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on Staff Workshop Regarding Research on Valuation of Investments in Electricity Sector Resilience

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Additional submitted attachment is included below.

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Jonah Steinbuck, Deputy Director
California Energy Commission
Research and Development Division
Docket Unit, MS-4
Docket No. 19-ERDD-01
715 P Street
Sacramento, CA 95814-5512

Subject: Comments on the Staff Workshop Regarding Research on Valuation of Investments in Electricity Sector Resilience

Dear Deputy Director Steinbuck:

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide comments on the November 5, 2021 Staff Workshop regarding Research on Valuation of Investments in Electricity Sector Resilience. During the workshop, CEC Staff Julia Harnad discussed that the upcoming research solicitation will respond to the Electric Program Investment Charge (EPIC) Research Initiative 6, specifically aiming to develop methods to valuate societal benefits to strengthen electricity resilience, especially within Disadvantaged Vulnerable Communities (DVCs), and to guide future policy making, financial investments, and resource allocation in clean electricity sector resilience solutions. In these efforts, it is critical to develop modeling capabilities that measure the gas grid's role in supporting electric grid resiliency and enabling decarbonization, especially in California's most vulnerable communities. This approach provides for a transparent, technically-informed research outcome from this future solicitation because an integrated energy system approach seeks achievement of the greatest public interest benefits for all Californians.

We commend the CEC for its support on this type of research, especially considering the broader context of climate-related events and associated impacts, such as energy disruptions, that are posing a growing resilience challenge to the energy sector. In our previous comment letters regarding the EPIC 4 Investment Plan, SoCalGas emphasized the important role of California's existing gas grid to support overall electric grid reliability and resiliency. Our comments build upon that and respond to workshop questions on the following areas:

(a) **What existing frameworks or metrics for Valuation of Resilience should be considered for this research?**
(b) **What data should be collected?**
(c) **What types of metrics should be established?**
(d) **What aspects of resilience should this research focus on?**

(a) What existing frameworks or metrics for Valuation of Resilience should be considered for this research?

Drivers and outcomes of resilience should be considered for research.

Resiliency metrics are context-specific, and the benefits of resiliency are generally less understood and harder to quantify prior to an event because different customer segments and customer behaviors implicate different impacts and considerations. By way of example, Table 1 below provides monetization values of avoiding energy disruptions. Through a review of regulatory proceedings and peer-reviewed literature, the Electricity Journal published research demonstrating that interruption costs significantly vary across different customer/stakeholder groups.[1] For example, a large industrial customer could incur substantial costs from a short-duration interruption due to loss of production, whereas a residential customer may not experience a significant cost or inconvenience from the same short-duration interruption. Further, a person who works in an external office environment may experience little to no customer interruption cost (CIC) compared to an investment banker working from home.[2] The research also concludes that "[t]here is a need to better collect and share infrastructure damage and associated societal impact data after extreme weather events to assess the effectiveness of resilience measures."[3]

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[1] Zamuda et. al., "Monetization methods for evaluation investments in electricity system resilience to extreme weather and climate change," The Electricity Journal, available at: https://toolkit.climate.gov/sites/default/files/Monetization%20methods%20for%20evaluating%20investments%20in%20electricity%20system%20re....pdf.
[2] Ibid.
[3] Ibid.

Table 1: Summary of Resiliency Benefit Values Found in Literature[4]

Benefit Type	Benefit Amount
Avoided Legal Liabilities	$87,100 per mile - reduced litigation from fewer contact fatalities and serious accidents
Avoided Vegetation Management Costs	$3000 - $12,000 per mile for distribution; $300 - $9000 per mile for transmission
Avoided Revenue Loss	$0.09-$0.32 per kWh (Range of System Average Rates Across U.S.; average SAR = $0.13)
Avoided Short-Duration Customer Interruption Costs: Medium/Large C&I (> 50,000 annual kWh)	$12-$37 per unserved kWh (interruptions lasting 30 minutes - 16 hours)
Avoided Short-Duration Customer Interruption Costs: Small C &I (< 50,000 annual kWh)	$214-$474 per unserved kWh (interruptions lasting 30 min - 16 h)
Avoided Short-Duration Customer Interruption Costs: Residential Customers	$1.3-$5.9 per unserved kWh (interruptions lasting 30 min - 16 h)
Avoided Long-Duration Customer Interruption Costs	$1.20/kWh (for high priority services) to $0.35 (for low priority services) (interruptions lasting 24 h; Allegheny County, PA) $190M-$380 M (24 -h interruption) $4.4B-$8.8B (7-week interruption) (downtown San Francisco)
Safety: Avoided Injuries and Fatalities	Fatality: $7.4 million ($2006) Injury: up to $7.4 million ($2006)
Avoided Aesthetic Costs	Avoided loss in property values due to overhead electricity being undergrounded: 5-20% increase in property value
Ecosystem Benefits	Depends on ecosystem, location and other factors.
Avoided Emissions	$5800 per ton - SO_2 from coal plants $1600 per ton - NOx from coal plants $460 per ton - PM-10 from coal plants

