

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

LC 66

In the Matter of

PORTLAND GENERAL ELECTRIC
COMPANY,

2016 Integrated Resource Plan Update.

Staff's Comments

Introduction

PGE filed their 2016 IRP update and a motion to acknowledge the update on March 8, 2018, seven months after the original IRP acknowledgement. The key driver behind PGE's accelerated timing for their annual IRP update is PGE's desire to revise the financial parameters used as inputs to qualifying facility avoided costs prior to the annual filing date of new avoided cost data on May 1, 2018.

This is Staff's first and only round of comments prior to our final Staff Report. The purpose of these comments is to draw the Commissioners attention to key issues and raise any preliminary concerns about acknowledgement. Staff will file its final report on April 17, 2018. The table below provides the remaining schedule.

Date	IRP Update Event
4/6	PGE Reply Comments
4/17	Staff Report with Recommendation for Acknowledgement
4/19	Stakeholder Comments
4/24	Public Meeting to Acknowledge the 2016 IRP Update
5/1	Annual Avoided Cost Filing

PGE's most recent avoided cost update was in September 2017, immediately following their IRP acknowledgement. This IRP update reflects new market and utility system information which impacts avoided costs. Frequent updates of avoided costs better align avoided cost rates with current system impacts.

Additionally, the IRP update also provides Staff an opportunity to communicate with PGE about their IRP progress, to better understand the direction of their IRP activities, and to share any expectations going forward.

Key Items from the IRP Update

PGE has accomplished several activities since their 2016 IRP acknowledgement in August 2017. Some notable highlights of what PGE has achieved in that relatively short amount of time are:

- Demand Side & Load Forecasts
 - o Established a Demand Response Review Committee (DRRC).
 - o Revision to Demand Response (DR) portfolio targets in excess of IRP goals.
 - o New forecast leading to higher energy efficiency targets.
 - o Improved capacity need assessment.
 - o Revised the load forecast through 2023.

- Supply Side & Needs Assessment
 - o Concluded bilateral negotiations securing over 300 MW of dispatchable capacity resources through power purchase agreements, per Order No. 17-494.
 - o Launched an RFP for 100 MWa of renewable resources, per Order No. 18-044.

- Updated RPS need.
- Developed a new 2021 capacity need and revised Loss-of-Load Expectation (LOLE) analysis for 2201.
- Enabling Studies
 - Launched a decarbonization study to understand the impact on PGE.
 - Engaged with stakeholders on load forecasting improvements.
- Distribution System Planning (DSP)
 - Developed Distribution Resource Planning roadmap with consultant.
 - Launched study to build foundational elements of roadmap.
 - Began process of streamlining hosting capacity assessments of distribution system.
- Updated Data & Improved Modeling for Forecasts
 - Gas Forecast
 - Wholesale Market Prices
 - Sensitivities
- Revised Avoided Cost Data in the IRP Update
 - Energy, capacity, and RPS needs
 - Key financial metrics
 - Natural gas costs
 - Wholesale market prices
 - Generation technology costs
 - Economic lives of technology

In the sections below, Staff summarizes its review of the filing and concerns going forward. While some concerns should be addressed prior to Staff's Report on the IRP Update, others do not. Rather, Staff sees these observations and concerns being addressed by PGE, Staff, and stakeholders over the next several months leading up to the release of the 2019 IRP.

Demand Side & Load Forecasts

Forecast Updates

In the IRP update, the near- and long- term forecasts for energy and capacity demands were all down slightly.¹ The minor changes in demand between the IRPs were due to changes made by PGE in the weather assumptions utilized and refreshing the data associated with industry-specific load forecast models. The table below captures the extent of the changes.²

¹ See LC 66, PGE's 2016 IRP Update, March 8, 2018, pg. 15.

