Integrated Resource Plan

2016

Roundtable #16-1

Wednesday, March 9, 2016

Portland General Electric

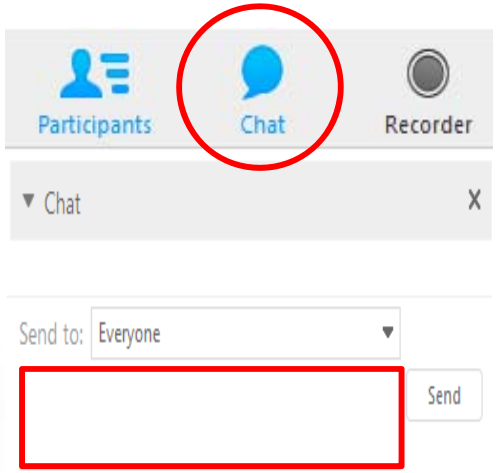
Portland General Electric

Welcome

Meeting Logistics

- Local Participants:
  - World Trade Center facility
  - Wireless internet access
  - Sign-in sheets

- Virtual Participants:
  - Ask questions via ‘chat’ feature
  - Meeting will stay open during breaks, but will be muted



  - Electronic version of presentation: *portlandgeneral.com/irp >> Integrated Resource Planning*

Portland General Electric

Safety Moment – Distracted Driving

Portland General Electric

Safety Moment

March 9, 2016 Slide 5

Eight Ways to Avoid Distracted Driving

1. Stay off your phone. Do NOT text and drive

2. Use Bluetooth in your car or talk through a Bluetooth headset if you must talk on the phone while driving

3. Look up your directions before you leave the house if you are going to a new or unknown location

4. Make car adjustments, such as mirror or seat adjustments, before you get on the road

5. Finish getting ready, such as doing make-up or fixing hair or clothes, before you leave the house

6. Avoid eating while you are behind the wheel. If you need to have breakfast or lunch, pull over to a safe place and take a break

7. Watch out for beverages. If you must have a beverage in the car, be sure it is in a spill-proof container. Many drivers rear-end the car ahead of them when reaching for a bottle of water

8. Minimize distractions from children in the back seat. Make it a habit to drive with two adults in the car. If you must drive alone with children, work on ways to safely occupy them while you drive

Source: www.totalsafety.com

Portland General Electric

Today's Topics

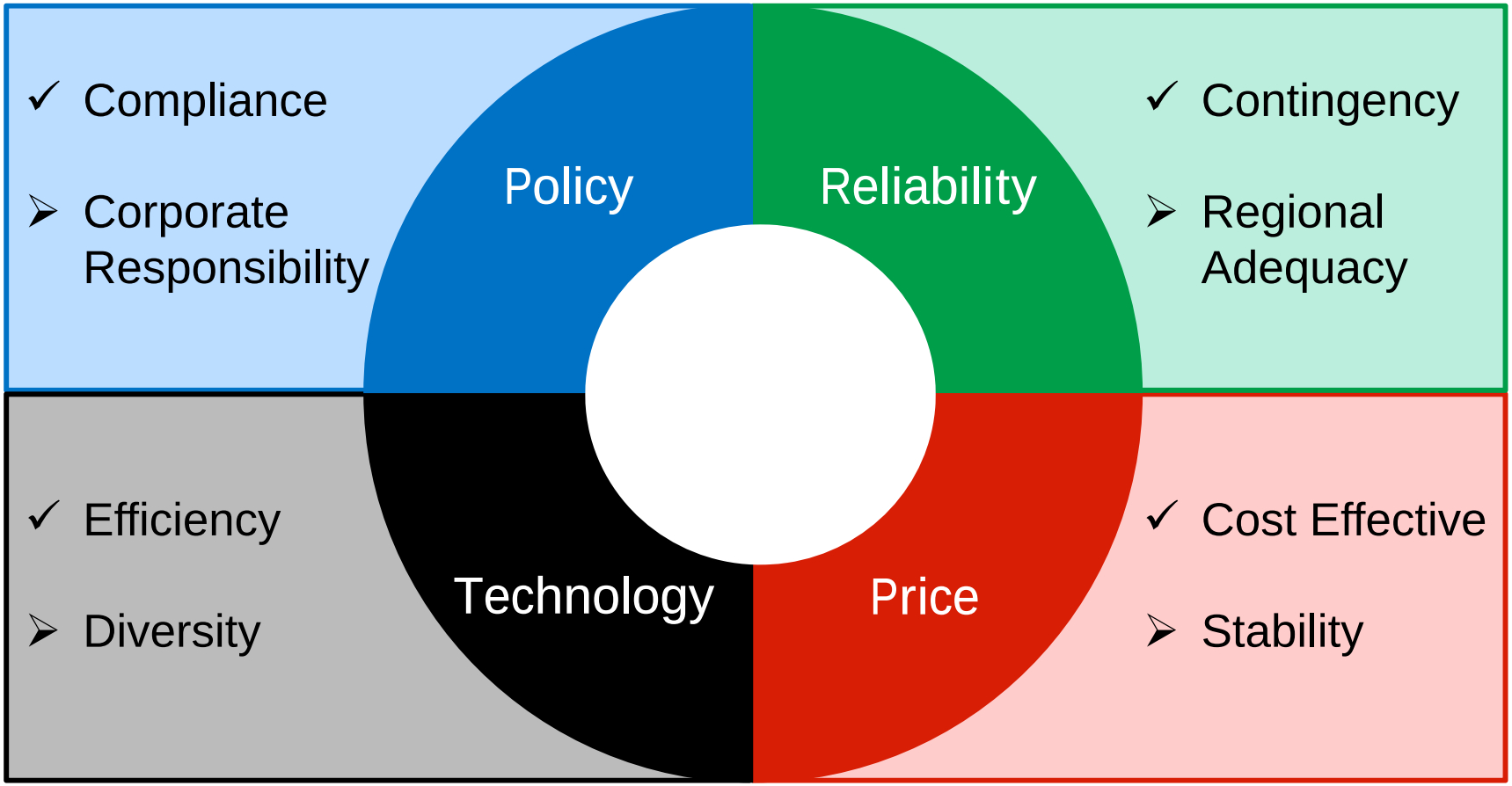
- Overview
- RPS Landscape
- Resource Adequacy
- Scoring Metrics
- Portfolios

Portland General Electric

Portland General Electric

Public Process Overview

Guiding Philosophy

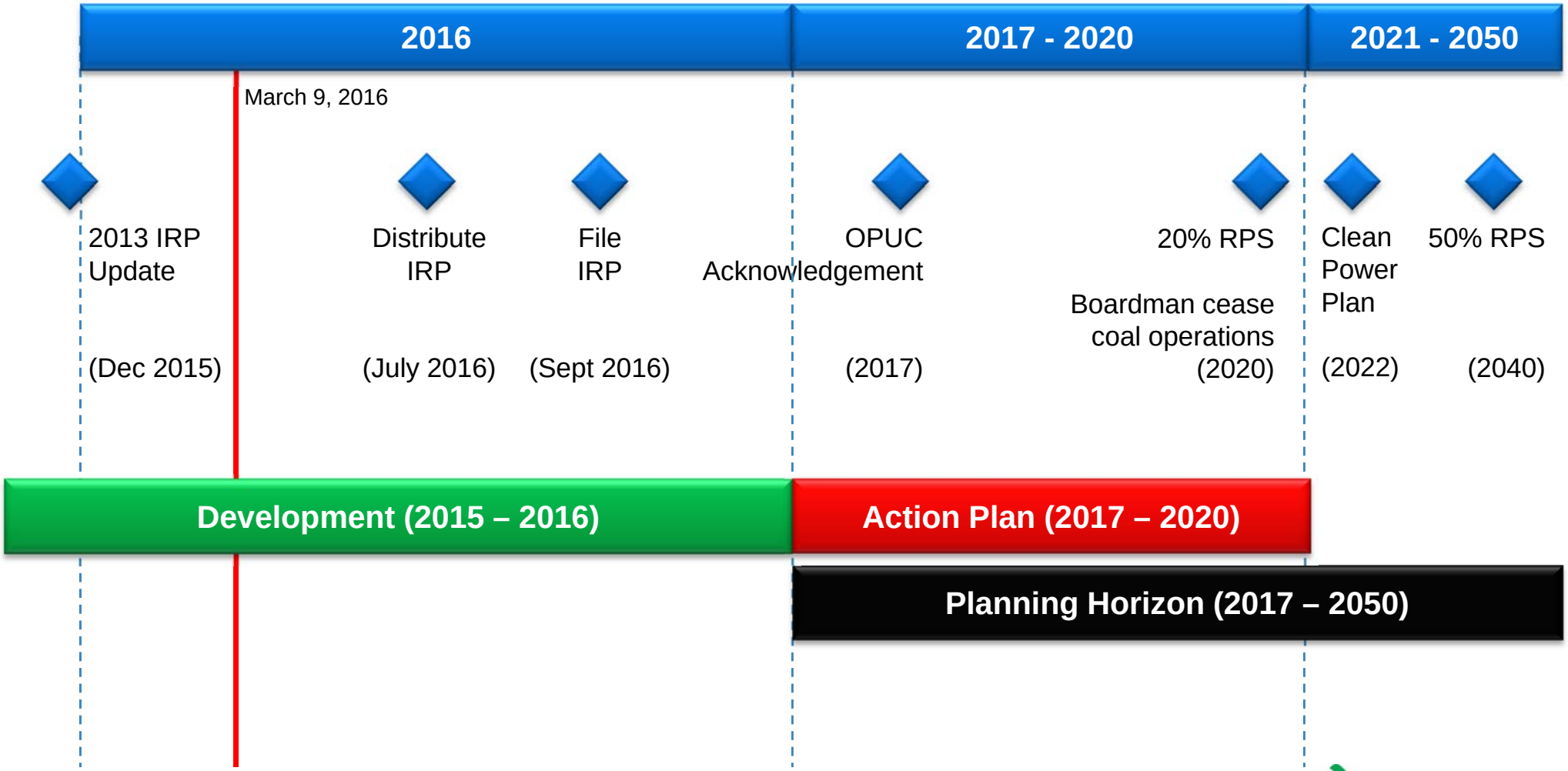


Metric based-decisions

- ✓ Constraints which will be met
- ➢ Values that inform decisions

Portland General Electric

2016 IRP Timeline



Dates subject to change

Portland General Electric

Round Table Meeting Schedule*

Q1 – March 9	• RPS Landscape • Scoring Metrics	• Resource Adequacy • Portfolios
Q2 – May 16	• Resource Flexibility • RPS Strategy	
Q3 – August 17	• Discuss Draft IRP**	
Q4 – November 16	• Discuss Final IRP*** • OPUC Process	

Additional Meetings:

❖ Tentative: April 21 – OPUC Public Meeting – Portfolios, Clean Power Plan Results

* All dates subject to change
** Draft IRP scheduled for distribution on July 29
*** Final IRP scheduled for filing on September 16

Portland General Electric

2016 IRP: Status

Item	Status
Round Table Meetings	**8 Planned** (5 complete, 3 scheduled)
Commission Meetings	**2 Planned** (1 complete, 1 tentative)
Feedback Forms	**4 Received** (0 since last meeting)
2013 IRP Action Plan	**5 Actions (OPUC Order No. 14-415)**
Supply Side	In progress (Hydro contracts, portfolios, no major resources)
Demand Side	Completed (EE, DR) In progress (CVR will be included in Portfolios)
Enabling Studies	Completed (Load forecast, EE, DG, EIM, Capacity) In progress (Biomass, Flexibility)
Transmission	In progress
Other	In progress (RPS, Clean Power Plan)
Related Topics	In progress [UM1708 (DR); UM 1716 (VoS); UM 1719 (VER CC); UM 1719 (Energy Storage)]
2016 IRP Development	**~13 Chapters**
Draft	Content outline under development
Final	Planned filing September 16, 2016*

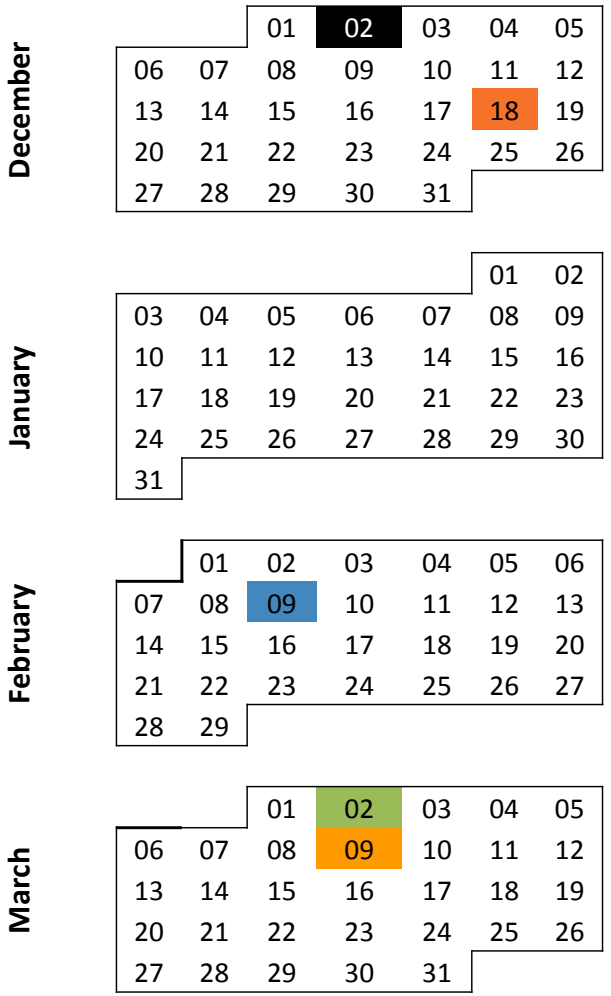
*Date subject to change

Portland General Electric

RPS Landscape

Recent Happenings

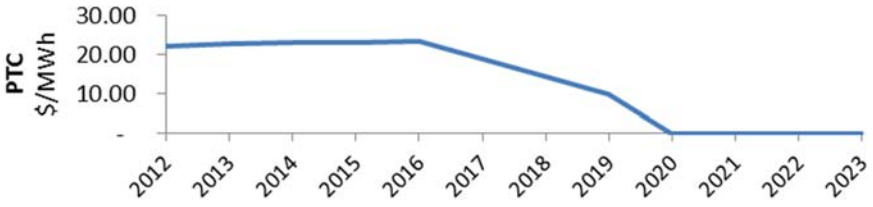
- 2013 IRP Update
- Federal tax credits
- Supreme Court Stay of CPP
- Oregon Senate Passes SB 1547
- Roundtable 2016-1

