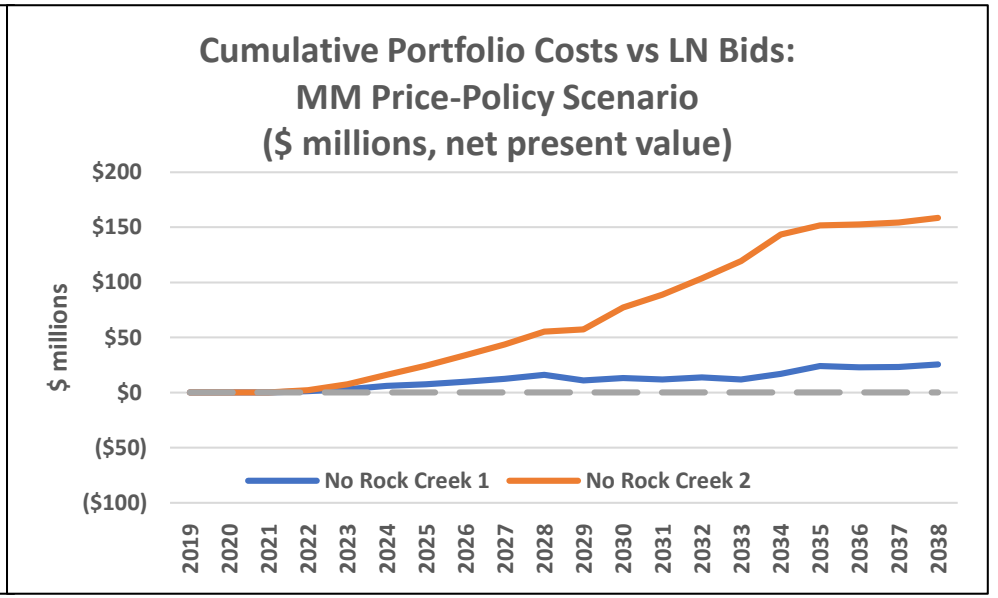
Marginal Bids – Annual Costs

- Each additional resource in a congested location produces lower benefits.
- The sensitivities evaluate the last-in benefits of each Rock Creek resource in eastern Wyoming.
- Because of its larger size (400 MW vs 190 MW for Rock Creek 1) Rock Creek 2 provides proportionately higher benefits, despite having a slightly lower indicative net benefit.
- Rock Creek 1, the smaller of the two Rock Creek bids, provides benefits in most years of the study period.
- Note a positive value indicates a net benefit, a negative value indicates a net cost.





