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California Energy Commission
Dockets Office, MS-4
Re: Docket Number 12-IEP-1D
1516 Ninth Street
Sacramento, CA 95814-5512

Re: 2012 Integrated Energy Policy Report/Renewables: Comments of Pacific Gas and Electric Company on Evaluating and Capturing the Benefits of Renewable Energy for California

I. INTRODUCTION

Pacific Gas and Electric Company ("PG&E") appreciates the opportunity to provide comments on evaluating and capturing the benefits of renewable energy for California. PG&E applauds the efforts of the California Energy Commission ("CEC") to identify and consider how these benefits of renewable generation accrue to renewable generators and the public. This is a critical undertaking as we implement the 33% Renewable Portfolio Standard ("RPS") requirement. PG&E provides the following brief overview, as well as responses to several of the questions posed to each panel during the course of the April 12, 2012 workshop on this topic.

PG&E strongly supports California's transition to a low-carbon economy. Last year, more than 19% of PG&E's electricity sales came from eligible renewable sources. In fact, more than 50% of PG&E's electricity portfolio comes from carbon-free resources, including large hydroelectric generation, nuclear power, and eligible renewable resources like wind, solar, geothermal, and small hydroelectric resources.

PG&E recognizes that renewable energy will play an important role in reducing greenhouse gas ("GHG") emissions. In 2011, we signed seven contracts for more than 700 megawatts ("MW") of renewable power. When combined with our prior contracting efforts, PG&E is well positioned to achieve the 33% RPS requirement. In addition, our new natural gas power plants emit significantly less CO_2 per unit of output and NO_x emissions than older gas-fired plants.

For the state to more fully capture the benefits of renewables, a variety of measures are needed to integrate these intermittent resources. There is a critical need for new, flexible generating resources that can provide the load-following services essential to integrate intermittent

resources that are being added to the electric system. Investments in new combined cycle facilities like Colusa, Gateway, and the proposed Oakley facility are essential for reliable electric system operation as we add more wind and solar to the generation portfolio. These new facilities, with their fast ramping capability, are needed to ensure that as older units using once-through cooling are retired, the electric grid can still be operated reliably when the wind suddenly declines or cloud cover passes over.

II. CURRENT POLICIES ALREADY CAPTURE MANY OF THE PUBLIC BENEFITS OF RENEWABLE ENERGY GENERATION

Question 1: Aside from those that are already sufficiently captured in current policies, what public benefits can various renewable technologies provide? Which benefit(s) is the most important driver for increased penetration of renewable energy?

Response: Many benefits of renewable energy are already captured in existing programs that encourage the development of energy efficiency and renewable or GHG-reducing technologies. Moving forward, PG&E suggests that if a specific technology has additional "public benefit" then the public should be responsible for the additional costs of this technology, not the customers of California's investor-owned utilities ("IOUs"). This perspective was emphasized at the workshop, when Commissioner Peterman acknowledged that ratepayer benefits are not necessarily public benefits. To the extent that these two benefits diverge, the individuals who receive the additional value should fund the development of these programs or technologies.

Question 2: To what extent do renewable energy resources reduce localized pollution impacts and provide public health benefits?

Response: It is important to distinguish between regional and localized pollution impacts. NO_x is considered a regional pollutant because it can contribute to regional ozone and fine-particulate problems. Toxic pollutants have more localized impacts:

> Unlike reactive pollutants, such as ozone and fine particulates which increase in concentration as the wind carries its precursor emissions [including NO_x] inland, many toxic pollutants are non-reactive. This means that highest levels are expected to be close to the sources.[1]

As discussed further in the response to Question 4 below, renewable energy resources may displace generation from gas-fired power plants and thereby reduce regional and localized pollution impacts. The reduction in regional pollution impacts however, is limited by the fact

