ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

1407 North Temple, Suite 310
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October 25, 2019

VIA ELECTRONIC FILING

Public Service Commission of Utah
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City, UT 84114

Attention: Gary Widerburg
Commission Secretary

RE: PacifiCorp's 2019 Integrated Resource Plan – Docket No. 19-035-02

Please find enclosed a copy of the data discs containing non-confidential and confidential work papers for the 2019 Integrated Resource Plan ("IRP"). PacifiCorp supplements its 2019 IRP filing with the discs to support and provide additional details for the analysis described within the 2019 IRP. Confidential information in the 2019 IRP will be provided to any party who certifies that it agrees to abide by the confidentiality rules of the Public Service Commission of Utah. PacifiCorp requests that interested parties contact the state manager at the number listed below for a copy of the certification that must be executed and submitted prior to obtaining a copy of the confidential information.

The Company also identified additional information and clarifying changes in the 2019 IRP, Volume II – Appendices A-L, and clarifying changes and a value correction in 2019 IRP Volume II – Appendices M-R. The changes are summarized in the table below. Enclosed as a supplement to the 2019 IRP is a replacement page for each change. The identified changes do not affect the preferred portfolio, inputs or outcomes of the 2019 IRP, and do not affect any other materials provided.

PacifiCorp 2019 IRP Volume II Appendices A-L[1]		
Reference	**Update**	**Page**
Appendix D	Replacement of blank page with additional DSM tables and discussion.	72
Appendix E	Replaced Appendix E in its entirety with updated discussion.	73-76b[3]

PacifiCorp 2019 IRP Volume II Appendices M-R[2]		
Appendix M	Replacement page to align the Gateway quick reference table (bottom of page) with the changes below:	276
	Replacement page of case P-22 fact sheet clarifying description and correcting the transmission path map.	378
	Replacement page of case P-22 fact sheet correcting the Bridger WY to Populus path rating from 1,621 MW to 1,700 MW.	379
	Replacement page of case P-23 fact sheet clarifying description, correcting description and transmission path map.	380
	Replacement page of case P-23 fact sheet correcting the Bridger WY to Populus path rating from 1,621 MW to 1,700 MW.	381
	Replacement page of case P-25 fact sheet clarifying description and correcting the transmission path map.	382
	Replacement page of case P-25 fact sheet correcting the Bridger WY to Populus path rating from 1,621 MW to 1,700 MW.	383
	Replacement page of case P-26 fact sheet clarifying description and correcting the transmission path map.	384

[1] This change is incorporated in the publicly posted version: https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2019_IRP_Volume_II_Appendices_A-L.pdf

[2] This change is incorporated in the publicly posted version: https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2019_IRP_Volume_II_Appendices_M-R.pdf

[3] Two additional pages in Volume II appendices A-L, Appendix E (Smart Grid) are numbered 76a and 76b.

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Informal inquiries may be directed to Jana Saba, Utah Regulatory Affairs Manager, at (801) 220-2823.

Sincerely,

Joelle Steward
Vice President, Regulation

Enclosures

cc: Service List

Preferred Portfolio DSM Resource Selections

The following tables show the economic DSM resource selections by state and year in the 2019 IRP preferred portfolio, P45CNW.

Table D.3 – Incremental Demand Response Resource Selections (2019 IRP Preferred Portfolio)

State/Product by Year	2019	2021	2023	2025	2026	2029	2030	2032	2035	2036	2037	2038	Total/Products (MW)
California-3rd Party Contracts												1.1	1.1
California-Cool/WH												1.5	1.5
California-Irrigate											4.8		4.8
California-Thermostat											5.8		5.8
Oregon-3rd Party Contracts												10.9	10.9
Oregon-Ancillary Services						7.5							7.5
Oregon-Irrigate											13.3		13.3
Washington-3rd Party Contracts												10.9	10.9
Washington-Ancillary Services						1.9							1.9
Washington-Cool/WH												7.7	7.7
Washington-Irrigate											8.3		8.3
Washington-Thermostat											16.6		16.6
Utah-3rd Party Contracts												76.7	76.7
Utah-Ancillary Services			8.3	5.3							3.2		16.7
Utah-Cool/WH	4.1	7.0	9.9		7.2	6.7		6.8	7.0			7.2	55.9
Utah-Irrigate												1.9	1.9
Utah-Thermostat						116.7	8.2		8.3			5.1	138.3
Idaho-Irrigate								5.2		3.7		1.8	10.6
Wyoming-3rd Party Contracts												37.3	37.3
Wyoming-Ancillary Services				3.0									3.0
Wyoming-Cool/WH												5.2	5.2
Wyoming-Irrigate											1.8		1.8
Wyoming-Thermostat											5.5	1.2	6.7
Total by Year	**4.1**	**7.0**	**18.1**	**8.2**	**7.2**	**132.7**	**8.2**	**12.0**	**15.3**	**3.7**	**48.7**	**166.0**	**431.2**

Table D.4 – Incremental Energy Efficiency Resource Selections (2019 IRP Preferred Portfolio)

Energy Efficiency Energy (MWh) Selected by State and Year										
State	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
CA	5,130	5,710	5,270	5,540	6,240	6,180	6,760	6,830	6,710	6,900
OR	182,370	168,410	165,580	177,040	170,830	175,640	163,960	158,100	152,370	144,500
WA	42,090	39,900	40,550	44,450	46,490	46,420	45,300	43,710	42,870	41,510
UT	255,470	254,270	254,120	254,590	260,140	256,810	252,620	244,500	244,770	236,870
ID	18,100	17,190	17,590	18,410	20,920	20,580	20,450	20,740	20,400	20,020
WY	59,320	50,960	54,960	71,250	79,200	83,290	84,430	91,700	91,270	88,540
Total System	562,480	536,440	538,070	571,280	583,820	588,920	573,520	565,580	558,390	538,340

Energy Efficiency Energy (MWh) Selected by State and Year										
State	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
CA	6,690	6,400	6,220	5,890	5,380	4,110	4,440	3,660	3,040	2,640
OR	130,550	122,100	118,120	113,420	98,860	99,240	96,100	95,190	87,690	84,090
WA	37,970	36,610	34,390	32,040	30,230	22,700	22,740	18,190	15,620	15,330
UT	216,320	213,380	200,900	198,880	184,760	135,510	122,290	93,920	80,230	87,710
ID	19,410	18,210	17,480	17,400	15,760	12,850	11,930	9,810	8,370	8,640
WY	81,230	75,380	66,490	61,490	56,140	43,140	40,520	35,180	25,690	25,880
Total System	492,170	472,080	443,600	429,120	391,130	317,550	298,020	255,950	220,640	224,290

For the 20-year assumed nameplate capacity contributions (MW impacts) by state and year associated with the Energy Efficiency resource selections above, see Table 8.18 – PacifiCorp's 2019 IRP Preferred Portfolio, in Volume I of the 2019 IRP.