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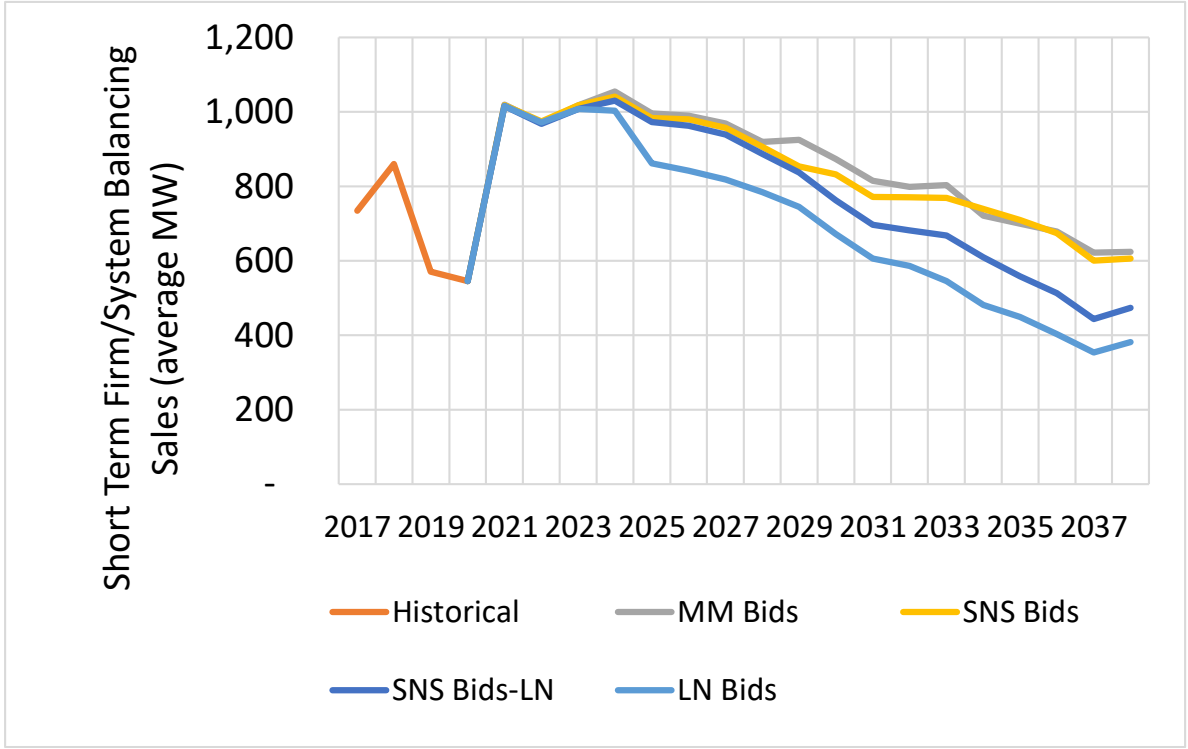
Market Sales by Portfolio

- While there is a slight uptick in forecasted market sales in 2024, market sales are forecasted to decline in the MM price-policy results for the LN, MM, SNS, and SNS Bids-LN resource portfolios.
- Market prices and volumes were low in 2019 due to weather and in 2020 due to COVID-19.
- Modeled markets can be more liquid (more purchases and sales) than current market structures, which primarily trade multiple hour blocks (e.g., the heavy load hour product from 6 a.m. to 10 p.m.)
- EIM has made intra-hour trading more liquid and an extended day-ahead market may further increase the liquidity of short-term firm transactions.



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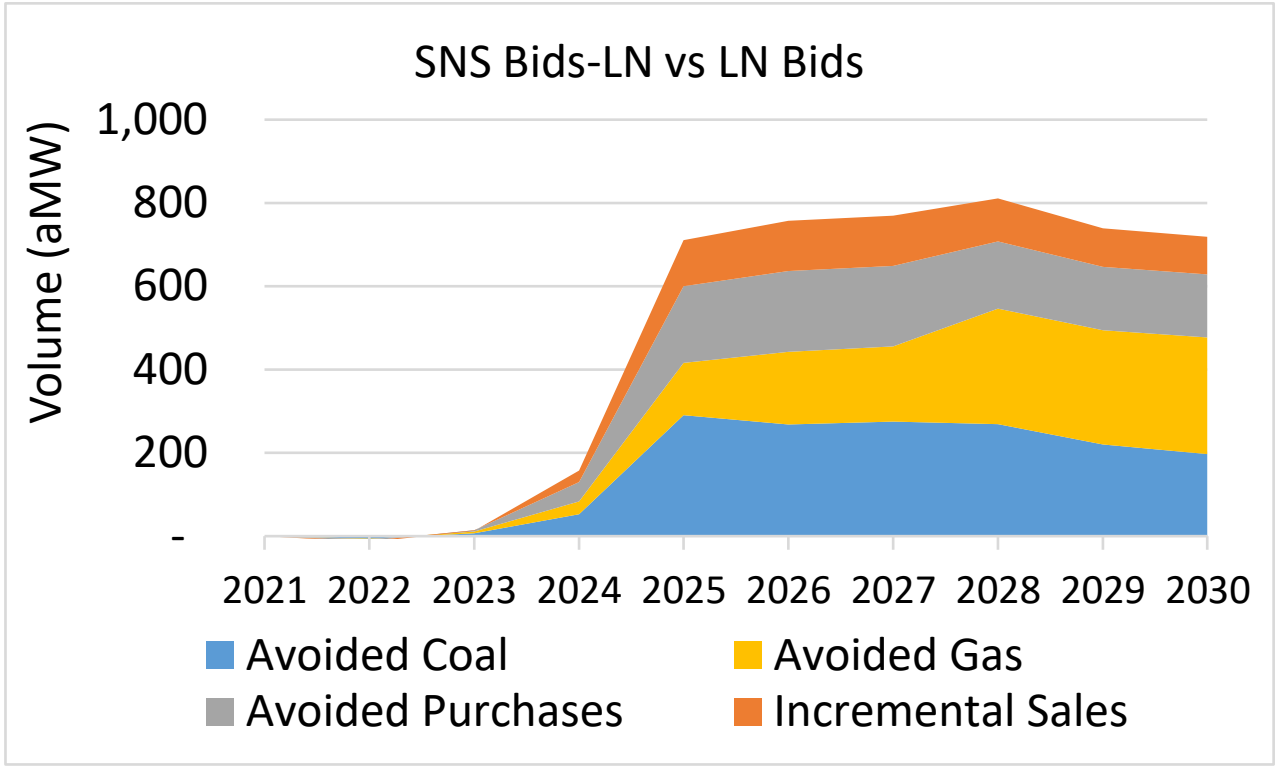
Incremental Bid Volumes (1)