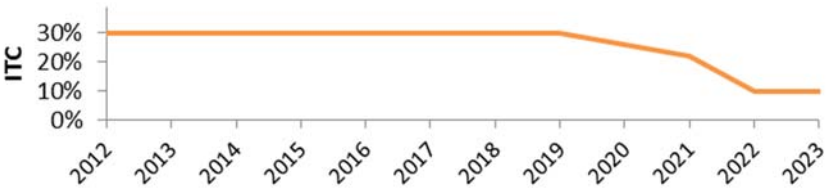


Portland General Electric

Production & Investment Tax Credit

- December 2015, Congress passes federal omnibus spending bill that includes:
  - Five year extension of Production Tax Credit
  - Three year extension of Investment Tax Credit

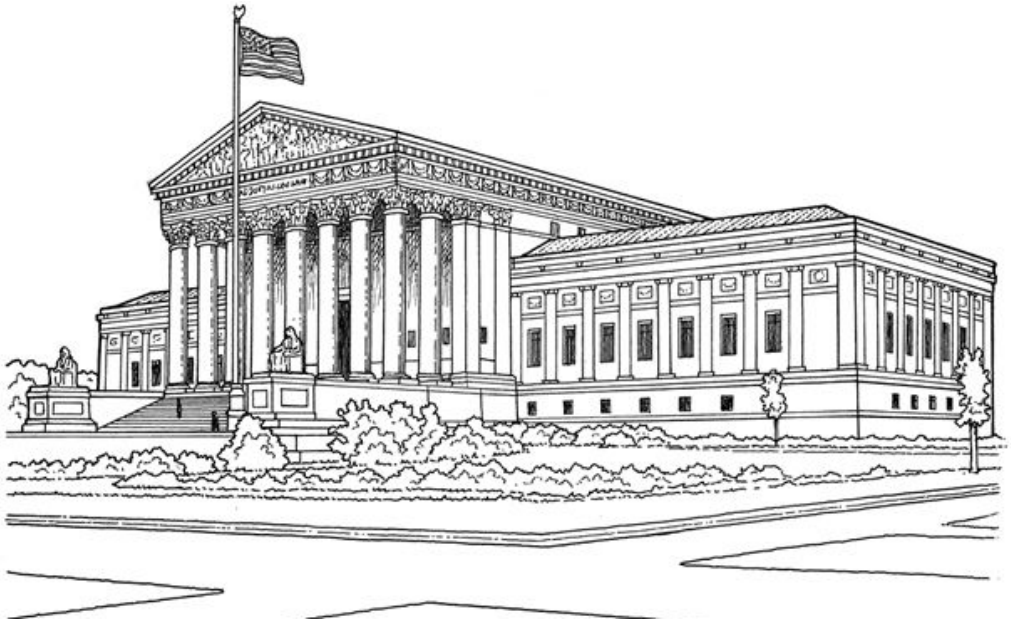




Portland General Electric

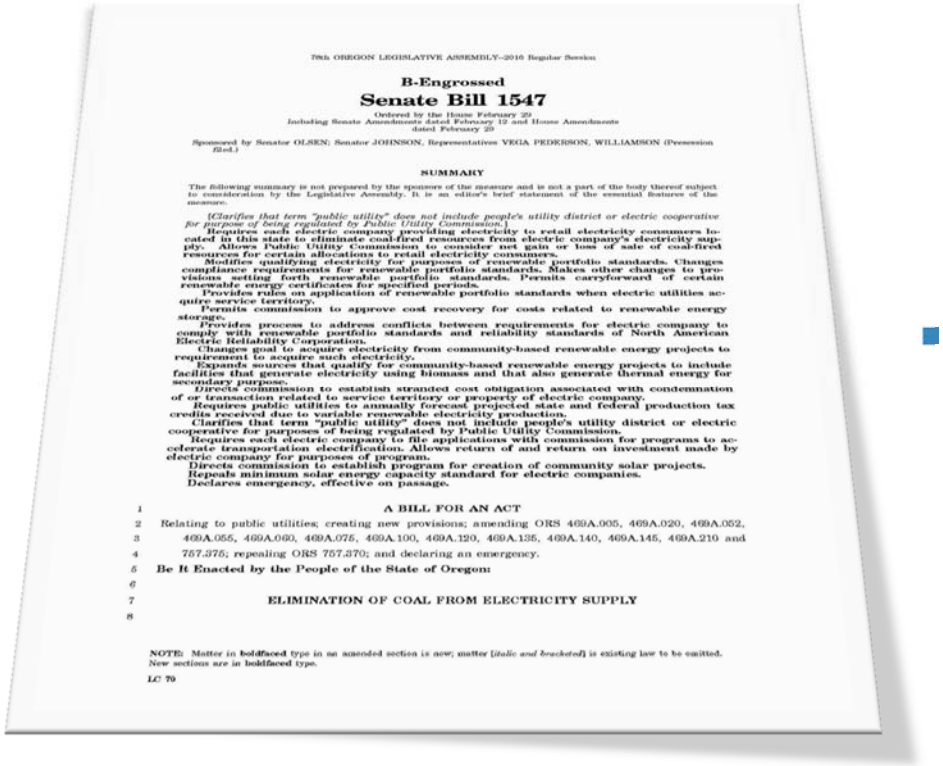
Clean Power Plan

- February 2016, United States Supreme Court grants emergency stay on EPA's implementation of CPP while reviewed by DC Circuit Court
  - DC Circuit Court's case begins June 2
  - Will be appealed to Supreme Court
  - Supreme Court ruling expected early 2018
- IRP will continue to evaluate both CPP and no CPP futures



Portland General Electric

Summary of Senate Bill 1547



78th OREGON LEGISLATIVE ASSEMBLY--2016 Regular Session

B-Engrossed
Senate Bill 1547

Ordered by the House February 25
Including Senate Amendments dated February 12 and House Amendments dated February 25

Sponsored by Senator OLSEN; Senator JOHNSON, Representatives VEGA PEDERSON, WILLIAMSON (Presession filed.)

SUMMARY

The following summary is not prepared by the sponsors of the measure and is not a part of the body thereof subject to consideration by the Legislative Assembly. It is an editor's brief statement of the essential features of the measure.

[Clarifies that term "public utility" does not include people's utility district or electric cooperative for purpose of being regulated by Public Utility Commission.]

Requires each electric company providing electricity to retail electricity consumers located in this state to eliminate coal-fired resources from electric company's electricity supply. Allows Public Utility Commission to consider net gain or loss of sale of coal-fired resources for certain allocations to retail electricity consumers.

Modifies qualifying electricity for purposes of renewable portfolio standards. Changes compliance requirements for renewable portfolio standards. Makes other changes to provisions setting forth renewable portfolio standards. Permits carryforward of certain renewable energy certificates for specified periods.

Provides rules on application of renewable portfolio standards when electric utilities acquire service territory.

Permits commission to approve cost recovery for costs related to renewable energy storage.

Provides process to address conflicts between requirements for electric company to comply with renewable portfolio standards and reliability standards of North American Electric Reliability Corporation.

Changes goal to acquire electricity from community-based renewable energy projects to requirement to acquire such electricity.

Expands sources that qualify for community-based renewable energy projects to include facilities that generate electricity using biomass and that also generate thermal energy for secondary purpose.

Directs commission to establish stranded cost obligation associated with condemnation of or transaction related to service territory or property of electric company.

Requires public utilities to annually forecast projected state and federal production tax credits received due to variable renewable electricity production.

Clarifies that term "public utility" does not include people's utility district or electric cooperative for purposes of being regulated by Public Utility Commission.

Requires each electric company to file applications with commission for programs to accelerate transportation electrification. Allows return of and return on investment made by electric company for purposes of program.

Directs commission to establish program for creation of community solar projects.

Repeals minimum solar energy capacity standard for electric companies.

Declares emergency, effective on passage.

A BILL FOR AN ACT

Relating to public utilities; creating new provisions; amending ORS 469A.005, 469A.020, 469A.052, 469A.055, 469A.060, 469A.075, 469A.100, 469A.120, 469A.135, 469A.140, 469A.145, 469A.210 and 757.375; repealing ORS 757.370; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

ELIMINATION OF COAL FROM ELECTRICITY SUPPLY

NOTE: Matter in **boldfaced** type in an amended section is new; matter [*italic and bracketed*] is existing law to be omitted. New sections are in boldfaced type.

LC 70

- Senate Bill 1547
  - Passed the Oregon House March 1st
  - Passed the Oregon Senate March 2nd
  - Awaits Governor Brown's signature
- Three primary components:
  - No coal in PGE's Oregon customer resources by 2035
  - RPS standard elevated to 50% by 2040
  - REC banking provisions changed

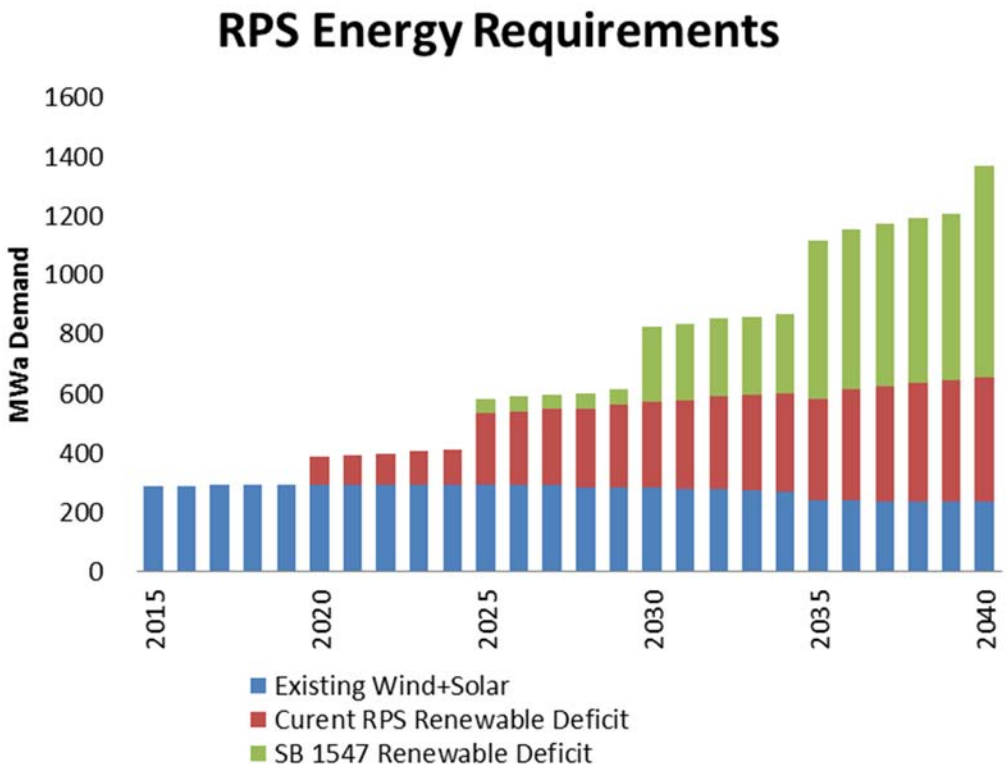
Portland General Electric

SB 1547 - Colstrip

- PGE's share of Colstrip Units 3 & 4 to be fully depreciated in 2030
- Five years following full depreciation, Colstrip is removed from PGE customer rates
- Removal from portfolio reflected in 2016 IRP load resource balance

Portland General Electric

SB 1547 - RPS Targets

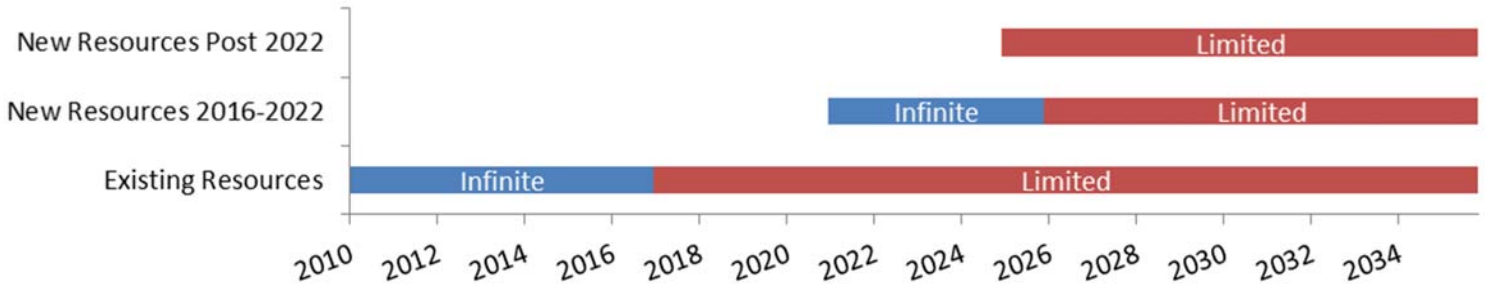


- *15% by 2015*
- *20% by 2020*
- 27% by 2025
- 35% by 2030
- 45% by 2035
- 50% by 2040

