



2021 IRP DSM Technical Workshop

February 18, 2020



Agenda



- 8:00am - 9:55am pacific – Energy Efficiency
Measure List Changes, Major Measures, Emerging Technologies, Measure Hierarchy, Baselines & Considerations, Measure Example, Measure Costs, and IRP Credits
- 9:55am - 10:00am – Break
- 10:00am - 11:55am pacific – Demand Response
Defining Demand Response, Resource Assumptions, Resource Costs, Resource Options, Resource Examples, Customer-Sited Energy Storage, Grid Services, IRP Credits
- 11:55am – 12:00pm – Next Steps



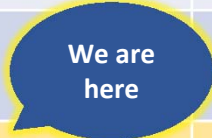
Schedule and Milestones

Throughout the 2021 CPA development process, we will continue to request feedback from interested parties.

For this meeting, PacifiCorp emailed and posted energy efficiency and demand response measure lists and a measure memo to solicited feedback from stakeholders.

- As of February 14, 2020, we have received three feedback forms.

Timeframe	Milestone	Public Input Request
December 20, 2019	Share Work Plan	Provide input on scope (2 forms)
January 21, 2020	Present on Scope of Work	Additional input on scope (0 forms)
January 31, 2020	Share Draft EE & DR Measure List	Provide feedback on included measures (3 forms)
February 18, 2020	Present on Measure List	Ask questions and provide feedback by end of month.
March 13, 2020	Finalize Measure List	n/a – feedback incorporated
April 16, 2020	Share Key Drivers of Potential and Assumptions	Participate in meeting, provide input on key drivers
June 18/19, 2020	Present Draft Results and Share Measure Data	Review materials and provide feedback
September 17/18, 2020	Present Final Supply Curves	Review changes made due to feedback
Early January 2021	Draft CPA for Review	Provide input on draft report
March 2021	Publish Final Report	n/a – feedback incorporated





Energy Efficiency Measures





Measure List Changes

AEG has identified 205 changes to the 2021 CPA EE measure lists. There are four general categories:

- **Measure Added:** new measure to the 2021 CPA due to AEG's review of priority sources and emerging technology
 - ENERGY STAR (3.0) Sound Bars
- **New Measure Included in Existing Measure:** newly-identified measure that has a very similar analog in the existing measure list
 - Residential Networked Lighting Controls → Home Energy Management System
- **Measure Reclassified:** Measure label or efficiency in alignment with industry trends
 - Thermostat: WiFi/Interactive → ENERGY STAR Connected Thermostat
- **Measure Removed:** Measure that had been determined to be obsolete or superseded by a more efficient option
 - Programmable Thermostats



Measure List Changes, Cont.

- Reclassifications are mainly due to lighting efficiency improvements and updated rating categories (e.g. EF -> UEF)
- Most commercial and industrial measures overlap, hence the similar numbers
- There were no changes to the street lighting measure list

Action Taken	Residential	Commercial	Industrial	Irrigation	Total
Measures Added	19	33	33	2	87
New Measures Included in Existing Measure	11	8	4	0	23
Measures Reclassified	30	22	16	3	71
Measures Removed/Excluded	16	6	1	1	24



Measure List Changes, Cont.