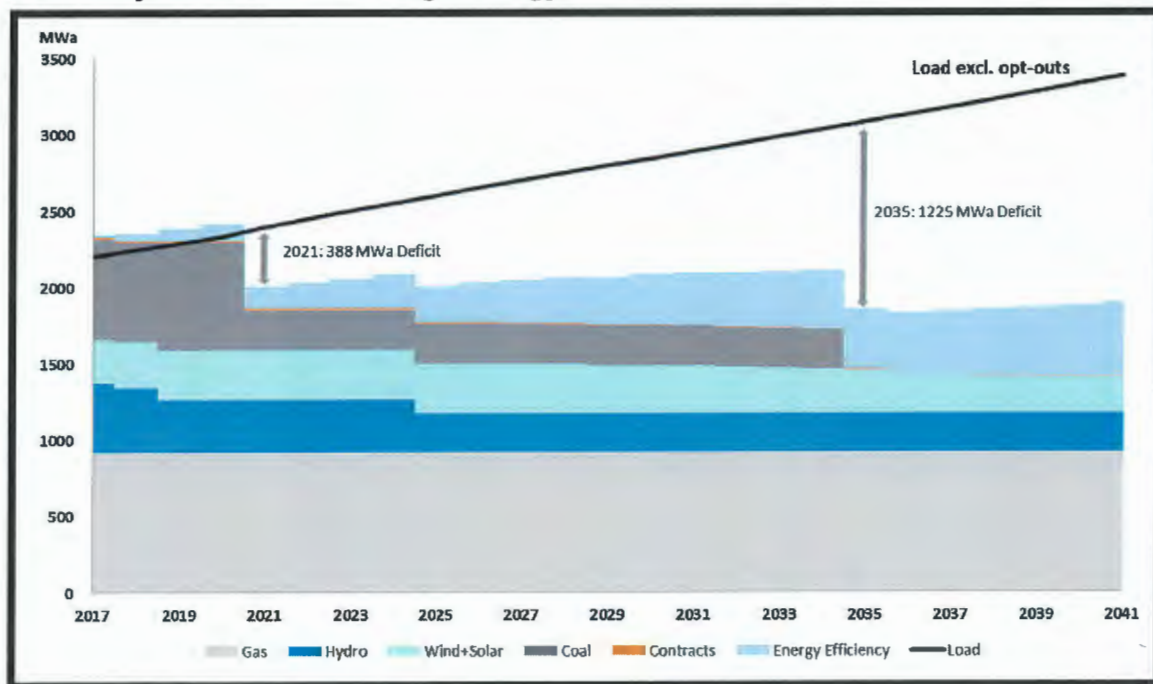
² See LC 66, Errata Filing, March 15, 2018, pg. 2.

Load Forecast	Energy		Winter Peak		Summer Peak	
	2021	2022-50	2021	2022-50	2021	2022-50
	MWa	Growth	MW	Growth	MW	Growth
2016 IRP Comments (Dec. 2016 forecast)	2,360	1.2%	3,633	0.9%	3,662	1.2%
2016 IRP Update (Dec. 2017 forecast)	2,313	1.1%	3,607	0.8%	3,618	1.1%
Difference	-47		-26		-44	

Energy Trust provided an updated, long-term, energy efficiency forecast in November 2017 to complement PGE’s revised load forecast. Energy Trust’s updated forecast called for a slight increase in savings and also a larger-than-expected rise in total costs over the next five years.³ Staff has issued information requests exploring Energy Trust’s forecasted increases in total costs, the use of partial forecasts, and how PGE has incorporated this new energy efficiency data into its overall load forecast.

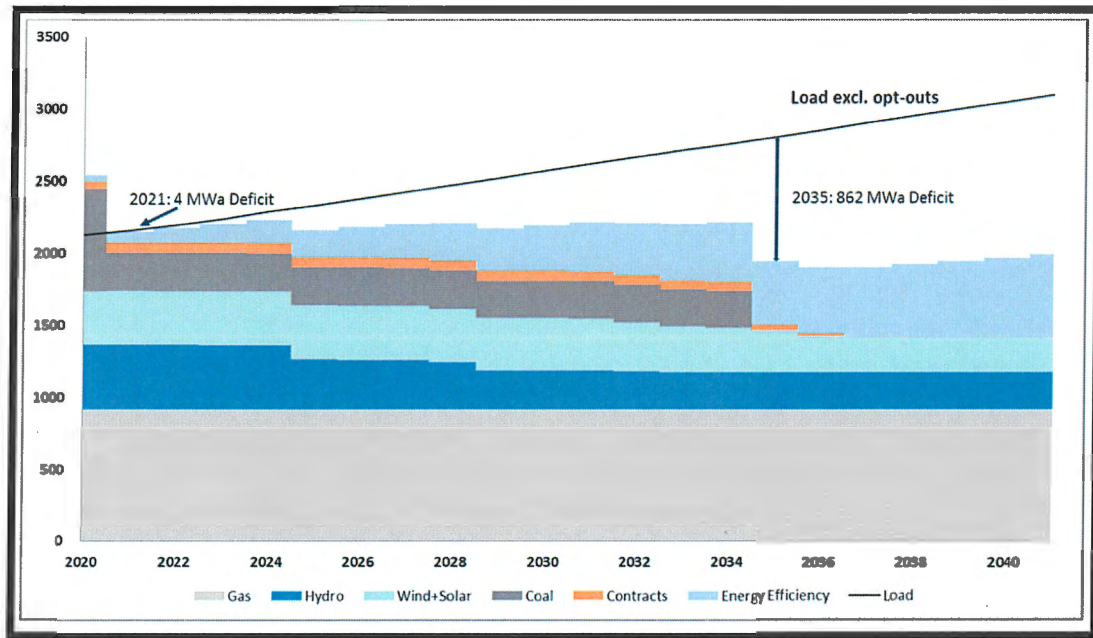
The overall energy load-resource balance improved in the IRP update. The energy load-resource balance reflected a slight drop in growth, an increase in energy efficiency and the acquisition of new supply resources from the bilateral contracts. It is worth conducting a visual comparison of the energy load-resource balance found in PGE’s initial LC 66 filing (November 2016) and its LC 66 IRP update (March 2018) beginning in the year 2020. The differences capture the impact of the actions taken by PGE and others over the past eighteen months to refine the IRP’s many forecasts and to bring new, clean resources online to meet demand. The two graphs below show how the 2021 load-resource deficit closed dramatically between the original IRP and the IRP update, from approximately 388 MWa to 4 MWa.