- All bids have scheduled CODs by the end of 2024 based on signed interconnection agreement or study results.
- Relative to the LN Bid portfolio, the SNS Bid-LN portfolio includes Gateway South and eastern Wyoming wind, plus solar in OR and UT.
- Under MM price-policy assumptions, the additional bids in the SNS Bids-LN portfolio mainly avoid coal, gas, and market purchases.
- Incremental sales in the SNS Bids-LN portfolio amount to roughly 16% of the total change in system energy in 2025-2027 and decline thereafter.



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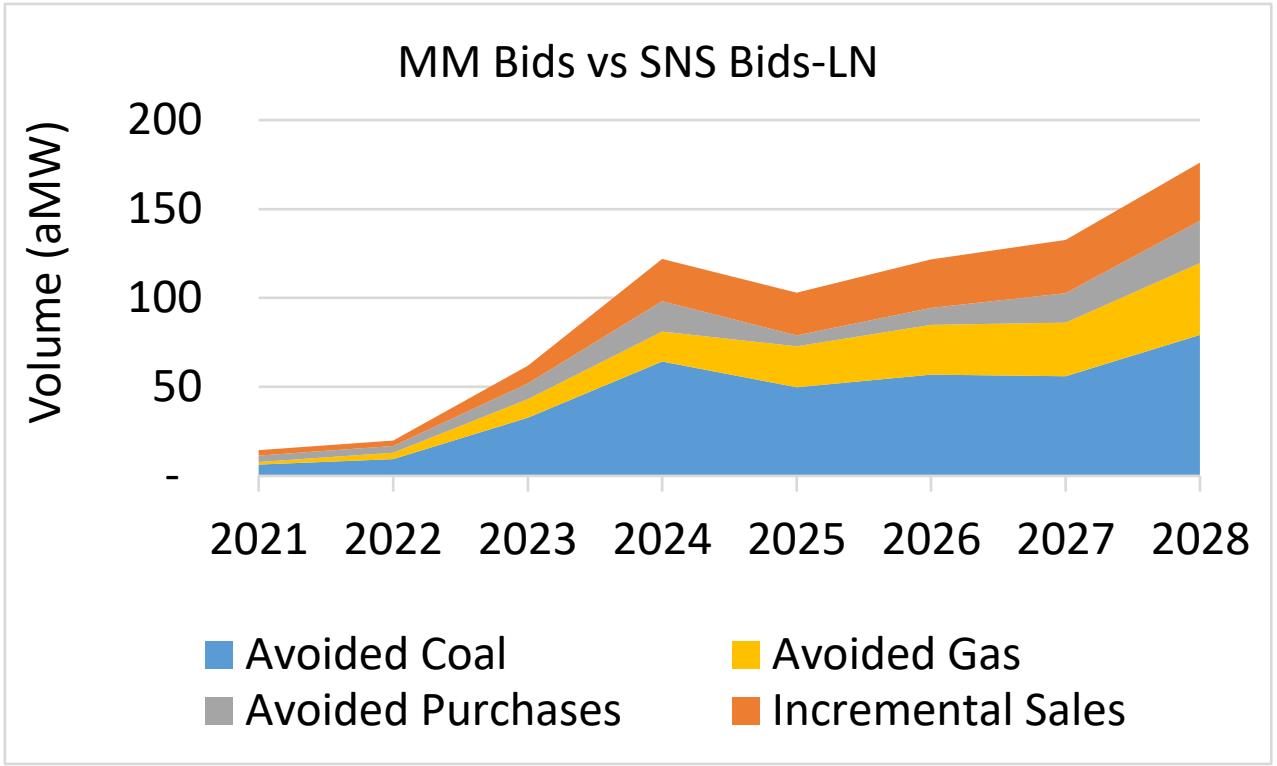
Incremental Bid Volumes (2)