APPENDIX E – SMART GRID

Introduction

Smart grid is the application of advanced communications and controls to the electric power system. As such, a wide array of applications can be defined under the smart grid umbrella. PacifiCorp has identified specific areas for research that include technologies such as dynamic line rating, phasor measurement units, distribution automation, advanced metering infrastructure (AMI), automated demand response and other advanced technologies. PacifiCorp has reviewed relevant smart grid technologies for transmission and distribution systems that provide local and system benefits. When considering these technologies, the communications network is often the most critical infrastructure decision. This network must have relevant speed, reliability, and security and be scalable to support the entire service territory and interoperable for many device types, manufacturers, and generations of technology.

PacifiCorp has focused on those technologies that present a positive benefit for customers and has implemented functions such as advanced metering, dynamic line rating, and distribution automation. This will optimize the electrical grid when and where it is economically feasible, operationally beneficial and in the best interest of customers. PacifiCorp is committed to consistently evaluating the value of emerging technologies for integration when they are found to be appropriate investments. The company is working with state commissions to improve reliability, energy efficiency, customer service, and integration of renewable resources by analyzing the total cost of ownership, performing thorough cost-benefit analyses, and reaching out to customers concerning smart grid applications and technologies. As technology advances and development continues, PacifiCorp is able to improve cost estimates and benefits of smart grid technologies that will assist in identifying the best suited technologies for implementation.

Transmission Network and Operation Enhancements

Dynamic Line Rating

Dynamic line rating is the application of sensors to transmission lines to indicate the real-time current-carrying capacity of the lines in relation to thermal restrictions. Transmission line ratings are typically based on line loading calculations given a set of worst-case weather assumptions, such as high ambient temperatures and very low wind speeds. Dynamic line rating allows an increase in current-carrying capacity when more favorable weather conditions are present and the transmission path is not constrained by other operating elements. The Standpipe-Platte (formally Miners-Platte) project was implemented in 2014 and has moved from pilot stage into full deployment. Standpipe-Platte is currently the only dynamic line rating application in PacifiCorp. The Standpipe-Platte project has delivered positive results as windy days are directly linked to increased wind power generation and increased transmission ratings. A dynamic line rating system is used to determine the resulting cooling effect of the wind on the line. The current carrying capacity is then updated to a new weather dependent line rating. The Standpipe-Platte 230 kilovolt (kV) transmission line is one of three lines in the TOT4A transmission corridor, and had been one of the limits of the corridor power transfer. As a result of this project, the TOT4A Western Electricity Coordinating Council (WECC) non-simultaneous path rating was increased.

Dynamic line rating will be considered for all future transmission needs as a means for increasing capacity in relation to traditional construction methods. Dynamic line rating is only applicable for

thermal constraints and only provides additional site-dependent capacity during finite time periods, and it may or may not align with expected transmission needs of future projects. PacifiCorp will continue to look for opportunities to cost-effectively employ dynamic line rating systems, and the Standpipe-Platte dynamic line rating system will be redeployed with newer equipment in 2020.

Digital Fault Recorders / Phasor Measurement Unit Deployment

To meet compliance with the North American Electric Reliability Corporation (NERC) MOD-033-1 and PRC-002-2 standards, PacifiCorp has installed over 100 multifunctional digital fault recorders (DFR) which include phasor measurement unit (PMU) functionality. The installations are at key transmission and generation facilities throughout the six-state service territory, generally placed on WECC identified critical paths. PMUs provide sub-second data for voltage and current phasors, which can be used for MOD-033-1 event analysis and model verification. DFRs have a shorter recording time with higher sampling rate to validate dynamic disturbance modelling per PRC-002-2. The DFR/PMUs will deliver dynamic PMU data to a centralized phasor data concentrator (PDC) storage server where offline analysis can be performed by transmission operators, planners, and protection engineers. Installation of the communications and data transfer systems between the individual PMUs and the PDC is underway and planned for completion by the end of 2019. Additionally, transient DFR data will be downloaded manually at substations.

Transmission planners will use the phasor data quantities from actual system events to benchmark performance of steady-state and transient stability models of the interconnected transmission system and generating facilities. Using a combination of phasor data from the PMUs and analog quantities currently available through Supervisory Control and Data Acquisition System (SCADA), transmission planners can set up the system models to accurately depict the transmission system prior to, during, and following an event. Differences in simulated versus actual system performance will then be evaluated to allow for enhancements and corrections to the system model.

Model validation procedures are being evaluated, in conjunction with data and equipment availability to fulfill MOD-033-1. Creation of a documented process to validate data that includes the comparison of a planning power flow model to actual system behavior and the comparison of the planning dynamic model to actual system response is ongoing. PacifiCorp will continually evaluate potential benefits of PMU installation and intelligent monitoring as the industry considers PMU in special protection, remedial action scheme and other roles that support transmission grid operators. With the transitions at Peak Reliability, PacifiCorp will continue to work with the California Independent System Operator (CAISO)'s Reliability Coordinator West to share data as appropriate.

Distribution Automation and Reliability

Distribution Automation

Distribution automation encompasses a wide field of smart grid technology and applications that focus on using sensors and data collection on the distribution system, as well as automatically adjusting the system to optimize performance. Distribution automation can also provide improved outage management with decreased restoration times after failure, operational efficiency, and peak load management using distributed resources and predictive equipment failure analysis using complex data algorithms. PacifiCorp is working on distribution automation initiatives focused on improved system reliability through improved outage management and response.

