Integrated Resource Plan

2023 IRP Public Input Meeting

February 25, 2022




PACIFICORP
POWERING YOUR GREATNESS

Agenda

February 25, 2022

- 9:00 am - 9:15 am pacific – Introductions
- 9:15 am - 11:45 am pacific – 2023 Conservation Potential Assessment (CPA)
- 11:45 am - 12:15 pm pacific – Lunch Break (30 min)
- 12:15 pm - 1:15 pm pacific – 2023 Supply-Side Resources
- 1:15 pm - 1:30 pm pacific – 2021 IRP Update / 2023 IRP Overview
- 1:30 pm - 1:45 pm pacific – 2023 IRP Public-Input Meeting Schedule
- 1:45 pm - 2:00 pm pacific – Wrap-Up / Next Steps

2023 Integrated Resource Plan (IRP) Conservation Potential Assessment




PACIFICORP
POWERING YOUR GREATNESS

Agenda/Topics

Introduction & Overview

- Background
- Conservation Potential Assessment (CPA) Overview

Potential Assessment Details

- Key Changes and Updates
- Market Characterization and Baseline Development
- Measure Characterization
- Potential Estimation

Stakeholder Feedback and Next Steps

- Feedback on 2023 CPA Work Plan (In Progress)
- 2023 IRP Public Input Meeting Schedule

Background

PacifiCorp's Conservation Potential Assessment (CPA) supports the Company's regulatory filing and other demand-side management (DSM) planning efforts and initiatives.

The two primary research objectives for the 2023 CPA are:

- **IRP:** long-term forecast of future demand response (DR) and energy efficiency (EE) technical achievable potential for dynamic optimization in the IRP
- **Program Planning:** insights into the near-term market for DSM
  - e.g., existing measures to prioritize and new measures to consider

PacifiCorp has hired a third-party consultant, AEG, to develop comprehensive analytical models that are customized to PacifiCorp's market in each jurisdiction (excluding EE in Oregon).

- Energy Trust of Oregon will be conducting a similar analysis for EE in Oregon

Conservation Potential Assessment Overview




PACIFICORP
POWERING YOUR GREATNESS

Definitions - Resource Classes

PacifiCorp separates DSM resources into four classes:

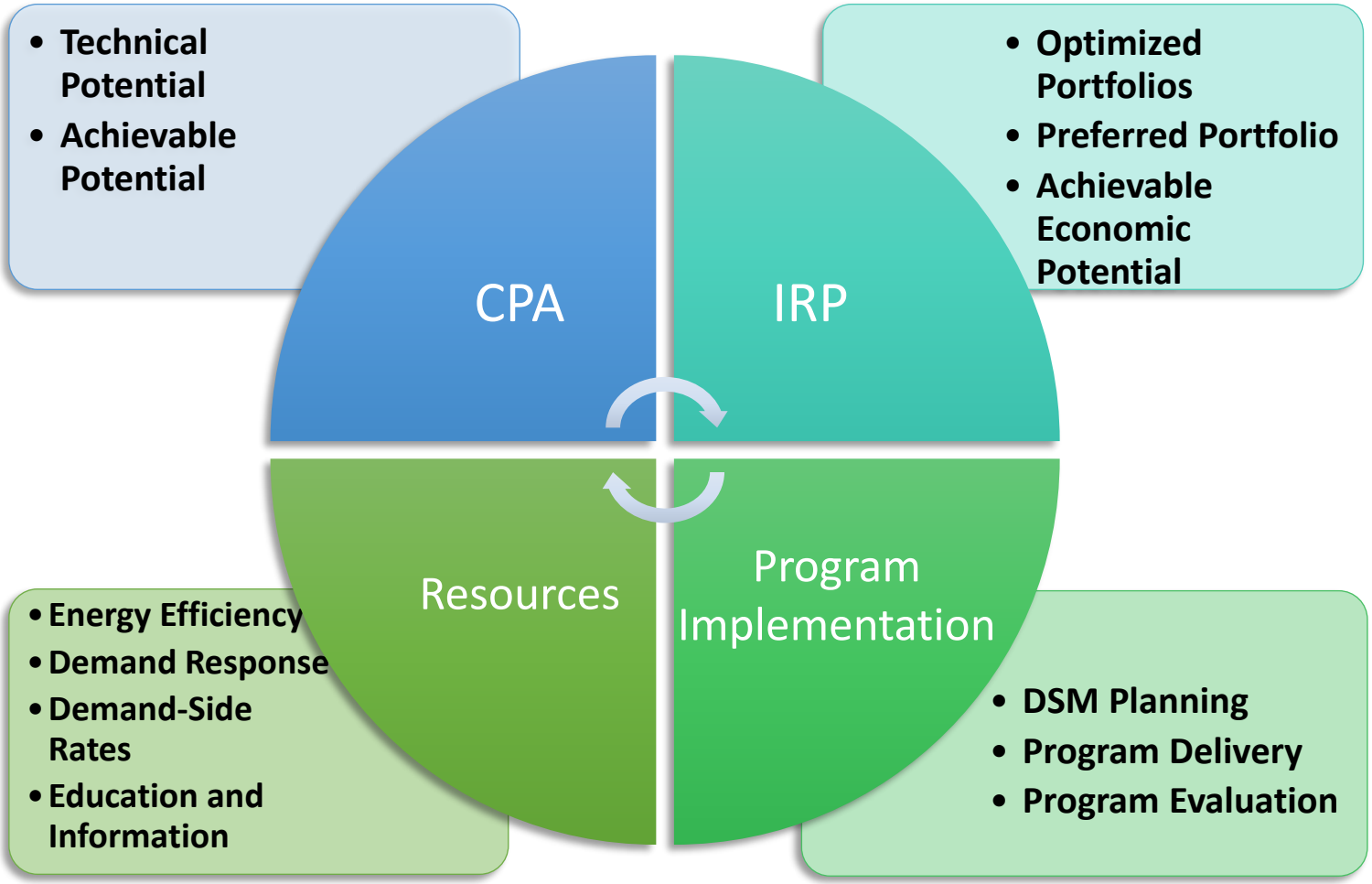
Demand Response (DR) (*Class 1*)**:** Resources from fully dispatchable or scheduled firm capacity product offerings/programs such as a load control.

Energy Efficiency (EE) (*Class 2*)**:** Resources from non-dispatchable, firm energy and capacity product offerings/programs such as energy efficiency and incremental savings from home energy reports.

Demand-Side Rates (*Class 3*)**:** Resources from price-responsive energy and capacity product offerings/programs such as pricing response or load shifting.

Education and Information (*Class 4*)**:** Non-incented behavioral-based impacts achieved through broad energy education and communication efforts.
**Last assessed in 2007*

