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VIA E-MAIL DOCKET@ENERGY.CA.GOV

California Energy Commission
Docket Office, MS-4
Re: Docket No. 13-IEP-1H
1516 Ninth Street
Sacramento, CA 95814-5512

Re: 2013 Integrated Energy Policy Report: Distributed Generation Integration Cost Study: Analytical Framework—Comments of Pacific Gas and Electric Company

I. INTRODUCTION

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to provide comments on the Navigant Consulting (Navigant) study, titled "Distributed Generation Integration Cost Study: Analytical Framework"[1] (Navigant Study). PG&E has consistently raised concerns about the need to better understand the impacts of distributed generation (DG) on the distribution system as well as operationally and the Navigant study provides timely and valuable information on these issues.

The California Energy Commission (CEC) hired Navigant to conduct an independent analysis of the interconnection cost impacts associated with increased installations of DG in Southern California Edison's (SCE) service territory; the Navigant Study is intended to validate and expand upon the findings of a DG penetration study, undertaken by SCE, and thus utilized SCE's system in its analysis.[2] PG&E provides detailed comments in Sections II through IV, and technical comments and clarifications in Section V. The following summarizes PG&E's key points:

- The Navigant Study is a great first step to better understanding the distribution system interconnection impacts of DG. PG&E looks forward to the results of the planned validation of the transmission system analysis.

[1] Shlatz, E., Buch, N., & Chan, M. (2013). Distributed Generation Integration Cost Study: Analytical Framework (CEC-200-2013-007). California Energy Commission. Retrieved from http://www.energy.ca.gov/2013publications/CEC-200-2013-007/CEC-200-2013-007.pdf

[2] Distribution Engineering and Advanced Technology. (2012). The Impact of Localized Energy Resources on Southern California Edison's Transmission and Distribution System. Southern California Edison. Retrieved from http://www.energy.ca.gov/2013_energypolicy/documents/2013-08-22_workshop/SCE_Local_Energy_Resources_Study.pdf

- Differences in utility systems and the need to validate the transmission analysis prevent directly extrapolating the Navigant Study's results to other utility service territories.

- The Navigant Study focused on the costs to *interconnect* a generator to the distribution system. It did not study *integration* costs. Therefore, the term integration should be replaced with interconnection.

- PG&E encourages the CEC to incorporate Navigant's information on interconnection costs into a planning framework that prioritizes locating DG on the utility grid based on total project cost (*e.g.*, land, labor, *etc.*). The planning process should be done in coordination with existing CEC, California Public Utilities Commission (CPUC), and California Independent System Operator (CAISO) processes.

II. THE NAVIGANT STUDY PROVIDES TIMELY AND VALUABLE RESULTS, BUT UPDATES ARE NEEDED

Utilities have consistently raised concerns about the need to better understand the impacts of increased DG penetration, from both an operations and a cost perspective. Accordingly, PG&E was pleased to see the Navigant Study examine these impacts for the SCE system. PG&E especially appreciates the approach Navigant used in its Study: an engineering-level examination of actual circuit performance on a representative number of feeders. This approach stands in contrast to past studies, which, while valuable, utilized econometric modeling or general circuit designs. Navigant's approach dramatically increases the accuracy of the Study's results and provides valuable information to both developers and system operators about what is driving increased interconnection costs on the distribution system.

However, the Navigant Study was limited to SCE's system and additional analysis is needed before applying the results to other utility service territories. Because of this limitation, PG&E recommends expanding the scope of Navigant's analysis to other utility services territories so that the significant differences in the structure of the various California utility systems can be assessed. For example, as indicated in the Navigant Study, SCE regulates voltage at the sub-transmission level and compensates with capacitors at the distribution level. In contrast, PG&E regulates voltage with voltage regulators and capacitors at the distribution level. Additionally, as shown in Figure 4, SCE's load is heavily concentrated in the Los Angeles metropolitan area. PG&E has several load centers including San Francisco, the East Bay, San Jose, Fresno, and Bakersfield. PG&E also tends to have longer feeders than SCE. Due to these, and numerous other differences between PG&E's and SCE's systems, the Study results are not directly transferable to PG&E's service territory and, consequently, cannot be used to extrapolate the total California DG impacts.

Nevertheless, the analytical framework for the DG penetration analysis established in this report is extremely valuable and will enhance stakeholders' understanding of DG impacts on utility distribution systems. Therefore, while the differences in utility systems prevent directly extrapolating the Study results to other utility service territories, extending the analytical

framework to PG&E's and other utility service territories and then aggregating those results with SCE's would likely provide the most accurate assessment of statewide interconnection costs to date.

Lastly, DG integration impacts on the distribution and transmission systems merit additional analysis. As the Navigant Study indicates, the transmission figures are "an adequate placeholder for this study" and a "more rigorous analysis of potential transmission integration costs" should be conducted.[3] Consequently, before utilizing these results for statewide regulatory and legislative decision-making, PG&E recommends expanding the Study scope to address the full DG integration costs on both the distribution and transmission systems referenced in these comments (see Section III). These additional analyses would provide a more comprehensive picture of DG impacts on the California electric grid to inform policy making that include, but are not limited to the Integrated Energy Policy Report, the CPUC's Long-Term Procurement Plan, the CAISO's 2014-2015 Transmission Planning Process, the Assembly Bill (AB) 327 requirements for an update to the Net Energy Metering program and a Distributed Energy Resource strategy, and future utility general rate cases.