[1] http://www.aqmd.gov/matesiidf/es.pdf p.ES-3

that power plants emit only 1% of regional pollutants such as NO_x in air basins in California.[2] Air-quality regulators do not focus on dispatchable gas-fired power plants as major contributors to localized pollution. Localized pollutants, also called "toxic air contaminants" or "air toxics" have been examined by the South Coast Air Quality Management District ("SCAQMD"), which concluded that diesel engines are a much larger contributor to public health risks from air toxics:

> While there has been improvement in air quality regarding air toxics… Diesel particulate continues to dominate the risk from air toxics, and the portion of air toxic risk attributable to diesel exhaust is increased compared to the MATES II Study… The results from this study underscore that a continued focus on reduction of toxic emissions, particularly from diesel engines, is needed to reduce air toxics exposure.[3]

In its April 2011 "Toxic Hot Spots" reports, SCAQMD examines point sources of toxic emissions. Appendix A of that report lists approximately 280 point sources of emissions in declining order of cancer risk. The dispatchable gas-fired power plants that could be displaced by renewables are near the bottom of the list. Additionally, the California Air Resources Board ("CARB") has published an "Air Quality and Land Use Handbook" that provides guidelines for siting of "sensitive land uses," such as daycare facilities. It includes discussions of ten emission sources of particular concern. Gas-fired power plants are not among those ten.[4i]

Question 3: How should we determine the best renewable energy resources, development locations, or siting strategies to maximize the reliability benefits of renewable energy resources?

Response: It is important to consider both the benefits and the costs of renewable energy resources when making procurement decisions. The best renewable resources for our customers are those that can provide renewable energy benefits at a cost that is affordable for the millions of Californians who live within PG&E's territory. They should continue to be determined with this in mind.

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[2] Recorded emissions of conventional air pollutants are shown in the "Emission Inventory" of the California Air Resources Board. Statewide data for 2008 are shown at: http://www.arb.ca.gov/app/emsinv/emssumcat_query.php?F_YR=2008&F_DIV=-4&F_SEASON=A&SP=2009&F_AREA=CA For example, statewide NOx emissions from the category "Electric Utilities" (which includes merchant power plants but excludes CHP) were 26.21 tons per day, or 0.8% of the statewide total of 3,209.71 tons per day. Similarly, data for the South Coast Air Basin are given at: http://www.arb.ca.gov/app/emsinv/emssumcat_query.php?F_YR=2008&F_DIV=0&F_SEASON=A&SP=2009&F_AREA=AB&F_AB=SC . In the South Coast, "Electric Utilities emitted 2.84 tons per day, or 0.3% of the basin total of 824.97 tons per day.

[3] Source: Multiple Air Toxics Exposure Study III, Executive Summary, p. ES-7(2008) at: http://www.aqmd.gov/prdas/matesIII/Final/Document/ab-MATESIIIExecutiveSummary-Final92008.pdf

[4] Source: "Air Quality and Land Use Handbook: A Community Health Perspective", Air Resources Board, at: http://www.arb.ca.gov/ch/handbook.pdf

PG&E believes that "least cost, best fit" renewable procurement evaluation criteria appropriately balance both sides of the cost-benefit equation. When determining the value of a renewable technology bidding into the RPS competitive solicitation, PG&E considers the following: portfolio fit, project viability, the market value of the energy procured, RPS goals, and transmission costs associated with bringing the power from the generating facility to PG&E's network. Other renewable procurement programs established by the California Public Utilities Commission ("CPUC") are not subject to this method: some are first-come first-served (e.g., feed-in tariffs) and procurement is selected primarily upon cost factors as directed by the CPUC (e.g., renewable auction mechanism).

The CEC has expressed its intention to host an additional workshop focused on permitting, including a discussion of development locations. PG&E looks forward to participating in this workshop.

Question 4: Under what circumstances will renewable resources displace and/or replace higher pollution generation (or generators with higher environmental impacts) in the short-term and for long-term resource planning studies (2020, 2030, 2050)?