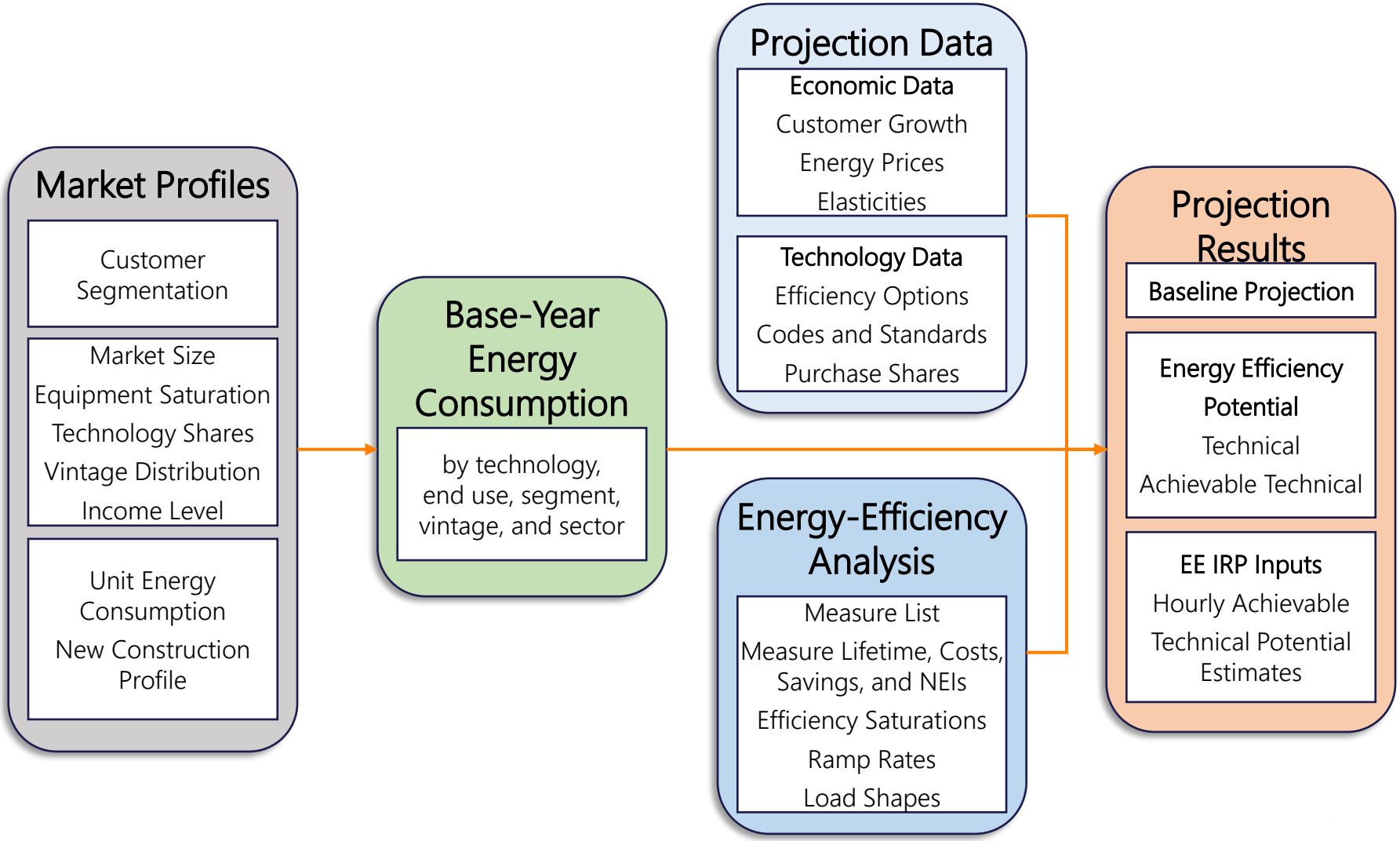
DSM Development Process for the IRP



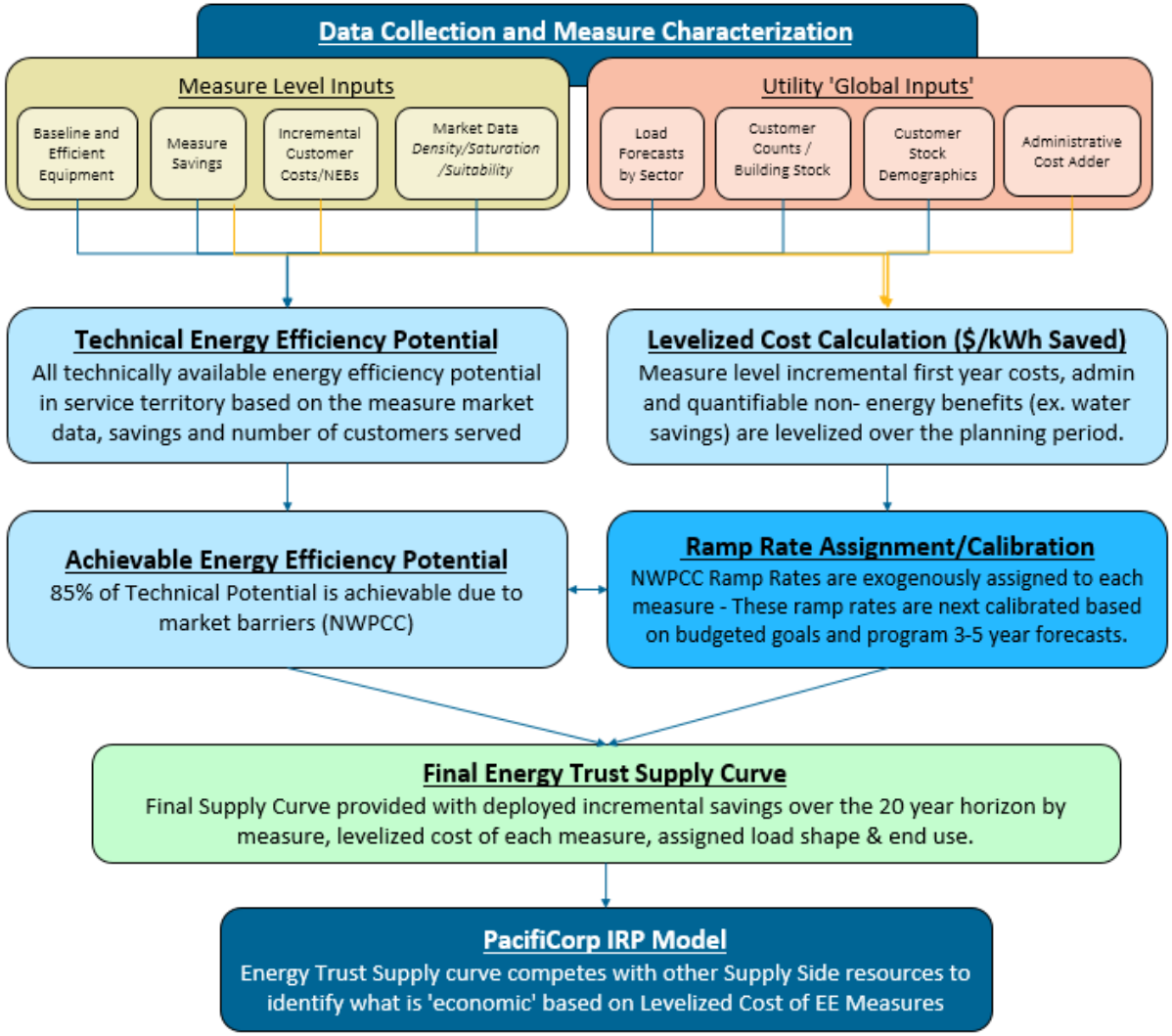
Areas of Coordination between Energy Trust and PacifiCorp

Element	Coordination Description
Measure Lists	Measure lists will be shared between the organizations to ensure alignment of conventional measures
Measure-Level Data	The organizations will share data inputs if one organization is missing data for a measure
Emerging Technologies	The two organizations will coordinate on emerging technology measures and research to align as best as possible on these technologies
Load Profiles	Ensuring lineup between the load profiles used by the organizations
Market Characterization	Coordinate assumptions between energy efficiency and demand response analyses
Low-Income Segmentation	Exploring segmentation of low-income potential to better understand different customers and line up potential for a more segmented residential sector

CPA Methodology (except Oregon)



Energy Trust of Oregon Methodology



Oregon Potential Methodology Comparison to Other States

- The overarching data inputs and sources between Energy Trust and the other states is generally the same
- The methodologies result in the same types of potential, but take slightly different paths to get there
  - AEG model builds a customer segment usage profile based on the same types of inputs as Energy Trust and estimates potential by looking at energy efficient options for that profile
  - Energy Trust builds up potential from the measure level and uses a 'density' to account for the customer segment profiles.
- Additional information can be provided by Energy Trust

Accounting for Differences between States

The DSM analysis is customized for each of PacifiCorp's six states. Some examples include:

- Local market conditions (customer composition, weather, home and building characteristics, etc.)
- State building codes and appliance standards
- Measure sources and assumptions
- Cost-effectiveness tests (pTRC, TRC, UCT, non-energy impacts)
- Participation rate and administrative cost assumptions
- Low- and moderate-income thresholds

Throughout the 2023 CPA, and within the final report, we will provide additional documentation surrounding these, and other, differences.

**Methodology changes and updates are highlighted in BLUE throughout this slide deck*

Key Changes and Updates
2023 CPA




PACIFICORP
POWERING YOUR GREATNESS

Summary of Key Changes and Updates Relative to the 2021 CPA

A number of key methodology changes and updates are present in the Draft Work Plan distributed this month (February 2022).