- Relative to the SNS Bid-LN portfolio, the MM Bid portfolio includes off-system wind in eastern Wyoming, plus solar in Washington.
- Under MM price-policy assumptions, the additional bids in the MM Bid portfolio lean more heavily on incremental market sales, which represent 23% of the total change in system energy in 2025-2027.
- As a result, the value of these bids is more dependent on market prices.
- These bids are expensive relative to other resource options—future alternatives may provide greater value.



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Additional MM Considerations

- Emissions and Reliability

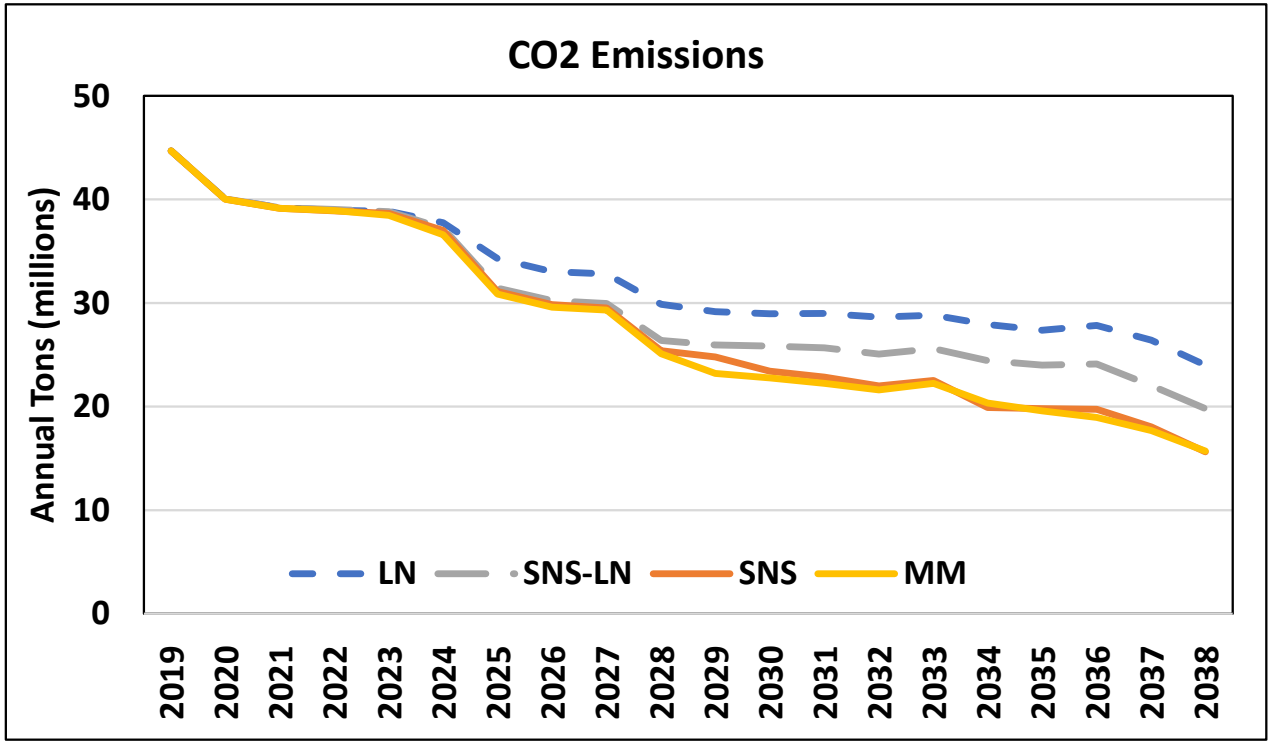
Revised	CO2 (ktons)	ENS (GWh)
MM Bids	557,013	361
LN Bids	647,710	242
SNS Bids	562,984	183
SNS Bids-LN	599,584	183