LC 66 Projected Annual Average Energy Load-Resource Balance, Nov. 2016



³ See LC 66, PGE’s 2016 IRP Update, March 8, 2018, pg. 16.

LC 66 Projected Annual Average Energy Load-Resource Balance, Mar. 2018



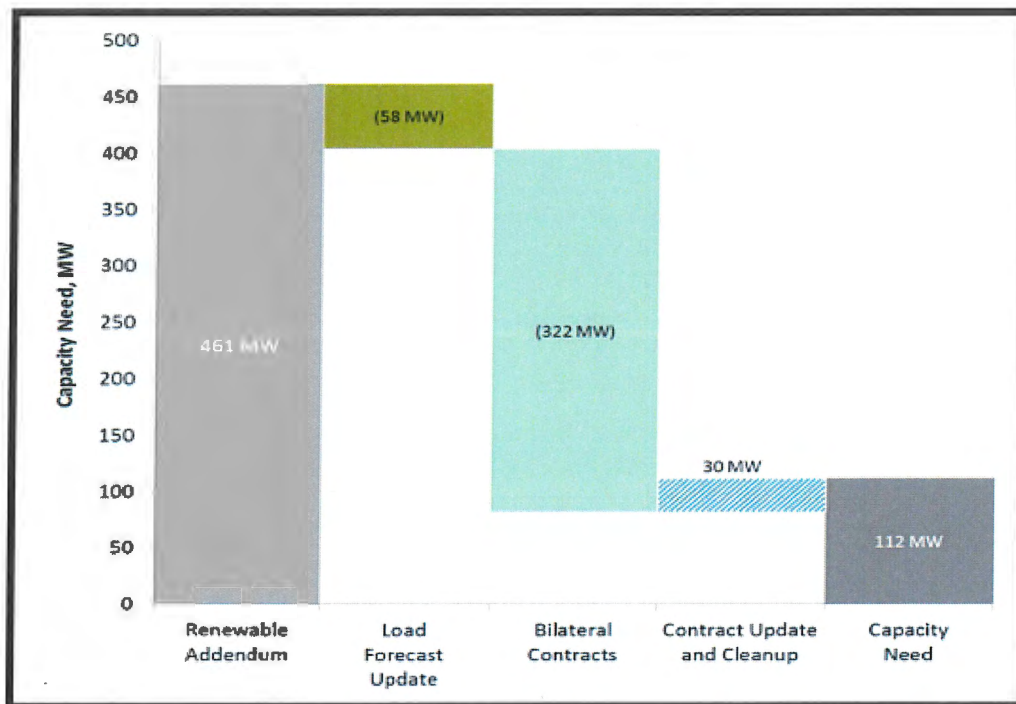
With regard to other demand side activities, Staff is supportive of the proactive work done by PGE to launch the demand response review committee (DRRC) and to establish its DR testbed.

Finally, Staff, PGE, and stakeholders are currently engaged in evaluating the Company's energy storage pilots and storage potential evaluation in UM 1856.