Portland General Electric

SB 1547 – REC Banking Provisions

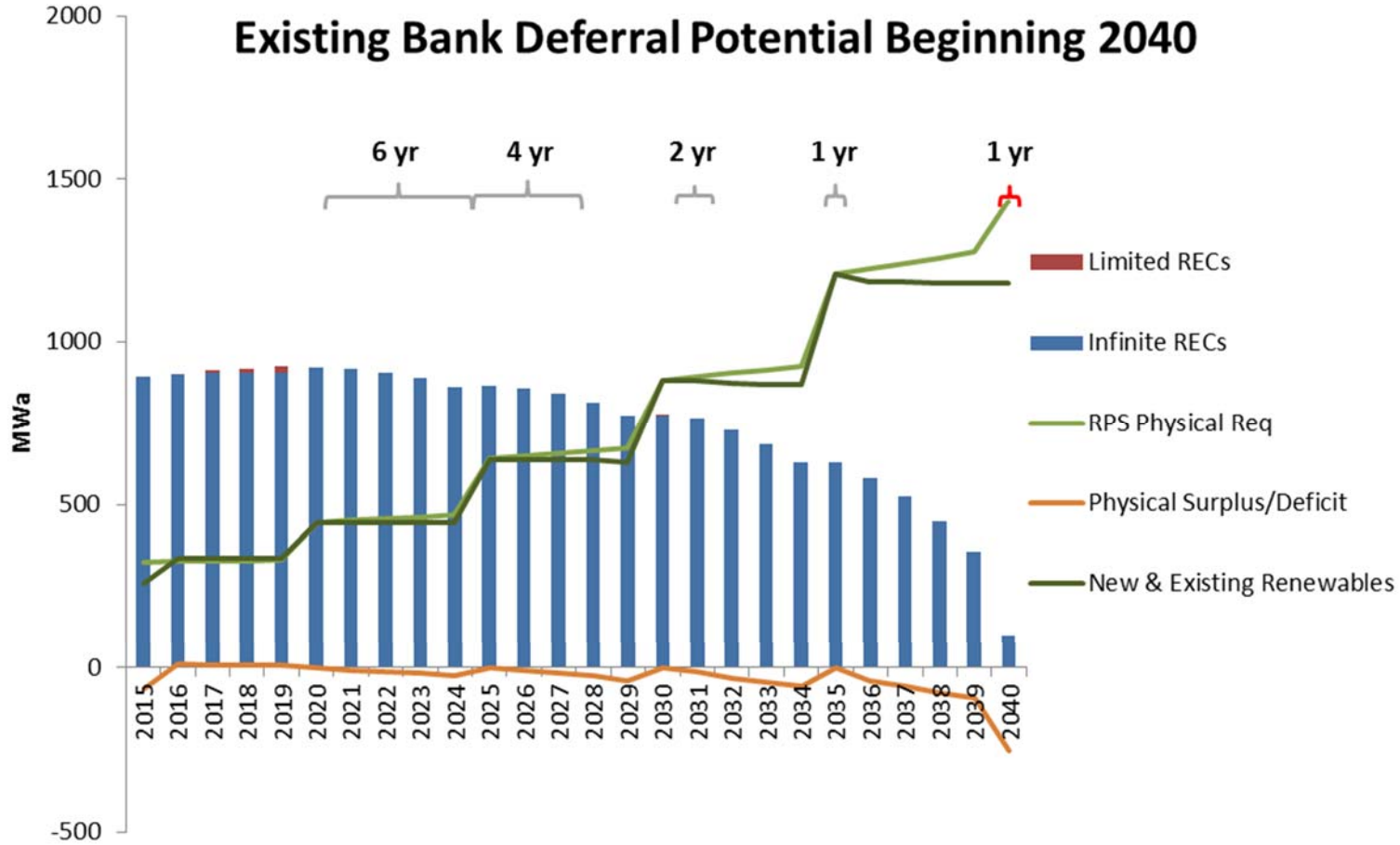
- Existing banked RECs retain infinite life
- RECs generated by existing units, following passage of the act, may be used in the contemporaneous compliance year, or the following five compliance years
- New qualifying units or contracts delivered before year end 2022 generate RECs with infinite lives for five years. Thereafter, new qualifying generation will create RECs with limited lives
- New qualifying units or contracts delivered after year end 2022 will create RECs with limited lives
- 'First-In, First-Out' retirement requirement eliminated. Allows for retirement of limited life RECs before valuable infinite life RECs



Portland General Electric

REC Banking Deferral Potential

- Number of RPS years coverable by existing REC bank



Portland General Electric

REC Banking Strategy

- Banked RECs facilitate:
  - Temporary alternatives to physical compliance necessary to accommodate resource delays or avoid adverse market conditions
  - RPS compliance following periods of renewable generation below forecasts
  - RPS compliance following periods of load growth exceeding forecasts
    - *RPS compliance associated with load growth between renewable builds*
    - *REC replacement for economic curtailment of renewables during periods of oversupply*

- Factors included in REC bank balance analysis

Portland General Electric

REC Banking Strategy

- Three Factor Annual REC Risk Analysis

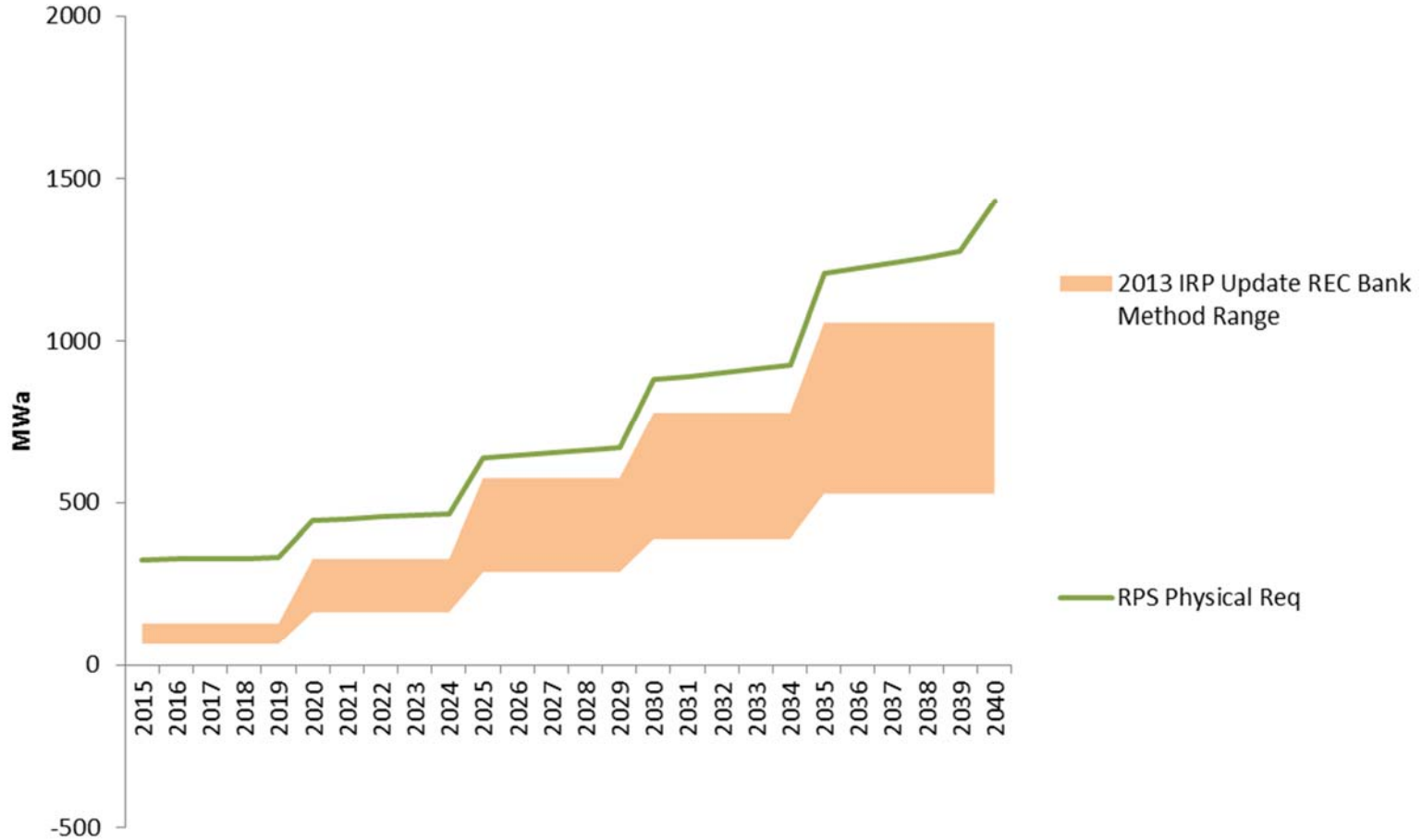
REC Requirement (MWa)

	2015-2019	2020-2024	2025-2029	2030-2034	2035-2039
Annual RPS Deferral Risk	0	95	195	251	327
Annual Wind Forecast Risk	59	80	122	175	246
Annual Load Forecast Risk	6	10	13	16	27
One-Year Adjusted Cumulative REC Risk	**65**	**164**	**288**	**389**	**528**
Two-Year Adjusted Cumulative REC Risk	**130**	**328**	**576**	**778**	**1057**