III. MORE ANALYSIS IS NEEDED TO ESTIMATE INTEGRATION COSTS, WHICH EXTEND BEYOND DISTRIBUTION AND TRANSMISSION INTERCONNECTION IMPACTS

The term "integration," which is used throughout the Navigant Study, should be replaced with the term "interconnection." In the context of the Navigant Study, the term "integration" refers to "new lines and equipment need[ed] to connect DG to the electric utility distribution system. . . . [and] enhancements of the existing system."[4] As described, these costs are more accurately and commonly referred to as "interconnection" costs. In addition to interconnecting DG systems, integration also involves deploying and operating enough flexible, controllable resources to ensure grid reliability. Flexible generation is required to balance load and resources and to manage intra-hour forecast uncertainty and variability. Furthermore, while the Navigant Study is clear that the transmission upgrade costs used in the analysis are a placeholder, it should also make clear that these too are interconnection costs, not integration costs.

PG&E also recommends including a description of interconnection costs at the beginning of the Study. This description would clearly indicate that the costs examined in this study relate only to interconnection equipment and indicate that additional study is needed to estimate DG integration costs. Moreover, today's low DG penetration environment represents only the early stages of DG integration and utility activities to accommodate this level of DG have been limited. Higher DG penetration will require robust integration activities, such as utility planning and the procurement of flexible and load following resources. Thus, there will be a need for an ongoing process to evaluate DG integration issues going forward.

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[3] Op. cit., Distributed Generation Integration Cost Study, pp. 58.
[4] Ibid., pp. 45.

IV. ANY PILOT PROJECT TO IDENTIFY PREFERRED DG LOCATIONS SHOULD FOCUS ON TOTAL PROJECT COSTS, NOT JUST INTERCONNECTION COSTS

Among other things, Chapter 6 describes the CEC's intent to launch a pilot project that, using the analytic framework developed in the Navigant Study, would identify locations on the electricity system that are preferable for renewable DG and other preferred resources. Since this pilot is still in the early stages of development, PG&E's comments are focused on what should be the ultimate end goal of this planning process: reducing total project costs in an environmentally friendly manner. Towards this end, PG&E encourages the CEC, as it works to leverage the results of Navigant's study and scope the pilot, to incorporate Navigant's information on interconnection costs into a planning framework that prioritizes based on total project cost.

In creating a framework for the CEC's pilot projects, interconnection costs must be considered in the overall project cost context. As described above, interconnection cost is only one element of the total DG project cost. Other balance-of-system costs, like land and labor, often make up an even greater share of total project cost. Thus, the end process should identify optimal DG development zones that have been evaluated on a broader set of factors, including total project costs and environmental considerations. Such a process may require additional analysis, but would provide the maximum benefit.

One possible output from such a study could be a map showing average interconnection, and potentially integration, costs geographically, by zones. This could be helpful to developers and utilities for planning purposes. However, as DG interconnect increases, these maps and associated cost estimates would become dated quickly. Thus, the CEC could help develop tools that can be easily updated over time and at a reasonable cost. Earlier maps produced for the renewable auction mechanism could serve as a model for this new initiative.

Finally, there are also many existing and planned studies underway, sponsored by various regulatory bodies. For instance, the CPUC sponsored a March 2012 Energy and Environmental Economics (E3) study that looked at similar issues called the "Technical Potential for Local Distributed PV in California."[5] It is important that the Navigant study, and any companion studies, be coordinated with these existing efforts and that the differences between the various studies be fully understood.

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[5] Energy and Environmental Economics, Inc. (2012). Technical Potential for Local Distributed Photovoltaics in California: Preliminary Assessment. California Public Utilities Commission. Retrieved from http://www.cpuc.ca.gov/NR/rdonlyres/8A822C08-A56C-4674-A5D2-099E48B41160/0/LDPVPotentialReportMarch2012.pdf

V. ADDITIONAL TECHNICAL COMMENTS AND CLARIFICATIONS

PG&E respectfully requests that Navigant make the following technical clarifications and corrections in the Final Study.

- On page 2, it should be clarified that system upgrades are those required to mitigate deficiencies or violations related to interconnection. Upgrades that are not directly needed to interconnect the generator would not be charged to the interconnection project.

- In Table 4, on page 18, the Navigant Study notes the number of line miles by each feeder type. The Study should clearly define the definition of line mile (*i.e.*, mainline, total 3 phase miles, or total circuit miles).

- The Study should go into greater detail on the methodology for consolidating the multiple DG units and the selection of insertion point locations. The feeder model section, on page 19, indicated that these are affected by the load locations. However, it is not clear how they are done or what the underlying assumptions are.

- On page 29, to the Study should clarify what capacity and voltage violation numbers refer to in Table 8. Additionally, the Study should clarify why the number of violations does not change, even though the DG megawatt (MW) sizes changed significantly.

- The back of the report shows Single Line Diagrams. Each of the 13 feeder diagrams showed 4 insertion points. The table showed different total values for each combination. It appeared that the intent is to show the difference between distributed photovoltaic (PV) versus clustered PV. The Study should clarify why the values shown in the Single Line Diagram tables do not conform to those in the parametric study Tables 11 through 19.

- On page 13, it is not clear why Feeder 13 showed a DG capacity of 13.58 MW in Table 13 when the load is 10.003 MW. This may have violated the performance standard number 2, which said that load cannot offset DG output.

- The Navigant Study should be clarified to explain how the PV voltage impacts on the taps can be represented by a lumped PV insertion point along the mainline. Any other methods used to approximate voltage impact on the taps, not shown in the report, should be included.

VI. CONCLUSION

In conclusion, PG&E appreciates the consideration of these comments and looks forward to continuing collaboration with the CEC. Please do not hesitate to contact me if you have any questions.

Sincerely,

/s/

Matthew Plummer

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