2 July 2018

To: PG&E and CPUC Energy Division
From: Vote Solar and Solar Energy Industry Association
RE: Comments on PG&E's Grid Needs Assessment; CPUC R. 14-08-013 and D.18-02-004 O.P. 2.d.

Introduction

Vote Solar and Solar Energy Industry Association (VS/SEIA) strongly support the objective established by the Commission for the Distribution Grid Needs Assessment (GNA) of providing transparency so that the distribution planning process yields an actionable candidate resource investment deferral shortlist. VS/SEIA further add that our comments herein to PG&E about its GNA seem as well applicable to SCE and SDG&E.

In PG&E's own words the objective of the GNA is explained as follows:

The objective of the GNA is to provide transparency into the assumptions and results of the distribution planning process that yield the candidate deferral shortlist, proposed grid modernization investments, and proactive hosting capacity upgrades proposed to accommodate forecast autonomous distributed energy resource (DER) growth.[1]

PG&E's initial GNA presents preliminary data available regarding PG&E's projected distribution grid needs over a five-year planning horizon.[2]

VS/SEIA recognize that this is the first iteration of the GNA and that PG&E intends to provide a more robust GNA in 2019. Nonetheless, VS/SEIA are concerned about the level of information provided about the assumptions used to determine need and the promised mapping of GNA characteristics. VS/SEIA are looking forward to seeing the upcoming Distribution Deferral Opportunity Report which will identify a candidate deferral short list. Creating some doubt about whether these results can be produced in a timely manner, PG&E raises questions about how future load transfers and switching operations will be carried out. In short, while PG&E has developed advanced tools and internal capabilities to accomplish the key GNA tasks, this report raises multiple questions about how PG&E intends to proceed to optimize the use of distributed energy resources.

It is Unclear How Integrated Capacity Analysis (ICA) – Load-Flow – Is Used in GNA

It is obvious that detailed load-flow analysis using CYME, run at a batch level to capture scenarios, is essential to define hosting and distribution impacts under circumstances where

[1] PG&E 2018 Distribution Grid Needs Assessment, Appendix 4 (unnumbered) pg. 1.
[2] PG&E 2018 Distribution Grid Needs Assessment, pg. 2.

specific equipment is in place. PG&E has explained this in other aspects of the instant proceeding. With-and-without testing based in part on load-flows – the electrical impacts on the distribution grid -- shows how the distribution system will need to be reconfigured, which then forms the basis for decisions on deferrable distribution components. PG&E has just posted a request with the Commission to delay its compliance with requirements to post results for 3000 feeders in its territory and post these results on its data portal.[3]

When questions have been asked in past DRP workshops about the connection between PG&E's CYME, ICA load-flow analysis and deferrable grid needs, the response has been that this analytical work would occur at a later time. VS/SEIA believes the response to these questions s are critical to understanding the GNA results. Accordingly, it would useful be for PG&E to explain why it does not "connect-the-dots" between CYME, ICA load-flow analysis and its determination of GNA results. Moreover, as explained below, ICA and CYME load-flows need to be used to determine voltage AND volts-amps-reactive (VAR) impacts, which may result in deferrable opportunities.

<u>Assessing Voltage and VAR Requirements in Distribution Load Growth Analysis</u>

As PG&E explains in this report and in other forums, granular data and robust statistical analysis can be used with advanced methods to provide greater locational accuracy in forecasting electricity loads in kW terms. What is not discussed, though most certainly needs to be a part of forecasting, are changes in voltage and VAR at a granular level. Greater transparency about voltage and VAR needs is needed in the next iteration of the GNA.

VS/SEIA appreciate that the forecasting tool PG&E uses is able to take system peak load and create a 576-hour load shape that can be applied to feeder or bank load shape. PG&E has explained at a high level how it conducts both a geo-spatial and regression forecasts of load. More detail on this analysis would be helpful. More information is needed regarding how PG&E allocates the adoption of DER technologies to feeders.