Some key updates/expansions include:

- Renewed emerging technology screen
  - Feedback on the forthcoming measure list is appreciated
- Low-income segmentation for all states
- Expanded integration of non-energy impacts in applicable States.
- Scenario and sensitivity analysis for up to 3 distinct energy efficiency scenarios.
- Assess Education and Information opportunities
- Assess impacts of existing demand-side rates

Low-Income Segmentation

Updated Approach

- In 2021 CPA, segmented residential low-income customers for Washington
- In 2023 CPA, segmenting residential low-income customers in all states*
- Threshold definitions for 2021 (same as Residential Survey year)
  - Three income categories: low, moderate, and above-moderate
  - Combination of federal poverty guidelines (FPG) and state median income (SMI), depending on LIHEAP annual income and household size levels

Jurisdiction	Threshold Definitions		
	Low-Income:	**Moderate-Income:** Above LI and Below:	**Above-Moderate Income:**
CA	≤ 60% SMI	≤ 100% SMI	> 100% SMI
ID	≤ 200% FPG		
OR*	≤ 200% FPG		
UT	≤ 200% FPG		
WA	≤ minimum of (60% SMI, 200% FPG)		
WY	≤ 60% SMI		

**The Oregon segmentation process and criteria are still being determined*

Resource Hierarchy: Energy Efficiency

Updated Approach

Similar to the 2021 CPA, a "Resource Hierarchy" for energy efficiency source data **specific to each state** has been developed.

Expanded/clarified for the 2023 CPA

Focus on state-specific needs and applicable sources → Prioritize TRMs from neighboring states and utilities → Leverage national sources, consider reliable TRMs from Midwest/Northeast

Priority	Washington	Idaho	Utah/Wyoming	California
Primary	RTF	RTF	RMP Ex-Ante Measure Characterizations RTF with Adjustments	California Technical Forum Electronic TRM (eTRM)
Secondary	2021 Power Plan Program-Specific Evaluations	RMP Ex-Ante Measure Characterizations Idaho Power TRM Program-Specific Evaluations	Idaho Power TRM Xcel Energy Colorado DSM Plan Program-Specific Evaluations	RTF with Adjustments 2021 CPUC P&G Study DEER and Non-DEER Workpapers Program-Specific Evaluations
Other	California eTRM RMP| National Sources Other Regularly Updated TRMs	2021PP | California eTRM | National Sources | Other Regularly Updated TRMs	2021PP | California eTRM | National Sources | Other Regularly Updated TRMs	CMUA TRM | 2021PP National Sources | Other Regularly Updated TRMs

Emerging Technologies

Updated Approach

The 2021 CPA included an in-depth review of emerging technology options (Appendix B of final report)

- Conducted a thorough review of emerging technologies, using data from NEEA, BPA, E3T, NREL, U.S. DOE, ETCC, and pilot/R&D programs throughout the nation
- Technical maturity (e.g., R&D, pilot, or regional implementation)
- Applicability (e.g., small niche, one segment, one sector)
- Data availability (e.g., manufacturer claims, independent studies, pilot data)

2023 Approach:

- Measures included as ET in 2021 will be reviewed for inclusion as conventional
- Measures put on the "watch list" in 2021 will be reviewed for inclusion in the potential
- Additional research to screen latest studies for addition of measures to CPA or watch list

Results of this analysis will be shared with the measure list.

Emerging Technologies - Examples

- Emerging measures added in 2021 CPA:
  - Stove - Smart Heating Elements (Residential)
  - Ozone Laundry (Residential)
  - Municipal Water Treatment - UV-C LED Disinfection
- Screened-out measures ("watch list")
  - Aerogel Insulation
  - Phase Change Building Materials
  - Clothes Washer - Polymer Bead Washer
  - Windows – Dynamic Glazing

- Measures included as emerging in the 2019 CPA and moved to conventional in the 2021 CPA:
  - Ductless Heat Pumps
  - Connected Thermostats
  - Heat Pump Water Heater (EF 2.45)

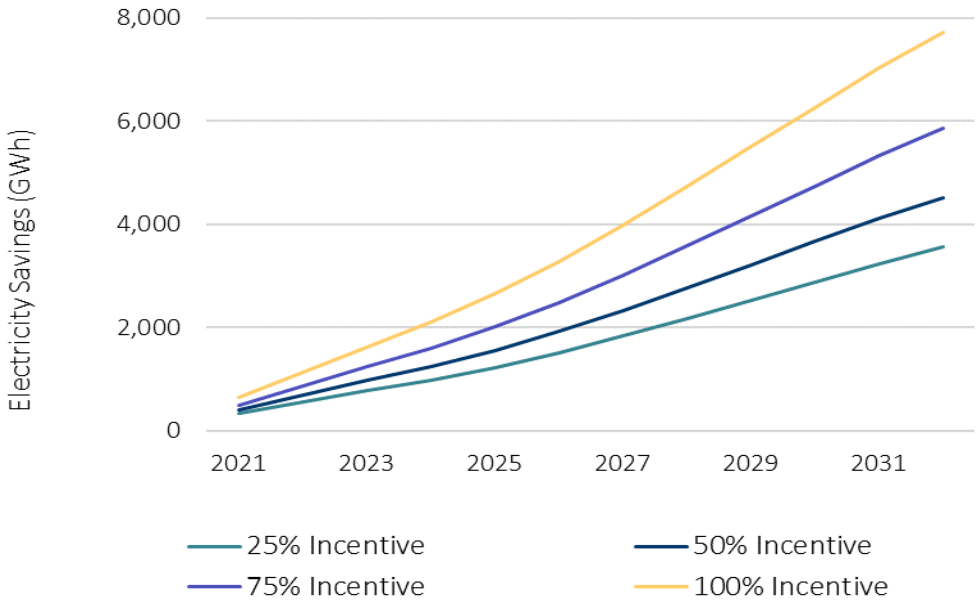
- PacifiCorp is soliciting emerging technology suggestions through IRP stakeholder feedback form request
- For full list of emerging technologies that were included or considered in the 2021 CPA, please refer to Appendix B measure tables posted on PacifiCorp website.

Energy Efficiency Scenario/Sensitivity Analysis

Updated Approach

- End-use load forecasting model allows for deep insight into EE potential **and** customized scenario analysis around inputs

- PacifiCorp team will develop up to three (3) distinct energy efficiency DSM potential scenarios, which may reflect changes in:
  - Load Forecasts
  - Weather/Climate
  - EE market adoption rates
  - Measure or program costs
  - Other factors that may affect resource potential/cost



Market and Program Characterization: Demand Response and Demand-Side Rates

The 2021 CPA increased alignment between EE and DR/DSM Rates resources

- Common baseline forecast
- Adoption of EE measures informs opportunities for DR and Rates

Identified potential for short- and sustained-duration events

2023 CPA will continue with this approach and incorporate any promising new program designs and refine applications of existing ones.

2023 CPA will review opportunities to incorporate attributable and quantifiable non-energy impacts

Resource Hierarchy: DR/DSM Rates

Updated Approach

- Creating more formalized hierarchy for Demand Response and Demand-side Rate Resources
- Same prioritization logic as in 2021 CPA
- Hierarchy more generic, but data for each state is prioritized by:
  - State Specificity
  - Region Specificity
  - National and Other Sources

Priority	Sources for DR/Rates
Primary	PacifiCorp Program and RFP Data
Secondary	Evaluated Program Data 2021 Power Plan 2021 CPUC P&G Study
Other	Evaluated Data from Other Jurisdictions National Sources

Existing DSM Rate Impacts

Updated Approach

- Impacts of existing DSM rates were last updated in the 2015 CPA
  - Structure and rates have and will continue to change
- Where existing rate impacts are pertinent to future planning:
  - Capture new DSM rate offerings
  - Ensure that prior estimates remain appropriate
  - Align impacts between relevant offerings and identified potential
- For relevant rates, use price elasticity for demand estimates
  - Review recent PacifiCorp estimates from sales forecasting models
  - Review and compile secondary elasticity data for similar programs/pilots
  - E.g., Elasticity of -0.10 = price goes up 100%, demand goes down 10%

Education/Information Measures

Updated Approach

- New for the 2023 CPA – review opportunities for educational/informational measures (previously “Class 4”)
- Firmer behavioral measures (Energy Reports, SEM, behavioral DR) continue to be evaluated as part of energy efficiency analysis in the CPA
- Review programs offered by other utilities, with a particular focus on those that have evaluated impacts and where implementation costs are public

- Examples:
  - School Energy Education
  - Conservation Messaging during Critical Events
  - ENERGY STAR Portfolio Manager
  - Building Operator Certification

Market Characterization and Baseline Development




PACIFICORP
POWERING YOUR GREATNESS

Market Segmentation: Example

The first step in the CPA analysis is to characterize the market, answering the question:

"How do PacifiCorp's customers use energy today?"

