THE UTILITY REFORM NETWORK DATA REQUEST

TURN-DR-002

SDG&E/SOCALGAS 2021 RAMP REPORT – A.21-05-011/014

DATE RECEIVED: JUNE 29, 2021

DATE RESPONDED: JULY 14, 2021

Question 01:
For the risks SDG&E-1 (Wildfire) and SCG-1 (High Pressure Gas System), for each MAVF attribute, provide complete specifications of the probability distributions used by the Sempra Utilities to describe the levels in natural units of the attributes and sub-attributes in the pre- and post-mitigation risk score calculations. If this information is provided in the workpapers, please provide a detailed description of how this information can be found in the workpapers for each mitigation for the two risks addressed by this question.

SDG&E/SoCalGas Response 01:

SCG-Risk-1:

Attribute	Sub-Event	Probability Distributions Used	Applicability
Frequency	Sub-Event A: High Consequence Transmission Incident	Poisson	Total Incidents per Year
	Sub-Event B: Low Consequence Transmission Incident	Poisson	Total Incidents per Year
	Sub-Event C: High Consequence Supply Line Incident	Poisson	Total Incidents per Year
	Sub-Event D: Low Consequence Supply Line Incident	Poisson	Total Incidents per Year
Safety	Sub-Event A: High Consequence Transmission Incident	Uniform	Average Fatalities and Injuries per Incident with a Safety Consequence
	Sub-Event B: Low Consequence Transmission Incident	N/A	N/A
	Sub-Event C: High Consequence Supply Line Incident	Uniform	Average Fatalities and Injuries per Incident with a Safety Consequence
	Sub-Event D: Low Consequence Supply Line Incident	N/A	N/A
Financial	Sub-Event A: High Consequence Transmission Incident	No Distribution	N/A
	Sub-Event B: Low Consequence Transmission Incident	Uniform	Percentage of Low Consequence Incidents that Result in an Outage

SDG&E/SoCalGas Response 01:-Continued

	Sub-Event C: High Consequence Supply Line Incident	No Distribution	N/A
	Sub-Event D: Low Consequence Supply Line Incident	Uniform	Percentage of Low Consequence Incidents that Result in an Outage
Reliability - Meters Out	Sub-Event A: High Consequence Transmission Incident	Pert	Gas Meters per Incident
	Sub-Event B: Low Consequence Transmission Incident	Pareto	Gas Meters per Incident
	Sub-Event C: High Consequence Supply Line Incident	Pert	Gas Meters per Incident
	Sub-Event D: Low Consequence Supply Line Incident	Pareto	Gas Meters per Incident
Reliability - Curtailment	Sub-Event A: High Consequence Transmission Incident	Pert	Gas Curtailment per Incident
	Sub-Event B: Low Consequence Transmission Incident	N/A	Gas Curtailment per Incident
	Sub-Event C: High Consequence Supply Line Incident	Pert	Gas Curtailment per Incident
	Sub-Event D: Low Consequence Supply Line Incident	N/A	Gas Curtailment per Incident
Stakeholder Satisfaction	Sub-Event A: High Consequence Transmission Incident	No Distribution	N/A
	Sub-Event B: Low Consequence Transmission Incident	No Distribution	N/A
	Sub-Event C: High Consequence Supply Line Incident	No Distribution	N/A
	Sub-Event D: Low Consequence Supply Line Incident	No Distribution	N/A