6/8/2021	CO2 (ktons)	ENS (GWh)
MM Bids	561,244	170
LN Bids	644,970	274
SNS Bids	565,943	349

  - CO_2 emissions in the MM Bid and SNS Bid portfolios are comparable, while the LN Bid portfolio emissions are 16% higher. The SNS Bid-LN portfolio is midway between MM and LN.
  - Most ENS is in the last ten years in all studies.
  - The company will be further refining its reliability calculations in its 2021 IRP and will be able to identify the best resource additions to address any shortfalls.
- Gateway South is included in the MM, SNS, and the SNS Bids-LN portfolios, but not in the LN portfolio:
  - Gateway South strengthens transmission at Mona/Clover allowing additional renewable generation in southern Utah with new transmission development.
  - Gateway South acts as a relief valve during low load and outage conditions increasing the reliability of the transmission system especially with the addition of renewable resources in southern Utah.
  - Modeled results do not fully capture these effects.

CO_2 Emissions

- CO_2 emissions are highest for the LN Bid portfolio due to higher dispatch of existing coal and gas, and more natural gas proxy resource additions.
  - 16% higher than MM Bids
  - 8% higher than SNS Bid-LN
- SNS Bid-LN portfolio emissions are comparable to MM and SNS until 2028 – the resource decisions that drive this difference will not be made for several more years.



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Portfolio Costs – Sensitivities

Revised Analysis

PaR Stochastic Mean PVRR ($ millions)
Portfolio

Price-Policy	MM Bids	Sensitivity	Change from MM Portfolio
SL	24,003	23,981	(22)
SNS	25,987	25,834	(153)
SNST	25,665	25,183	(482)

June 8, 2021 Analysis

PaR Stochastic Mean PVRR ($ millions)
Portfolio

Price-Policy	MM Bids	Sensitivity	Change from MM Portfolio
SL	24,143	24,058	(85)
SNS	25,922	25,857	(65)
SNST	25,812	25,283	(529)

- "Sensitivity" portfolios were developed and evaluated for each of Staff's price-policy assumptions.
- The MM Bid portfolio was also evaluated under each of these assumptions for comparison.
- Each Sensitivity outperforms the MM Bid portfolio under its respective price-policy assumptions, though the impact in the SL and SNS scenarios is relatively small.
- The SNST portfolio has the same wind selections as the SNS portfolio identified in the final shortlist, so benefits are from future wind selections that supplement rather than replace the RFP bids.