In Oregon, PacifiCorp identified 40 circuits on which cost benefit analyses were performed. From this analysis two circuits in Lincoln City, Oregon were selected to have a fault location, isolation and service restoration (FLISR) system installed. The project is on track to be installed by the end of 2019. This pilot is intended to provide field validation of lab tested solutions for outage management and automated restoration, and will identify improvements to the operating systems and drive implementation of FLISR throughout the service territory.

Wildfire Mitigation

In response to concerns of wildfire danger to customers, PacifiCorp began developing communication systems and practices to improve system reliability in at risk areas. Selected substations in Siskiyou County, California and Wasatch County, Utah are preliminary sites that will have remote communication installed to allow dispatch operators to modify re-closer settings. Development of standards for re-closers to enable the remote communication have been completed and the pilot implementation will be provided to at risk substations by the conclusion of 2019. The ability to integrate legacy systems to various communication networks will allow PacifiCorp to improve its response to failures in remote locations.

Distribution Substation Metering

Substation monitoring and measurement of various electrical attributes were identified as a necessity due to the increasing complexity of distribution planning driven by growing levels of primarily solar generation as distributed energy resources. Enhanced measurements improve visibility into loading levels and generation hosting capacity as well as load shapes, customer usage patterns, and information about reliability and power quality events.

In 2017, an advanced substation metering project was initiated to provide an affordable option for gathering required substation and circuit data at locations where SCADA is unavailable and/or uneconomical. SCADA has been the preferred form of gathering load profile data from distribution circuits, however SCADA systems can be expensive to install and additional equipment is required to provide the data needed to perform distribution system and power quality analysis. When system data rather than data and control is important, SCADA is no longer the best option.

A preliminary wave of approximately 20 meter replacements with cellular communications were deployed in 2018, with 30 additional meters to be fully deployed by the end of 2019 at identified substations to fully investigate their capabilities. Specialized software will provide users a refined view the reliability and power quality information in addition to the standard substation and circuit data. The project will also evaluate if the metering solutions provide cost effective situational awareness and control.

Distributed Energy Resources

Energy Storage Systems

In 2017, PacifiCorp filed the Energy Storage Potential Evaluation and Energy Storage Project proposal with the Public Utilities Commission or Oregon. This filing was in alignment with PacifiCorp's strategy and vision regarding the expansion and integration of renewable technologies. The company proposed a utility-owned targeted energy storage system (ESS) pilot project. In 2019 PacifiCorp began project development and is progressing to build an ESS on a Hillview substation distribution circuit in Corvallis, Oregon. This is a 20.8 kV radial distribution circuit with a peak load of 20 megawatts (MW). The intent of this project is to integrate the ESS

into the existing distribution system with the capability and flexibility to potentially advance to a future micro grid system.

PacifiCorp is installing a stationary battery system and photovoltaic (PV) solar array to test the effectiveness of using non-traditional methods to correct the voltage issues during peak loading conditions. The project location is on a distribution circuit out of the Panguitch substation located in Garfield County, Utah with an anticipated in-service date of November 2019. This project is intended to reduce the loading on the power transformer, improve voltage conditions, and mitigate costs associated with upgrading the upstream 69 kV transmission system under a traditional poles and wires build-out. The battery system is rated at one MW capacity and five megawatt-hours (MWh) of energy delivery, and the solar PV array is rated at 650 kilowatts (kW) of capacity.

PacifiCorp is partnering with Utah State University to demonstrate the ability to integrate solar PV, natural gas generation, energy storage, and electronic controls to create a customer managed microgrid. This microgrid is designed to operate autonomously and seamlessly connect and disconnect from the company's electric grid based on demand and supply. The microgrid system will be located at Utah State University's Electric Vehicle Roadway facility in Logan, Utah and is expected to be fully operational by the end of 2019.

Demand Response

In 2018, PacifiCorp transitioned to the automatic dispatch of the residential air conditioner (A/C) program in Utah, utilizing two-way communication devices to respond to frequency dispatch signals. Known as Cool Keeper this frequency dispatch innovation is a grid-scale solution using fast-acting residential demand response resources to support the bulk power system. Some utilities use generating resources to perform this function, but as higher levels of wind and solar resources are added, additional balancing resources are required. The Cool Keeper system provides over 200 MWs of operating reserves to the system through the control of more than 108,000 A/C units.

Dispatchable Customer Resources

PacifiCorp partnered with a developer in 2018 to make an innovative solar and battery solution possible at a 600 unit multi-family community in Utah. Known as Soleil Lofts, this project provides a unique opportunity for the company to implement an innovative solution using solar and battery storage integration along with demand response and advanced management of the grid through daily energy load shaping. The project will include the development of a company-owned utility data and dispatch portal with direct access to 621 Sonnen batteries, each rated at 8kW, for a total of 4.8 MWs of capacity and 12 MWh of energy within the project area. In addition to the cost savings with leveraging the Soleil community partnership, the project creates opportunity to develop and test new programs related demand response, load shaping and rate design.

Advanced Metering Infrastructure

Advanced metering infrastructure (AMI) is an integrated system of smart meters, communications networks, and data management systems that provide interval data available on a daily basis. This infrastructure can also provide advanced functionalities including remote connect/disconnect, outage detection and restoration signals, and support distribution automation schemes. In 2016, PacifiCorp identified economical AMI solutions for California and Oregon that delivered tangible benefits to customers while minimizing the impact on consumer rates. The California AMI project was completed in 2018 and the Oregon project is on schedule for completion before the end of 2019. The California project installed approximately 45,000 smart meters and constructed a field area network covering the 11,000 square mile California service area. The Oregon project will

install approximately 608,000 smart meters and construct a field area network covering the 21,000 square mile Oregon service area.

A new information technology (IT) infrastructure for the AMI project was put in place prior to the start of field network and meter deployments. This IT solution included all required data acquisition, connect/disconnect, outage detection/restoration and related functions as well as an enhanced customer website that allows customers to view their hourly, daily, weekly, and monthly usage. The information provided through the enhanced website provides customers with more tools to better monitor and manage their energy usage.