Below provides an example list of measure changes

ET	Reclassified	Added	Removed/Excluded
Central AC: SEER 21			
Central AC: SEER 24.0 VRF	EISA Compliant (18.6 lm/W)	SEER 24.0 VRF	Water Heating, EF 0.91
Room AC: Dual Invertor CEER 14.7	CFL (70.6 lm/W)	Dual Invertor CEER 14.7	Water Heating, EF 0.885
ASHP: SEER 21.0 / HSPF 9.1 Variable Capacity (CEE)			
ASHP: SEER 24.0 / HSPF 10.9 EIA 2030 Projection	LED 2019/2020 (100 lm/W)	Basement Sidewall Insulation	ASHP: SEER 13
GSHP: EER 36 / COP 4.9	T8 - F32 (80.0 lm/W system)	Rim/Band Joist Insulation	GHP: EER 13.4 / COP 3.1
HPWH: NEEA Tier 3 Heat Pump (UEF 2.6)			
HPWH: NEEA Tier 4 Heat Pump (UEF 3.0)	T8 - F28HE (85.0 lm/W system)	DHP for FAF with Optimized Controls	2017 Best in Class
			Standard Set-top Boxes/DVR
Water Heater - Connected Controls	Incandescent (9.8 lm/W)	High Efficiency Bathroom Exhaust Fan	Engine Block Heater Controls
LED 2025			
LED 2030	Halogen (16.7 lm/W)	Water Heater - Connected Controls	Controls
Refrigerator: CEE Tier 3 (20% above standard)	CFL (47.4 lm/W)	Water Heater Blankets	Air Cleaner
Clothes Dryer: UCEF 3.3 - Heat Pump			
Clothes Dryer: UCEF 4.0 - Heat Pump			
Clothes Dryer: UCEF 6.65 - Heat Pump			
Clothes Dryer: UCEF 8.0 - Heat Pump	EISA Compliant (19.8 lm/W)	Stove - Smart Burners	Radiant Cooling - Chilled Ceiling Panels
			Programmable Thermostats
Stove/Oven: Induction	SEER 14.0 / HSPF 8.2	Ozone Laundry	
Advanced Power Strips - IR Sensing	SEER 15.0 / HSPF 8.8 ENERGY STAR (5.0)	Set-top Boxes/DVRs ENERGY STAR (5.1)	Boiler Pipe Insulation
Advanced Power Strips - Load or Occupancy	SEER 19.0 / HSPF 9.0	TVs: ENERGY STAR (8.0)	Shower Timer
	SEER 21.0 / HSPF 9.1 Variable Capacity (CEE)		
Connected Home Control System		ENERGY STAR (3.0) Sound Bars	ENERGY STAR (4.0) Ceiling Fan
	SEER 24.0 / HSPF 10.9 EIA 2030 Projection		
Home Energy Management System (HEMS)		Dehumidifiers	Home Energy Audit



Major Measures

Because the measure list is expansive, we recognize it may not be possible for stakeholders to review every measure and data input.

To help focus the review of measures that are likely to receive either high potential or a high level of interest (or both) in this study, PacifiCorp's third-party consultant, AEG, will identify "major measures". Major measures are defined as:

- *Large current or expected contributions to PacifiCorp's program portfolio (e.g., nonresidential linear lighting)*
- *Stakeholder comments and interest (e.g., heat pumps)*
- *High potential in PacifiCorp's 2019 CPA (e.g., water heaters)*
- *High potential in comparable utility DSM programs and plans throughout the country (e.g., ductless heat pumps)*

AEG will create a "major measure" flag in the measure list to help PacifiCorp staff and stakeholders efficiently review draft inputs.

- ***This will be defined in the final measure list***

Emerging Technologies



For the 2021 CPA, AEG completed a thorough review of emerging technologies, which included:

- Updating the emerging technology review conducted as part of the 2019 CPA
 - Conducted a thorough review of emerging technologies, using data from E3T, NEEA, BPA, NREL, U.S. DOE, and pilot/R&D programs throughout the nation
- Screening measures for:
 - 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 publications, pilot data)
- Revisiting measures put on the “watch” list during the last study

PacifiCorp welcomes additional sources and/or measures not already captured on the emerging technologies measure list.

- Stakeholders can submit measures ideas and sources through a feedback form



Measure Hierarchy

Similar to the 2019 CPA, AEG developed a “Measure Hierarchy” for source data. This time, AEG has developed unique sources for each state with the following considerations:

- Regulatory requirements of the state (e.g., RTF in Washington, DEER in California)
- Prioritize TRMs from neighboring states and utilities
- Consider TRMs from the Midwest and Northeast

Each source from other jurisdictions will be vetted for appropriateness prior to inclusion (e.g., temperature, humidity, baseline conditions, etc.)