FOT Sensitivity

- Additional sensitivities were prepared using the FOT limits from the 2021 IRP.
  - 500 MW in summer and 1,000 MW winter, starting 2022
- Reducing FOT limits results in substantially higher costs in the LN Bids case, but only a modest cost increase in the MM Bids and SNS Bids cases.

PaR Stochastic Mean PVRR and Impact of Reduced FOT Limit ($ millions)				
Price Policy	RFP Bids (MW)	2019 IRP FOT Limits	2021 IRP FOT Limits	Delta
LN Bids	1,156	23,828	25,078	1,249
MM Bids	3,722	23,968	24,076	109
SNS Bids	3,445	23,893	24,079	186

REDACTED

MM Bids vs. SNS Bids

- There are three fewer bids selected in the SNS Bid-LN portfolio, relative to bids selected in the MM Bid portfolio
  - [redacted] (off-system in Eastern Wyoming)
    - This resource is the most expensive remaining bid in eastern Wyoming
    - Because it is located within the Tri-State Generation and Transmission (TSGT) BAA, it requires transmission service to the PacifiCorp system
    - While the developer covers transmission service costs, it is unclear how it will be treated for intra-hour dispatch, or future day-ahead market or resource adequacy showings
    - Parts of TSGT are in the intra-hour market run by SPP, and not the Western EIM run by CAISO in which PacifiCorp participates (www.spp.org/weis/)
  - [redacted] and [redacted] (Yakima)
    - Relative to other solar with storage and solar bids, these projects are higher cost
- For these reasons and considering the increased reliance on market sales for the MM Bid portfolio relative to the SNS Bid-LN portfolio (described earlier), PacifiCorp is not considering these three bids for selection to its final shortlist.

Value of Final Shortlist Bids

Revised Analysis

PaR Stochastic Mean PVRR ($ millions)
Portfolio

Price-Policy	SNS Bids	Best No Bid	Change with no bids
LN	20,096	18,744	(1,352)
MM	23,893	24,306	413
HH	27,367	28,559	1,192

Price-Policy	SNS Bids-LN	Best No Bid	Change with no bids
LN	19,299	18,744	(555)
MM	23,735	24,306	571
HH	27,799	28,559	760