Begin by analyzing PacifiCorp data to segment the market by:

- **State** (CA, ID, OR*, UT, WA, WY)
- **Sector** (Residential, Commercial, Industrial, Irrigation)
- **Segment** (Various)

Utah Commercial Segmentation (2021 CPA)

Segment	Consumption (MWh)	Floor Space (sf)	Intensity (kWh/sf)
Large Office	1,953,386	123,322,683	15.84
Small Office	1,256,783	100,262,121	12.53
Large Retail	472,209	30,156,013	15.66
…	…	…	…
Total	**9,039,386**	**715,538,852**	**12.63**

PacifiCorp Sales and Customers (Total Area)

PacifiCorp Customer Account Data
- Residential: Dwelling Code
- Nonresidential: SIC Code

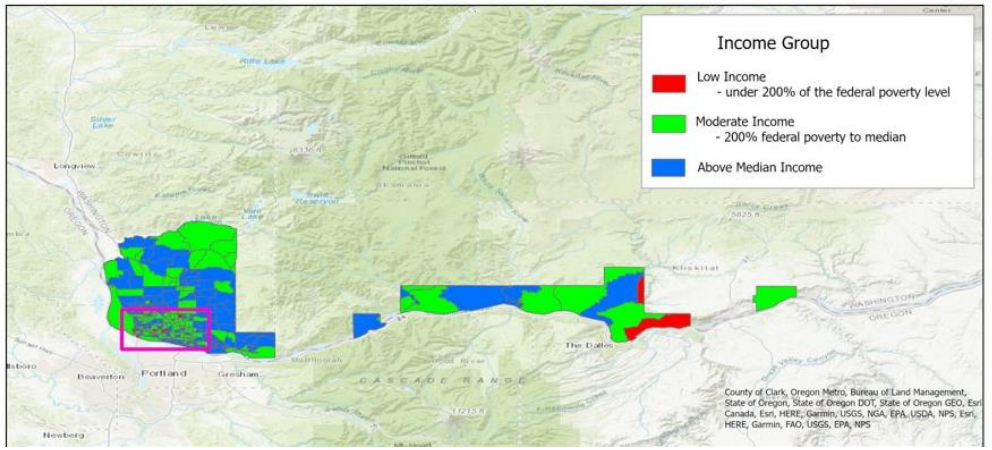
**AEG develops Oregon segmentation for DR and P&R purposes only*

Market Segmentation: Low Income

- Expanding low-income segmentation in 2023 CPA
- Map census block groups from American Community Survey to PacifiCorp customer data
- Residential surveys (stratified by income) identify differences in equipment saturation by income
- NEEA's Residential Building Stock Assessment to inform differences in building characteristics across income groups
- Use Low-Income Weatherization program results to ensure reasonableness of measure applicability and per-home savings

Washington Residential Segmentation (2021)

Segment	Consumption (MWh)	Households	Intensity (MWh/HH)
Single Family	904,664	57,460	15.7
Single Family - LI	279,984	17,455	16.0
Multi-Family	79,437	8,184	9.7
Multi-Family - LI	116,954	11,988	9.8
Mobile Home	128,510	7,233	17.8
Mobile Home - LI	98,218	5,497	17.9
Total	1,607,767	107,817	14.9



Market Profiles: Example

After segmenting the market, the team allocates consumption and peak load to individual technologies present

UEC: Unit Energy Consumption

*Usage = (Saturation*UEC)*(# homes)*

Baseline Study Data

- Residential: PacifiCorp Customer Decisions Survey
- C&I: NEEA CBSA and IFSA, AEG Energy Market Profiles (Pacific and Mountain)

Consumption Data

- HVAC: Calibrated energy simulations
- Non-HVAC: Engineering algorithms (TRMs and RTF workbooks) and the U.S. DOE's Annual Energy Outlook (AEO)

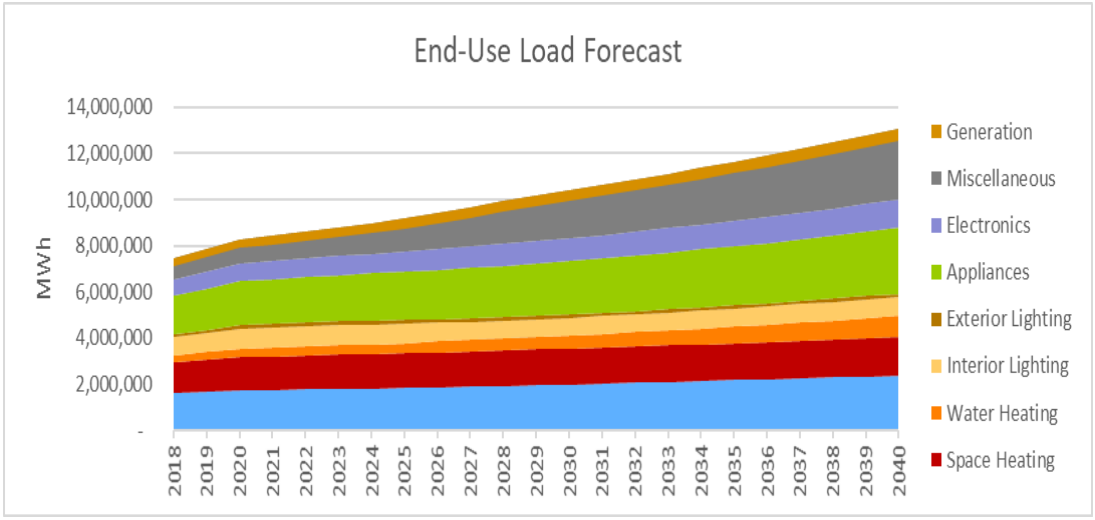
Utah Single Family, 2021 CPA

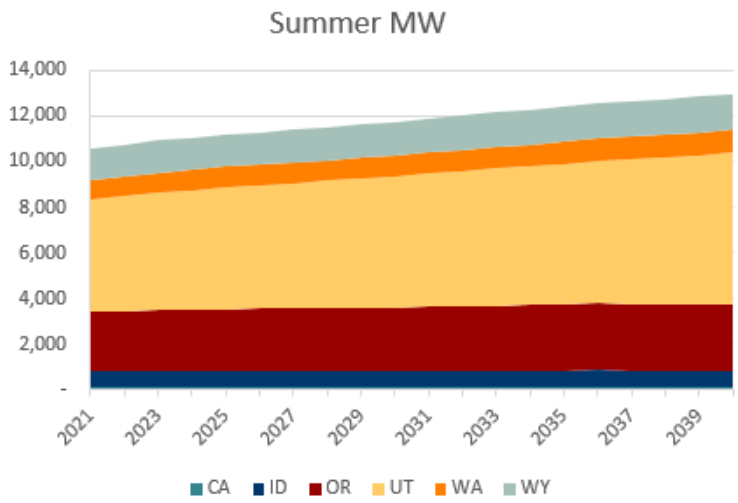
End Use	Technology	Saturation	UEC (kWh)	Intensity (kWh/HH)	Usage (MWh)
Cooling	Central AC	79%	2,947	2,317	1,351,930
Cooling	Room AC	7%	517	36	20,819
Cooling	Air-Source Heat Pump	2%	3,095	72	42,082
Cooling	Geothermal Heat Pump	1%	3,182	26	15,286
Cooling	Evaporative AC	10%	354	35	20,398
Space Heating	Electric Room Heat	1%	15,941	238	138,997
Space Heating	Electric Furnace	6%	15,804	987	575,571
Space Heating	Air-Source Heat Pump	2%	9,680	226	131,617
Space Heating	Geothermal Heat Pump	1%	4,895	40	23,513
Space Heating	Secondary Heating	31%	1,768	553	322,415
Water Heating	Water Heater <= 55 Gal	10%	2,919	288	167,994
Water Heating	Water Heater > 55 Gal	0%	3,016	6	3,533
Interior Lighting	General Service Lighting	100%	657	657	383,359
Interior Lighting	Linear Lighting	100%	117	117	68,467
Interior Lighting	Exempted Lighting	100%	344	344	200,968
Exterior Lighting	Lighting	100%	222	222	129,437
Appliances	Clothes Washer	98%	109	107	62,425
Appliances	Clothes Dryer	77%	789	609	355,333
Appliances	Dishwasher	81%	94	76	44,300
Appliances	Refrigerator	100%	557	556	324,210
Appliances	Freezer	63%	472	297	173,297
Appliances	Second Refrigerator	45%	829	373	217,742
Appliances	Stove/Oven	58%	443	258	150,749
Appliances	Microwave	93%	121	113	66,086
Electronics	Personal Computers	79%	146	115	67,057
Electronics	Monitor	124%	58	71	41,655
Electronics	Laptops	233%	38	89	51,685
Electronics	TVs	229%	100	229	133,873
Electronics	Printer/Fax/Copier	118%	40	48	27,797
Electronics	Set-top Boxes/DVRs	44%	95	42	24,472
Electronics	Devices and Gadgets	100%	347	347	202,156
Miscellaneous	Electric Vehicles	1%	4,324	36	21,158
Miscellaneous	Pool Pump	3%	1,313	34	19,613
Miscellaneous	Pool Heater	1%	3,517	34	19,867
Miscellaneous	Hot Tub / Spa	6%	1,897	113	66,034
Miscellaneous	Furnace Fan	90%	372	334	194,588
Miscellaneous	Well pump	3%	561	17	10,167
Miscellaneous	Miscellaneous	100%	856	856	499,120
Generation	Solar PV	5%	-11,051	-586	-341,815

Baseline Projection - Example

End-use projection of energy and demand, aligned as appropriate with PacifiCorp's approved Load Forecast

- **Frozen efficiency** for most measures (technology is fixed at present-day levels throughout forecast)
- **Codes and standards** applied when "on the books" at the federal and state levels
- **Market baseline** for some measures in relevant jurisdictions when naturally-occurring efficiency and market transformation are present (e.g., lighting in Washington)





Measure Characterization




PACIFICORP
POWERING YOUR GREATNESS

Measure List

AEG, ETO, and PacifiCorp are working to develop a list of EE, DR, and DSM Rates measures and programs for consideration in the 2023 CPA.