Source Hierarchy	Utah	Wyoming	Idaho	Washington	California
Primary	RTF with Adjustments [†] , National Sources, ^{††} Idaho Power TRM, Xcel Energy Colorado DSM Plan, Other Regularly Updated TRMs ^{†††}		RTF, 2021 Power Plan		DEER and non-DEER Workpapers
Secondary			National Sources, ^{††} Idaho Power TRM, Other Regularly Updated TRMs ^{†††}		RTF with Adjustments [†]
Other					National Sources, ^{††} Other Regularly Updated TRMs ^{†††}



Baselines & Considerations

AEG will develop baselines unique to how DSM planning is conducted in each state. Examples include:

- State building codes
 - ASHRAE 90.1, IECC or state specific (see below)
- Regional guidance on baselines
 - RTF or DEER

Each regional variation will be documented in a table similar to Table 2-5 from the 2019 CPA report for review

Table 2-5 Guidance for Building Codes

State	Residential Energy Code Used	Non-Residential Energy Code Used
California	2019 Building Energy Efficiency Standards, Title 24 ¹⁸	2016 Building Energy Efficiency Standards, Title 24
Washington	Washington State Energy Code 2015 (WSEC 2015)	Washington State Energy Code 2015 (WSEC 2015)
Idaho	2012 IECC	2012 IECC
Utah	2012 IECC	2012 IECC
Wyoming	2009 IECC with adjustments based on survey data for new buildings	2009 IECC with adjustments based on survey data for new buildings

Baselines & Considerations, Cont.

EISA 2007, 2020 Backstop



On December 28, 2019 the U.S. Department of Energy released a Final Rule rolling back the 2020 General Service Lighting backstop

The 2021 CPA proposed to treat this differently in each state:

- **California:** Assumed to be implemented in 2018 through current state building codes and rulemakings
- **Washington:** Implemented per HB 1444*
 - *Washington is subject to change if guidance is provided by the Power Council during development of its 2021 Plan ***before April 1, 2020***
- **Idaho:** Not implemented until 2025*
 - *Idaho is subject to change if guidance is provided by the Power Council during development of its 2021 Plan ***before April 1, 2020***
- **Utah and Wyoming:** Not implemented until 2025

AEG will work with PacifiCorp's Load Forecasting to ensure baseline assumptions in the load forecast is not duplicated or double-counted in the CPA.

- *For example, if PacifiCorp does not model the 2020 backstop in their load forecast for Washington but regional guidance is to enforce it in the CPA, AEG and PacifiCorp will work to ensure that the "missing" savings are well-documented.*



Measure Example

AEG will curate data from multiple sources, accounting for variations in baselines, weather conditions, etc.

Care must be taken to ensure source data is applied consistently and appropriately.

Example Measure: Air-Source Heat Pump

Characterization	DEER (California)	Regional Technical Forum (Washington, Idaho)	New Mexico TRM (Utah)	Illinois TRM (Wyoming, Utah)
Baseline Definition	SEER 13 HSPF 8.1	SEER 14 HSPF 8.5	SEER 14 HSPF 8.0	SEER 14 HSPF 8.2
Efficient Definition	SEER 18 HSPF 9.2	SEER 18 HSPF 12	SEER 18 HSPF 9.6	SEER 18 HSPF 8.5 w/QI
Lifetime	15 years	15 years	18 years	18 years
Unit of Measure	per ton	per home	3 tons	per ton
Incremental Cost	\$685	\$5,378	--	\$724
Climate	California	CZ 1, HZ2	Santa Fe	Springfield, IL
Annual kWh Savings	n/a	604 kWh	999 kWh	1,640 kWh



Measure Costs

Similar to how savings vary, costs are likely to change by jurisdiction as well.

The table below walks through the adjustments that AEG makes prior to levelizing measure costs for supply curves, which are based on the state-specific cost-effectiveness test.

Table 1-3 Economic Components of Levelized Cost by State

Parameter	WA	CA	WY	UT	ID
Cost Test	Total Resource Cost (TRC)			Utility Cost Test (UCT)	
Initial Capital Cost	Included (100% of incremental cost, full measure cost for retrofit measures)			Utility Incentive (50%-70% of incremental cost)	
Annual Incremental O&M	Included		Not Included		
Secondary Fuel Impacts	Included		Not Included		
Non-Energy Impacts	Included		Not Included		
Administrative Costs (% of incremental cost)	35%	44%	27%	18%	36%

Field	Washington	California	Wyoming	Utah	Idaho
Cost-effectiveness test	TRC, plus 10% adder	TRC (Dual-test)	TRC	UCT	UCT (Dual-test)
Measure Cost	\$1,000	\$1,000	\$1,000	n/a	n/a
Incentive Paid	n/a	n/a	n/a	\$500 (50%)	\$700 (70%)
Utility Admin %	35%	44%	27%	18%	36%
Admin Spend	\$350	\$440	\$270	\$180	\$360
Cost for Bundling	\$1,350	\$1,440	\$1,270	\$680	\$1,060