Supply Side & Needs Assessment

The IRP update reflects the recently announced addition of over 300 MW of new capacity from bilateral contracts. This new, supply side resource has had a positive impact on PGE's 2021 capacity need. PGE is currently launching a renewable RFP to help meet, in part, the Company's remaining 2021 capacity need of 112 MW.

2021 Forecasted Capacity Need from the IRP Update



RPS Need

Staff is unclear if PGE’s overall RPS need for new renewable resources and RECs has improved or stayed the same since the December 2017 acknowledgement of the Company’s revised renewable action item. The IRP update lacks a direct comparison that details how PGE’s overall RPS may have evolved since that last acknowledgement over three months ago and Staff will work with PGE to improve our understanding of the situation.

A related point of clarification is with regards to PGE’s physical renewable resources and the size of its forecasted REC bank. Both would have appeared to have increased since the latest IRP acknowledgement in December, but Staff is not entirely sure. Staff also plans to seek a clarification on this point.

Lastly, PGE notes that they will not refresh the glide path analysis utilized in December to justify their revised renewable action item. PGE’s will instead update their glide path analysis in the 2019 IRP because “...the Company is not proposing incremental renewable actions within this IRP update.” While true, Staff would note that PGE is currently launching an RFP to acquire 100 MW of renewable resources by the end of 2018 and could have easily included new renewables in its sensitivity analysis.

As a result, Staff plans to work with PGE to secure the following information prior to Staff’s final report in April:

- The Company’s use of banked RECs relative to REC production from PGE’s resources and other contracts.
- An update on the Company’s renewable sufficiency/deficiency period.
- Two revised glide path analyses using the latest data found in the IRP update and one that builds upon that with the scenario of PGE securing 100 MW of new renewables by 2020, per its current RFP.

Enabling Studies & Other Recommendations

Market Capacity Study

Staff appreciates the coordination and background work PGE has done to date on the Market Capacity Study. However, Staff would like to ensure that several key elements are included in any study that informs the 2019 IRP. Those key elements include such things as:

- Detailing PGE's access, via its physical transmission interconnection rights, to regional and western resources under actual peak conditions.
- Explaining how participation in the California Independent System Operator's Energy Imbalance Market is impacting PGE's understanding and participation in the regional market for energy and capacity.

Staff will be working with PGE over the next several weeks so that our expectations and any future study can be appropriately aligned.

Decarbonization Study

Staff appreciates the work PGE has done on its decarbonization study and is curious about the findings. However, Staff would note that it agreed with PGE's assertion that an enabling study should be conducted to address planning questions around decarbonization given that it became one of the justifications underpinning the Company's renewable action item. Specifically, Staff thought PGE was correct in scoping a study that explored, (1) "the opportunities and challenges in achieving a 100% clean and renewable electricity mix over time and [(2)] in understanding how decarbonization efforts in other sectors may impact the nature of electricity demand."⁴ At this time, it appears the study only addresses the latter issue of changes to electricity demand from decarbonization. Staff plans to engage with PGE prior to the 2019 IRP to better understand how the study and other efforts by PGE will explore the opportunities, challenges and tradeoffs the Company will face in achieving ever higher percentages of clean and renewable energy from a strategy of decarbonization.

Load Forecasting

The Commission's acknowledgement of LC 66 in August 2017 called on PGE to do three things related to its load forecasting by the next IRP:

- Conduct stakeholder workshops to improve forecasts, including consideration of probabilistic forecasts.
- Conduct out-of-sample testing and select models based on the results.
- Include in the next IRP a technical appendix that describes PGE's forecast methodology and lists assumptions and specifications.

PGE discussed these issues at its most recent IRP stakeholder meeting on February 15, 2018. PGE plans to meet with stakeholders later this year to provide further updates and to announce technical workshops. Staff finds progress in this area to date meets the Commission's direction.

Study of Risks Associated with Direct Access

PGE states in the IRP update that it will be engaging stakeholders in the scoping of a study of the risks associated with direct access. Staff looks forward to working with PGE on this especially in light of the OPUC's new rulemaking, AR 614.

⁴ See LC 66 PGE's Final Comments, June 23, 2017, pg. 43.

Workshops on Portfolio Ranking and Scoring Metrics

An additional requirement from the August 2017 IRP acknowledgement was for PGE to hold workshops with interested parties on the 2019 IRP portfolio ranking and scoring metrics. While Staff did not see any mention of this additional requirement in the IRP update, Staff notes that this item can be addressed later in 2018 and we look forward to working with PGE and other stakeholders when the issue is brought forward by the Company.