SDG&E/SoCalGas Response 01:-Continued

SDG&E-Risk-1

Attribute	Sub-Event	Probability Distributions Used	Applicability
Frequency	Significant fire	Poisson	Total significant fire Incidents per Year
	Sub-Event A: Wildfire Tier 3	No Distribution	Total Incidents per Year
	Sub-Event B: Wildfire Tier 2	No Distribution	Total Incidents per Year
	Sub-Event C: Wildfire Non-HFTD	No Distribution	Total Incidents per Year
	PSPS events	No Distribution	Total Incidents per Year
Safety	Significant fire	Based on the distribution for the financial attribute	Average safety index per Incident
	Sub-Event A: Wildfire Tier 3	No Distribution	Average safety index per Incident
	Sub-Event B: Wildfire Tier 2	No Distribution	Average safety index per Incident
	Sub-Event C: Wildfire Non-HFTD	No Distribution	Average safety index per Incident
	PSPS events	No Distribution	Average Fatalities and Injuries per Incident with a Safety Consequence
Financial	Significant fire	Gamma (3, 0.8) Distribution	Average financial cost per Incident
	Sub-Event A: Wildfire Tier 3	No Distribution	Average financial cost per Incident
	Sub-Event B: Wildfire Tier 2	No Distribution	Average financial cost per Incident
	Sub-Event C: Wildfire Non-HFTD	No Distribution	Average financial cost per Incident
	PSPS events	No Distribution	Average financial cost per Incident
Reliability	Significant fire	No Distribution	Average reliability index per Incident
	Sub-Event A: Wildfire Tier 3	No Distribution	Average reliability index per Incident

SDG&E/SoCalGas Response 01:-Continued

	Sub-Event B: Wildfire Tier 2	No Distribution	Average reliability index per Incident
	Sub-Event C: Wildfire Non-HFTD	No Distribution	Average reliability index per Incident
	PSPS events	No Distribution	Average reliability index per Incident
Stakeholder Satisfaction	Significant fire	No Distribution	N/A
	Sub-Event A: Wildfire Tier 3	No Distribution	N/A
	Sub-Event B: Wildfire Tier 2	No Distribution	N/A
	Sub-Event C: Wildfire Non-HFTD	No Distribution	N/A
	PSPS events	No Distribution	N/A

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Question 02:
Please state and explain whether and how the CoRE values shown in the workpapers provided on 5/17/21 with the RAMP reports are the expected scaled values of each top-level attribute. If not, what do they represent?

SDG&E/SoCalGas Response 02:

Yes, the CoRE values shown in the workpapers provided on 5/17/21 are the expected scaled value for each MAVF top-level attribute, e.g., Safety, Financial, Reliability, Stakeholder Satisfaction.

The supplemental workpapers provided on July 9, 2021 (TURN DR03-Supplemental 07092021.pdf) contain the data and calculations used to develop these values.

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Question 03:

The following questions apply only to the SAFETY attribute.

a. Please confirm that the maximum natural units level for the Fatalities subattribute is 20 (= 20/1.00).
b. Please confirm that the maximum natural units level for the Serious Injury sub-attribute is 80 (= 20 / 0.25).
c. Please confirm that the maximum natural units level for acres burned is 400,000 (=20 / 0.00005).
d. Please confirm that the maximum natural units level of the Safety attribute is therefore 60 units, corresponding to an event that results in 20 deaths, 80 injuries, and 400,000 acres burned.

SDG&E/SoCalGas Response 03:

The components that feed into the Safety attribute should be thought of more as an index, rather than as sub-attributes. The safety index is a straightforward system to create a single safety value, by aggregating three distinct safety consequences (fatalities, serious injuries, and acres burned) into a common platform. SDG&E and SoCalGas overviewed the safety index during the two public pre RAMP filing workshops. The Reliability attribute does have a complete set of sub-attributes with scales and weightings.

Response to 3a: Please see above.
Response to 3b: Please see above.
Response to 3c: Please see above.
Response to 3d: The maximum natural unit for the Safety attribute is 20 safety units, which are determined by the safety index.

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Question 04:
In reference to the "discounted time" factors used by Sempra, please confirm that Sempra assumes that, for mitigations which provide benefits over multiple years, those benefits remain constant each year in terms of their annual risk reduction amounts (other than being reduced by the 3% discount rate that the Sempra Utilities apply to all benefits), as measured by the difference between pre-mitigation LoRE x CoRE and post-mitigation LoRE x CoRE.

a. If the answer is "yes," please explain the basis for Sempra's assumption regarding the constancy of annual risk reduction benefits.

b. Does Sempra assume that, for all such activities with multi-year benefits, the pre-mitigation and post-mitigation LoRE values are constant? If the answer is no, please provide annual pre-mitigation and post-mitigation LoRE values for all mitigations with non-constant multi-year benefits for the risks: SDG&E-1 (Wildfire), SDG&E-2 (Electric Distribution), SDG&E-9 (Medium Pressure Gas System), SCG-1 (High Pressure Gas System), SCG Risk-3 (Medium Pressure Gas System), and Cybersecurity (SCG/SDG&E Risk-6).