Portland General Electric

REC Banking Strategy

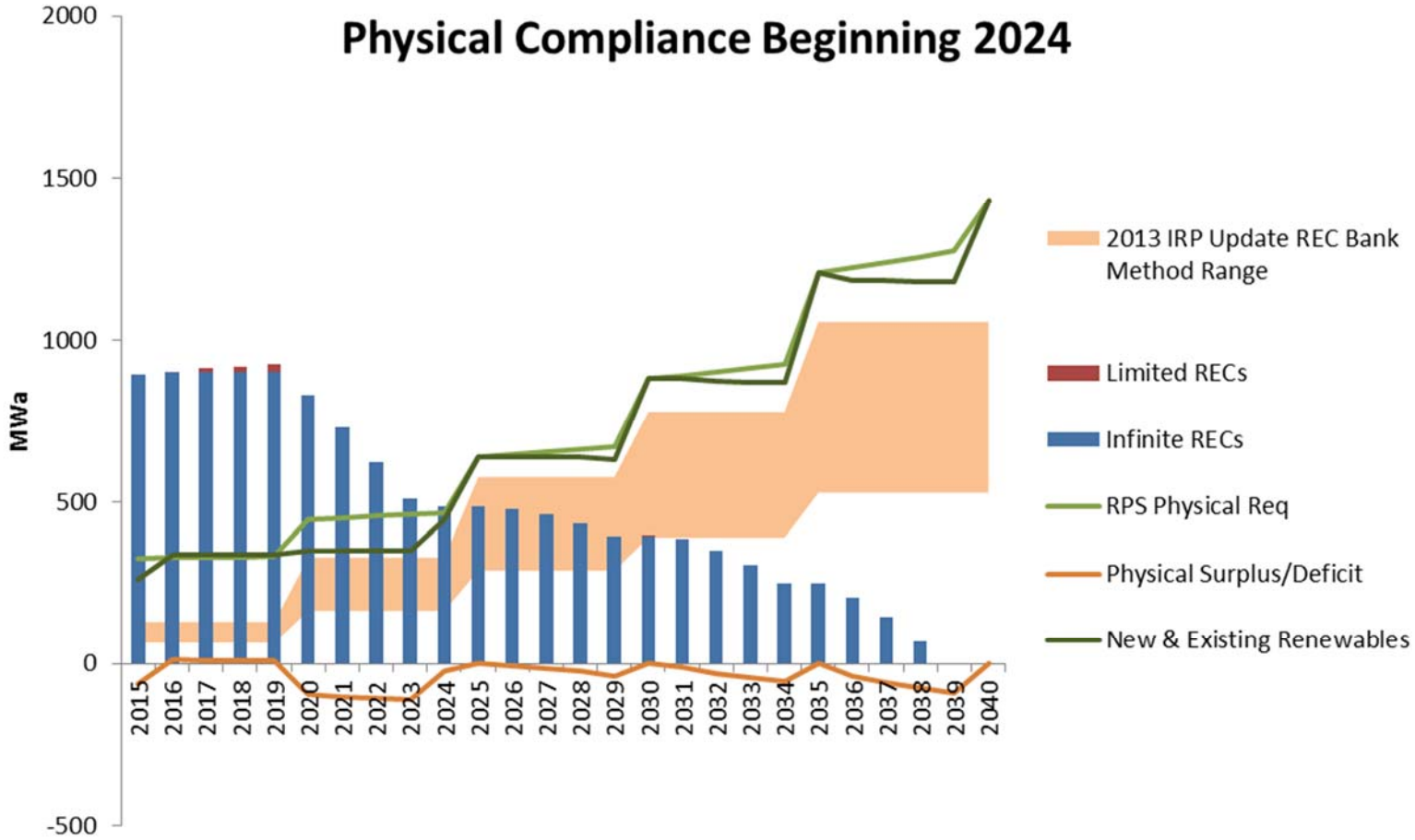
- Three Factor Annual REC Risk Analysis



Portland General Electric

REC Banking Pathways

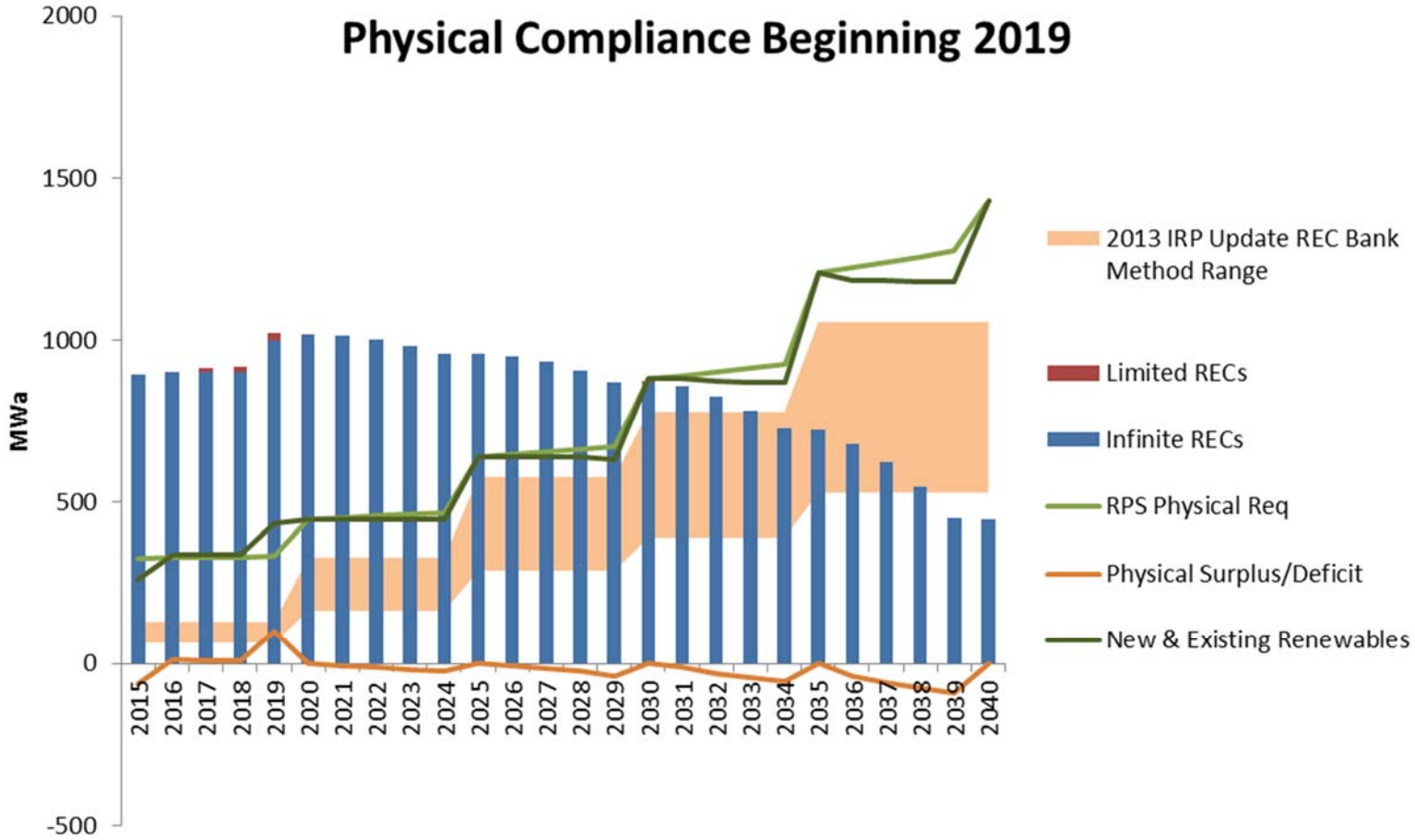
- 2013 IRP Update Recommendation



Portland General Electric

REC Banking Pathways

- Forecasted REC bank following earlier action



Portland General Electric

RPS Compliance Strategy Summary

- 2016 IRP will revisit RPS compliance strategy

- PGE's compliance strategy will weigh:
  - The benefits of federal tax incentives
  - CPP compliance
  - REC bank adequacy and forecast risk
  - Year-over-year rate impacts

- 2016 IRP will test 2019-2024 online dates for new renewable resources

Portland General Electric

Portland General Electric

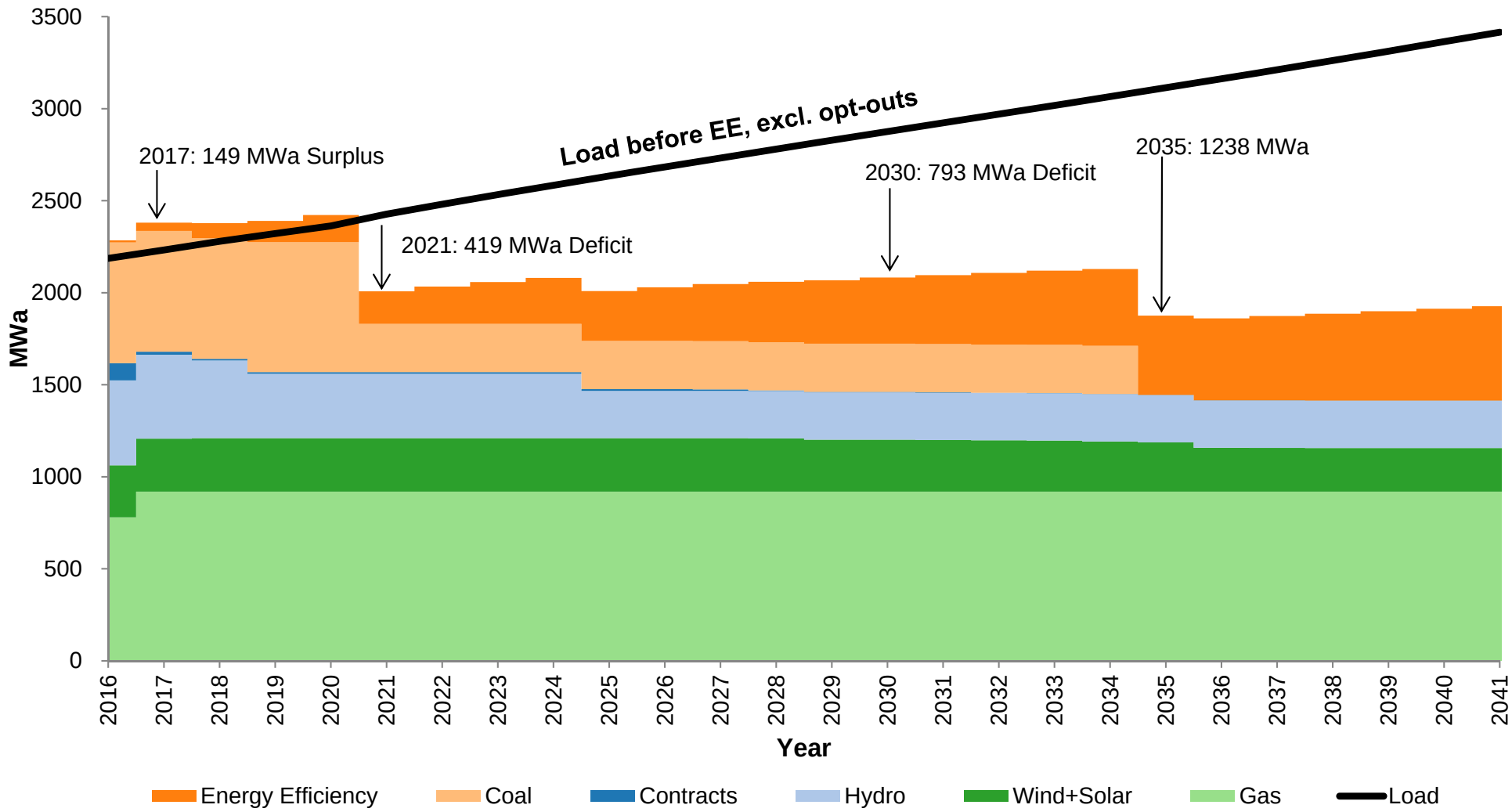
Resource Adequacy

Resource Adequacy Topics

- Energy Load-Resource Balance and RPS Need
- RECAP review
- Capacity Need
- Capacity Contribution
- Future Considerations

Portland General Electric

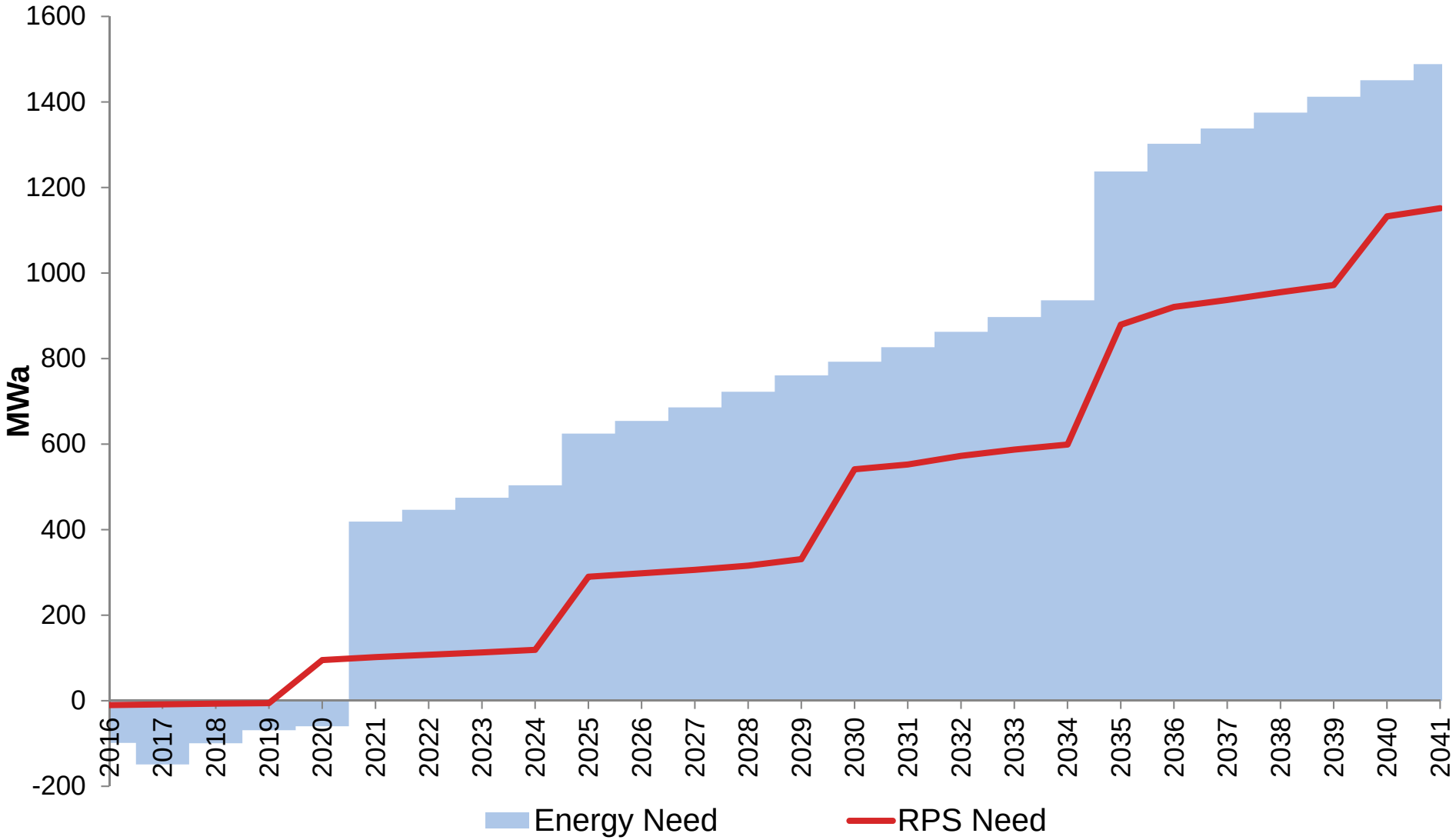
Energy Load-Resource Balance



- SB 1547 coal requirements included

Portland General Electric

Energy and RPS Needs

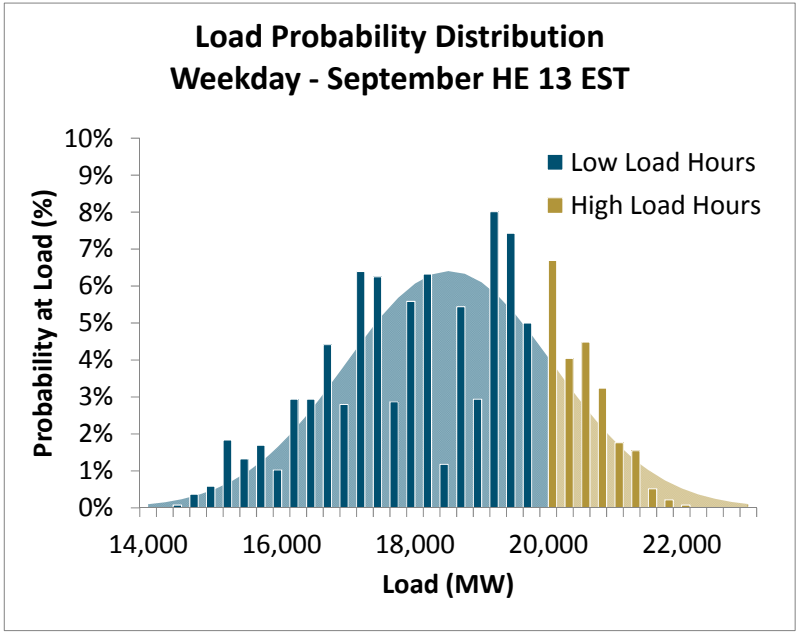


- SB 1547 coal and RPS requirements included

Portland General Electric

Capacity Need and Contributions

- **PGE is using E3's RECAP model for the 2016 IRP to assess capacity need and capacity contribution**
  - RECAP calculations are based on a loss-of-load probability (LOLP) study for all hours of the test period
  - Study assesses hourly capacity need. Not a flexible capacity study
  - Model background, inputs, and draft values were discussed during public meetings in 2015 (August 13 and December 17, presentations available online)