In 2018, AMI projects were approved for Utah and Idaho, and work on these projects is underway and scheduled for completion by the end of 2021. The projects will be executed under one management structure with two strategies, and involves replacing nearly all Idaho meters with Itron Riva smart meters and constructing a field area network that will allow two-way meter communication. AMI functionality consistent with California and Oregon will be delivered in Idaho including capturing interval read data, remote connect and disconnect capability, outage management functionality and analytic data.

In Utah, a hybrid AMR/AMI system will be put in place, and approximately 172,000 Itron Riva smart meters will be installed in strategic locations. These meters will deliver full AMI functionality, consistent with Idaho. The field area network will be able to communicate with the new Riva meters and the approximately 790,000 remaining AMR meters that were installed beginning with the initial AMR deployment started in 2006. This hybrid solution will enable interval data and outage management capability for the AMR meters while allowing the investment to be better utilized. Over time, the AMR meters will be replaced with AMI meters as they fail, or new meters are connected, or in areas where customer or business benefits are identified.

Outage Management Improvements

PacifiCorp is in the process of upgrading its outage management software to incorporate smart meters outage notifications. These notifications, in concert with customer reported outages, will provide higher visibility into distribution systems to identify the most likely point of failure. With this information field operations will be able to locate and isolate the damaged sections and restore customers sooner, while providing better clarity to customers through the existing web-based outage map. The software upgrade will be completed in mid-2020.

In Utah, PacifiCorp has initiated a project to enhance the ability to receive outage notifications from intelligent line sensors, smart meters and existing AMR meters. The intelligent line sensors will be installed on distribution circuits that will provide service to critical facilities. For the purpose of this project, critical facilities have been defined as major emergency facility centers such as hospitals, trauma centers, police and fire dispatch centers, etc. The information provided by the line sensors will allow control center operators to target restoration at critical facilities during major outages sooner than is currently possible. Full implementation of the project is expected to be completed by December 2021, concurrent with the completion of the AMI project.

Future Smart Grid

PacifiCorp is continuing to evaluate smart grid technologies and pilot projects that can benefit customers. The company regularly develops smart grid reports to examine the quantifiable costs and benefits of individual components of the smart grid. While the net present value of implementing a comprehensive smart grid system throughout PacifiCorp is negative at this time, the company has implemented specific projects and programs that have positive benefits for customers and continue to explore pilot projects in other areas of interest. In order to reduce risks to the company, the grid, our customers and supporting systems, it is essential to identify affordable advanced technologies and implement industry best practices.

Case Fact Sheets - Overview

CP-Cases Portfolio-Development Fact Sheets

The following CP-Cases Portfolio-Development Fact Sheets summarize key assumptions and portfolio results for each CP-Case developed for the 2019 IRP.

Quick Reference Guide

Case	Description	Parent Case	SO PVRR ($m)	Load	Private Gen	CO_2 Policy	FOTs	Gateway	1st Year of New Thermal
P-36CP	Jim Bridger 1-2 and Naughton 1-2 Retirement 2025	P-46	21,553	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026
P-45CP	Jim Bridger 1-2 Retirement 2023 and 2038	P-31	21,480	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026
P-46CP	Jim Bridger 3 & 4 Retirement 2025	P-31	21,460	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026
P-46CP J23C	Jim Bridger 3 & 4 Retirement 2023	P-46	21,402	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026
P-47CP	Jim Bridger 3 & 4 Retirement 2035	P-45	21,469	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026
P-48CP	Jim Bridger 3 & 4 Retirement 2033	P-45	21,457	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026
P-53CP	Jim Bridger 1 & 2 Retirement 2025, Jim Bridger 3 Retirement 2028, and Jim Bridger 4 Retirement 2032	P-31	21,479	Base	Base	Med Gas, Med CO_2	Base	Segment F	2026

No Gas & Energy Gateway Fact Sheets

The following Fact Sheets summarize key assumptions and portfolio results for each No Gas and Energy Gateway Case developed for the 2019 IRP.

Quick Reference Guide

Case	Description	Parent Case	SO PVRR ($m)	Load	Private Gen	CO_2 Policy	FOTs	Gateway	1st Year of New Thermal
P-29	P-45CNW, No New Gas Option	P-45CNW	21,798	Base	Base	Med Gas, Med CO_2	Base	Segment F	-
P-29 PS	P-45CNW, No New Gas Option with pumped hydro storage	P-45CNW	21,970	Base	Base	Med Gas, Med CO_2	Base	Segment F	-

Case	Description	Parent Case	SO PVRR ($m)	Load	Private Gen	CO_2 Policy	FOTs	Gateway	1st Year of New Thermal
P-22	Energy Gateway Segment D.3	P-45CNW	21,886	Base	Base	Med Gas, Med CO_2	Base	Add Segment D.3	2030
P-23	Energy Gateway Segment D.3, E & H	P-36CP[1]	22,151	Base	Base	Med Gas, Med CO_2	Base	Add Segments D.3, Segment E, and H	2026
P-25	Energy Gateway Segment D.3, E & H	P-45CNW	22,273	Base	Base	Med Gas, Med CO_2	Base	Add Segments D.3, Segment E, and H	2030
P-26	Energy Gateway Segment H	P-45CNW	21,579	Base	Base	Med Gas, Med CO_2	Base	Add Segment H	2028

[1] P-36 retirements with no DJ wind, no stand-alone solar and expanded reliability studies.

Energy Gateway Portfolio-Development Fact Sheets

CASE ASSUMPTIONS

Description

Gateway Study P-22 includes Segment D3 –Bridger/Anticline to Populus, which also increases Path C capacity from Borah to Utah North. Path C capacity expands by 1,000 MW northbound, and by 650 MW southbound. This sensitivity is a variant of the preferred portfolio, P-45CNW.