c. Does Sempra assume that, for all such multi-year programs, the pre-mitigation and post-mitigation CoRE values are constant? If the answer is no, please provide annual pre-mitigation and post-mitigation CoRE values for all mitigations with non-constant multi-year benefits for the risks: SDG&E-1 (Wildfire), SDG&E-2 (Electric Distribution), SDG&E-9 (Medium Pressure Gas System), SCG-1 (High Pressure Gas System), SCG Risk-3 (Medium Pressure Gas System), and Cybersecurity (SCG/SDG&E Risk-6).

d. If Sempra does not assume multi-year benefits from a given mitigation are constant, please explain how Sempra uses the discounted time factor to accurately calculate the discounted value of risk reduction.

SDG&E/SoCalGas Response 04:

SDG&E and SoCalGas assume that risk reduction for multiple years is constant.

a) Precise values to use for risk reduction, either due to a decrease in LoRE or CoRE, are difficult to determine. In the end, the important aspect to focus on is the difference in LoRE or CoRE if a mitigation is undertaken, versus if it is not. Focusing on asset-related mitigations, it is known that the failure rate of individual assets can rise through time.

SDG&E/SoCalGas Response 04:-Continued

For the RAMP, SoCalGas and SDG&E used the assumption that the failure rates between an aging asset versus the failure rate of a new asset, would generally have the same difference in failure rate as years pass. For example, assume that a 40-year-oldasset is being considered for replacement. That asset, if not replaced, would continue to age, and might have an increasing failure rate. Now consider if that asset was replaced with a brand new asset. The new asset would start aging as soon as it was constructed. The difference in failure rates between a 40-year-old asset and a new asset are assumed to be similar to the difference in failure rates between a 50-year-old asset and a 10-year-old asset. SDG&E and SoCalGas are aware that these assumptions are not precise, but as the utilities' asset management programs mature, there will be more support for data-driven methods that consider the relationship between age and failure rates.

b) Please see answer to a). The utilities do not assume LoRE is constant, nor do they utilize a failure rate that changes with age to support the multi-year analysis in the RAMP. The utilities do not generally possess failure rates for assets based solely on age.

c) SDG&E and SoCalGas assume that the CoRE stays constant regardless of age.

d) Please see answer to a).

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Question 05:

Does SDG&E's analysis assume a PSPS event reduces the likelihood of occurrence of a wildfire?

a. If the answer is "yes," please explain how Sempra calculates the marginal risk reduction benefits of wildfire mitigations as a function of the number of PSPS events that are implemented. Please provide a quantitative example.

b. For each Wildfire mitigation, provide the marginal change in LoRE when the number of PSPS events is taken into account. Please provide all supporting data, analysis, and workpapers.

c. If the answer to question 6 is "no," please explain why not.

SDG&E/SoCalGas Response 05:

Yes, SDG&E assumes that PSPS activities reduce the likelihood of wildfires.

a) SDG&E currently has no specific analysis to relate how changes in PSPS activities would change the likelihood of fires. Subject matter expert judgment is that wildfire risk has been reduced by 40% due to the current level of PSPS activities. As WiNGS becomes more mature, over the next few years, it is believed that its modeling will create a platform to analyze the effectiveness of PSPS activities.
b) Please see the answer to a).
c) N/A

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Question 06:
Identify all Wildfire mitigations included in the SDG&E RAMP report that reduce the likelihood Sempra will need to institute a PSPS event.

a. For all mitigations so identified, provide the change in the expected number of PSPS events. Please provide an explanation of how this is calculated and all supporting data, analysis, and workpapers.

b. If there are no such mitigations, then for each Wildfire mitigation, explain why that mitigation will not reduce the expected number of PSPS events.