Generic load distribution, E3

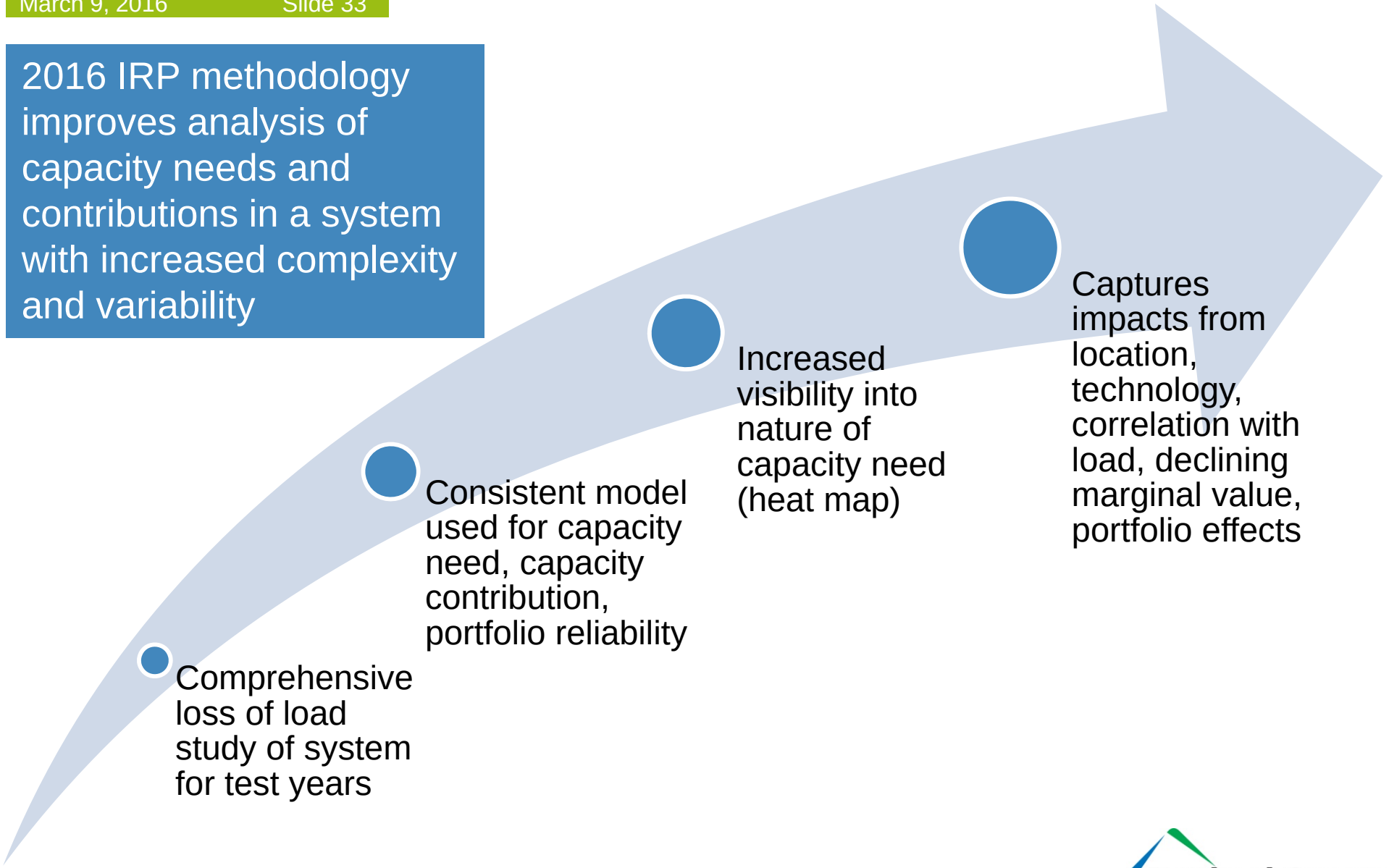
Portland General Electric

Capacity Need and Contributions

- **Annual capacity need based on reliability target**
  - Reliability target is industry standard of 1-day-in-10 years (2.4 hr/yr) Adequacy determined as ability to meet hourly load and required operating reserves
  - Existing renewables included based on historic and synthetic data, capturing annual, seasonal, hourly variations and correlation with load
- **Marginal capacity contribution values calculated for candidate renewable resources**
  - Capacity contribution expressed as effective load carrying capacity (ELCC) in terms of avoided conventional units (CU, 100 MW, 5% forced outage rate)
  - Captures impacts of location and technology, declining marginal value, portfolio effects

Resource Adequacy Process Improvements

2016 IRP methodology improves analysis of capacity needs and contributions in a system with increased complexity and variability



Portland General Electric

Challenges: Complexity, New Tool

Significant increase in input data needs, processing time

Complexity in interpreting and applying results

Learning curve to develop best methods to use tools

Externally run model, ability to run at PGE soon!

Portland General Electric

RECAP Capacity Need – 2021, 2025, 2030

- **Annual capacity need must be met to achieve the annual reliability target**
  - Winter and summer values are seasonal minimums
  - Shortage (need) defined in terms of CU (100 MW unit, 5% FOR)
  - Load growth and contract expirations reflected in 2025 and 2030 results

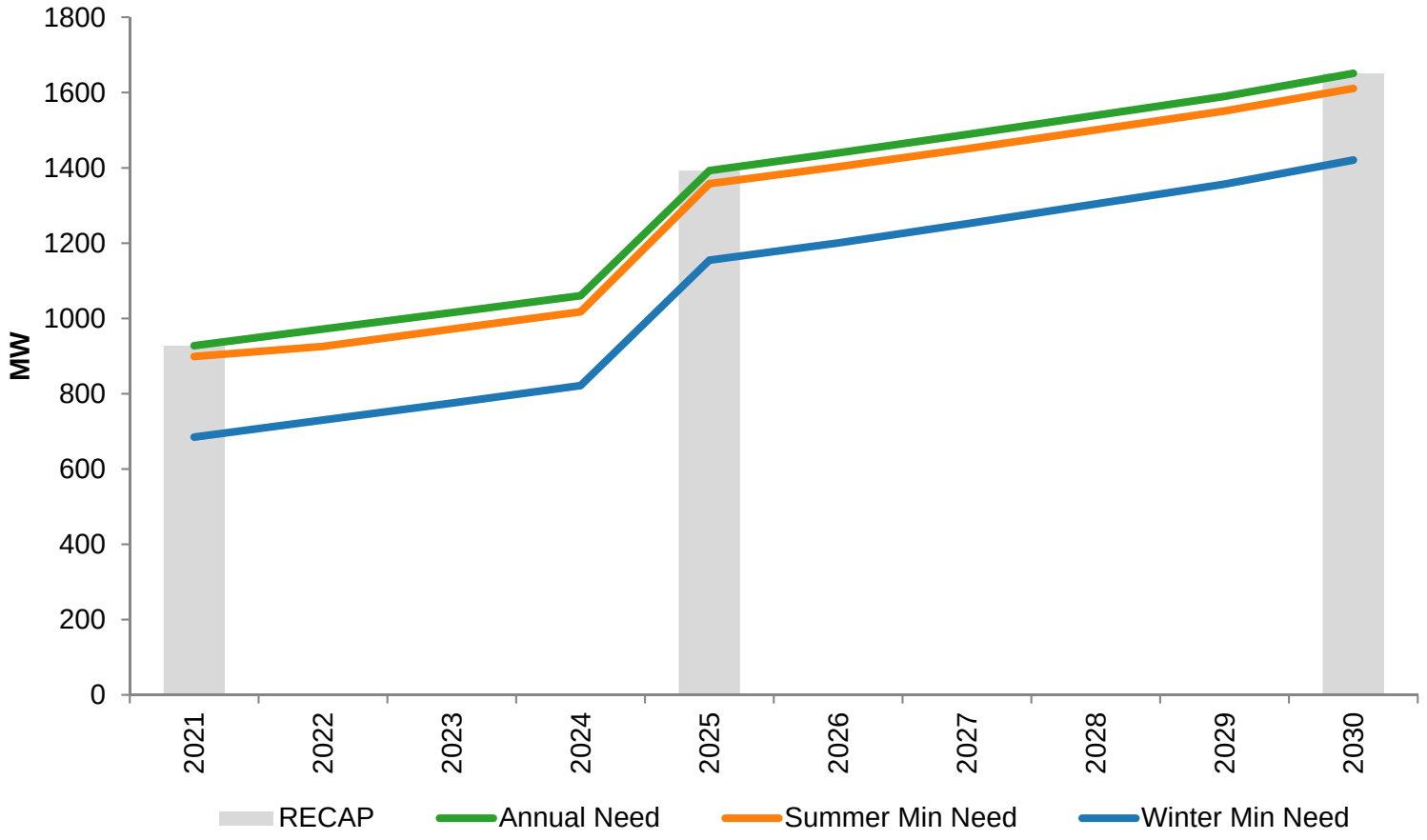
RECAP Results	2021	2025	2030
Reliability Target, day-in-year	1-in-10	1-in-10	1-in-10
1-in-2 Annual Peak Load[1], MW	3,525	3,660	3,843
Annual Resources[2], MW	3,146	2,919	2,912
Annual PRM	15.6%	17.8%	18.7%
Annual Shortage, MW	**928**	**1,393**	**1,651**
Winter Shortage (min), MW	685	1,155	1,421
Summer Shortage (min), MW	899	1,358	1,611

1. Annual peak load is winter peak for 2021-2030
2. Annual resources represented by a summary view that is a mixture of annual capacities and ELCC values. It does not necessarily indicate the treatment in the model, such as inclusion of forced outage rates. EE is embedded in the load forecast

Portland General Electric

Capacity Need 2021-2030

- RECAP results for 2021, 2025, 2030
- Estimated values for intermediate years based on changes to load and resources



Portland General Electric

Existing Portfolio 2021 – Loss of Load Expectation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.006	0.005	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.005	0.025
2	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.007
3	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005
4	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.006
5	0.005	0.005	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.016
6	0.099	0.085	0.049	0.019	0.000	0.000	0.001	0.007	0.012	0.014	0.137	0.215
7	0.603	0.475	0.309	0.041	0.001	0.001	0.009	0.031	0.049	0.086	0.538	1.347
8	2.272	1.283	0.645	0.087	0.005	0.005	0.064	0.179	0.153	0.164	1.166	3.019
9	3.736	2.117	0.776	0.062	0.012	0.026	0.285	0.768	0.223	0.138	2.112	4.746
10	3.208	1.693	0.690	0.054	0.027	0.084	0.951	1.793	0.404	0.106	1.882	4.475
11	2.672	1.285	0.500	0.032	0.052	0.196	2.081	3.295	0.655	0.086	1.619	4.095
12	2.247	0.953	0.296	0.023	0.085	0.386	3.319	4.730	0.980	0.077	1.324	3.616
13	2.002	0.670	0.152	0.016	0.135	0.673	4.778	6.112	1.477	0.064	1.102	2.850
14	1.590	0.423	0.097	0.012	0.180	1.004	6.030	7.398	2.101	0.068	0.893	2.151
15	1.247	0.321	0.065	0.009	0.232	1.223	6.965	8.423	2.650	0.074	0.766	1.655
16	1.058	0.301	0.051	0.007	0.257	1.439	7.486	8.787	3.027	0.079	0.878	2.107
17	1.684	0.461	0.081	0.008	0.298	1.483	7.359	8.761	3.169	0.140	1.404	3.946
18	3.757	0.972	0.161	0.011	0.264	1.178	6.341	8.158	2.977	0.273	3.017	6.374
19	5.685	1.805	0.400	0.015	0.198	0.732	4.755	7.054	2.472	0.413	4.609	8.259
20	5.551	2.109	0.584	0.024	0.130	0.396	3.370	5.552	2.123	0.343	4.206	7.535
21	4.121	1.496	0.397	0.020	0.067	0.200	2.133	4.172	1.740	0.141	2.988	5.466
22	2.412	0.803	0.123	0.007	0.023	0.072	0.218	0.965	0.139	0.025	1.598	3.118
23	0.884	0.272	0.020	0.001	0.001	0.006	0.023	0.190	0.007	0.003	0.560	1.044
24	0.115	0.033	0.001	0.000	0.000	0.000	0.001	0.011	0.000	0.000	0.086	0.176