Measure Costs, Cont. Mapping



Perspective	Total Resource Cost			Utility Cost		Included In:
	WA	CA	WY	UT	ID	
State/Sector-Specific Line Losses	✓	✓	✓	✓	✓	Potential Study
Customer Cost	✓	✓	✓			Potential Study
Utility Costs	✓	✓	✓	✓	✓	Potential Study
Annual Incremental O&M	✓					Potential Study
Secondary Fuel Impacts	✓					Potential Study
Non-Energy Impacts	✓					Potential Study
10% Conservation Credit	✓					IRP Modeling
T&D Deferral Benefits	✓	✓	✓	✓	✓	IRP Modeling
Risk Mitigation Benefits	✓	✓	✓	✓	✓	IRP Modeling



IRP Credits

The IRP incorporates three credits that reduce the modeled cost of energy efficiency bundles competing with supply-side resources in IRP modeling:

- Stochastic Risk Reduction Credit
- Northwest Power Act 10-percent credit (Oregon & Washington only)
- Transmission and Distribution Deferral Credit

These credits are intended to capture benefits of energy efficiency that would otherwise not be reflected in IRP modeling.

These credits are consistent with industry standards and with the Northwest Power and Conservation Council.

IRP Credits, Cont.

Stochastic Risk Reduction Credit



The stochastic risk reduction credit is intended to reflect the value energy efficiency provides in terms of reducing portfolio risk.

This credit is calculated by:

- Determining the difference in present-value revenue requirement (PVRRd) between stochastic studies and deterministic studies with and without energy efficiency.
- Dividing the delta of the two PVRR(d) results by the net present value of the energy efficiency savings (MWh) yields the \$/MWh assumed value of stochastic risk reduction.

The 2019 IRP credit value was \$4.74/MWh, and this will be updated for the 2021 IRP.

IRP Credits, Cont.

T&D Deferral Credit



Table 6.8 from Volume I of the 2019 IRP shows the T&D credits used

Table 6.8 – State-specific Transmission and Distribution Credits

State	Transmission Deferral Value (\$/KW-year)	Distribution Deferral Value (\$/KW-year)	Total
California	\$4.16	\$6.58	\$10.74
Oregon	\$4.16	\$9.20	\$13.36
Washington	\$4.16	\$11.79	\$15.95
Idaho	\$4.16	\$11.07	\$15.22
Utah	\$4.16	\$9.02	\$13.18
Wyoming	\$4.16	\$5.26	\$9.41

Transmission & Distribution (T&D) Credit

- The T&D value is applied to each EE cost bundle to convert it to a \$/MWh credit.

$$\frac{T\&D\ Value \times Summer\ PCF \times 1000}{EE\ 1\ year\ bundle\ shape\ [between\ 1\ and\ 8760]}$$

- Example:

$$\frac{\$12.96 \times .57 \times 1000}{5750} = \$1.29/\text{MWh reduction in the EE cost bundle}$$

IRP Credit, Cont.

NW Power Act 10% Credit



Northwest Power Act 10-percent Credit (Oregon & Washington only)

- The formula for calculating this \$/MWh credit is:

$$\frac{\text{Bundle price} - (1\text{st year MWh savings} \times \text{Market Value} \times 10\% + 1\text{st year MWh Savings} \times \text{T\&D Deferral} \times 10\%)}{1\text{st year MWh savings}}$$



Demand Response Measures



Defining Demand Response



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

- *Previously Class 1 DSM*

Categories to consider for the 2021 CPA:

DR Measure: a controllable technology capable of performing one or more grid services throughout the year

- Grid Service Provided: Peak shaving, fast DR, etc.
- Control Mechanism: Smart thermostat, DLC switch, etc.
- Technology Controlled: Central AC

DR Program: a combination of DR measures which can be called to perform one or more grid services during a utility DR event. *This approach was used in the 2019 CPA.*

- Cool Keeper: A central AC with a direct load control switch cycling during a peak event

Evolving Considerations for DR



Regulations for Bulk Electric System:

- Regulations (CAISO) for resource modeling continue to evolve and recognize non-traditional resources
- Metering requirements for resource aggregation continue to evolve and allow more widespread use

Evolving Deployment Technology :

- Innovation continues to develop for capacity measurement and deployment in Real Time
 - Accuracy in measurement increases value by reducing forecast error
 - Real Time flexible deployment increases the possible uses of resources

Resource Assumptions



AEG conducts research to develop a comprehensive list of DR measure/program assumptions. We utilize PacifiCorp-specific program data where available.