- Starting with the list from the 2021 CPA and updating with new measures and sources, particularly from those listed on the next slide

End Use	Applicable Technology	Measure Label	Emerging	Baseline	Revisions from Previous Study (if Applicable)	On Market	Off Market	Measure Description
Cooling / Space Heating	Air-Source Heat Pump	SEER 14.0 / HSPF 8.2		Baseline	SEER 13.0		2022	A central heat pump consists of components similar to a CAC system, but is usually designed to function both as a heat pump and an air conditioner. It consists of a refrigeration system using a direct expansion (DX) cycle. Equipment includes a compressor, an air-cooled condenser (located outdoors), an expansion valve, and an evaporator coil (located in the supply air duct near the supply fan) and a reversing valve to change the DX cycle from cooling to heating when required. The cooling and heating efficiencies vary based on the materials used, equipment size, condenser type, and system configuration. Heat pumps may be unitary (all components housed in a factory-built assembly) or a split system (an outdoor condenser section and an indoor evaporator section connected by refrigerant lines).
Cooling / Space Heating	Air-Source Heat Pump	SEER 15.0 / HSPF 8.8 ENERGY STAR (5.0)		Baseline (2023+)	SEER 14.0			
Cooling / Space Heating	Air-Source Heat Pump	SEER 19.0 / HSPF 9.0			SEER 15.0			
Cooling / Space Heating	Air-Source Heat Pump	SEER 21.0 / HSPF 9.1 Variable Capacity (CEE)			SEER 16.0 / HSPF 9.0 (CEE)			
Cooling / Space Heating	Air-Source Heat Pump	SEER 24.0 / HSPF 10.9 EIA 2030 Projection	x		SEER 18.0 / HSPF 12.0 (VCHP)	2030		
Cooling / Space Heating	Air-Source Heat Pump				SEER 23			

Measure Characterization: Energy Efficiency

Measures are applied to the Baseline Projection, yielding energy and peak savings. The PacifiCorp team catalogs many assumptions, including those listed below.

- Will include measure-specific non-energy impacts where appropriate, and incorporate new research specific to Washington
- Data required for each measure:
  - Technical applicability
  - Current saturation
  - Unit energy savings: annual energy
  - Current costs: installation, O&M, and non-energy impacts
  - Projections of changes in costs or efficiency, where applicable (e.g., LED lighting)
  - Lifetime
  - Baseline conditions
  - Appliance standards
  - Measure adoption rates

Measure and Program Characterization: Demand Response and DSM Rates

Demand response and rates programs are characterized differently from energy efficiency

- Potential does not exist without a mechanism to call events
- Many, if not all, of the same data points as energy efficiency are required to estimate potential
- Some energy efficiency measures enable DR programs (e.g., connected thermostats)
- Potential further depends on controllability, sheddability, and program participation

Sources considered include:

- PacifiCorp programs and pilots
- Programs and pilots successfully run by similar utilities in the US and broader if applicable
- Well-vetted potential studies such as LBNL's 2025 California Demand Response Potential Study

We will take a similar approach to modeling Demand-Side Rates as the 2021 CPA

Potential Estimation




PACIFICORP
POWERING YOUR GREATNESS

Definitions - Potential Levels

Technical Potential: all feasible opportunities

Assumes all eligible customers adopt the most efficient technology or measure option regardless of cost

Energy efficiency only

Technical Achievable Potential: feasible, attainable

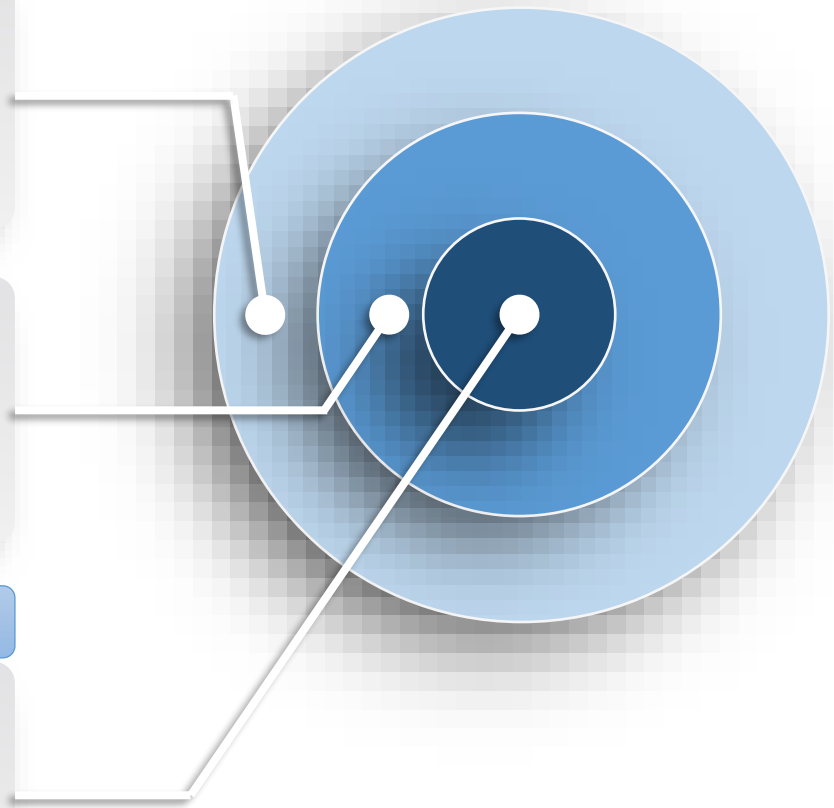
Constrains technical potential by applying market adoption rates for each measure and program.

Intended to represent market barriers to measure or program uptake and customer preference

IRP Modeling Process

Economic Achievable Potential: feasible, cost-effective, and attainable

Based on the IRP's Preferred Portfolio. It is the subset of technical achievable potential within the levelized cost bundles selected by the IRP.



Potential Results Example – Energy Efficiency

The 2023 CPA will estimate Technical and Technical Achievable Potential for EE measures in each state (excluding OR) and each sector

- Compared to the 2021 CPA, the 2023 CPA will shift the analysis forward two years, estimating potential from 2023 though 2042
- Results presentation will include comparison to 2021 CPA results