- 2021 LOLE = 336 hours per year

Portland General Electric

Wind – 2021 Marginal ELCC

- Values below are for specific scenarios and do not apply to all technologies, locations, quantities, or time frames
- ELCC is expressed as percent of nameplate based on avoided CU

Incremental Renewables	Annual ELCC	Winter ELCC	Summer ELCC
Wind, Gorge, 300 MW	12%	22%	10%
Wind, Montana, 300 MW	24%	52%	19%

Portland General Electric

Solar – 2021 Marginal ELCC

- Values below are for specific scenarios and do not apply to all technologies, locations, quantities, or time frames
- ELCC is expressed as percent of nameplate based on avoided CU

Incremental Renewables	Annual ELCC	Winter ELCC	Summer ELCC
Solar, Fixed-Tilt **Westside OR, 100 MW**	41%	3%	55%
Solar, Fixed-Tilt **Central OR, 150 MW**	41%	9%	54%
Solar, Single-Axis Tracking **Central OR, 150 MW**	46%	7%	60%

Portland General Electric

Portfolio – 2021 Marginal ELCC

- Values below are for specific scenarios and do not apply to all technologies, locations, quantities, or time frames
- ELCC is expressed as percent of nameplate based on avoided CU

Incremental Renewables	Annual ELCC	Winter ELCC	Summer ELCC
Wind, Gorge, 300 MW Solar, Fixed, C. OR, 100 MW	20%	19%	21%
Wind, Montana, 300 MW Solar, Fixed, C. OR, 100 MW	31%	42%	28%

Portland General Electric

Capacity Contribution – Increased RPS

- Initial examination of increased RPS scenarios indicates capacity value of diversified renewables

Incremental Renewables	Annual ELCC
Wind, Gorge, 300 MW	12%
Wind, Gorge, 900 MW	9%
Wind, Gorge, 300 MW **Wind, Montana, 300 MW** **Solar, Tracking, C. OR, 300 MW**	26%

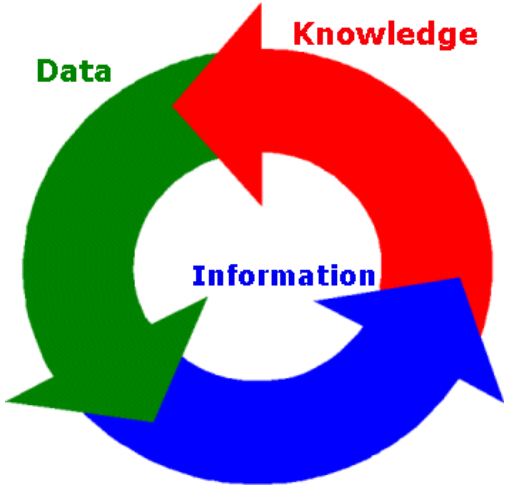
Future Considerations: Near-term

- Ability to run model in-house
- Investigate additional incremental resources
- Continue developing process to interpolate/extrapolate
- Investigate impacts of increased RPS
- Characterize declining marginal values
- Align with demand response portfolio treatment
- Investigate RECAP output for expected unserved energy (EUE)

Portland General Electric

Future Considerations: Long-term

- Expand and improve input data sets
- Examine EE modeling options (currently embedded in load)
- Examine import assumptions
- Examine thermal capacity temperature modeling
- Investigate time-sequential modeling



Portland General Electric

Conclusion

- **Significant improvements to assessments and evaluation tools**
- Substantial increase to process complexity
- Continued work to improve data, tools, and analysis

Sellwood Bridge Construction, en.wikipedia.org

Portland General Electric

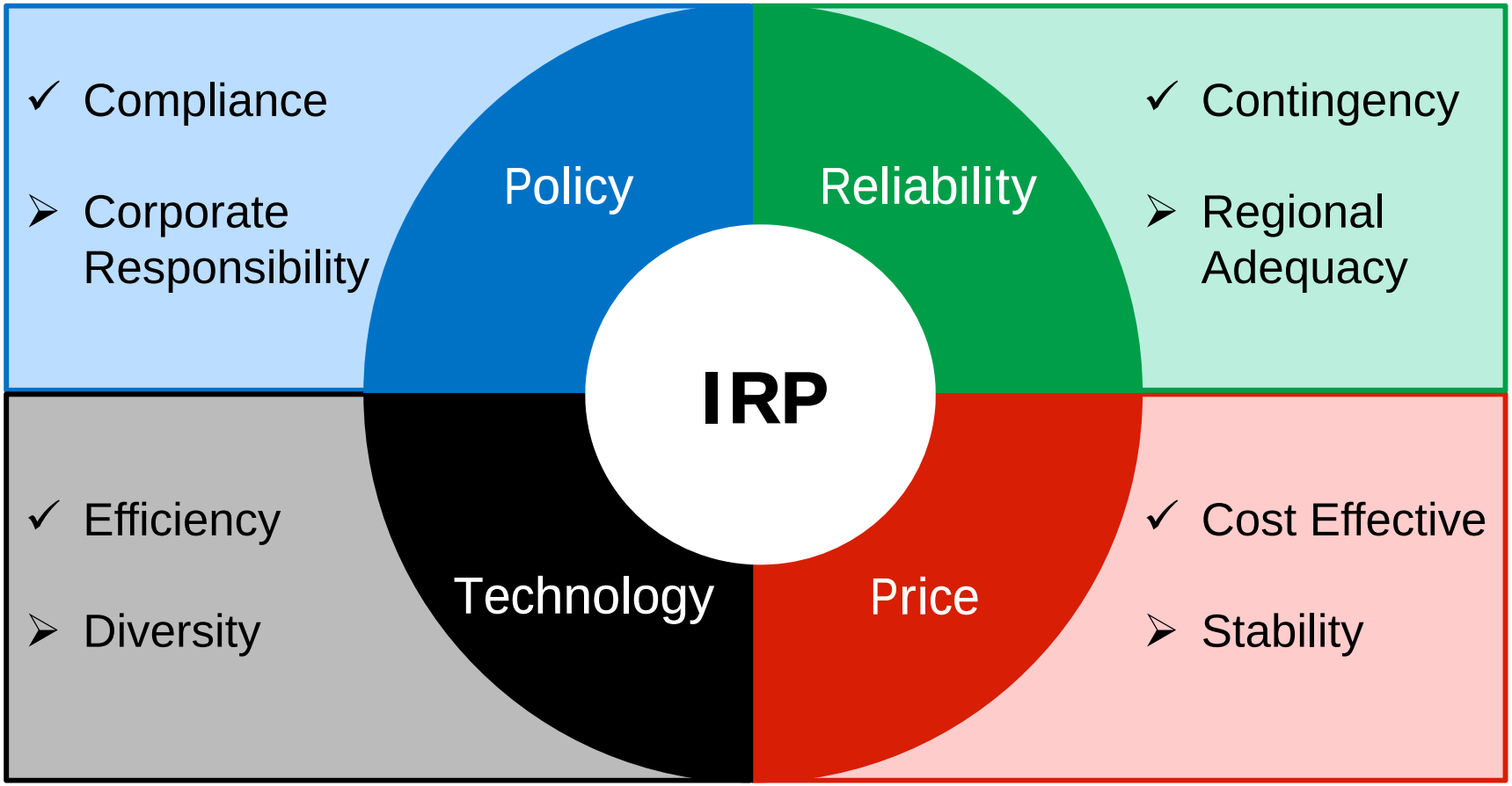
Portland General Electric

Scoring Metrics

Portfolio evaluation guidelines

Guideline (07-047)	Status
1 (c)	The primary goal must be the selection of a portfolio of resources with the best combination of expected costs and associated risks and uncertainties for the utility and its customers.
	Utilities should use present value of revenue requirement (PVRR) as the key cost metric.
	To address risk, the plan should include, at a minimum:
	1. Two measures of PVRR risk: one that measures the variability of costs and one that measures the severity of bad outcomes.
	2. Discussion of the proposed use and impact on costs and risks of physical and financial hedging.

IRP Guiding Philosophy



Metric based-decisions

- ✓ Constraints which will be met
- ➢ Values that inform decisions

Portland General Electric

Guiding Philosophy → Portfolio Scoring

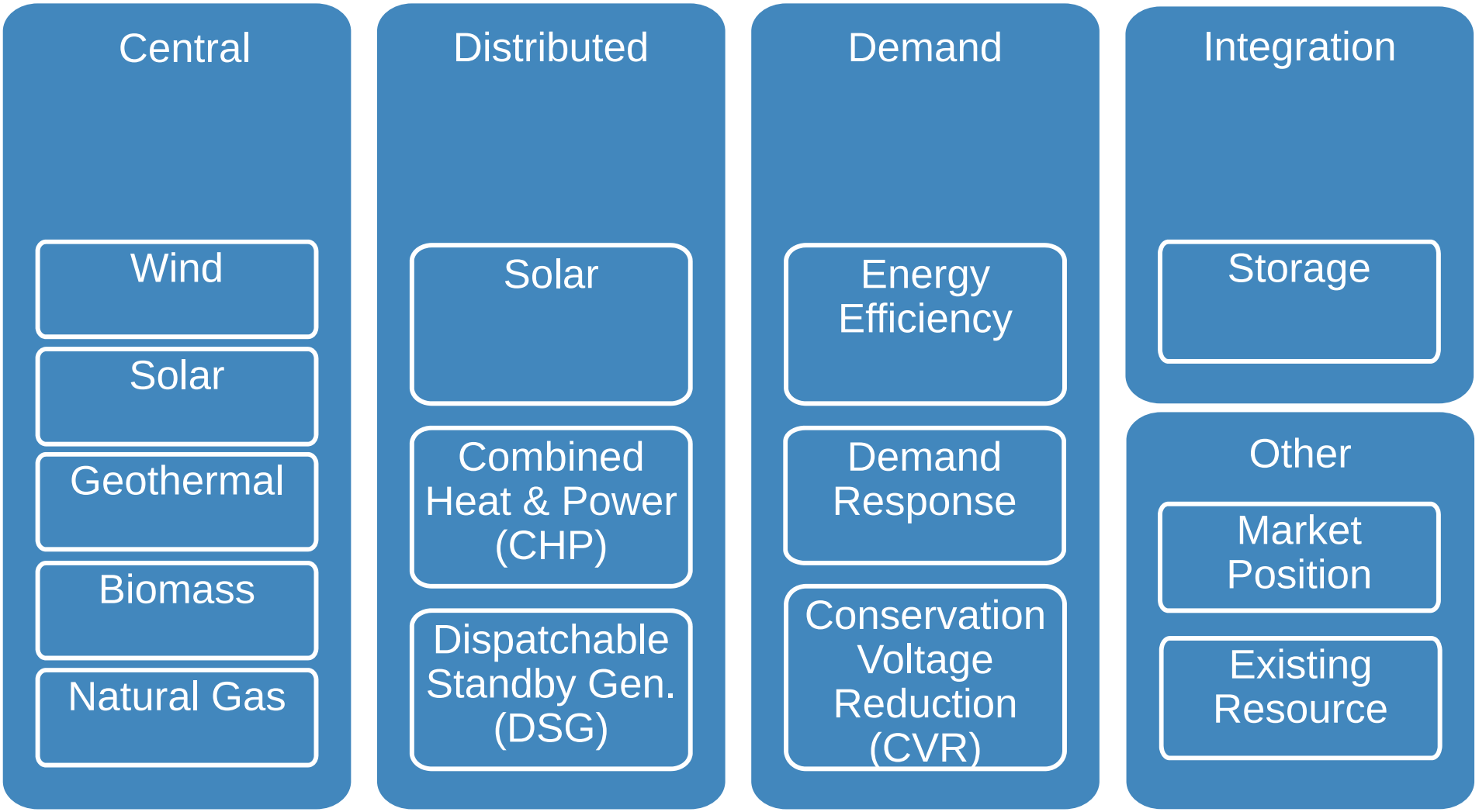
Policy	• Environmental Impact
Reliability	• Resource Adequacy
Price	• Balance Financial Cost and Risk
Technology	• Diversification