Response: Electricity from renewable resources used to meet California's 33% RPS in 2020 is generally expected to displace electricity produced by natural-gas-fired power plants, given that PG&E has very little coal in its portfolio (about 1% from qualifying facility contracts). As mentioned in the response to Question 2 above, California's natural-gas-fired power plants emit roughly 1% of emissions of regional pollutants such as NOx.[5] Some of that 1% can be displaced, but an irreducible amount of gas-fired generation may be needed for many years to accommodate the fluctuations in output from intermittent renewable resources. At the workshop, Commissioner Peterman commented that she agrees with this point: installing renewables may not necessarily replace non-renewable generation.

[5] Recorded emissions of conventional air pollutants are shown in the "Emission Inventory" of the California Air Resources Board. Statewide data for 2008 are shown at: http://www.arb.ca.gov/app/emsinv/emssumcat_query.php?F_YR=2008&F_DIV=-4&F_SEASON=A&SP=2009&F_AREA=CA For example, statewide NOx emissions from the category "Electric Utilities" (which includes merchant power plants but excludes CHP) were 26.21 tons per day, or 0.8% of the statewide total of 3,209.71 tons per day. Similarly, data for the South Coast Air Basin are given at: http://www.arb.ca.gov/app/emsinv/emssumcat_query.php?F_YR=2008&F_DIV=0&F_SEASON=A&SP=2009&F_AREA=AB&F_AB=SC . In the South Coast, "Electric Utilities emitted 2.84 tons per day, or 0.3% of the basin total of 824.97 tons per day.

In addition, Arne Olson of E3 Consulting cited his company's study during the workshop. E3 consulting found that 50% of the natural gas displacement that results from a 1 MWh solar photovoltaic ("PV") project in Southern California occurs out-of-state.

Question 7: To what extent do methods and tools sufficiently assess the benefits of renewable energy? Are those methods and tools publicly available?

Response: Some methods and tools are currently available to measure renewable energy benefits assuming a deterministic profile for the generation. However, PG&E would like to note the need for methods and tools improvements:

First, wind and solar capacity or reliability values used for planning and the state's resource adequacy ("RA") program should be updated to reflect resources' equivalent load carrying capacity as a function of penetration. This may decline as the percentage or renewable generation that serves load within CAISO increases. Today's RA values are based on historical performance of a small set of existing resources using a methodology that doesn't reflect the impact of large wind and solar additions, or simply assumed.

Second, model improvements are needed to capture variations in benefits and costs due to wind and solar resources' dependency on weather and their intermittency. As noted before, Today's values are based on a deterministic generation profiles of typical resources.

There is also a need for better data and tools to estimate the integration requirements of higher levels of intermittent resources. Tools to estimate the amount and type of resources needed to integrate higher level of intermittent resources should be developed.

Question 8: What drives the uncertainties in estimates of future benefits of renewable energy? How can these uncertainties be reduced?

Response: Any estimate of the future benefits of renewable energy is highly dependent upon those projects' ability to come online. The benefits of a resource cannot be realized until this is achieved. This will impact when the benefits begin to accrue and how long they will be available. There are several factors that can impact this timing, including:

- The time required or inability to acquire a construction permit.
- The high cost of or inability to arrange project financing.
- The cost of and schedules associated with distribution and transmission upgrades necessary to accommodate renewable generation.

Furthermore, uncertainties about the cost, reliable integration, and public health benefits of renewable technologies persist.

Question 9: How can the state maximize the value of renewable resources? For example, what can the state do to further improve forecasting and visibility of generation from systems connected to distribution lines?

Response: The most effective way to maximize the value of renewables would be to seek resources that minimize the cost per ton of CO_2 reduction, including the costs of accommodating renewable resources. To date, the California Independent Systems Operator ("CAISO"), CPUC, and CEC have facilitated the identification of infrastructure needed to connect sufficient renewable resources and meet state goals. The state should seek ways to continue this cooperation to support the CAISO as they analyze the needs for operationally flexible capacity to manage high levels of renewable penetration. Specific attention should be given to determinations of need for transmission and to products that can provide attributes, such as flexible ramping, to help integrate renewable resources.