Distribution System Planning

The Commission directed PGE to work with Staff on two things related to distribution system planning (DSP) prior to the next IRP. They were:

- Advance distributed energy resource (DER) forecasting to improve DER representation.
- Define a proposal for opening a DSP investigation.

PGE has proactively undertaken several DSP activities in response to the Commission. First, PGE worked with a consultant to complete a Distribution Resource Planning “roadmap” to develop a foundational development process for the many departments involved in DSP with the Commission. Preliminary findings identified key planning criteria and interdepartmental touchpoints for program development. Based on these findings, PGE has organized its foundational development process into four priority elements:

- Streamlining the DER Interconnection Process;
- Projecting a Baseline Hosting Capacity;
- Assessing Resource Locational Value; and,
- DER Forecasting, with Delimited Load and Generation Profiles.

PGE and its consultant have now moved on to “Phase 2” of their work, which is to use the roadmap to establish the internal processes for building out PGE’s DSP capacities. Additionally, PGE has also adopted new modelling software to streamline their ability to provide Hosting Capacity Assessments. From the Phase 1 study, these assessments were determined to be critical to organizing DSP work within PGE and establishing the value of specific DSP investments.

Staff is encouraged by PGE’s work and initiative in researching internal needs and identifying the need to organize further work around priority elements. PGE has been very helpful in addressing Staff’s questions about the current state of distribution planning at PGE. However, the same concern Staff raised in comments throughout the 2016 IRP process—namely an absence of transparency in distribution planning investments and activities—remains relatively unaddressed in the IRP update.

The description of PGE’s thorough DSP’s activities in the IRP update is helpful, but is not focused on getting to Staff’s main issue of the need for improved transparency and creation of an overall plan for distribution system investments. PGE’s four priority elements may be the best four areas for focus from a ratepayer perspective but the reasoning behind these selections and the ultimate goal these activities are intended to achieve was not provided, so Staff and stakeholders are unable to provide review of PGE’s roadmap and plan.

Staff wants to ensure PGE and our efforts are well-aligned. For example, the work PGE has completed could be very helpful in informing Staff’s preliminary investigation into DSP. (Staff

plans to ask for Commission approval to open an investigation into DSP later this spring.) At that time, Staff plans to take this issue to a public meeting to seek commission approval to open a DSP investigation. The main focus of this investigation will be to create a framework for greater transparency and opportunity for stakeholder engagement in PGE's DSP roadmap. It will also look into improving the forecasting and representation of DERs in the IRP and, again, PGE's work could be very beneficial here. As Staff envisions the Commission's DSP efforts to fully launch in Q2 2018, Staff plans to work more closely with PGE over the coming months on DSP activities.

Updated Data & Improved Modeling for Forecasts

Gas Forecast & Wholesale Market Prices

PGE revised its short- and long- term natural gas prices in the IRP update. These revisions resulted in a lowering of forecasted gas prices. Staff is currently working to determine if PGE used the same methodology and data sources as were used in the IRP.

These revised natural gas price forecasts were used to model wholesale market prices. PGE's IRP update used almost the entirely same methodology and data sources for developing the wholesale market price forecast as was used in the initial IRP filing. The one exception was that PGE's model of wholesale market prices used three hydro scenarios, instead of one like in the initial 2016 IRP filing.

Sensitivities

One notable inclusion by PGE in the IRP update was an entire section on the treatment of uncertainties in forecasting called, "Sensitivities." Staff appreciated PGE adding this section and its exploration of the topic of uncertainties in the forecasts for capacity, energy and RPS needs. Staff finds this analysis helpful and plans to work with PGE to better understand how its sensitivity analyses were conducted prior to the 2019 IRP.