Event Assumptions

- Capacity reductions
- Seasonal availability
- Climate zone and curtailable load
- Event ramp up (how long to fully respond)
- Event duration
- Maximum events per year

DR Program Assumptions

- Comparable program assumptions (key sources)
- Measure dependencies (AMI)
- Participation rates (including state-specific assumptions, WA CTA-2045)
- Regulatory lead time (years)
- Levelized cost methodology



Resource Costs

The following components are typically included within demand response program costs:

- Measure costs
 - Energy-using technology cost (e.g. ENERGY STAR Connected EV Charger)
 - Enabling technology cost (e.g. DLC switch, smart thermostat, HEMS)
 - “Bring-Your-Own” program designs can lower measure costs substantially and will be considered where possible
- Incentives (annual, per-event, or both)
- Utility administrative costs*
 - Utility staff to manage program (X FTEs at \$Y/yr. allocated amongst multiple programs)
 - Program development costs (up-front \$ for each new program)
 - Marketing costs (\$/yr.)
 - *Can be transitioned to a third-party aggregator in some circumstances



Resource Options

Load-Control Resources

Option	Eligible Customer Segments	Mechanism / Description	Current Offering
Direct Load Control (DLC) of Central Air Conditioners	Residential, Small C&I, Medium C&I	DLC switch installed on customer's equipment.	Cool Keeper in Utah
DLC of Room Air Conditioners	Residential	Direct load control switch installed on existing customer's equipment.	No
DLC of Smart Thermostats	Residential, Small C&I, Medium C&I	Internet-enabled control of thermostat set points (cooling and electric heating).	Residential
DLC of Space Heating	Residential, Small C&I, Medium C&I	DLC switch installed on customer's equipment.	No
DLC of Domestic Hot Water Heaters (DHW)	Residential, Small C&I, Medium C&I	Native open-communication protocol and "smart" controller installed on customer's water heater. <u>Can also be used for energy storage.</u>	No
DLC of Networked Lighting Systems	Commercial and Industrial	Automated dimming or shutoff of lighting fixtures connected through a networked lighting control system or building energy management system.	No
DLC of Smart Consumer Goods	Residential	Internet-enabled control of operational cycles of white goods appliances, electronics, and lighting. Controlled by a central smart hub or smart speaker.	No
DLC of Connected Electric Vehicle Chargers	Residential, C&I	Automated, level 2 EV chargers that postpone or curtail charging during peak hours. <u>Can potentially be used for energy storage.</u>	No
Irrigation Load Control	Irrigation	Automated pump controllers.	Idaho and Utah Pilot in Oregon



Resource Options, Cont.

Energy Storage Resources

Option	Eligible Customer Segments	Mechanism / Description	Current Offering
Customer-Sited Battery Energy Storage	Residential, C&I	Shifting of load away from peak hours using stored electrochemical energy. For residential customers, we are considering a lithium ion solution similar to a Tesla Powerwall. For C&I, we are considering an array of lithium-ion batteries sized to meet a portion of customer load.	Pilot in Utah
Thermal Energy Storage	Small and Medium C&I	Shifting of space cooling loads away from peak hours using stored ice.	No
Grocery – Refrigerated Case Energy Storage	Commercial grocery stores	Shifting of grocery refrigeration loads away from peak hours by adding thermal mass within refrigerated cases, extending the time it takes for a case to lose temperature.	No

Previously Considered Resources Expanded into Other Offerings (no longer modeled individually)

Option	Eligible Customer Segments	Mechanism / Description	Current Offering
Third Party Contracts	Medium C&I, Large C&I, Extra-large C&I	Includes Curtailable Agreements for extra-large customers and third-party aggregator-type programs for smaller customers. Will be comprised of various measure-level DR options.	No
Ancillary Services	Residential, C&I	Automated control of various building management systems or end-uses through one of the mechanisms already described	Cool Keeper in Utah



Resource Examples

The examples of DR measure assumptions to the right highlight some of the unique difference between various measures and jurisdictions.

