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Additional submitted attachment is included below.

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California Energy Commission
Dockets Office, MS-4
Docket No. 15-IEPR-03
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Docket 15-IEPR-03: Comments of Pacific Gas and Electric Company on the California Energy Demand 2016-2026, Preliminary Electricity Forecast

I. Introduction

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to provide comments on the July 7, 2015, California Energy Commission (CEC or Commission) Workshop on the Preliminary Electricity Demand Forecast. PG&E thanks the Staff for their commitment to an open process and willingness to consider stakeholder input.

These comments provide initial feedback on the Preliminary Electricity Forecast (CEC forecast). PG&E's internal forecast tracks very closely with many elements of the CEC's forecast, a result of much collaboration between PG&E and CEC staff in recent years to develop a consistent forecasting methodology. PG&E offers a few suggestions so that future updates to the Electricity Forecast will be even more robust than the Preliminary Electricity Forecast, with the primary areas of focus in the photovoltaic (PV) and energy efficiency savings areas.

II. MODELING ASSUMPTIONS FOR PV ADOPTION RATES MAY NEED TO BE REVISITED

PG&E appreciates the CEC's efforts over the last year to update its approach to forecasting solar PV adoption. As retail (rooftop) solar PV installations in California have grown rapidly in recent years, the importance of understanding how retail PV will impact California's electric system has become increasingly important.

The CEC's use of actual retail rates and a net energy metering calculation instead of average sector rates significantly improves the CEC model's estimation of bill savings to investor-owned utility (IOU) customers who install PV. The result of this change has brought CEC's draft PV adoption forecast for PG&E's planning area much closer to PG&E's IEPR submission.

However, PG&E is concerned that these higher adoption numbers are a result of a modeling assumption that is not realistic – that current rate structures and the current Net Energy Metering (NEM) tariff persist over the next ten years. Once the CEC incorporates residential rate reform as well as potential changes under the NEM successor tariff into the forecast, the CEC's modeling approach may continue to result in unreasonably low PV forecasts. This is because the CEC's underlying adoption model relies on a market share curve[1] that is not applicable to the current PV market.

PG&E recommends that the CEC revise the functional form of its PV adoption model to be based on a market share curve, described below. PG&E also recommends that the CEC carefully assess the cost and system size inputs to the modeling. Finally, given the wide range of policy and market developments around PV, it is reasonable to expect that there should be a higher level of variation among the low-, mid-, and high-PV adoption scenarios in the California Energy Demand forecast.

i. The CEC market adoption curve may under-predict PV adoption

The underlying adoption modeling approach taken by the CEC relies on a market share curve that does not appear to be appropriate given developments in the PV market over the past several years. Appendix B of the Preliminary Forecast indicates that the underlying curve used in the CEC's model is based on estimates developed as part of the "Distributed Renewable Energy Operating Impacts and Valuation Study" produced for Arizona Public Service (APS) in 2009. In this report, the primary source referenced for the PV adoption curve is a 1982 study (Kastovich et. al.)[2] based on survey responses of utility customers' willingness to pay for electric heat pumps.

There are three potential problems with using these sources to estimate a PV market adoption curve:

1) The market share curve used in the 2009 RW Beck study (Figure 2-19 Page 2-20) does not appear to show a reasonable "S" curve shape, where one would expect that – as PV cost-effectiveness reaches a threshold – the share of customers willing to adopt PV would increase more rapidly and then level off. In the NEM successor tariff proceeding before the California Public Utilities Commission (CPUC), PG&E has highlighted that a market share curve that follows a more logistic growth pattern is more appropriate for modeling PV adoption.[3] In the final version of the public tool, the market share curve was adjusted to reflect a more logistic growth pattern.

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[1] Per page B-10 in the July 23, 2015, CEC draft forecast. "Market share curve" estimates the percent of customers that represent the market potential that would be willing to adopt given different levels of cost effectiveness.

[2] Kastovich et al. 1982. Advanced Electric Heat Pump Market and Business Analysis. Oak Ridge National Laboratory Report, ORNL 79-24712/1.