Avoided Cost Data for Qualifying Facilities in the IRP Update

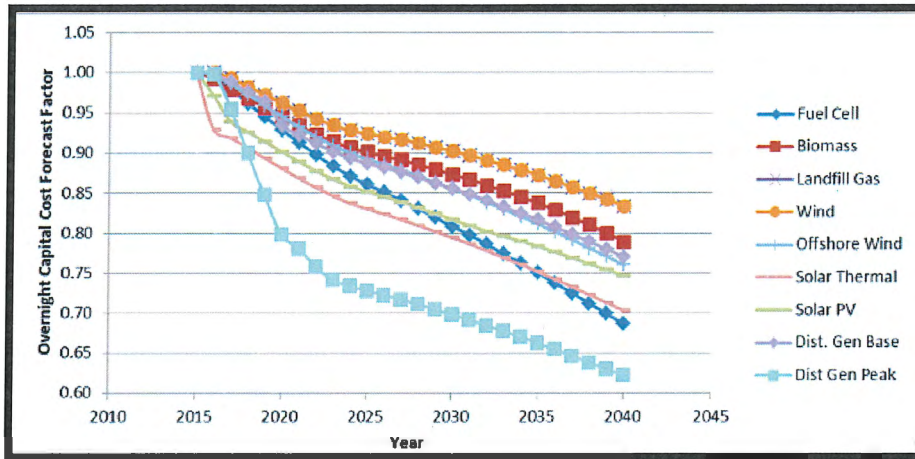
The IRP update includes updated costs, financial metrics and operating parameters for key supply side resources. These refreshed costs and operating parameters will have an impact on PGE's avoided cost filings in May 2018, if the IRP update is acknowledged. These items include but are not limited to:

- Updated energy, capacity, and RPS needs;
- Key financial metrics, such as the composite tax rate and weighted cost of capital;
- Natural gas costs;
- Wholesale market prices;
- Generation technology costs; and,
- Economic life assumptions of various technology.

Staff is working internally to better vet the data supplied by PGE prior to our final Staff Report and to review the information to be provided on the items listed above through information requests.

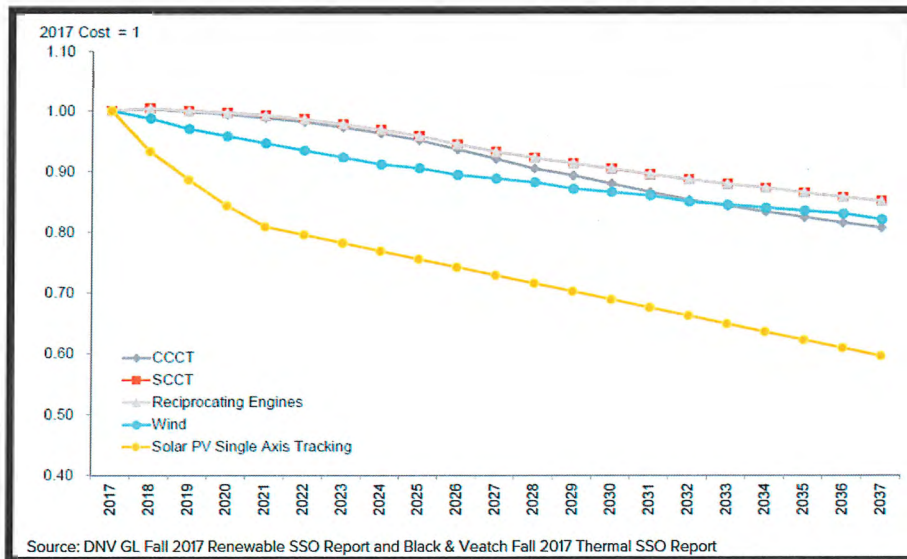
Staff would like to direct the Commission’s attention one notable area of change: the overnight capital cost of utility scale solar. In the originally filed IRP for LC 66 (Nov. 2016) a report by Black & Veatch forecasted the cost of solar dropping approximately 10 percent between the years 2015 and 2020.⁵ (See green line in graphic below.)

2016 LC 66 PGE IRP, 2015 Technology Maturity Forecast



This forecast for solar was incorrect. While seemingly optimistic at the time, it was, in fact, too conservative. In the IRP update, the overnight cost of capital for utility scale solar dropped 23% *in the two years between 2015 and 2017 alone*. Further, PGE’s latest forecast for the overnight cost of capital for utility scale solar is forecasted to drop *another 20%* between 2017 and 2020 (see yellow line below).⁶

2016 LC 66 PGE IRP Update, 2017 Technology Maturity Forecast



Staff highlights these differences to show that there are real world implications from quickly out-of-date forecasts for least-cost resource selections by IRP models, and that technology

⁵ See LC 66 PGE’s Initial Filing, November 2016, pg. 705.

⁶ See LC 66 PGE IRP Update, March 8, 2018, pg. 28.

forecasts and long-term investments in a rapidly evolving environment should be approached with a fair amount of caution.

Next Steps

Staff will be filing its final Staff Report on April 17, 2018 with its recommendations. In the meantime, Staff will be working to address the issues raised in the comments above.

This concludes Staff's comments.

Dated at Salem, Oregon, this 29th of March, 2018.



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