¹ Savings weighted by ratio of homes with electric heating vs. homes with cooling – cannot call events on gas furnaces

²Washington House Bill 1444 sets a new appliance standard that mandates CTA-2045 communication ports on all new water heaters in the state

³CTA-2045-based program costs being developed. 2019 CPA assumed no additional costs as this was an “add-on” to the Central Cooling program.

Smart Thermostats	Washington	Utah
Summer kW Reduction	0.53 kW	0.97 kW
Winter kW Reduction (Footnote 1)	1.01 kW	0.21 kW
Eligible Market	Smart Thermostats	Smart Thermostats <u>not enrolled</u> in Cool Keeper
Equipment Costs	\$0	\$0
Incentive Costs	\$60	\$50
Program Admin Costs	\$44	\$44

Water Heater DLC	Washington	Utah
Summer kW Reduction	0.58 kW	0.58 kW
Winter kW Reduction	0.58 kW	0.58 kW
Eligible Market	<u>All electric water heaters</u> at turnover (Footnote 2)	Electric water heaters, limited by customer choice
Equipment Costs	\$0	\$315 switch + installation
Incentive Costs	\$24	\$24
Program Admin Costs	Under development <u>Footnote 3</u>	\$0

Customer-Sited Energy Storage



We will be modeling customer-sited battery energy storage as a DR measure in the 2021 CPA. Some key features of the storage measure include:

Battery Adoption

- Residential – tied to solar PV growth
- Nonresidential – combination of PV growth and demand charge mitigation

Program Characteristics

- Considering customer-owned energy storage participation
- Utility signal controls battery charge/discharge

Potential Event Characteristics

- Participating residential batteries will be controlled by event signal
- Nonresidential batteries remain charged outside typical customer peak period

Next Steps: develop customer-sited storage technology and event characteristics (cost, battery capacity, etc.)

Grid Services



Demand response options may be used to provide a range of grid services including:

- **Contingency Reserve**
 - Spin and Non-spin
 - In the 2019 IRP, an Operating Credit adjustment applied in System Optimizer (SO).
- **Regulation Reserve**
 - Regulating reserve – Operating Credit adjustment in SO (2019)
 - EIM Participation
 - The PaR model does not capture sub-hourly dispatch. In the 2019 IRP, PAC proposed an intra-hour flexible reserve credit; but was not used for portfolio selection.
- **Frequency Response**
 - In the 2019 IRP, the preferred portfolio has more than adequate frequency response capability without incenting adoption via credits, but credits may be appropriate if expected capability becomes insufficient.
- **Interruptible Load**
 - Assumed in the CPA as part of the measure development.
- **Load Shift**
 - Assumed in the CPA as part of the measure development.

The 2021 CPA aims to clarify these services in a way that is streamlined and easy to identify which measures contribute to which services

Grid Services, Cont.



Grid Service		Definition	Sub Group	Performance Specifics	IRP Credit
Operating Reserves	Contingency Reserve	Contingency Reserves ensure compliance with NERC regional reliability Standard BAL-002-WECC-2a. Contingency Reserve may be deployed when unexpected outages of a generator or transmission line occur. May not be used to manage other system fluctuations. 3% of load and 3% of generation.	Non Spinning Reserves	Deployed within 10 minutes and up to 60 minutes. If called for longer other resources must be mobilized to provide that reserve. Contingency reserve can not be deployed in EIM.	Embedded within PaR. SO has a credit: Operating Credit Adjustment.
			Spinning Reserves	Must be able to respond in less than a minute for up to 60 minutes. If called for longer other resources must be mobilized to provide that reserve. Contingency reserve can not be deployed in EIM.	Embedded within PaR. SO has a credit: Operating Credit Adjustment.
	Regulation Reserve	Regulation Reserves ensure compliance with NERC Control Performance Criteria in BAL-001-2. Regulation Reserves are used to respond to changes in generation and manage Area Control Error.	Regulating reserve	Deployed within 30 minutes and must be available for a full hour.	Embedded within PaR. SO has a credit: Operating Credit Adjustment.
			EIM Participation	Deployed within 5 minutes when called by EIM, when resource is available.	The PaR model does not capture sub-hourly dispatch. In the 2019 IRP, PAC proposed an intrahour flexible reserve credit; but was not used for portfolio selection.
	Frequency Response Reserve	Frequency Response Reserves ensure compliance with NERC standard BAL-003-1. Frequency Response Reserves are deployed during interconnection underfrequency events.	Must respond within seconds. Events are less than one minute in duration. Can be contributed by resources that are holding spinning reserves and/or regulating reserves.		NA - Assumed to be in the CPA as the Ancillary Services Measure.
	Interruptible Load	Interruptible load is designed to shed load during high peak times, day-ahead or day-of notification, longer event hours	Ability to shed load during system peak times, day-ahead or day-of notification, potentially longer event hours.		Assumed in the CPA as part of the measure development.
Load Shift	Load Shift is designed to move load to off-peak hours, day-of notification, longer event hours (e.g. customer-sited storage)	Ability to shift load to off-peak hours with day-of notification, longer event hours		Assumed in the CPA as part of the measure development.	