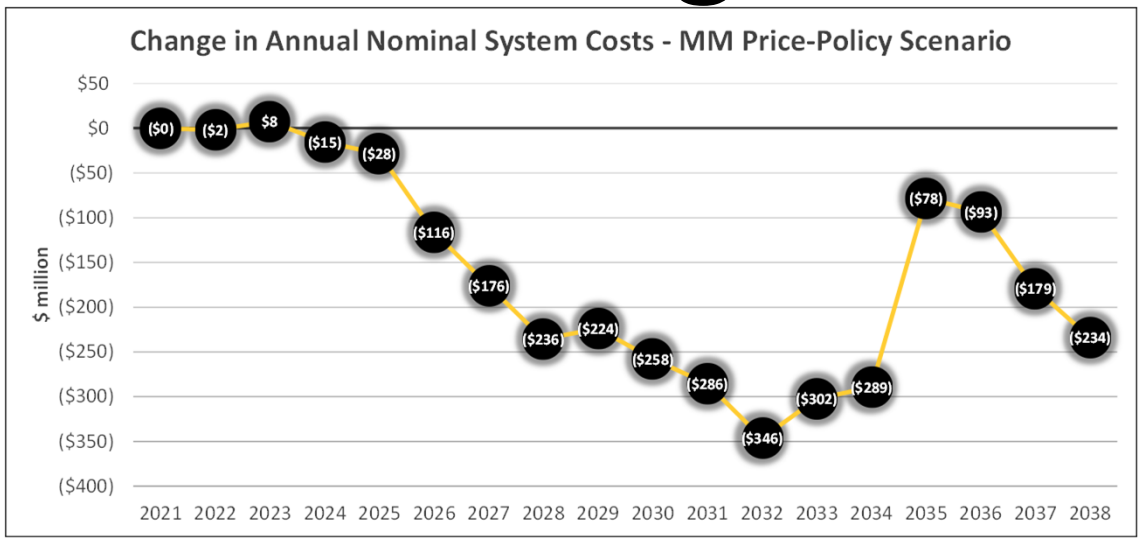
June 8, 2021 Analysis

PaR Stochastic Mean PVRR ($ millions)
Portfolio

Price-Policy	SNS Bids	No Bid	Change from SNS Portfolio
LN	20,192	18,744	(1,449)
MM	24,022	24,345	323
HH	27,493	28,559	1,066

- Under MM and HH price-policy conditions, the SNS Bid portfolio outperforms the best no bid portfolio.
- The SNS Bid-LN portfolio has even lower costs under LN and MM conditions.
- After adding the SNS bids to the company's portfolio, many opportunities will remain to reoptimize future resource decisions.

Nominal Change in Annual Cost



Best portfolio w/ bids in MM:
SNS Bid-LN

minus

Best portfolio w/o bids in MM:
No Bid LN

- The figure above summarizes annual nominal revenue requirement impacts associated with the RFP final shortlist bids and all associated transmission costs relative to the no-bid scenario assuming MM price-policy assumptions—negative values represent a reduction in revenue requirement with final shortlist bids and associated transmission projects.
- In 2025, the first full year all shortlisted bids and transmission projects are in service, the system nominal revenue requirement decreases by $28m.
- Year-to-year variability in annual nominal costs over time are largely influenced by changes in the timing of future resources between the two scenarios (with and without shortlisted bids).
  - Without shortlisted bids, gas resources are needed in 2026-2028 timeframe, battery resources are accelerated in 2031-2032, and wind and solar are added in 2036-2037, all of which reduce revenue requirement relative to the case with shortlisted bids (the SNS Bid-LN portfolio).
  - PTCs for the two build-transfer agreement wind bids expire beginning 2034, resulting in an uptick in system costs.
  - The increase in annual savings in the 2037 timeframe coincides with the retirement of Huntington, which is replaced by a combination of gas peakers and solar with storage in both studies, with a larger amount of solar with storage added in the portfolio without bids.

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Appendix A

Indicative Assessment of the Net Benefit/Cost for Each Bid

Overview of Appendix A

- To determine which resources might be marginal, the company used the system benefit curve values developed for the ISL and the final bid costs to identify a net benefit (or cost) for each bid.
- This data is provided for informational purposes only to give a sense of how the potential value of bids with the same or similar technology in a region compare to one another.
- System benefit curve values were developed using the company's June 2020 market prices and resource additions from the 2019 IRP preferred portfolio.
- When preparing values for a location, resources in that location were cut by half so that the result represents an average value for that location, rather than a last-in or marginal value.
- As a result of market price changes, declining marginal benefits within each location, and interactions across the system, the actual value of generation is expected to vary from that identified here, but is expected to impact resources in the same location and of the same type in a comparable manner, making the results useful for assessing the relative value or cost of specific bids.
- Updated Net Delivery Costs and Indicative Generation Values reflect corrections in annual generation and net capacity factors related to embedded text and omission of hours with no generation in some bidders' 8760 profiles.