PORTFOLIO SUMMARY

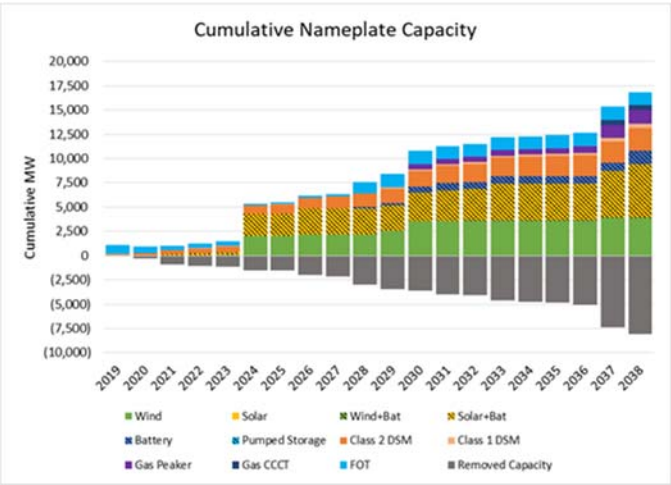
System Optimizer PVRR ($m) ***$21,886***

Incremental Transmission Upgrades

Description	***Year***	***Capacity***
(D3) Bridger/Anticline-Populus	*2026*	*1,700+1,000*
Aeolus Wyoming – to - Utah S	*2024*	*1,700*
Goshen – to – Utah N	*2030*	*800*
Yakima- to – S. Oregon/California	*2037*	*450*

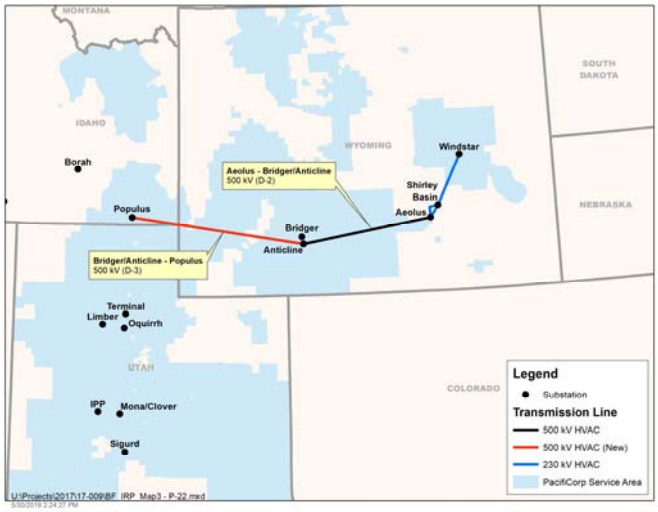
Resource Portfolio

Cumulative changes to the resource portfolio (new resource additions to address load service and reliability requirements and resource retirements), represented as cumulative nameplate capacity, are summarized in the figure below.



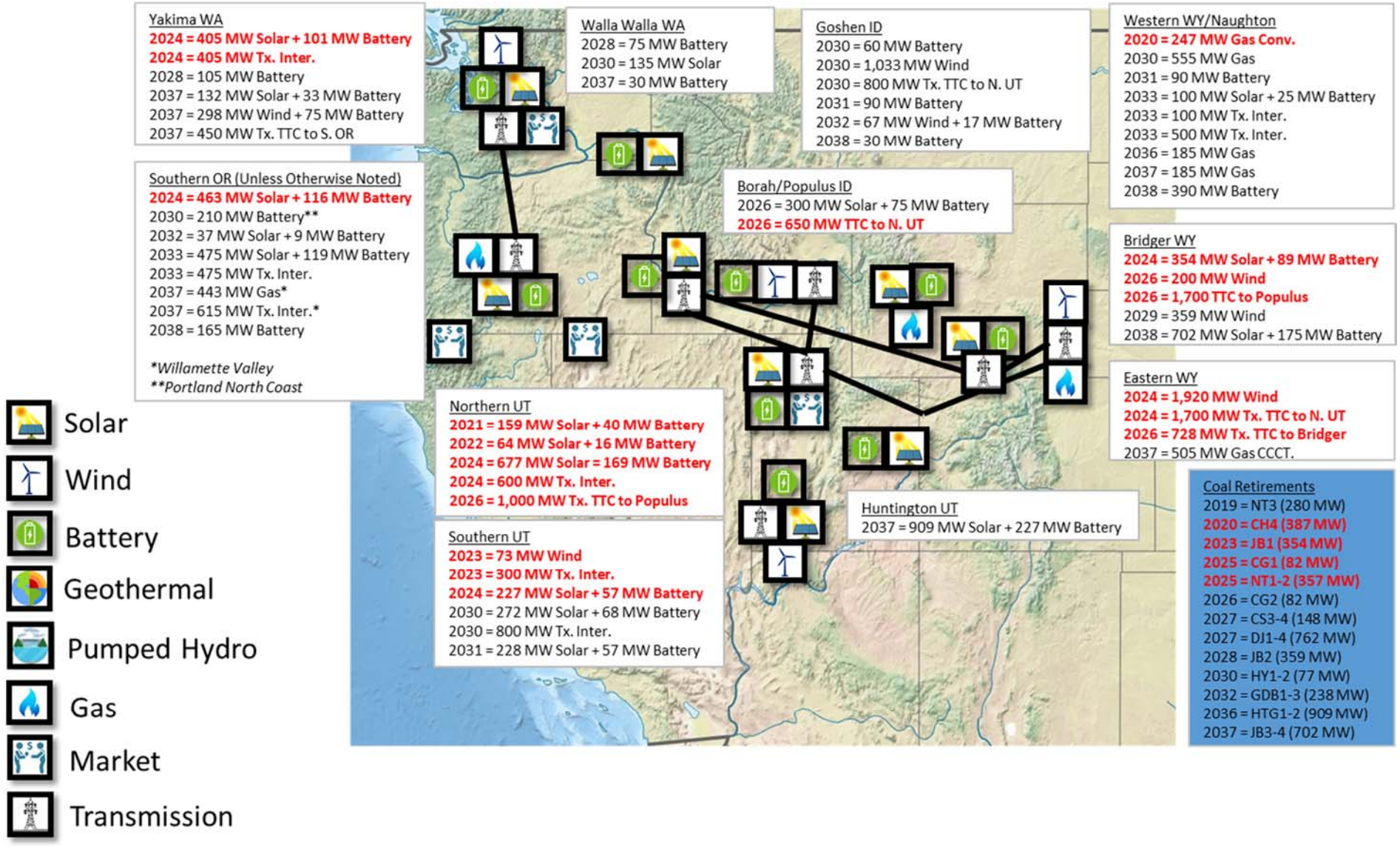
Transmission

Incremental transmission path D3 is shown in the map below.