SDG&E/SoCalGas Response 06:

A complete reply to this question requires defining a PSPS event. A PSPS event is defined as a time period where at least one customer is currently de-energized due to PSPS. For example, assume customer A is de-energized due to PSPS from 1:00PM to 8:00PM, and customer B is de-energized due to PSPS from 2:00PM to 11:00PM on the same day. If these were the only 2 customers that were de-energized due to PSPS, it would be considered a single PSPS event that lasted from 1:00PM to 11:00PM. This definition holds regardless of the number of customers involved or the number of devices used to perform the de-energization.

Currently, no mitigation purports to reduce the LoRE for PSPS events. Some mitigations reduce the consequence of the PSPS event – such as by reducing the amount of customers affected by the event.

Generally, forecasting PSPS events is largely dependent on weather conditions. Our initiatives do not change the weather or the number of events, but they can reduce the scope of those events. As such, the quantification of PSPS reductions from initiatives are largely focused on reduction in scope because of the ability to directly tie initiatives to customer benefits. SDG&E has quantified values for PSPS scope reduction and the number of customers benefiting from the seven initiatives below.

1. Overhead Distribution Fire Hardening – Covered Conductor
2. PSPS Sectionalizing
3. Microgrids
4. Resiliency Grant Programs
5. Standby Power Programs
6. Resiliency Assistance Programs
7. Strategic Undergrounding

SDG&E/SoCalGas Response 06: -Continued

a) Given the definitions and understanding above, no mitigation is assumed to reduce the LoRE for PSPS.
b) Please see the response above.

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Question 07:
On page RAMP E-25, the companies suggest that capital costs should be discounted using a different discount rate than expense-related costs because the former earn a return and the latter do not. Do the Sempra Utilities agree that using weighted average cost of capital as the discount rate for capital costs and a lower discount rate for expenses would, all other things kept equal, lead to relatively higher RSEs for capital activities than for expense activities? If the answer is anything other than an unqualified yes, please explain your answer.

SDG&E/SoCalGas Response 07:

This question states that "the companies suggest that capital costs should be discounted using a different discount rate than expense-related costs…" This is not an accurate representation of SoCalGas's and SDG&E's position. As explained in Chapter RAMP-E at 25, "The Companies revisited this topic in preparing their 2021 RAMP Reports and agree with TURN that escalation and discounting are different concepts. While the Companies are not opposed to the concept of discounting, TURN's suggestion to discount all costs at the WACC does not represent differences in utility costs."

Notwithstanding this clarification, RSEs are numerical values that represent the ratio of the benefit of a mitigation to the cost of the mitigation. To the extent the denominator of this ratio is decreased to reflect a discount factor, SDG&E/SCG agree that a relatively larger discount factor will result in a relatively smaller denominator which will result in a relatively larger ratio using a constant numerator.

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Question 08:
The Sempra Utilities claim at page RAMP E-25 that, because they report costs in real (inflation-adjusted) dollars, there is no need to discount costs further.

a. Do the Sempra Utilities believe the real discount rate is zero?

b. If the answer to 9(a) is "no," then please provide Sempra's estimate of the real discount rate.

c. If the answer to 9(a) is "yes," please explain why Sempra believes this to be the case. Please provide all supporting data, analysis, and workpapers.

d. Given Sempra's position on not discounting real (inflation adjusted) dollars, would Sempra be indifferent to receiving $1,000 today or $1,000 in inflation-adjusted dollars 10 years from now? Why or why not?

SDG&E/SoCalGas Response 08:

The Commission established the RAMP process to be as a first step in the utility's GRC application process, i.e., the RAMP process is incorporated into the GRC filings, and as such – as stated in the RAMP,[1] SoCalGas and SDG&E believe that language in the Settlement Agreement pertaining to discounting of costs needs to be read in this context. Because all costs in the GRC are presented in base year dollars to reflect a single year's dollar, without adjustment for escalation, SoCalGas and SDG&E believe that the "comparable measurements" and "present values" language in the Settlement Decision is consistent with the Rate Case Plan's requirement to present all costs in base year, constant dollars.

Response to 08.a
In the context of how the dollars in RAMP are incorporated in the utility's GRC, please refer to the answer above in Response to 08.

Response to 08.b
In the context of how the dollars in RAMP are incorporated in the utility's GRC, please refer to the answer above in Response to 08.