<u>PG&E Needs to Better Explain its Decision Making regarding Load Transfers and Switching</u>

The GNA fails to adequately explain how PG&E will address or account for future planned distribution load transfers and switching operations. While planned load transfers and switching operation may be a low cost alternative, more information will be needed to support this assertion in specific instances. PG&E mentions it may identify additional upgrades that impact this analysis. VS/SEIA urge that such information about additional upgrades be included in the DDOR. It is critical to understand the timing on when distribution projects will be recommended, and thus be considered for deferral by targeted DERs.

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[3] 28 June 2018, (Letter to CPUC) Request of PG&E to Comply with Decision 17-09-026.

Raising these questions PG&E explains:
PG&E's 2018 GNA submittal includes the results of PG&E's electric distribution grid as a snapshot in time and does not include future planned load transfers and switching operations that will be performed. Consequently, many of the grid needs identified in the GNA can and will be mitigated by such operations rather than a planned investment. Typically, planned load transfers and switching operations are the lowest cost alternatives that take advantage of available existing "back-tie" interconnections to other distribution feeders. PG&E may identify additional upgrades over the next several months. In this case, such upgrades will be reflected in the DDOR that will be submitted on September 1.[4]

PG&E must resolve these questions and recommend investments to its distribution system. PG&E now has much more advanced demand and DER forecasting methods, as well as more advanced distribution planning tools. Accordingly, PG&E's decision making framework to integrate load transfers and switching operations needs to be made transparent, and the investment implications defined in terms of the candidate deferral shortlist.

<u>Methods to Achieve Feeder-Level and Single Phase Analysis Have Been Used for Decades</u>

Utility distribution planning is certainly becoming more advanced. Results can be determined to ensure its four main objectives are achieved: distribution capacity, voltage support, reliability (back-tie), and resiliency.

Load flow tools like CYME can be run to determine multiple scenarios with cloud computing. The assumptions, basic methods, and analytic questions are much the same as they have been for decades. PG&E needs to take its advanced data bases and modeling to the feeder-level and to single-phase voltage lines in order to address the needs of its many residential customers. Greater levels of granularity are needed both to better understand voltage/VAR compliance needs and to define the underlying electricity flows that the drive the candidate deferral shortlist and DER hosting levels.

As PG&E explains, it has to date not defined feeder-level distribution analysis:
As adopted in D.18-02-004, grid needs that are reported in this GNA submittal are limited to the substation level forecast deficiencies, associated with the four distribution services that DERs can provide as adopted in D.16-12-036, which are distribution capacity, voltage support, reliability (back-tie) and resiliency. These distribution services that DERs can provide are further described in Appendix 3. For this year's GNA, identified needs were limited to substation level forecast of distribution capacity and limited reliability (back-tie) distribution grid needs for both substation transformer banks and feeders. As tools and processes are further refined and

[4] PG&E 2018 Distribution Grid Needs Assessment, pg. 10.

matured, PG&E plans to include more components to the GNA, such as feeder-level needs downstream of the substation.[5]

PG&E's Consumer Confidentiality Criteria Needs Reconsideration

PG&E's current policy regarding customer confidentiality is apparently as follows:

In order to respect and protect customer privacy PG&E follows aggregation and anonymization rules, the primary of which is referred to as the "15/15 rule." When releasing aggregated nonresidential customer usage data, the sample population must be more than 15 customers and no single customer should account for more than 15% of usage at any given time. For residential customers, the minimum requirements are at least 100 customers within the sample. Areas that do not meet these requirements will be listed in this report as "Customer Confidential."[6]

PG&E lists a number or circuits as "customer confidential," including 11 out of 44 total circuits in the Bay Area.[7] In effect, this policy limits information access about a significant portion of the distribution system. This means that customers in these "blacked-out" areas will not be targeted for DER solutions unless an arrangement to provide for the confidential release of the related data can be applied. Solutions to this policy are needed, otherwise these parts of the grid will be left "in the dark," depriving customers of DER solutions that could be cheaper and provide superior value.