Portfolio: Energy Gateway Segment D3 (P-22)

P-22 (Energy Gateway Segment D3)



Energy Gateway Portfolio-Development Fact Sheets

CASE ASSUMPTIONS

Description

Gateway Study P-23 includes Segment D3 – Populus to Bridger/Anticline, along with Segment E, Populus-Hemingway and Segment H, Boardman – Hemingway. This sensitivity is a variant of the case P-36CP.

PORTFOLIO SUMMARY

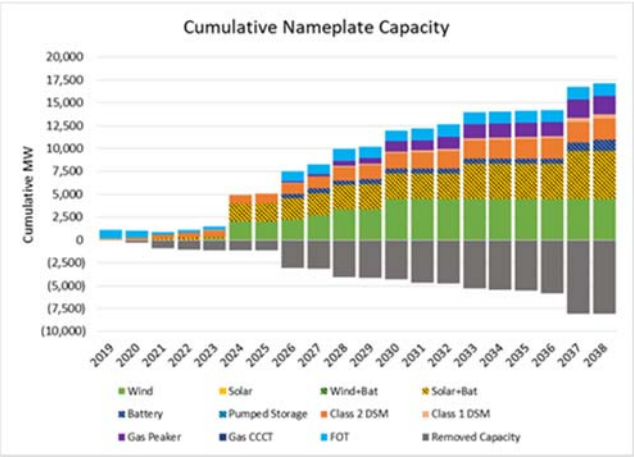
System Optimizer PVRR ($m) ***$22,151***

Incremental Transmission Upgrades

Description	***Year***	***Capacity***
D3 – Bridger/Anticline-Populus	*2026*	*1,700+1,000*
E – Populus-Hemingway	*2026*	*1,260*
H – Boardman-Hemingway	*2027*	*600*
Aeolus Wyoming – to - Utah S	*2024*	*1,700*
Goshen – to – Utah N	*2030*	*800*
Yakima- to – S. Oregon/California	*2037*	*450*

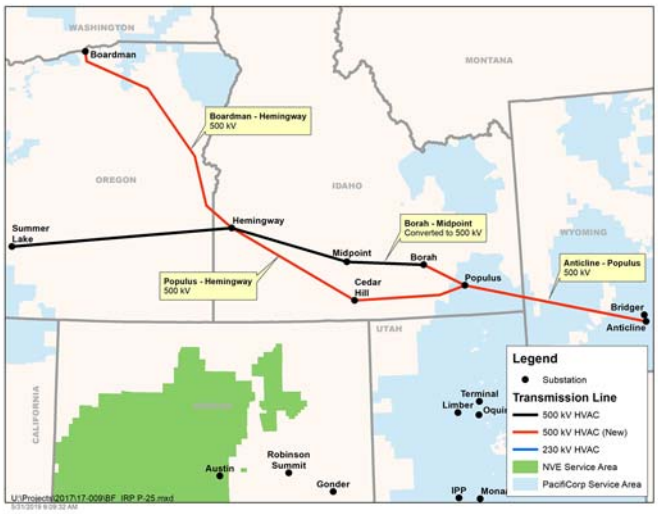
Resource Portfolio

Cumulative changes to the resource portfolio (new resource additions to address load service and reliability requirements and resource retirements), represented as cumulative nameplate capacity, are summarized in the figure below.