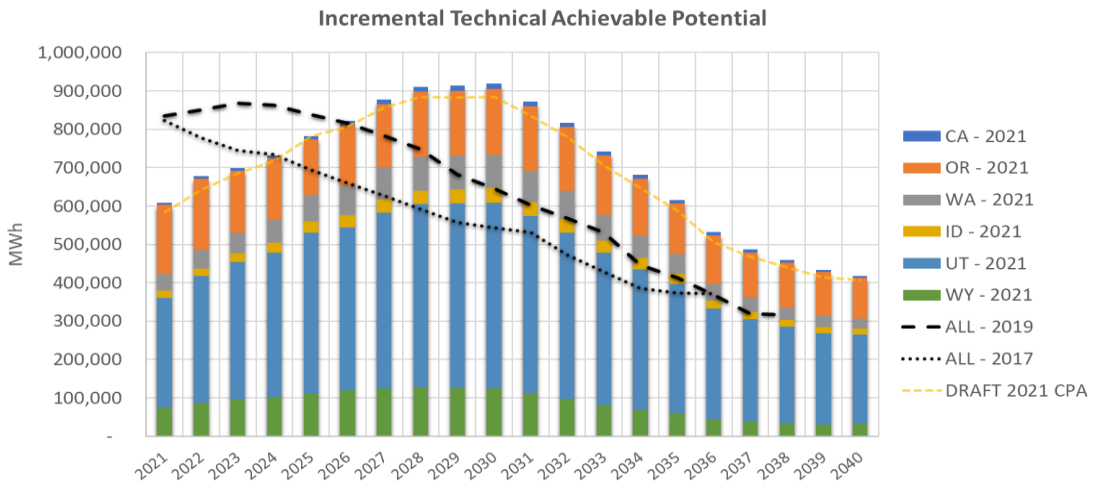


Table 4-1 Cumulative Energy Efficiency Potential by Sector in 2040

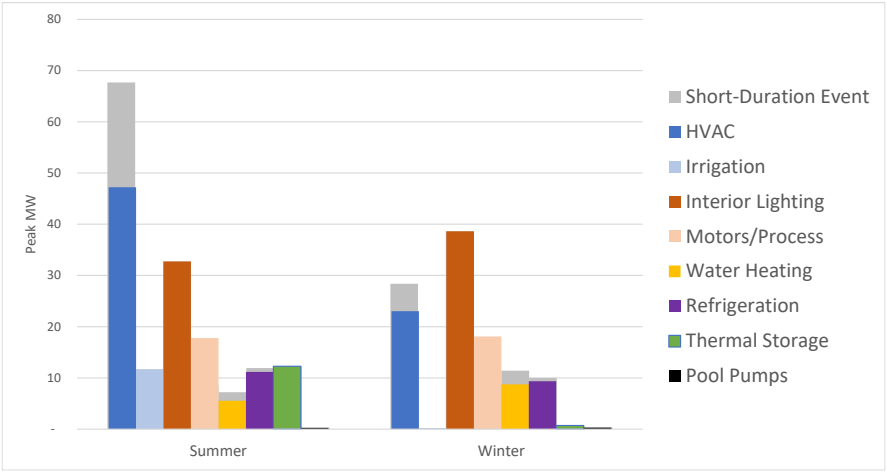
Sector	Baseline Loads (MWh)	Technical Potential (MWh)	Achievable Technical Potential (MWh)	Technical Potential (% of Baseline)	Achievable Technical Potential (% of Baseline)
Residential	17,986,738	5,967,919	3,618,297	33.18%	20.1%
Commercial	17,283,715	6,099,590	4,635,547	35.29%	26.8%
Industrial	17,184,134	2,829,408	2,372,759	16.47%	13.8%
Irrigation	1,243,976	198,877	171,279	15.99%	13.8%
Total	**53,698,564**	**15,095,795**	**10,797,882**	**28.11%**	**20.1%**

Potential Results Example – Demand Response

- Potential segmented by customer class and program
- Achievable fraction of customers developed by benchmarking with mature programs throughout the country
  - Existing PacifiCorp programs are identified separately
- Impacts separated by Short and Sustained Duration events
- State-specific cost-effectiveness methodologies (TRC vs. UCT)
- Results are presented as incremental to existing PacifiCorp programs

Table 5-1 Demand Response Program Potential by Season and Event Type, 2040

	Summer MW		Winter MW	
Program	Short Duration	Sustained Duration	Short Duration	Sustained Duration
HVAC Direct Load Control (DLC)	117	60	198	132
Domestic Hot Water Heater (DHW) DLC	5	4	12	10
Grid-Interactive Water Heaters	57	46	158	133
Connected Thermostat DLC	148	80	57	32
Smart Appliance DLC	27	15	10	6
Pool Pump DLC	1	1	1	1
Electric Vehicle Connected Charger DLC	51	51	52	52
Battery Energy Storage DLC	676	417	676	417
Third Party Contracts	198	208	157	173
Irrigation Load Control	21	21	0	0
Total All Sectors	**1,300**	**904**	**1,322**	**957**



Utah Non-Residential Potential, 2021 CPA

Feedback on 2023 CPA Work Plan




PACIFICORP
POWERING YOUR GREATNESS

Stakeholder Feedback Forms

- Stakeholder feedback forms and responses can be located at www.pacificorp.com/energy/integrated-resource-plan/comments.html
- Depending on the type and complexity of the stakeholder feedback received, responses may be provided in a variety of ways including, but not limited to, a written response, a follow-up conversation, or incorporation into subsequent public input meeting or state specific advisory group meeting materials.

2023 IRP Supply-Side Resource Table




PACIFICORP
POWERING YOUR GREATNESS

Supply-Side Resources

- Background Review
  - Data sources
  - General assumptions
- Resource Update and Overview
  - Renewables
    - Solar PV
    - Wind
    - Energy Storage
  - Nuclear
  - Thermal

Background

- Data Sources
  - Third-Party Engineering Studies (performance and cost estimates)
  - Recent projects and Request for Proposal Bids
  - Engineer-Procure-Construct Contractors
  - Original Equipment Manufacturers (OEMs)
  - Developers
- General Assumptions
  - Mid-year 2022 dollars
  - Capacities and costs adjusted to “proxy site” parameters and general locations
  - Capital costs based on “greenfield” sites for hydrogen-fueled resources
  - Capital costs include:
    - Direct: costs: Engineering-Procure-Construct (EPC) costs to in-service year; include applicable sales taxes, insurance and contractor’s contingency
    - Owner’s costs: Development, permitting, project management/engineering, water, “outside the fence” linears, land, legal costs, interconnection, capital spares and owner’s contingency
    - Owner’s financial costs: Allowance for Funds Used During Construction (AFUDC), capital surcharge and capitalized property taxes

Renewable Resources

SSR Table Improvements

- Supply-Side Resource (SSR) Table changes since 2021 IRP cycle
  - Increased the size of renewable resources
  - Added off-shore wind
  - Added hydrogen, ammonia and biomass resource studies

Renewables Combined Study

- A competitive RFP has been issued to update the following areas:
  - Solar
  - Wind
  - Energy Storage
  - Solar + Energy Storage
  - Wind + Energy Storage
  - Wind + Solar + Energy Storage
- The report includes:
  - Current capital and O&M costs
  - (10) year forecast trend of expected capital costs
  - Performance data

Renewable Resources

Proposed Wind Resources

Wind	Pocatello, ID, 20 MW, CF: 37.1%
Wind	Arlington, OR, 20 MW, CF: 37.1%
Wind	Monticello, UT, 20 MW, CF: 29.5%
Wind	Medicine Bow, WY, 20 MW, CF: 43.6%
Wind	Goldendale, WA, 20 MW, CF: 37.1%
Wind	OffShore Wind CA, OR 20 MW Coast
Wind	Pocatello, ID, 200 MW, CF: 37.1%
Wind	Arlington, OR, 200 MW, CF: 37.1%
Wind	Monticello, UT, 200 MW, CF: 29.5%
Wind	Medicine Bow, WY, 200 MW, CF: 43.6%
Wind	Goldendale, WA, 200 MW, CF: 37.1%
Wind	OffShore Wind CA, OR 200 MW Coast
Wind + Storage	Pocatello, ID, 200 MW, CF: 37.1% + BESS: 100% pwr, 4 hours
Wind + Storage	Arlington, OR, 200 MW, CF: 37.1% + BESS: 100% pwr, 4 hours
Wind + Storage	Monticello, UT, 200 MW, CF: 29.5% + BESS: 100% pwr, 4 hours
Wind + Storage	Medicine Bow, WY, 200 MW, CF: 43.6% + BESS: 100% pwr, 4 hours
Wind + Storage	Goldendale, WA, 200 MW, CF: 37.1% + BESS: 100% pwr, 4 hours
Wind + Solar + Storage	Pocatello, ID, 200 MW, Wind + 200 MW PV + 200 MW BESS, 4 hours
Wind + Solar + Storage	Arlington, OR, 200 MW, + 200 MW PV + 200 MW BESS, 4 hours
Wind + Solar + Storage	Monticello, UT, 200 MW, + 200 MW PV + 200 MW BESS, 4 hours
Wind + Solar + Storage	Medicine Bow, WY, 200 MW, + 200 MW PV + 200 MW BESS, 4 hours
Wind + Solar + Storage	Goldendale, WA, 200 MW, + 200 MW PV + 200 MW BESS, 4 hours

Recommendations have been received and are being considered for offshore wind resources; additional suggestions and feedback are welcome.