IRP Credits for DR

The 2019 IRP incorporated two credits that reduced the modeled cost of competing DR with supply-side resources in IRP modeling. These credits are intended to capture benefits that would otherwise not be reflected in IRP modeling.

- Transmission and Distribution Deferral Credit
 - Applied same credit to DR as described in the EE measure section of this presentation.
- Operating Reserve Credit
 - In this case, for Contingency and Regulation Reserves

IRP Credits, Cont.

Operating Reserve Credit

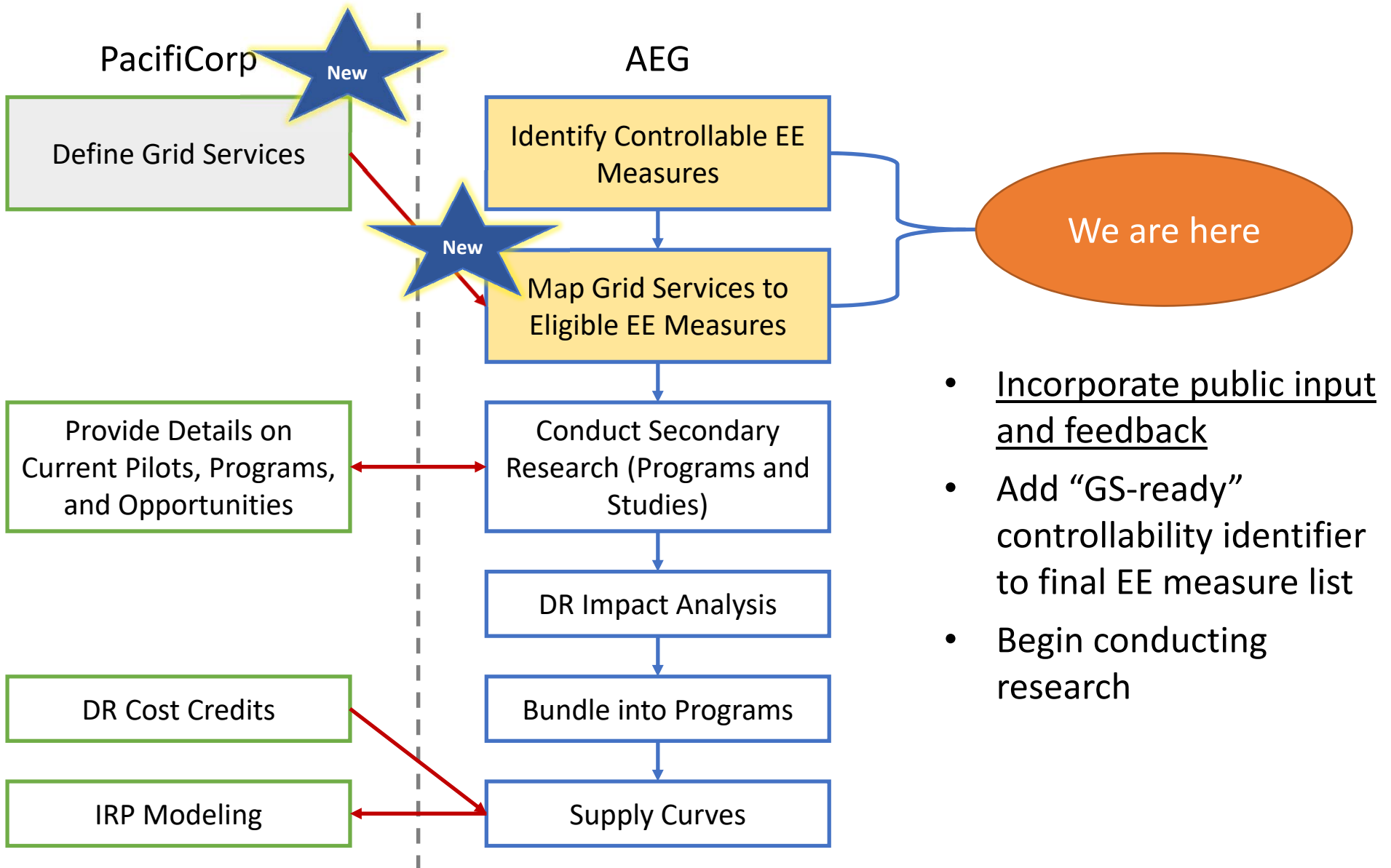


When evaluated in PaR, a portfolio will be evaluated on its ability to meet operating reserve requirements, including regulation and contingency reserves, but the SO model does not account for either reserve obligations or the reserve capability that resources can provide.

- For a resource that is available throughout the year, such as a gas peaking unit, the operating reserve credit in the 2019 IRP amounted to \$50/kw-year (2018\$).
- For resources with limited availability, such as seasonal demand response resources or storage combined with wind or solar, the credits are prorated to account for the periods when a resource provides operating reserves.
- The operating reserve credit has been applied to proxy storage, gas peaking units, and demand response that are available for selection within the SO model



Next Steps



- Incorporate public input and feedback
- Add “GS-ready” controllability identifier to final EE measure list
- Begin conducting research



Stakeholder Feedback Form Recap



Stakeholder Feedback Forms



- 5 stakeholder feedback forms submitted to date.
- 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 material.
- Stakeholder feedback is summarized on the following slides for reference.

Summary - Recent Stakeholder Feedback Forms

Stakeholder	Date	Topic	Brief Summary (complete form available online)	Response (posted online when available)
Southwest Energy Efficiency Project and Utah Clean Energy	Jan 3	CPA Scope of Work	Recommendations to expand the CPA analysis of demand response potential and energy efficiency potential.	Addressed in part at the January 21, 2021 CPA workshop, a written reply will be sent week of February 17, 2020.