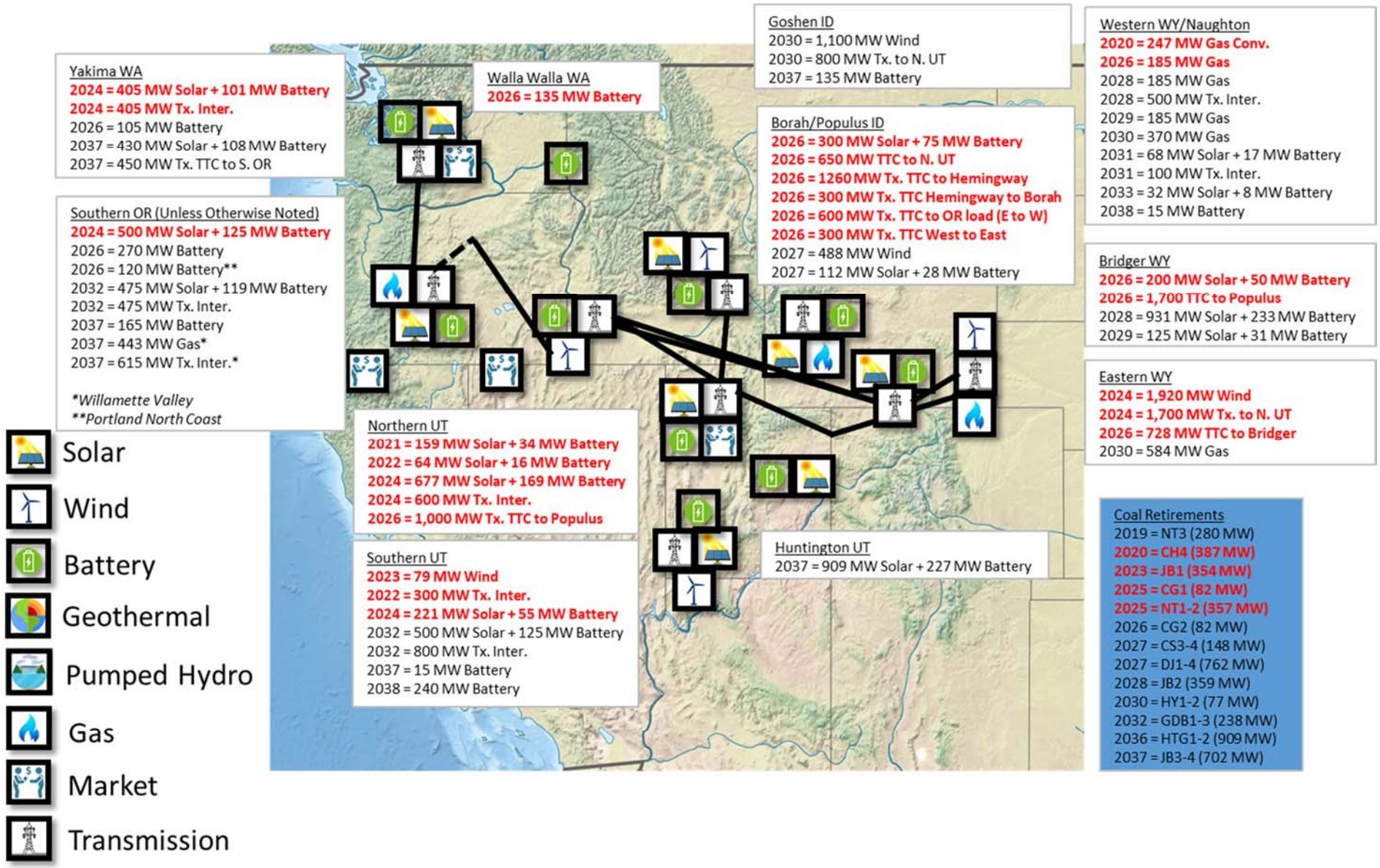
Transmission

Incremental transmission paths are shown in the map below.



Portfolio: Energy Gateway Segments D3, E and H (P-23)

P-23 (Energy Gateway Segments D3, E and H)



Energy Gateway Portfolio-Development Fact Sheets

CASE ASSUMPTIONS

Description

Gateway Study P-25 includes Segment D3 – Populus to Bridger/Anticline, along with Segment E, Populus-Hemingway and Segment H, Boardman - Hemingway. This sensitivity is a variant of the preferred portfolio, P-45CNW.

PORTFOLIO SUMMARY

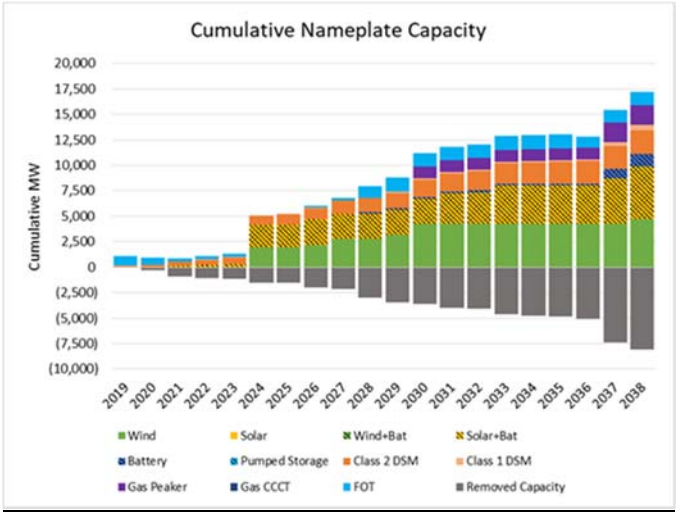
System Optimizer PVRR ($m) ***$22,273***

Incremental Transmission Upgrades

Description	***Year***	***Capacity***
D3 – Bridger/Anticline-Populus	*2026*	*1,700+1,000*
E – Populus-Hemingway	*2026*	*1,260*
H – Boardman-Hemingway	*2027*	*600*
Aeolus Wyoming – to - Utah S	*2024*	*1,700*
Goshen – to – Utah N	*2030*	*800*
Yakima- to – S. Oregon/California	*2038*	*450*

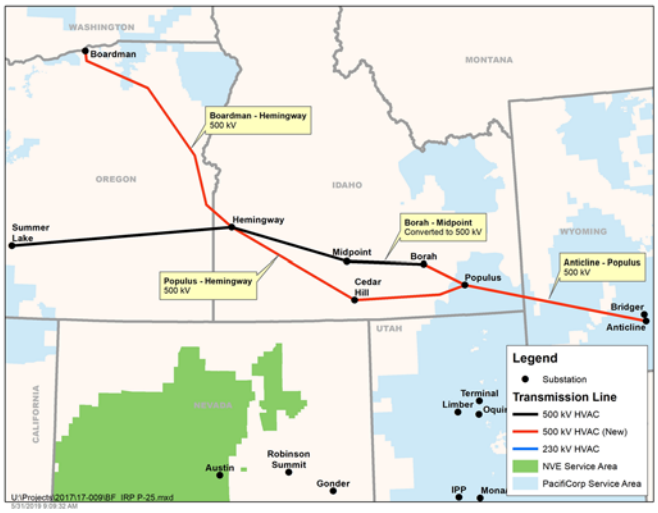
Resource Portfolio

Cumulative changes to the resource portfolio (new resource additions to address load service and reliability requirements and resource retirements), represented as cumulative nameplate capacity, are summarized in the figure below.