Renewable Resources

Proposed Solar Resources

Solar	Idah Falls, ID, 20 MW, CF: 26.1%
Solar	Lakeview, OR, 20 MW, CF: 27.6%
Solar	Milford, UT, 20 MW, CF: 30.2%
Solar	Rock Springs, WY, 20 MW, CF: 27.9%
Solar	Yakima, WA, 20 MW, CF: 24.2%
Solar	Idah Falls, ID, 200 MW, CF: 26.1%
Solar	Lakeview, OR, 200 MW, CF: 27.6%
Solar	Milford, UT, 200 MW, CF: 30.2%
Solar	Rock Springs, WY, 200 MW, CF: 27.9%
Solar	Yakima, WA, 200 MW, CF: 24.2%
Solar + Storage	Idah Falls, ID, 200 MW, CF: 26.1% + BESS: 100% pwr, 4 hours
Solar + Storage	Lakeview, OR, 200 MW, CF: 27.6% + BESS: 100% pwr, 4 hours
Solar + Storage	Milford, UT, 200 MW, CF: 30.2% + BESS: 100% pwr, 4 hours
Solar + Storage	Rock Springs, WY, 200 MW, CF: 27.9% + BESS: 100% pwr, 4 hours
Solar + Storage	Yakima, WA, 200 MW, CF: 24.2% + BESS: 100% pwr, 4 hours

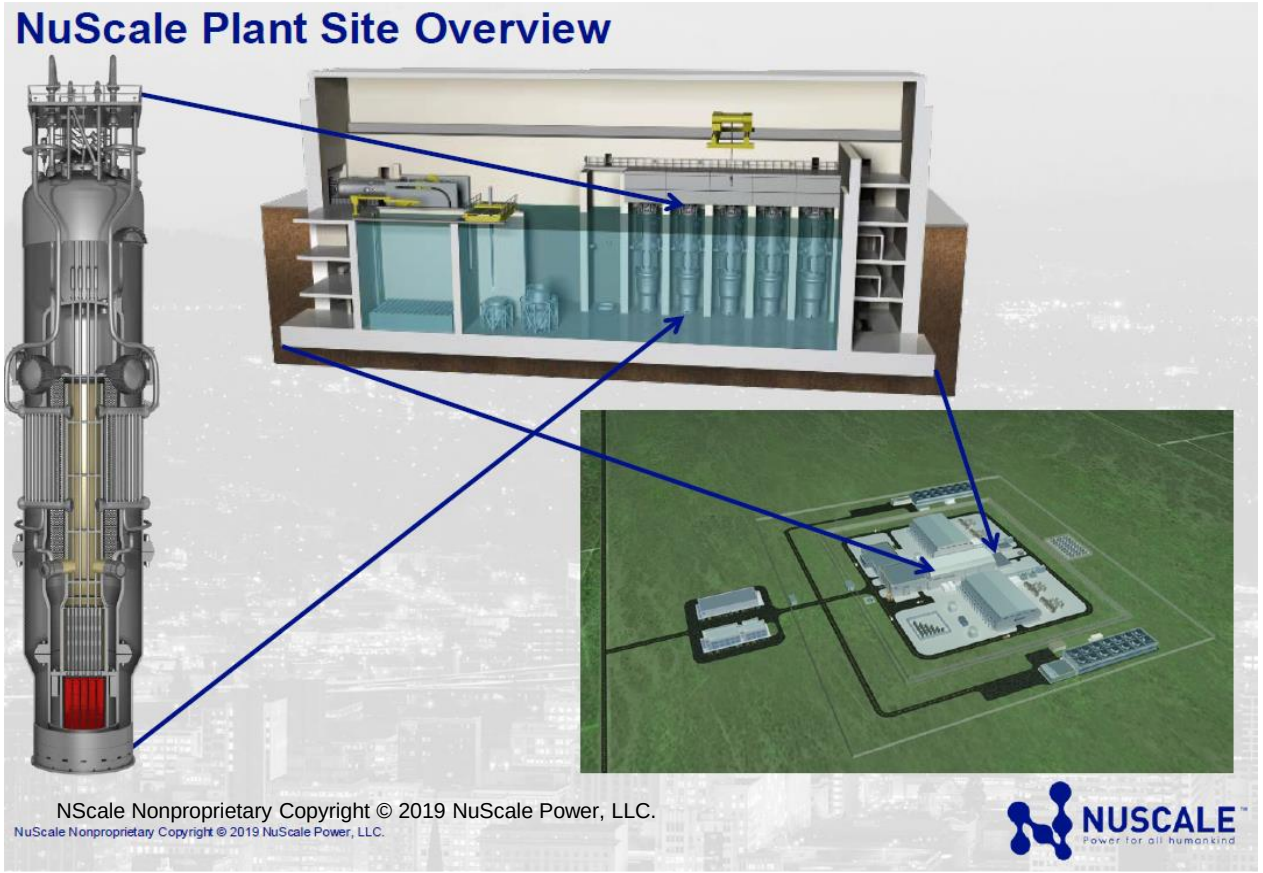
Renewable Resources

Proposed Energy Storage Resources

Storage	Pumped Hydro, Southern OR
Storage	Pumped Hydro, Portland North Coast
Storage	Pumped Hydro, Central WY
Storage	Pumped Hydro, Eastern WY
Storage	Pumped Hydro, Central UT
Storage	Pumped Hydro, Southern ID
Storage	Pumped Hydro, MT
Storage	Adiabatic CAES, Hydrostor, 500 MW, 2000 MWh
Storage	Adiabatic CAES, Hydrostor, 500 MW, 4000 MWh
Storage	Adiabatic CAES, Hydrostor, 500 MW, 6000 MWh
Storage	Li-Ion Battery, , 50 MW, 200 MWh
Storage	Li-Ion Battery, , 500 MW, 2000 MWh
Storage	Li-Ion Battery, , 1000 MW, 4000 MWh
Storage	Flow Battery, , 20 MW, 160 MWh

Additional pumped hydro storage options are currently under consideration.

Nuclear
Small Modular Reactor



Resource	Elevation (AFSL)	Net Capacity (MW)	Commercial Operation Year	Design Life (yrs)	Base Capital ($/KW)	Var O&M ($/MWh)	Fixed O&M ($/KW-yr)	Demolition Cost ($/kW)
Small Modular Reactor	5,000	684	2028	60	6,229	16.01	179.12	Not available

Thermal Resources
Proposed Resource

Supply Side Resources

Fuel	Resource	Elevation (AFSL)
Hydrogen	Non-Emitting Peaker (100% hydrogen)	5,050
Hydrogen	Gas Peaker Frame "F" (30% hydrogen)	5,050
Coal	PC CCUS retrofit @ 500 MW pre-retrofit basis	4,500
Coal	PC CCUS retrofit @ 500 MW pre-retrofit basis	6,500

Study Resources

Fuel	Resource
Hydrogen	Fuel Cell
Hydrogen	Steam Unit Conversion (hydrogen)
Ammonia	Steam Unit Conversion (anomia)
Biomass	Steam Unit Conversion(biofuels)

2021 IRP Filing Update




PACIFICORP
POWERING YOUR GREATNESS

2021 IRP Filing Update

September 1, 2021 – IRP filed

September 15, 2021 – IRP data discs; errata filed

September 30, 2021 – IRP supplemental filing sensitivity cases; errata to data discs

Comment and Acknowledgement

California Docket R 18-07-003

Idaho Case No. PAC-E-21-19

- Comments due March 15, 2022
- PacifiCorp reply comments due April 4th

Oregon Docket LC 77

- Opening Comments December 3, 2021 / December 6, 2021
- PacifiCorp reply comments December 23, 2021
- Commission workshops, January 13, 2022 / February 24, 2022
- Staff report with final comments February 11, 2022
- Transmission workshop, March 8, 2022
- All comments on staff report and recommendations March 11, 2022
- Commission decision on acknowledgement March 22, 2022

Utah Docket 21-035-09

- Technical Conference January 19, 2022
- Comments due March 4, 2022
- Intervenor deadline March 14, 2022
- PacifiCorp reply comments due April 7, 2022
- Acknowledgement Order anticipated in May

Washington Docket UE-200420

- Close of CEIP comment period May 6, 2022
- IRP Acknowledgement pending commission decision

Wyoming Docket 20000-603-EA-21 (Record No. 15935)