Portland General Electric

Portland General Electric

Portfolios

Portfolios: Resource alternatives



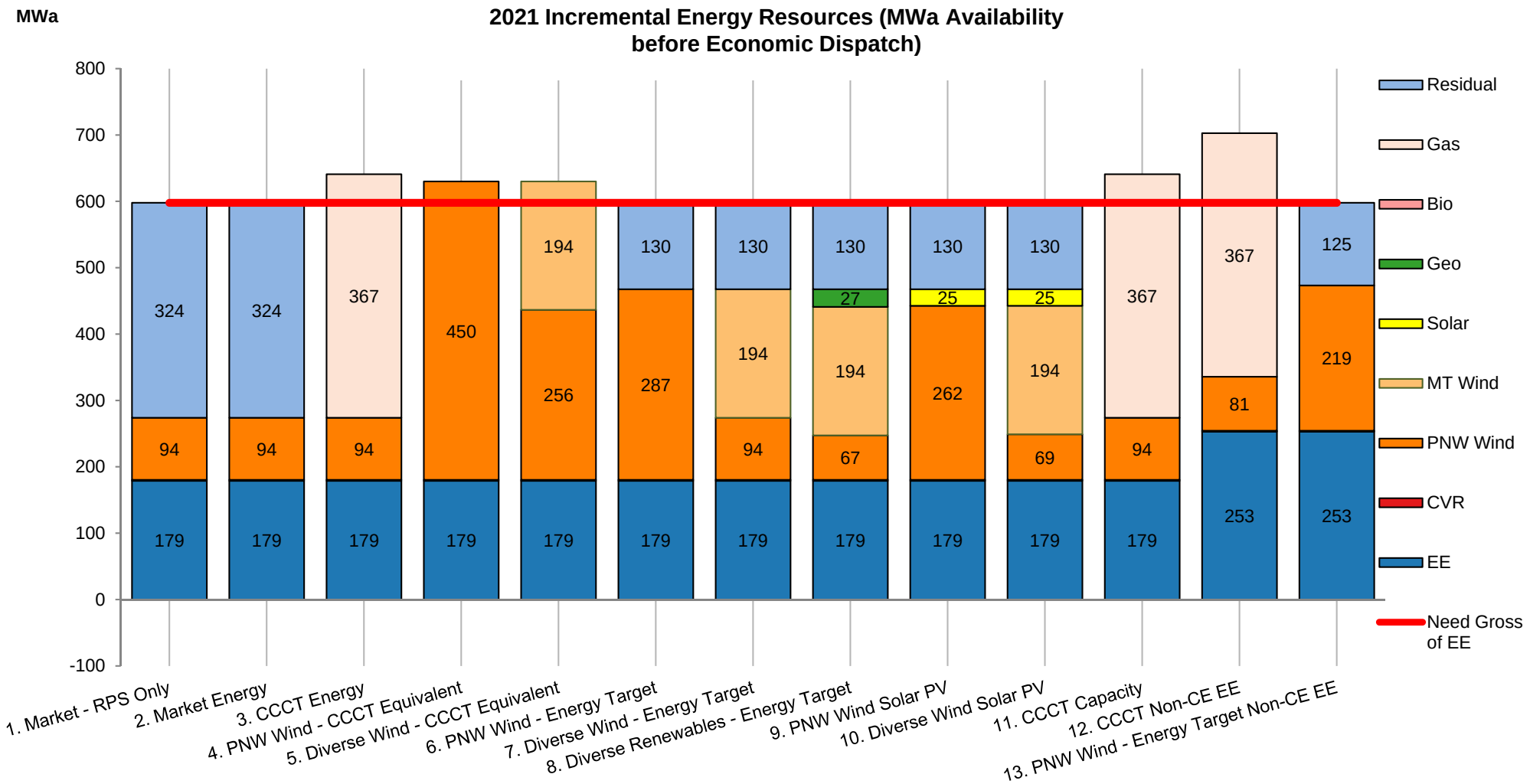
Portland General Electric

Portfolios: Common Assumptions

- Renewable Portfolio Standard compliance by 2025
  - Compliance strategy refresh for 2016 IRP
  - Obligations currently assume SB 1547 timing and quantity
- ETO Energy Efficiency
- Demand Response
- Short-term/Mid-term market procurement – Energy and Capacity
- CVR deployment

Portland General Electric

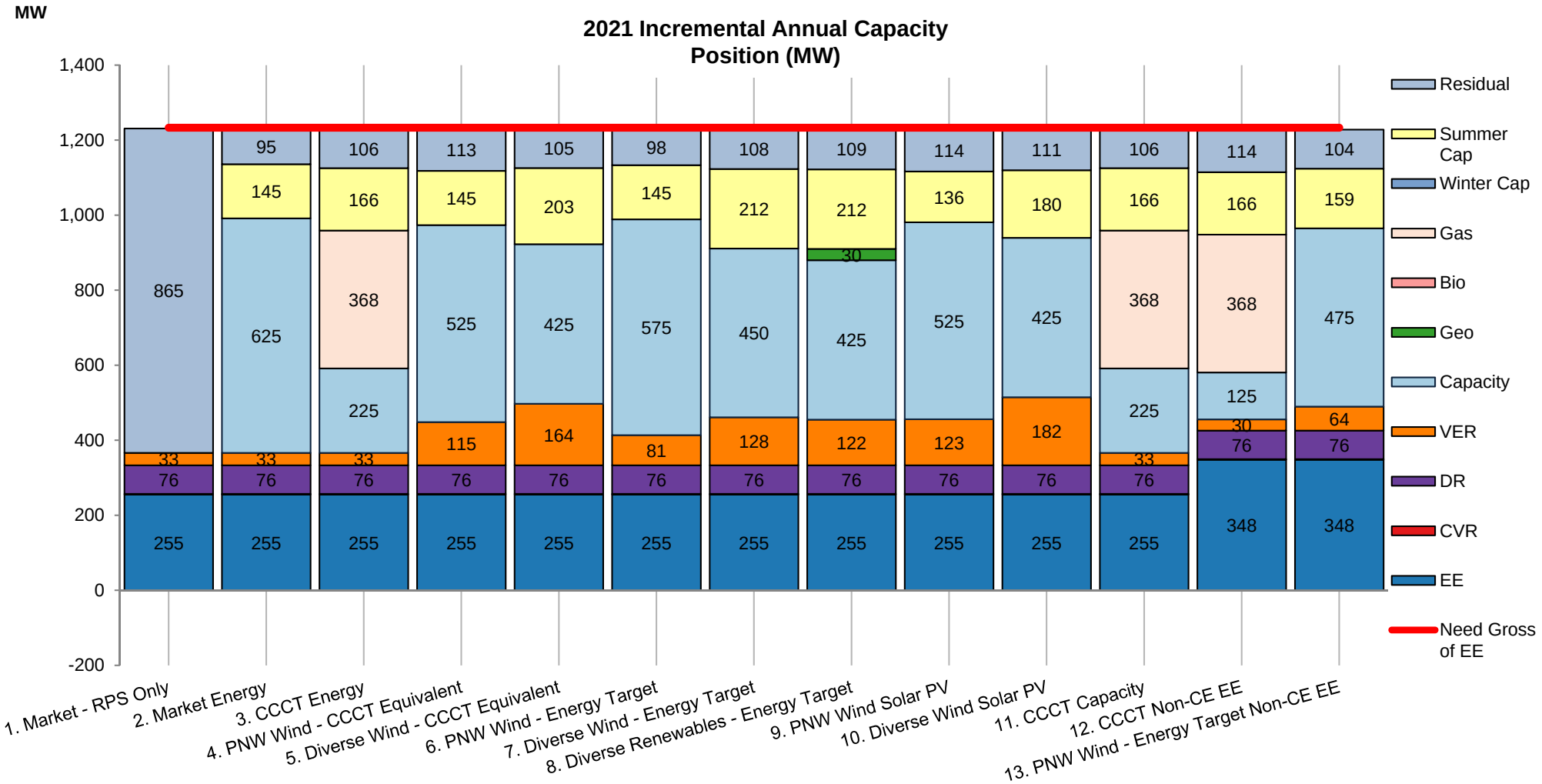
Portfolios: Energy (2021)



Assumes zero energy contribution from “capacity” resources

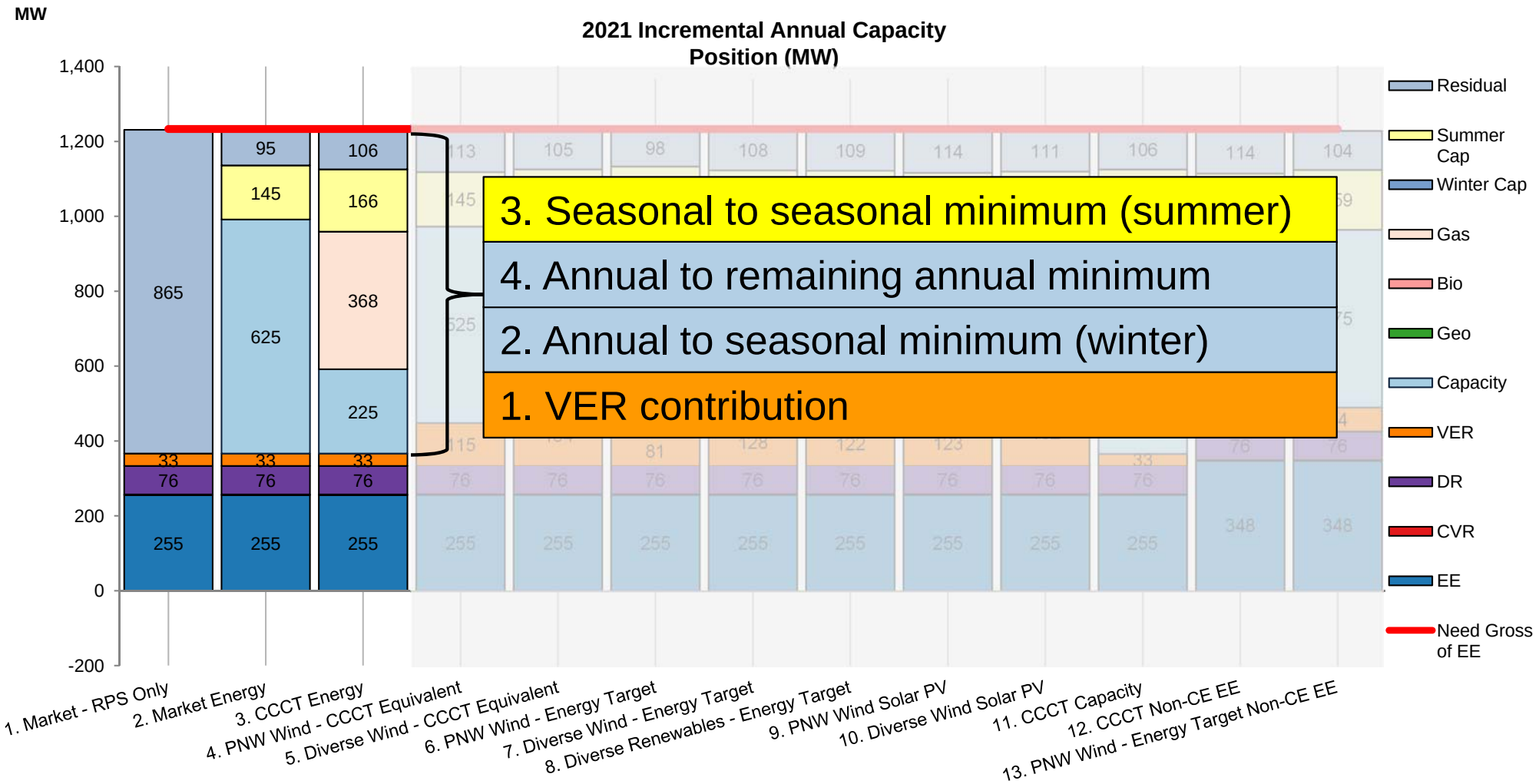
Portland General Electric

Portfolios: Capacity (2021)