REDACTED

Wind Bids

- Seven (7) wind resource bids are in eastern Wyoming, including five PPAs and two BTAs
- One bid is in Goshen, Idaho and one is in southwest Wyoming
- The Indicative Generation Value is based on hourly locational prices from June 2020 used in price scoring for the initial shortlist, which is mainly useful for comparing resources of the same type and location
- Net Benefit/(Cost) reflects the final bids and network upgrade costs

Location	Company	Project / Facility Name	Contract Type	Generating Asset (MW)	BESS Capacity (MW)	BESS Duration (Hours)	FSL Proposed COD	Net Delivery Cost ($/MWh)	Indicative Generation Value ($/MWh)	Net Benefit / (Cost)
East WY	NextEra	Cedar Springs IV	PPA	350.4	0	0	1/1/2025			
East WY	Innergex Renewable	Boswell Springs	PPA	320	0	0	10/1/2024			
East WY	BluEarth Renewables US/Clearway Renew	Two Rivers Wind	PPA	280	0	0	1/1/2025			
East WY	NextEra	Anticline	PPA	100.5	0	0	1/1/2025			
East WY	Invenergy	Rock Creek II 400	BTA	400	0	0	12/31/2024			
East WY	Invenergy	Rock Creek I BTA	BTA	190	0	0	12/31/2024			
Goshen ID	rPlus	Cedar Creek	PPA	151	0	0	12/31/2022			
SW WY	Invenergy	Uinta	BTA	121.8	0	0	12/31/2024			

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Utah Bids

- All Utah bids are for solar and/or battery storage
- Bids for solar with storage have battery capacity ranging from 25% to 100% of solar capacity, and duration ranging from two to four hours
- The Indicative Generation Value is based on hourly locational prices from June 2020 used in price scoring for the initial shortlist, which is mainly useful for comparing resources of the same type and location
- Net Benefit/(Cost) reflects the final bids and network upgrade costs

Location	Company	Project / Facility Name	Contract Type	Generating Asset (MW)	BESS Capacity (MW)	BESS Duration (Hours)	FSL Proposed COD	Net Delivery Cost* ($/MWh)	Indicative Generation Value ($/MWh)	Net Benefit / (Cost)
UT South	Enyo Renewable Energy	Hornshadow II	PPA	200	50	2	12/31/2023			
UT North	Able Grid Energy Solutions, Inc.	Dominguez I	BSA	0	200	4	7/1/2024			
UT South	rPlus	Green River Solar I	PPA	400	200	2	1/1/2025			
UT South	Long Road Energy	Rush Lake	PPA	99	49.5	4	11/30/2023			
UT South	Long Road Energy	Fremont	PPA	99	49.5	4	11/30/2023			
UT South	Enyo Renewable Energy	Hornshadow I	PPA	100	25	2	12/31/2023			
~~UT North~~	~~DESRI~~	~~Steel I 80 + Steel II~~	~~PPA~~	~~147~~	~~37.5~~	~~2~~	~~12/31/2023~~			
UT South	First Solar (now Leeward Energy)	Parowan	PPA	58	58	4	12/31/2024			
UT South	AES Clean Power (sPower LLC)	Glen Canyon A	PPA	95	0	0	12/31/2023			
UT North	DESRI	Rocket II	PPA	45	12.5	4	12/31/2023			

* Net Delivery Cost is net of value of storage, if applicable

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West Bids and Ranking

- All west-side bids are for solar or solar with battery storage
- Bids are in Central Oregon, Southern Oregon, and Yakima, Washington
- The Indicative Generation Value is based on hourly locational prices from June 2020 used in price scoring for the initial shortlist, which is mainly useful for comparing resources of the same type and location
- Net Benefit/(Cost) reflects the final bids and network upgrade costs

Location	Company	Project / Facility Name	Contract Type	Generating Asset (MW)	BESS Capacity (MW)	BESS Duration (Hours)	FSL Proposed COD	Net Delivery Cost* ($/MWh)	Indicative Generation Value ($/MWh)	Net Benefit / (Cost)
[redacted]										
South OR	ecoplexus	Hayden Mountain 2	PPA	160	40	4	12/31/2023			
South OR	ecoplexus	Hamaker	PPA	50	12.5	4	12/31/2023			
[redacted]										

* Net Delivery Cost is net of value of storage, if applicable

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