In addition to these ongoing studies, the state should coordinate and support the CAISO efforts to understand and plan for the impact of distributed resources. PG&E suggests that the development of methodologies to track, plan, and forecast distributed resources at an aggregated level would be beneficial for both future planning and operational purposes.

III. STATE AND LOCAL POLICIES AND PROGRAMS SUFFICIENTLY REWARD RENEWABLE TECHNOLOGY

Question 2: What are the barriers to incorporating those factors that are not yet accounted for into policy decisions?

c. Are there other priorities or policies that prevent your agency from incorporating these factors into decisions?

Response: PG&E is committed to providing safe, reliable, and cost-effective power. Paying an additional cost to incorporate benefits has a significant rate impact on our customers. PG&E believes that the existing premium paid for renewables already captures the benefits. Any programs considered by PG&E or by the State, including those for renewable energy, must appropriately balance these priorities.

Question 4: To what extent does electricity procurement by utilities address the public benefits of renewable energy generation?

Response: Many procurement programs that capture the public benefits of renewable energy generation for customers are currently available. These programs, used by California's IOUs, include the state's 33% RPS mandate and other significant state-mandated renewable procurement activities. For example, the numerous existing utility-scale renewable procurement programs include:

- General RPS solicitations, which procure RPS resources for the purposes of satisfying RPS program requirements;[6]
- The Renewable Auction Mechanism (RAM), a simplified, market-based procurement mechanism for renewable projects up to 20 MW on the system-side of the meter; [7]
- A Renewable Feed-in Tariff, which is currently being expanded, for the purchase of renewable generating capacity from small facilities;[8]
- PG&E's Photovoltaic Program, which authorizes PG&E to procure up to 250 MW of solar PV facilities through a competitive solicitation process[9]; and
- The qualifying facility ("QF") program

In the ten years since California first implemented the RPS program, PG&E has signed contracts for more than 10,000 MW of RPS-eligible generation. More than 70 of these contracts were signed with new facilities. Of these contracts, 20 are currently online and 14 are under construction – representing a significant increase in renewable generation for PG&E's customers.

While the programs above are the primary vehicles for new utility-scale renewable energy procurement, there are additional programs that stimulate development of customer-sited renewable generation.[10] The California Solar Initiative ("CSI") and Self-Generation Incentive Program ("SGIP") provide incentives for customers to install renewable distributed generation technologies that directly serve their on-site load.

[6] For information on PG&E's renewables RFO, see http://www.pge.com/b2b/energysupply/wholesaleelectricsuppliersolicitation/renewables2011/index.shtml
[7] For information on RAM, see http://www.pge.com/rfo/RAM/
[8] For information on PG&E FiTs, see http://www.pge.com/b2b/energysupply/wholesaleelectricsuppliersolicitation/standardcontractsforpurchase/
[9] For information on PG&E's Solar Photovoltaic Program, see http://www.pge.com/b2b/energysupply/wholesaleelectricsuppliersolicitation/PVRFO2012/index.shtml
[10] See http://www.cpuc.ca.gov/PUC/energy/consumers/ and http://www.cpuc.ca.gov/PUC/energy/DistGen/ for further information on customer generation incentives.

Question 5: Are renewable resources that displace fossil fuel resources, distribution upgrades, or transmission upgrades being appropriately rewarded?

Response: Yes, renewable resources are being appropriately rewarded. PG&E customers currently pay a premium for renewable generation; and the renewable generation market is clearly healthy. Moving forward, PG&E does not believe that generators should be paid an additional adder.

Question 6: Are renewable technologies that minimize integration costs and contribute to a diverse energy portfolio being appropriately rewarded?

Response: Requiring utility customers to financially reward renewable technologies that minimize integration costs would prevent those customers from realizing the benefit of lowered integration costs. A more appropriate reward system would incorporate the total cost of the project, including integration during the procurement process. Those with low integration costs would then naturally be favored.