During workshops on the DRP, a number of parties suggested that a qualified group of third party DER providers be placed under nondisclosure agreements to address specific grid needs. VS/SEIA suggest this or another solution be adopted to ensure that customers on these parts of the grid can obtain comparable treatment to that of other customers.

Electric Vehicle Charging Will Grow Substantially but is Not Directly Addressed in the GNA

PG&E needs to provide a forecast of EV charging stations, which will be critical in regions such as in the San Francisco Bay area.

PG&E explained as follows:

The Bay Area DPR load is perceived to be highly concentrated commercial and residential loads within a relatively small footprint. That may change in the future as there is a considerable amount of load growth anticipated by EV charging stations.[8]

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[5] Ibid.

[6] Ibid.

[7] Ibid, pp. 13-15.

[8] Ibid, pg. 12.

Smart Inverters are Required to Provide Voltage Control and VAR

While PG&E provides a summary of the incidence of inverter-based resources in each planning region it does not explain how these inverters could be used or the assumptions that will be important to determine inverter-based impacts going forward.

As PG&E explains for the Bay Area planning region:
The Bay Area DPR has a total of 549 MW of existing DG nameplate capacity, of which 81.3% is inverter based. Currently 35 circuits are considered "High Penetration". These are circuits with interconnected nameplate generation of more than 30% of the circuit peak load.[9]

There will be at least two levels of smart inverter service that may be tapped to provide services in PG&E's territory; 1) inverters that have reactive power adjustment capability and 2) those that do not have this capability. Smart inverters with reactive power adjustment capabilities will be more valuable when VAR adjustments are needed, especially when used on a dynamic basis (as compared to a seasonal basis) in near-real time. VAR compensation can substitute for smart capacitor banks and switching to control such capacitors.

As discussed in the Smart Inverter Working Group, all that must be done to commercialize the use of the newest smart inverters in California to deploy reactive power control is to approve certification, testing, and the related paperwork.[10] In this light, the GNA process should address the use and integration of the numerous new smart inverters that will be available.

PVRAM and GNA Maps Do Not Provide Sufficient Detail for Deferral Projects to Be Proposed

Access to the PVRAM and GNA maps can be obtained through the Appendix I URL (IP address).[11]

The GNA is intended to provide information about constraints, specifically to define future grid needs, and to do so in a usable manner.

PG&E explains: *The GNA map shows assumptions and results of the distribution planning process that yield grid needs related to distribution grid services.*[12]

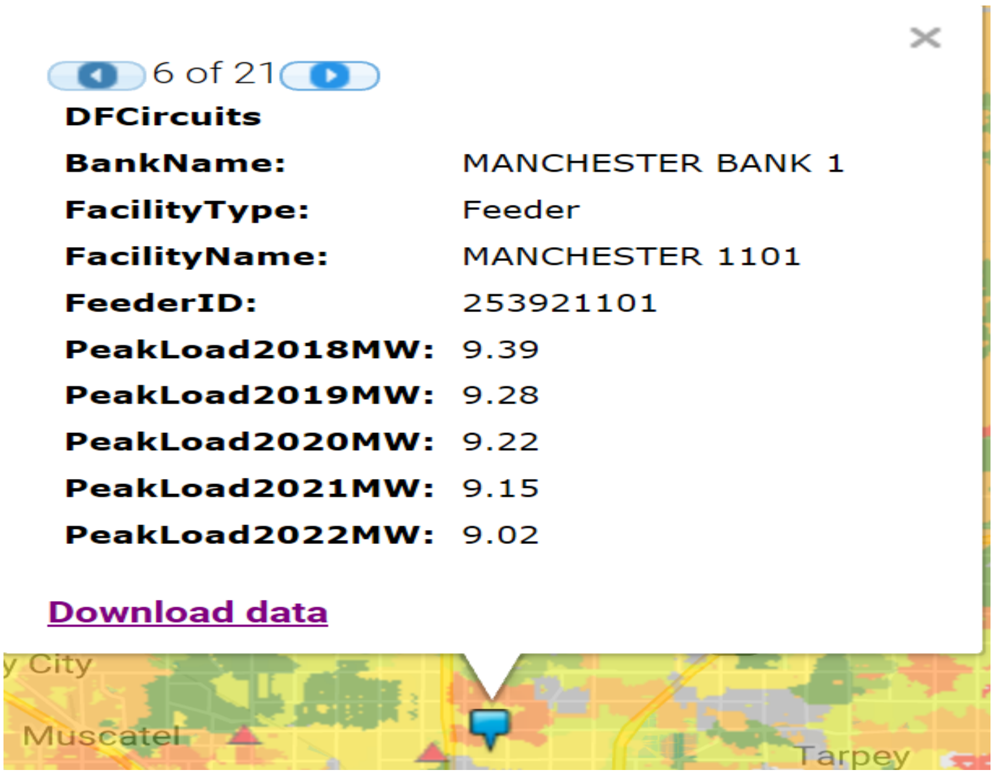
One can put in an address, present a location, request the GNA information for constrained areas (noted in maps in red), and obtain circuit specific data. Information is provided about the circuit bank, facility, and peak load information.