In addition to measuring the outcomes of resilience, it is also important to measure the drivers of resilience—the extent to which investments can increase resilience for a community. For example, gas-fired generators can enhance resilience by providing power during moments when the electric grid is stressed, but their ability to do so depends on their receiving sufficient supplies of gas, which in turn depends on generator size, location of interconnection to the gas system (transmission or distribution), and customer class designation (core or non-core). Additionally, utilizing technologies such as fuel cells running on hydrogen, renewable natural gas, or natural gas, can complement existing systems and enhance reliability and resiliency at local levels. Location of generation supply also is a key factor to resiliency of delivering electricity. Typically, gas-fired generators are located near load pockets while imports and renewables are located far from cities requiring longer transmission lines. Therefore, there are more potential points of failure associated with procuring electricity far from load centers, which have become more evident through Public Safety Power Shutoff (PSPS) events. These factors should be considered in valuation frameworks for generation-focused resilience investments. Since a clean fuels network consists mostly of underground transmission and distribution infrastructure, which is inherently resilient to climate impacts, cleaner gaseous energy can be quickly delivered to the various energy users within the system, reducing the risk of energy interruption.[5] These reliability and resiliency benefits could be extremely important, but require data and analysis of both that, so far, are lacking.

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[4] Ibid.

[5] *See* The Role of Clean Fuels and Gas Infrastructure in Achieving California's Net Zero Climate Goal, SoCalGas, available at: https://www.socalgas.com/sites/default/files/2021-10/Roles_Clean_Fuels_Full_Report.pdf.

(b) What data should be collected? and (c) What types of metrics should be established?

Data should be collected in a manner that prioritizes the root-cause of outages and financial impacts to Californian communities.

Research related to the valuation of electricity sector resilience should be framed in a way to analyze and interpret the root-cause of outages, the frequency of outages, reliance, and quantification of backup power (batteries, gasoline, propane, and diesel generators) and associated data related to safety, reliability, compliance, and financial impacts to the community. These data points should be collected in 12-month, 24-month, 36-month, and 60-month periods to measure the various causes of outages and seasonality of such events.

The following metrics should be considered as tools to measure electric grid resilience**:**

- The development of a value of lost load (VoLL) metric which evolves over time, especially during a longer-term disruptive event, differentiated by customer classes and regions in California.
- A metric to capture the system-wide consequences from sectoral interdependencies (e.g., water, telecommunications, and natural gas).
- A metric to capture the relationship between distributed energy resources and resilience duration, particularly in terms of their potential to mitigate long-duration outages.
- A conceptual risk score, where the present value of current and future risk over the planning horizon needs to be considered as part of the modeling effort. A Confidence Interval (such as $/ton of CO_2 or the like) could be established to provide investors with reasonable estimates of the risk of a given resilience investment.
- Establishing a metric to underscore customer impacts, pre- and post-pandemic, with a particular emphasis on DVCs. This metric could also provide information on whether the outages are planned versus unplanned.
- Outage rates and duration by census tract.
- Establish a reasonable mechanism that considers income disparities. As Pete Larsen, Lawrence Berkeley National Lab, emphasized during the workshop, an equitable metric is needed to determine a customer's VoLL. For instance, some customers may be better able to pay more to avoid a service interruption, whereas customers within DVCs may not. These two groups of customers tend to have high variability between their levels of discretionary spending. A metric that divides lost load by average income of a particular customer class could offer a more reflective and equitable metric to the future research solicitation.
- A metric to capture and compare the extent by which various investments can increase resilience for a community. This should include consideration of the underlying reliability of those investments.

(d) What aspects of resilience should this research focus on?

Research should incorporate an integrated energy system framework to achieve the greatest public interest benefits.

The research should also seek to measure, analyze, and interpret aspects of the existing gas grid that continue to provide peaking capacity in constrained energy zones in California. As highlighted in the Clean Fuels Report by SoCalGas, the value of existing gas transportation and delivery services are expected to continue to play a critical role in the decarbonization of California to help all customers, including DVCs, meet resiliency needs.[6] Thus, this research should also focus on measuring and analyzing the deployment of fuel cells and other fuel-flexible distributed generation, especially in California wildfire zones, that help address resiliency needs in DVCs.[7] Further, to maximize research funding for this upcoming solicitation to achieve the greatest public interest benefits for all communities, resiliency metrics and corresponding research should analyze the complementary nature of the electricity, traditional gas, and clean fuels components of the integrated California grid.

Conclusion

SoCalGas appreciates the opportunity to comment on the EPIC 4 Program and the upcoming solicitation regarding Initiative 6. A focus on research and development that leads to a reliable and robust electricity system will have the greatest GHG and other air pollutant emission reductions benefits. Accounting for the resiliency benefits supplied by the existing natural gas grid will assure that resilient energy solutions are actualized in DVCs. SoCalGas looks forward to collaboratively pursuing our common interest of lowering GHG emissions today and in the future.

Respectfully,

/s/ Kevin Barker

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[6] *See* The Role of Clean Fuels and Gas Infrastructure in Achieving California's Net Zero Climate Goal, Full Report, October 2021, available at: https://www.socalgas.com/sites/default/files/2021-10/Roles_Clean_Fuels_Full_Report.pdf
[7] Ibid.