Question 7: How can public policy better incentivize social benefits from renewable energy?

Response: Several panelists emphasized that current renewables policies overlap and occasionally contradict one another. For example, a single 1.5 MW solar installation currently qualifies for five separate procurement mechanisms. The best way for the state to better incentivize the social benefits of renewable energy would be to examine the existing programs and reform them based upon their performance to date. This would allow more successful programs to thrive through more effective spending of customer dollars.

IV. THE CURRENT PREMUIM PAID FOR RENEWABLE TECHNOLOGIES REFLECTS THE VALUE THEY PROVIDE

Question 1: How do current policies or programs capture benefit values of renewable energy?

a. What benefits are considered? Are these benefits evenly distributed across communities, including low income and environmental justice communities?

Response: As previously discussed, the benefits of renewable energy are captured through existing state-mandated energy procurement programs (e.g., RPS Requests for Offers, FiT, and RAM) to purchase renewable energy at prices above the cost of other resources. This price premium implicitly encompasses the benefits of renewable energy.

The primary benefit of renewable energy – GHG reduction – is distributed evenly across communities. Air quality benefits are also distributed evenly across communities because, as discussed earlier, electric generation does not significantly contribute to criteris pollutant emissions in the state.

b. How are the benefits quantified?

Response: Renewable energy benefits are quantified as the difference between the average price of renewable energy minus the average price of other sources of energy in the marketplace. Please see our response to Panel 1 Question 3 for additional values that are considered.

c. What assumptions are used?

Response: The basic assumption is that renewable energy must be considered more beneficial than other sources of energy or it would not be paid a higher price.

Question 2: What are the barriers to expanding the inclusion of other benefits of renewable energy into policies and programs?

b. Do state agencies have authority to appropriately identify, quantify, and incorporate these benefits into current programs?

Response: State agencies have the authority to identify and quantify benefits of renewable energy. Incorporation may be accomplished through program design, except to the extent that remuneration for those benefits is sought. Any remuneration for any benefit that does not reflect an actual avoided cost from the perspective of ratepayers is prohibited. Federal law recognizes the Federal Energy Regulatory Commission ("FERC") as the sole entity with the authority to set rates for wholesale power by utilities.[11] The only exception to this authority is provided to states pursuant to the Public Utility Regulatory Policy Act of 1978 ("PURPA), which grants states the authority to set wholesale power rates at the purchasing entity's avoided costs for qualifying facilities. Therefore, state agencies do not have the authority to mandate a price to be paid by a utility for these benefits unless they reflect actual costs avoided.

Question 4: What are the major uncertainties about benefits of renewable energy and how can we reduce these uncertainties?

Response: One major uncertainty associated with renewable energy benefits is that, as California's renewable programs become increasingly successful, the costs associated with the

[11] Federal Power Act of 1935

significant infrastructure and engineering issues associated with bringing significant amounts of renewable energy online are yet to be determined. Ultimately, Californians will best be served by California policies that balance environmental, system reliability, and customer cost impacts. PG&E also believes that time is needed to implement the array of renewables programs offered in California. For example, increasing renewable penetration results in increased challenges of system operation and integration. More time will be needed to gradually integrate these new technologies and allow the system to adapt accordingly. Please see our response to Panel 1 Question 8 for additional information.

Question 5: How is renewable energy valued for resource adequacy?

Response: As explained in Section II, Question 7, wind and solar capacity or reliability values used for planning and in the state's RA program are based on historical performance of a small set of existing resources using a methodology that doesn't reflect the impact of large wind and solar additions, or simply assumed. Therefore, wind and solar RA values should be updated to reflect resources' equivalent load carrying capacity as a function of penetration.

V. Conclusion

PG&E appreciates the opportunity to provide comments on evaluating and capturing the benefits of renewable energy for California. We look forward to participating in additional upcoming workshops. Should you have any questions about PG&E's comments, please do not hesitate to contact me.

Sincerely,

/s/

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