[3] Comments of Pacific Gas and Electric Company (U 39 E) on draft version of the Net Energy Metering Public Tool Rulemaking 14-0002, Filed July 10, 2014

2) The metric of cost-effectiveness used is "payback" which does not reflect the economic value proposition to the many current PV customers who adopt solar using low- or no-money down financing (e.g., leases, loans, PPAs). Since 2012, over two-thirds of residential PV adoption has been through third-party financing arrangements. The result of broad access to financing for rooftop solar is that most adopters no longer use payback for their decision making and predominantly use monthly bill savings instead, as supported by the findings from a recent National Renewable Energy Laboratory (NREL) study. The NREL report evaluated what financial metrics solar customers use to assess the economics of a solar investment.[4] The 2014 study was based on a survey administered to over 790 non-solar and 1,200 solar customers in San Diego, California. It concluded that "monthly bill savings" was the primary economic measure used by all customers, even those who owned their own systems. For those who leased their solar system, 60 percent used monthly bill savings to evaluate their solar investment while only 16 percent used payback time.

   The Kastovich study – that serves as the basis for the CEC model – identified that many electric utility customers require very rapid payback times for investments that reduce utility bills, as many customers use high internal discount rates for deciding whether to invest in energy saving investments when faced with an upfront capital investment that is recovered over time via bill savings. Implicitly, if zero-down financing options (e.g., PPA/leases and some newer forms of loans) permit customers to avoid or reduce upfront costs and save money from day one, then the attractiveness of an energy saving technology would be much less sensitive to high discount rates. This would result in increased market potential at a given level of cost- effectiveness relative to the payback approach. PG&E recommends that a more appropriate cost-effectiveness metric would be one that better captures the opportunity for immediate bill savings, such as a benefit/cost ratio that compares levelized bill savings over levelized PV costs.

3) The curve is based on a technology type (i.e., electric heat pumps) that may not be similar to solar PV in terms of consumer interest. While PG&E understands that there is limited research available on how PV adopters respond to changes in PV cost effectiveness, there is significant research underway in this area through the US Department of Energy's Solar Energy Evolution and Diffusion Studies (SEEDS) program.[5] PG&E recommends that the CEC leverage information developed through this initiative and the 2014 NREL study to improve estimates of a PV market share curve for the 2015 California Electricity Demand PV forecast.

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[4] Sigrin B., Drury E., Diffusion into New Markets: Economic Returns Required by Households to Adopt Rooftop Photovoltaics, Energy Market Prediction: Papers from 2014 AAAI Fall Symposium. 28

[5] http://energy.gov/eere/sunshot/solar-energy-evolution-and-diffusion-studies

ii. Cost/Price inputs to the adoption model should reflect the most current cost information

The CEC's draft California Electricity Demand forecast report states that the source of the cost data was the draft NEM public tool developed for the NEM successor tariff proceeding before the CPUC. The tool was recently updated with a lower price cost scenario, as a number of stakeholders indicated that the costs were unreasonably high. PG&E's comments on the tool outlined why the PV cost/price data in the tool was not reflective of current market conditions.[6] PG&E recommends that the CEC revise the PV forecast modeling assumptions to incorporate these changes to the NEM tool, which reflect lower PV costs and prices to consumers.

iii. System size inputs to the model appear low

The CEC's draft California Electricity Demand forecast states that a system size of 4 kilowatts (kW) was used as the average for residential PV adoption. PG&E's existing residential PV systems average about 5 kW in size and the statewide CSI database average is 5.7 kW.[7] PG&E asks that the CEC clarify how the residential system size was chosen.

iv. The CEC's forecast scenarios should reflect greater uncertainty in future PV adoption

Given the uncertainty in regulatory changes and market innovations that could affect future PV adoption rates, PG&E recommends that the CEC reassess the range of potential adoption scenarios covered in the low, mid, and high cases and consider providing a range that reflects more potential variation in future PV adoption.

III. A MORE GRADUAL DECAY RATE OF ENERGY EFFICIENCY SAVINGS SHOULD BE USED

The CEC forecast currently contains energy efficiency savings estimates that decline steeply after 2014, from a savings of approximately 7,000 gigawatt-hours (GWh) in 2015 to about 2,200 GWhs in 2025. PG&E disagrees with this estimate and predicts a more gradual rate of energy efficiency savings decay for the following reasons.

While there is very little data on which to base energy efficiency decay assumptions, the expected useful life (EUL) definition is one that can be used as a starting point for the analysis. The EUL of a measure is defined as the point at which half of products would need to be replaced, with the remaining 50 percent still in service and continuing to decay after this point. This suggests that 50 percent of the savings would still be available when the weighted average EUL of efficiency efforts is reached. For PG&E, this weighted average EUL is about 10 years for the latest program results (2014). Assuming the other program administrators across the state

[6] Comments of the Pacific Gas and Electric Company (U 39 E) on Draft Version of the Net Energy Metering Public Tool Rulemaking 14-0002, Filed July 10, 2014

[7] California Solar Statistics Database: https://www.californiasolarstatistics.ca.gov/ Accessed July 15, 2015.

have similar results, this suggests that the lowest remaining savings after 10 years would be half what was initially installed.