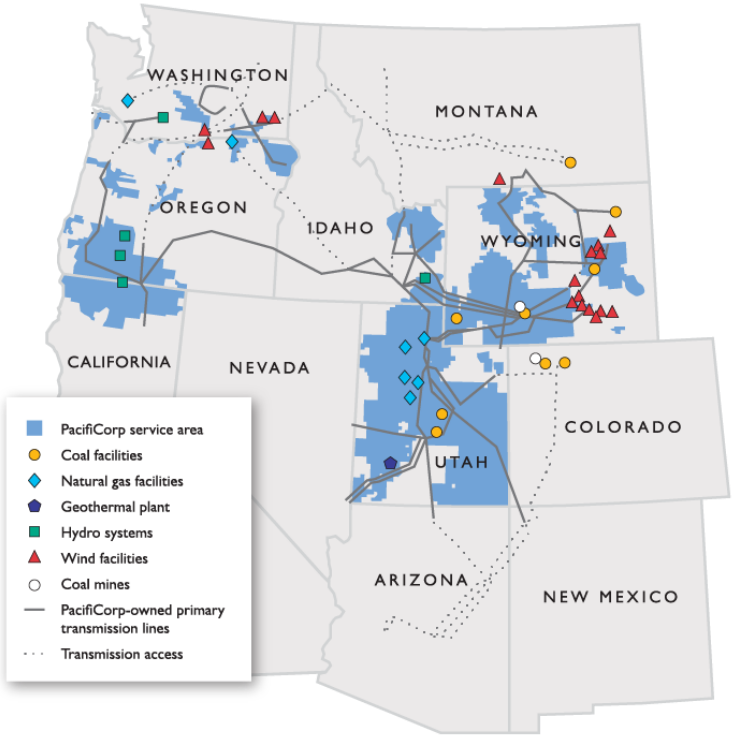
- Comments received February 14, 2022
- Reply comments due March 7, 2022
- Public comment hearing, Glenrock March 15, 2022
- Public comment hearing, Kemmerer & Rock Springs March 23-24, 2022

2023 IRP Overview



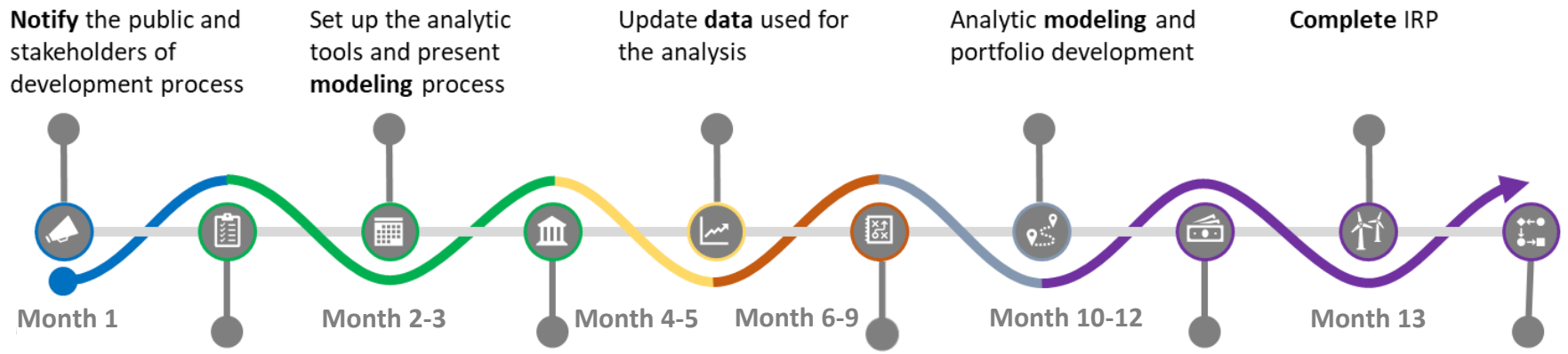

PACIFICORP
POWERING YOUR GREATNESS

PacifiCorp Overview



- PacifiCorp serves approximately 1.9 million customers across six states
- Rocky Mountain Power serves Utah, Idaho and Wyoming customers
- Pacific Power serves Oregon, Washington and California customers
- Extensive generation, transmission and distribution infrastructure across the west
- Large decarbonization efforts underway
- Extensive energy efficiency portfolio
- Long-term resource planning occurs in PacifiCorp's Integrated Resource Plan

Overview of PacifiCorp's IRP Development Process

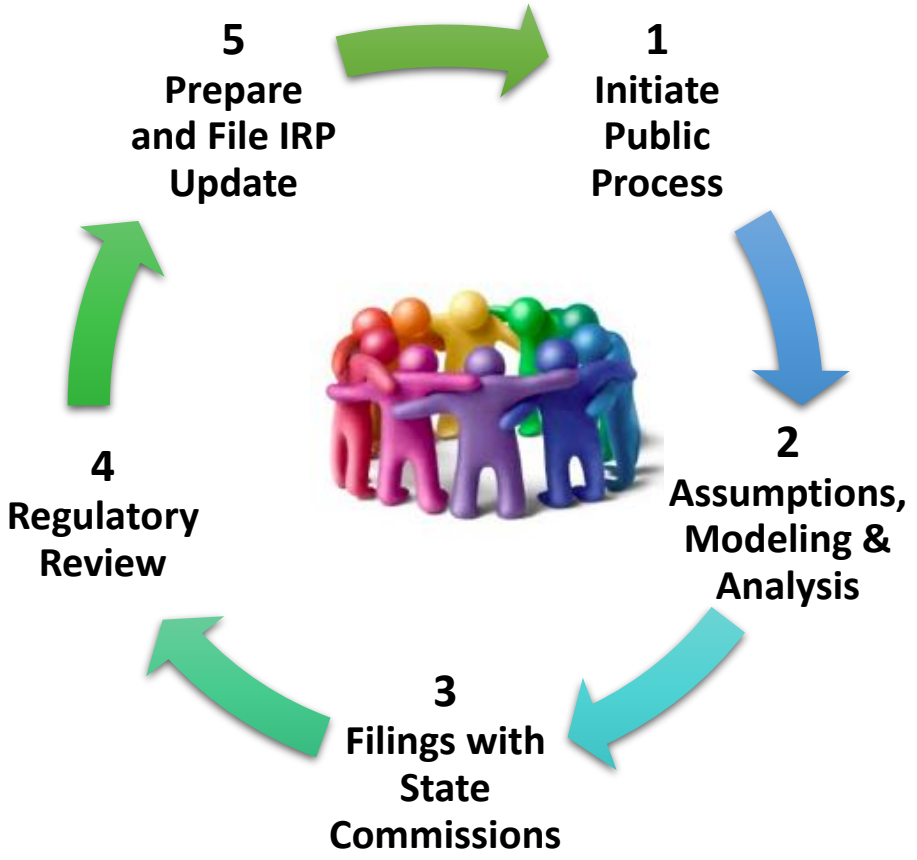


PacifiCorp seeks, receives, and incorporates public feedback throughout the IRP development cycle

Learn more about PacifiCorp's IRPs at: www.pacificorp.com/irp

Pursuing Change with Integrity

- PacifiCorp has been producing resource plans for over two decades (what, when, where, and how much)
- Costs and risks from our customers' perspective (six states with retail load)
- PacifiCorp operates its two balancing authority areas as a single system—planning aligns with this paradigm (one plan for all states)
- 20-year planning horizon
- Two-year cycle with updates in off years to highlight how changes in the planning environment affect the plan (limited scope)
- Developed with extensive stakeholder input and outreach
- Intensive data modeling and portfolio analysis



Wrap-Up/Additional Information




PACIFICORP
POWERING YOUR GREATNESS

2023 Public Input Meeting Schedule

Upcoming Public Input Meeting Dates*

- **April 7, 2022 – Public Input Meeting 2**
  - Conservation Potential Assessment (CPA)
  - Optimization modeling overview
- **May 12, 2022 – Public Input Meeting 3**
- **June 9-10, 2022 – Public Input Meeting 4**
- **July 14-15, 2022 – Public Input Meeting 5**
- **September 1-2, 2022 – Public Input Meeting 6**
- **October 13-14, 2022 – Public Input Meeting 7**
- **December 1-2, 2022 – Public Input Meeting 8**
- **January 13-14, 2023 – Public Input Meeting 9**
- **February 23-24, 2023 – Public Input Meeting 10**

**meeting dates are subject to change*

Additional Information

- Public Input Meeting and Workshop Presentation and Materials:
  - pacificorp.com/energy/integrated-resource-plan/public-input-process
- 2023 IRP Stakeholder Feedback Forms:
  - pacificorp.com/energy/integrated-resource-plan/comments
- IRP Email / Distribution List Contact Information:
  - IRP@PacifiCorp.com
- IRP Support and Studies:
  - pacificorp.com/energy/integrated-resource-plan/support