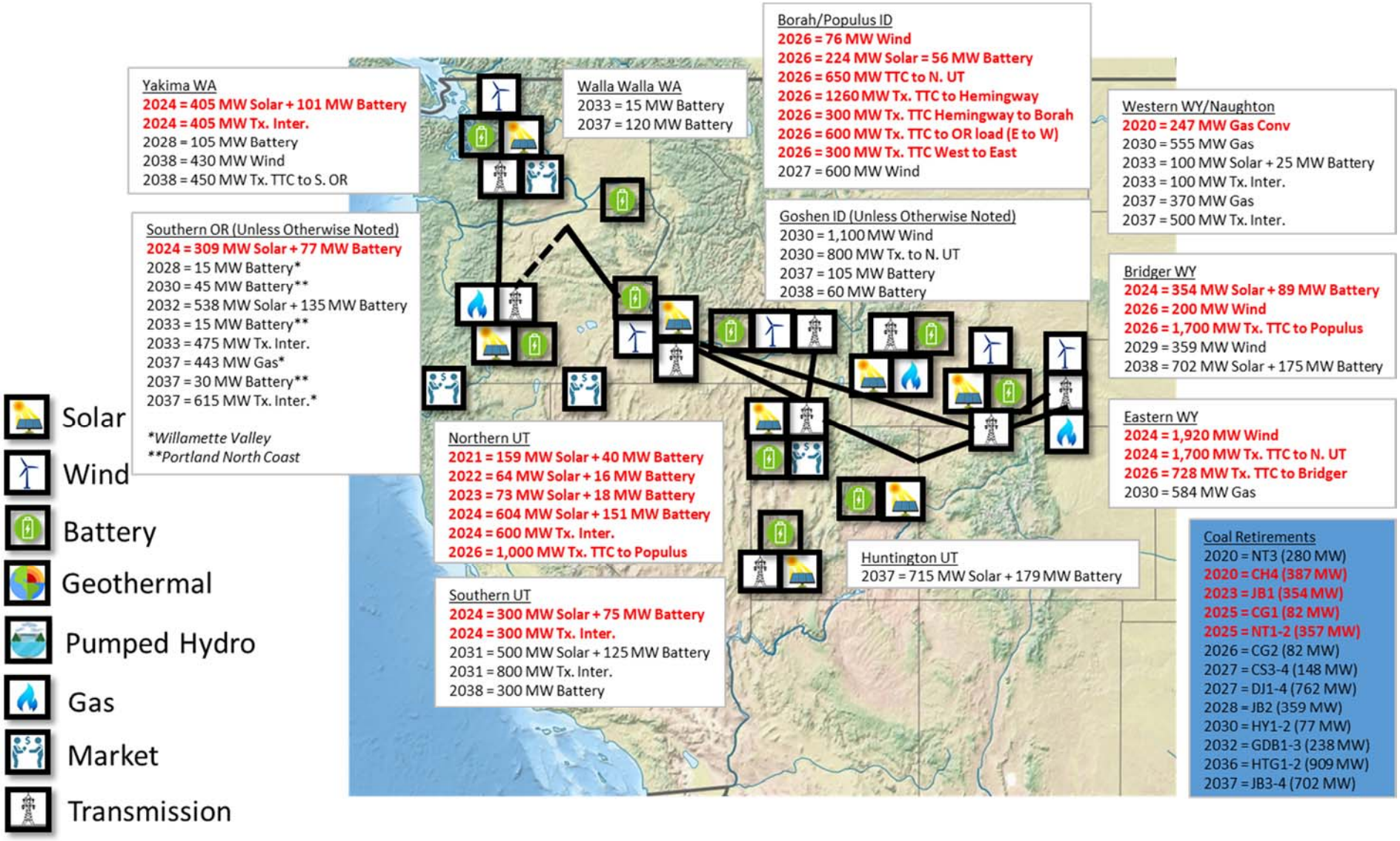
Transmission

Incremental transmission paths are shown in the map below.



Portfolio: Energy Gateway Segments D3, E and H (P-25)

P-25 (Energy Gateway Segment D3, E, and H)



Energy Gateway Portfolio-Development Fact Sheets

CASE ASSUMPTIONS

Description

Gateway Study P-26 includes Segment H, Boardman - Hemingway. This sensitivity is a variant of the preferred portfolio, P-45CNW.

PORTFOLIO SUMMARY

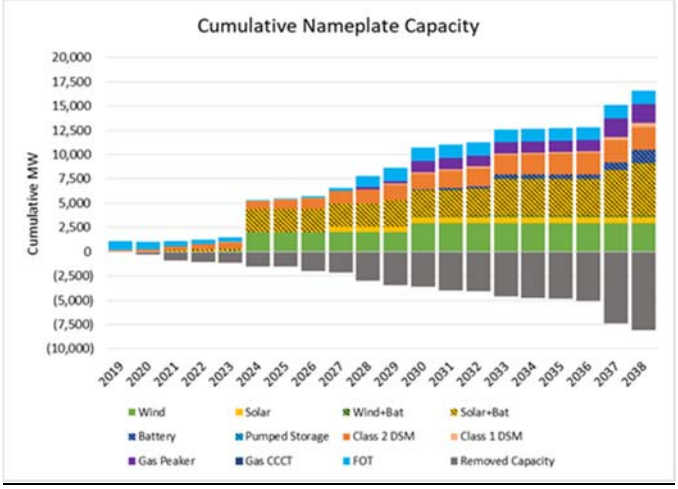
System Optimizer PVRR ($m) ***$21,579***

Incremental Transmission Upgrades

Description	***Year***	***Capacity***
H – Boardman-Hemingway	*2027*	*600*
Aeolus Wyoming – to - Utah S	*2024*	*1,700*
Goshen – to – Utah N	*2030*	*800*

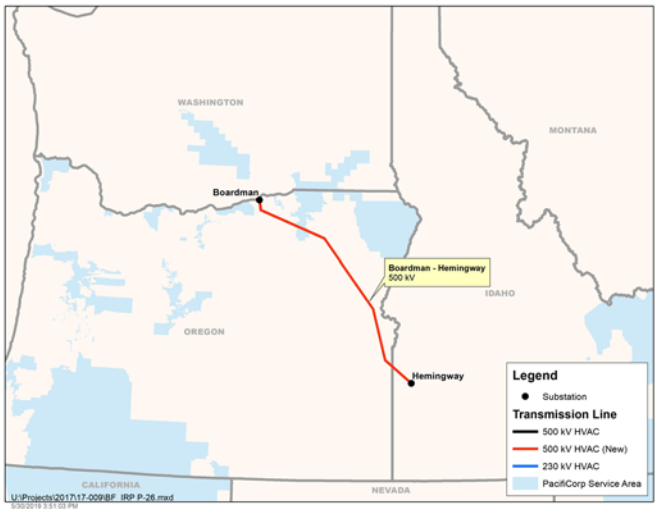
Resource Portfolio

Cumulative changes to the resource portfolio (new resource additions to address load service and reliability requirements and resource retirements), represented as cumulative nameplate capacity, are summarized in the figure below.



Transmission

Transmission path is shown in the map below



CERTIFICATE OF SERVICE

Docket No. 19-035-02

I hereby certify that on October 25, 2019, a true and correct copy of the foregoing was served by electronic mail to the following:

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