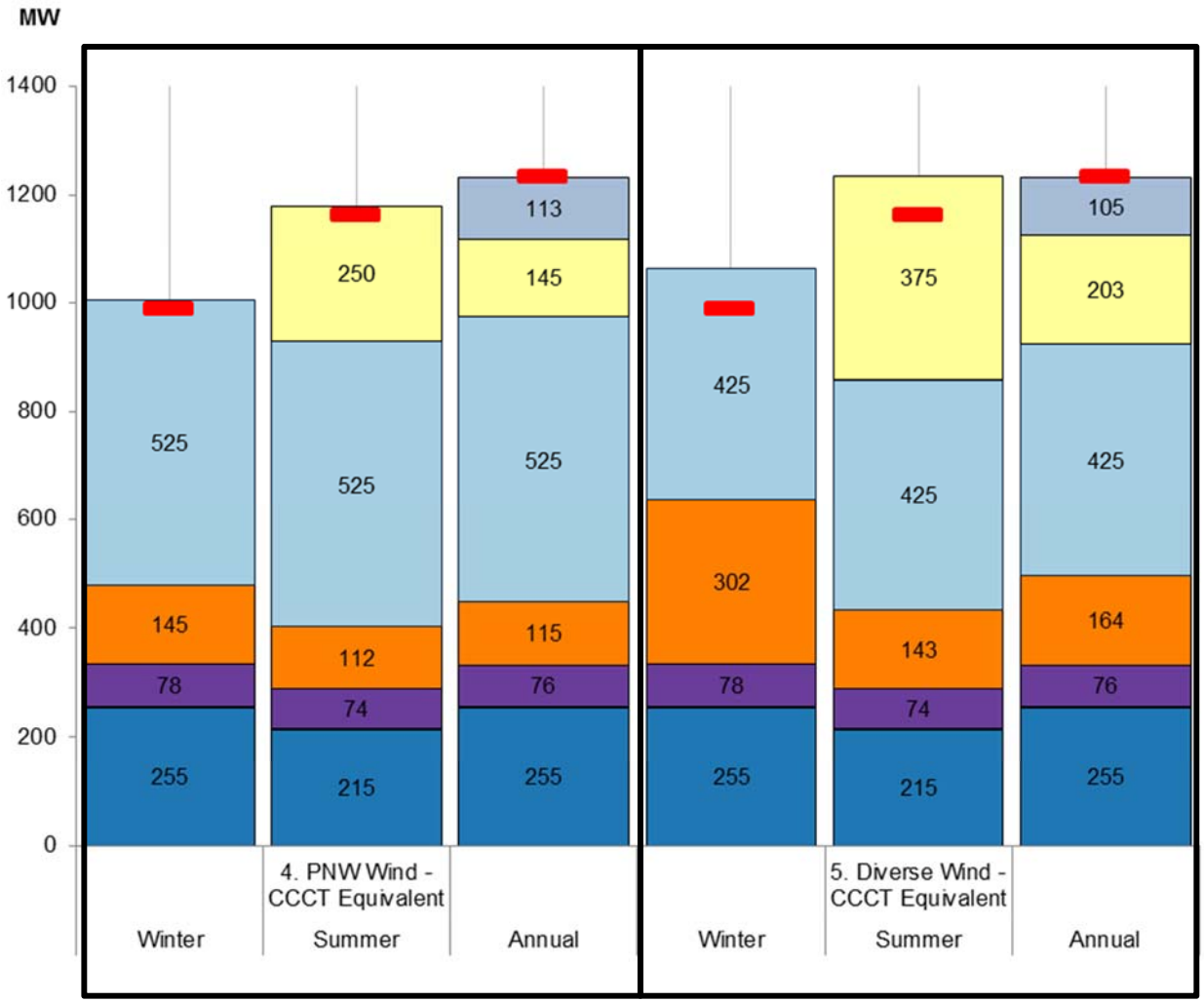
Portland General Electric

Portfolios: Filling Capacity Need Example



Portland General Electric

Portfolios: Capacity Need Distinctions Example



- Portfolio 5 vs. Portfolio 4 190 MWa MT Wind replaces PNW Wind

3. Increases summer-only need

2. Reduces year-round need

1. Increases VER contribution

Portland General Electric

Portland General Electric

Appendix

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
General	Passing the mic was cumbersome.	For stakeholder questions, provide a stationary microphone at a podium or mics at each table.	4/13/2015
Process	Why is schedule different on handout?	Update schedule slides to account for automation. Plan to revise and post updated slide deck to website and include summary update in 'thank you' email.	4/9/2015
Process	Is schedule firm or can the November 18th date be adjusted? (Power Council has important meeting on November 18)	Moved IRP meeting to November 20th.	4/9/2015
Process	Can the October 23rd date be adjusted? (CUB has important meeting on October 23)	Moved IRP meeting to October 21st.	4/9/2015
Environmental Policy	Why will climate data set be a scenario instead of a base case?	PGE to consider suggestion after vetting data.	
Environmental Policy	Does PGE place any type of weather weighting on load forecast?	PGE uses 15-year average weather, with rolling updates	

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Load Forecast Methodology	For future discussion, how is the ETO forecast in later years developed?	PGE to address questions about EE projection in the future. Refer to April 2nd Slide 31.	Est. 7/15/15 and 7/16/15
Load Forecast Methodology	Comment on in-fill vs. suburban sprawl – suggestion to be cautious about moving to more standard household variables	PGE to take note.	4/8/2015
Load Forecast Methodology	Request to show load growth with and without EE.	PGE to meet this request.	Est. 8/13/2015
Load Forecast Methodology	What % of PGE service territory is within the urban growth boundary?	90% of the UGB is within PGE Service Territory UGB is 822.7 sq. mi. PGE SVC Territory is 7532.2 sq. mi. Overlap is 741.6 sq. mi.	4/8/2015
Environmental Policy	Will temperature data drive (1) increased cooling demand and (2) an acceleration of cooling device purchases?	PGE to follow-up internally with load forecast staff.	Est. 8/13/2015 (with scenarios and climate change weather discussion)

Portland General Electric

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Demand Response	How is PGE using the convergence of EE and DR programs, and avoiding over-counting benefits?	PGE is engaging the ETO on a number of DR programs, particularly with Energy Partner and the smart thermostat pilot. Our current plan is to only attribute incremental demand reductions (after EE) to the DR programs. This may change in the future if a more integrated program was offered. In either case, only measured impacts are used and therefore we should not see double counting.	Ongoing
Demand Response	What happened to the EV charging pilot?	The manufacturing of the twenty CEA-2045-equipped smart EVSEs [EV chargers] was delayed. Ten are for PGE and ten for another utility in the EPRI project. PGE now expects delivery in Q1 of 2016 and when we get them we intend to install them at employee homes and systematically test the smart features.	Q1 2016
Demand Response	What is the preferred method of evaluating the cost effectiveness of DR in Oregon?	PGE will be engaging stakeholders in 2016 as part of the larger integrated (smart) grid report process. At a high level, our preferred approach is to look at both total resource and utility cost tests when assessing cost effectiveness.	12/17/15

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Demand Response	Would PGE provide a copy of the DR study, along with the assumptions (particularly materials supporting the basis for electric heating load control)?	The report is currently under review. Our plan is to have this report finalized by the end of 2015.	Est. 12/31/15
Flexible Capacity Study	Rather than focusing on how renewable curtailment can reduce the trough of the duck, can PGE assess how to change the slope of the neck? (Reference- “Teaching the Duck to Fly”)	Our goal is to begin exploring the potential role that energy storage may play with respect to flexibility challenges in this IRP.	12/17/15
Flexible Capacity Study	Can the Flexible Capacity Study include a range of CO2 prices?	At this point, the flexible capacity modeling effort will likely not consider a range of CO2 prices.	12/17/15

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Futures	Can there be discussions about the Clean Power Plan and mass vs. rate-based modeling?	PGE is willing to host detailed modeling discussions; we look forward to receiving detailed feedback regarding the specific aspects that stakeholders would like to discuss.	12/17/15
Portfolios	How will the results of the Flexible Capacity Study inform portfolio scoring? How will REFLEX work with Aurora to help PGE insure that each type of capacity is appropriately valued?	PGE is willing to host detailed modeling discussions; we look forward to receiving detailed feedback regarding the specific aspects that stakeholders would like to discuss.	12/17/15
Portfolios	Stakeholders would like to see portfolios that intuitively account for the geographical diversity of renewables (i.e., better examples than Gorge wind).	Our goal is for the resource portfolios tested in this IRP to include aspects of diversification benefits of renewable resources.	12/17/15

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
PRM Study	What is PGE's definition of dependable hydro capacity or what does it mean in this context? What method was used to create PGE's estimates?	The definition is dependent on the particular capacity assessment question. PGE presented an overview of the treatment of hydro capacity in the Dec 17 Public Meeting. PGE is willing to host a more detailed technical discussion.	12/17/15
PRM Study	When will PGE share the other portions of the reliability assessment (in addition to the statistics presented at the meeting)?	PGE plans to use the results of the PRM study in the 2016 IRP without other adjustments applied.	12/17/15
PRM Study	How will risk adjustment measures fit in with the PRM study?	PGE plans to use the results of the PRM study in the 2016 IRP without other adjustments applied.	12/17/15
PRM Study	What was the market import assumption?	The import assumption was 200 MW, excluding summer On-peak hours.	12/17/15

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
PRM Study	Can PGE provide clarification on the net capacities used in winter and summer?	The plant capacities were discussed in the 12/17/15 Public meeting.	12/17/15
PRM Study	Why does DSM not change from winter to summer?	As in the 2013 IRP, the PRM Study models the same quantity of demand response (DR) in the winter as in the summer.	12/17/15
PRM Study	Can energy efficiency be pulled out of load forecast and shown as a capacity resource?	EE cannot be removed from load and shown as a resource in the PRM Study for this IRP cycle. PGE is willing to investigate options for future cycles, but due to the relationship between EE and load, there may be impacts to the quality of the results.	12/17/15
Wind Integration	How does the wind integration study intersect with an EIM?	There is no explicit modeling of the EIM in the wind integration study. The study, however, does assume liquid market transactions every 15 minutes.	12/17/15

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Clean Power Plan	Is PGE going to treat Carty as an existing resource? Can PGE provide the correspondence between PGE and EPA regarding Carty?	Yes. PGE's correspondence with EPA regarding Carty is ongoing. PGE is willing to share the letter dated September 7, 2015, with stakeholders on request.	12/17/15
Clean Power Plan	Does PGE have a preferred state plan option?	PGE prefers a sub-category specific rate based standard.	12/17/15
Clean Power Plan	Is there a more detailed analysis about PGE's Montana obligations with respect to Colstrip 3 and 4?	No. Detailed analysis will be performed in the 2016 IRP.	12/17/15
Clean Power Plan	What will the new emphasis be between mass-based and rate-based futures? Does PGE know the ratio of studied mass-based vs. rate-based scenarios?	PGE will study both rate and mass based implementation plans. PGE does not yet know the ratio of mass to rate based scenarios.	12/17/15

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Climate Study	Can the report be provided to stakeholders?	Yes. The report will be included in the 2016 IRP.	Est. 7/29/2016
Climate Study	Is the study providing information about plant cooling requirements? Transmission interruptions from wild fires? Higher temperature implications for transformers and line capacities?	No. The focus of the report is the forecasted change of temperatures in the Portland metropolitan area.	Complete
2016 IRP Schedule	At the last public meeting (9/25/15), the schedule showed the draft IRP was planned to be filed at the end of Q1 and the final was to be complete by the end of Q2. Now the schedule is for a draft July 29th and final Sept 16th. What was the reasoning behind this change?	Due to the filing of an IRP Update and other work, PGE's IRP team needed time to complete all analysis, allow for public feedback, and sufficient time internally draft and review the document.	Complete

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Integrated Grid	You note the large number of use cases for the Salem Smart Power project. Initially 6, now 14. The large number is interesting and implies more value to be derived from storage but any analysis/quantification of the end use cases would be valuable to present. What is the timing for having more quantifiable evaluation data available? How do the values compare relative to each other and how has this work helped you quantify values?		
Integrated Grid	You mention working with Energy Trust on the Rush Hour Rewards Pilot. Specifically, what has been/will be their role in the pilot?		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Integrated Grid	What is your estimate per household reduction for the Pricing Pilots for the estimated 3,500-7,000 customers? Why is the range of households participating so large? Which pilot has the most uncertainty in gaining targeted participation?		
Integrated Grid	What does "identifying the system benefit of targeted peak energy usage education…." mean? Does it mean "quantifying"? If so, is the system benefit the actual capacity reduction or is the benefit quantified in dollars?		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
DR Potential Study	Please share your evaluation of the Energy Partner Pilot. You noted overlap with energy savings and Energy Trust's work. How is energy savings realized at these sites attributed to Energy Partner quantified and reported? Is an Energy Trust program also working with these sites and if so, have interactive effects between programs been addressed?		
DR Potential Study	In the High Case for DR Potential, do default TOU and Peak time Rebates replace the opt-in type programs in the low and base cases?		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
DR Potential Study	If the High Case programs are cost effective, listing the barriers to acquisition and risk factors and any specific actions that may help overcome those barriers would be helpful. The difference in potential impact is high so it will be necessary to clearly see the barriers and the magnitude of effort/costs for what it would take to overcome the barriers in order to reach that high impact level.		
Resource Adequacy Study	Slide 72 (Public Meeting, 12/17/2015) notes that energy efficiency is in the load forecast. Does the hourly shape (binned hour and day type impacts vs hourly) of the energy savings align with the Energy Trust's updated end use load shapes from the Power Council?		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Resource Adequacy Study	Slide 89 (Public Meeting, 12/17/2015) states that generalizations will be made for capacity needs and capacity contributions for other years and resource combinations. Does this mean that the analysis was done for 2021 only and other years will be estimated based off the 2021 work? Please provide more description as to how this study will be used.		
Resource Adequacy Study	Slide 91 (Public Meeting, 12/17/2015), Please add energy efficiency to this list of modeling options for next cycle to be modeled as a resource, not a decrement to load.		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Futures & Portfolios	Please clarify assumptions used for market depth for energy and capacity. Recommend limiting the amount of market purchases to a level in line with historical capabilities or justified future market depth projections to provide energy/capacity. For example, in portfolio 1, how does the 961 MW of market capacity compare to historical and estimated future market possible size?		
Futures & Portfolios	Generally, why study 2021 for ELCC and 2025 for portfolio coverage? Why the difference?		

Portland General Electric

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Futures & Portfolios	Slides 99 and 100 differentiate between Capacity and Summer or Winter capacity. Please explain the difference between the two and how they were determined. Suggest showing capacity needs by having portfolios not reach the capacity need line, not with two blocks (Capacity and either summer or winter capacity)		
Futures & Portfolios	How was this portfolio creation process illustrated in the past and is this current approach meant to be a new approach that addresses concerns from last time?		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Futures & Portfolios	Slide 98 (Public Meeting, 12/17/2015), portfolio 3 shows 600aMW of PNW Wind. This resource then equates to just 127 MW winter VER capacity and 235 MW summer VER capacity. Compare that to portfolio 2 where 243aMW PNW Wind equates to 98 MW winter VER capacity and 111 MW summer VER capacity. For more than 2 times the PNW Wind in energy in portfolio 3 vs portfolio 2, why is the winter capacity contribution in portfolio 3 just 30% more than in portfolio 2?		
Futures & Portfolios	Please describe the methodology used in determining the Capacity needs vs the market needs for slides 99 and 100 (Public Meeting, 12/17/2015).		

2016 IRP: Feedback Status

Topic	Feedback Received	Resolution	Completed
Futures & Portfolios	Consistency in labeling between all three plots would be helpful. VER should remain differentiated by type of wind and solar added (Public Meeting, 12/17/2015)		
Futures & Portfolios	When are scenario discussions scheduled?	Scenarios (or “Futures”) have been presented at two IRP Public Meetings with stakeholder response and feedback solicited at each. At this time, Stakeholder feedback is welcomed via the web-based feedback form.	Complete