An additional consideration is that not all customers who participate in a utility rebate program will revert to the base level technology of the past. What customers do after a measure expires is an area that requires future research; however, there are many reasons to believe that most customers will not revert to base level technologies. Considerations include technological improvements, code changes, and a likelihood that the values of the customer who initially adopted the more efficient technology will not change dramatically.

This suggests that some large portion of the savings that has decayed should be maintained somewhere in the model. Options for maintaining this savings include: the programs area, the Codes and Standards area (assuming a future code change is included in the model that would account for this), or in the naturally occurring savings area. Using the CPUC assumption and PG&E portfolio results, 50 percent of the savings that would have decayed after 10 years (or 25% of the original amount – 50% * 50%) should still be maintained in the model.

Accordingly, a much more gradual decay rate should be reflected in the model. PG&E would like to work with the CEC to gain a better understanding of the assumptions used in the relevant modeling for this forecast.

IV. MORE INFORMATION IS NEEDED TO UNDERSTAND WHY THE CEC'S RATE FORECAST DIVERGES FROM PG&E'S

The CEC's preliminary rate forecast shows a 1.7 percent per year growth (in real dollars) in average class rates between 2015 and 2026. However, PG&E's most recent internal rate forecast shows no growth in real system average rates in the 2015 to 2026 timeframe. This is primarily due to expectations of lower natural gas prices and the expiration of high cost renewable portfolio standard (RPS) contracts balancing out other increases in capital spending.

PG&E would like to work with the CEC to better understand and inform the rate forecasts used in the next draft of California Energy Demand. PG&E has recently submitted Forms 8.1a and 8.1b, which show PG&E's forecast of long-term revenue requirements that would likely result in a more modest projection of rate increases.

IV. ELECTRIC VEHICLE ADOPTION RATES ARE GENERALLY CONSISTENT

PG&E agrees with CEC's recent revision to the electric vehicle forecast. PG&E's 2015 forecast of PEV adoption is based on the growth of new PEV registrations in the near term of around 1 percent each month. In the long term, the PG&E forecast is generally consistent with Governor Brown's goals in the ZEV Action Plan.

V. THE INDUSTRIAL SALES FORECAST MERITS ADDITIONAL ANALYSIS

As the CEC has noted, PG&E's industrial sales forecast is higher than in the CEC forecast. PG&E has observed sales growth in the large commercial and industrial sector, which, if controlled for the departure of one of PG&E's largest customers in 2013, has grown by about 8 percent since 2010. Year-to-date in 2015, PG&E's large commercial and industrial category has consumed approximately 440 GWh (6 percent) more than in 2014. PG&E would like to continue to work with the CEC to highlight the positive growth trends in this sector and discuss how to account for the level adjustment from the loss of the large customer.

VI. WEATHER NORMALIZATION OF THE PEAK DEMAND FORECAST SHOULD BE EXPLORED IN THE DEMAND ANALYSIS WORKING GROUP

PG&E and CEC peak demand forecasts have similar trends; however, the forecasts differ on starting point in 2014. Notably, there are methodological differences between the way PG&E and the CEC weather adjust recorded peak data. PG&E also notes that 2014 was an unusual year with few, if any, consecutive hot days. The issue of peak weather normalization should be further explored at a future Demand Analysis Working Group (DAWG) meeting, as this is an issue of concern for all utilities in the state.

VII. ADDITIONAL CLARITY IS NEEDED

Additional footnotes or references for some columns on Form 1.2 would help to clarify if the numbers shown are at the retail meter level or generation level (including the effect of losses). This will promote understanding of whether the load values considered are at the retail meter level or at the generation level, which include the effect of transmission and distribution losses. Based on conversations with CEC staff, PG&E's understanding is that column F, "PV," reflects the PV - Private Supply as measured at the retail meter level and column E, "Non-PV Self Generation," is also measured at the retail meter level. This should be clearly identified in a footnote.

The composition of column C, "Net Losses," should also be clarified. It appears the net loss may reflect losses from "Total Consumption" reduced by the losses associated with "Total Private Supply" (column G). It would be helpful if this was clearly stated.

III. Conclusion

PG&E is committed to continuing to work with CEC Staff to refine the California Electricity Demand forecast, and thanks the CEC Staff and Commissioners for their openness to stakeholder input and willingness to share information and build understanding.

Sincerely,

/s/

Valerie Winn