A significant concern of VS/SEIA, however, is that the analysis period for circuits spans only four years, 2018 to 2022. VS/SEIA question whether in future GNAs the analysis will be

[9] Ibid.
[10] Solstice Agenda, Smart Inverter Working Group, R. Salas, Southern California Edison, 21 June 2018.
[11] https://www.pge.com/en_US/for-our-business-partners/energy-supply/solar-photovoltaic-and-renewable-auction-mechanism-program-map/solar-photovoltaic-and-renewable-auction-mechanism-program-map.page.
[12] The web page is titled "Use Our Map to Identify Potential Sites for Your Project," but the legend does not explain constraints, or lack of constraints.

extended to at least 10 years, so that longer-term deferral plans can be planned and executed upon.

As an example the Manchester Bank 1 shown below presents peak loads but appears unconstrained in the next 4 years.



The next example, Airways Bank 2 shown immediately below, however shows that it currently faces loadings in excess of 100% in 2018 and loadings are expected to increase to 123 percent of peak load in 2022. This circuit then would be a candidate for targeted DERs to defer distribution upgrades.

3 of 3

GNACircuits

BankName:	AIRWAYS BANK 2
FacilityType:	Feeder
FacilityName:	AIRWAYS 1105
FeederID:	252041105
PrimaryDriver:	Demand Growth
DistributionServiceRequired:	Capacity
AnticipatedNeedDate:	7/2018
FacilityRatingMW:	11.82
PercentLoading2018:	118.697123519459
PercentLoading2019:	120.05076142132
PercentLoading2020:	120.558375634518
PercentLoading2021:	121.573604060914
PercentLoading2022:	123.181049069374

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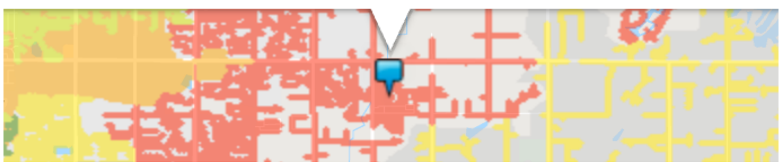

What is unclear, however, is the hourly or sub-hourly (e.g., 15 minute) circuit load profile during expected peak periods, which would then allow DER packages to be designed that would lower a specific set of peak loads. More specifically, the feeder load-profile is not provided, even at an hourly level much less the 15 minute level, which will make it quite difficult to define DER packages that can defer such needs.

VS/SEIA recommend that the Commission require PG&E to hold a workshop that will address these and other related questions posed here informally. Without a more complete picture, IOUs will be successful in keeping out third-party DER providers and continuing to increase distribution rate base investment, regardless of the economic benefits of DERs.