Utah Valley Earth Forum	Feb 4	CPA Draft Measures	Provided a list of items that Utah Valley Earth Forum considers important to residential energy savings.	PacifiCorp will address this at the February 18, 2020 CPA workshop. A written response will be sent February 24.
Washington Utilities & Transportation Commission Staff	Feb 10	CPA Draft Measures	Provided feedback on how draft measures were provided, offered recommendations for improvement to this process, and requested a master crosswalk be provided to enable multiple review approaches.	PacifiCorp will address this at the February 18, 2020 CPA workshop. A written response will be sent February 24.
Utah Clean Energy	Feb 14	CPA Draft Measures	Questions and recommendations related to emerging technologies, the residential measure list, the non-residential measure list, and the residential and non-residential air infiltration, building shell, and insulation measures.	PacifiCorp will address this at the February 18, 2020 CPA workshop. A written response will be sent February 24.



Additional Information and Next Steps



Additional Information and Next Steps



- Public Input Meeting and Workshop Presentation and Materials:
 - pacificorp.com/energy/integrated-resource-plan/public-input-process
- 2021 IRP Stakeholder Feedback Forms:
 - pacificorp.com/energy/integrated-resource-plan/comments
- IRP Email / Distribution List Contact Information:
 - IRP@PacifiCorp.com
- IRP Support and Studies – CPA Draft Documents
 - pacificorp.com/energy/integrated-resource-plan/support

Upcoming Public Input Meeting/Workshop Dates



- April 16, 2020 (conference call only) – CPA Workshop #3
- June 18-19, 2020 – Public Input Meeting
- July 30-31, 2020 – Public Input Meeting
- September 10-11, 2020 – Public Input Meeting
- October 22-23, 2020 – Public Input Meeting
- December 3-4, 2020 – Public Input Meeting
- January 14-15, 2021 – Public Input Meeting
- February 25-26, 2021 – Public Input Meeting

**meeting dates are subject to change*