Response to 08.c
In the context of how the dollars in RAMP are incorporated in the utility's GRC, please refer to the answer above in Response to 08.

[1] SDG&E RAMP-C-32, (Section IV-D) and SCG/SDG&E-E-24.

SDG&E/SoCalGas Response 06: -Continued

Response to 8.d
As stated in the Response 7 above, Chapter RAMP-E confirms (at 25) "the Companies are not opposed to the concept of discounting." However, the $1,000 hypothetical in this question does not specify whether these costs are capitalized or expensed. Such determination may impact the answer to this question. This is one reason that SoCalGas and SDG&E are interested in continuing conversations on this topic, as explained in Chapter RAMP-E at 25 ("Prior to the implementation in a RAMP or GRC filing, questions should be addressed as to the types of costs subject to discounting.").

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Question 09:
Page RAMP C-11 includes the following statement regarding the MAVF structure:
"Adjustments were made after the reasonableness test runs and results were internally discussed. During the internal testing and discussions, it became clear that no set of scales and weights would lead to expected results for all situations. More refinements were made, and this RAMP Report utilized a set of scales and weights that may reflect an amalgam of SME and external source views."

a. Please identify all external sources used by the Sempra Utilities to inform the MAVF scales and weights.

b. Please explain how the Sempra Utilities determined the "expected results for all situations" prior to using its MAVF. Provide all supporting data, analysis, and workpapers.

SDG&E/SoCalGas Response 09.a:

Once the MAVF attributes were agreed upon, and the application of the Settlement Agreement's steps were used as a starting point, there was generally a consideration of three issues: finding scales and weights that reflected the companies' view of risk, consideration of how some scales and weights appeared to be related, and performing sensitivity work on RSEs and risk scores.

The term "external source views" is comprised of what other utilities were using, the specific source of reliability studies at Lawrence Berkeley National Labs (LBNL), and non-utility entity's public discussions of risk frameworks.

In different forums, the other CA IOUs have discussed or shared official or draft versions of their MAVFs. Although there may be some differences between utilities, and those differences may have grown or contracted as each utility matured, there are many similarities between the attributes, scales, and weights between the CA IOUs.

The Lawrence Berkeley National Labs (LBNL) have written a document that is frequently cited in the electric reliability utility community. An example of which can be found at the following link (Estimated Value of Service Reliability for Electric Utility Customers in the United States (lbl.gov)). This document draws a connection between electric reliability and financial consequences. Although it should not be considered a source document to SDG&E's and SoCalGas's final MAVF, it was used to reflect a general understanding of the consequences to society from electric reliability events. Although other sources were reviewed and considered, no other sources were used.

SDG&E/SoCalGas Response 09.a-Continued

Lastly, our research for non-utility entities did not return much information, as it seems that few non-utility entities make public their multi-attribute value framework, if they even exist. And even those entities that do discuss the topic do not appear to be using those frameworks to operate their entire enterprise, but only an isolated segment of their business, such as specific project decisions, and therefore have little value to this effort which employs a single framework for an enterprise with vastly different activities.

SDG&E/SoCalGas Response 09.b:

SoCalGas and SDG&E object to this request to the extent that it uses an excerpt from the RAMP Report to assume facts that do not exist. The statement "it became clear that no set of scales and weights would lead to expected results for all situations" does not imply that SDG&E or SoCalGas "determined the 'expected results for all situations,'" as the question assumes. Just one unexpected result would support the quoted statement. An example of an unexpected result is provided in response to Question 10.

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Question 10:
Page RAMP C-12 states: "In an ideal world, the relationship between each of the four pairwise combinations (i.e., reliability vs. safety, safety vs. financial, and financial vs. reliability, stakeholder satisfaction vs. reliability, financial vs. stakeholder satisfaction and safety vs. stakeholder satisfaction) would be consistent.

a. Does this statement mean that the four pairwise combinations in the MAVF are not consistent? If the answer is "yes," please explain why they are not consistent.

b. On page RAMP C-13, the companies use an example of preferring an 8-hour system outage with a cost of $1 billion to the loss of one life, and state, "This example highlights the complexity of creating multi-attribute value functions that have non-transitive pairwise comparisons." Please identify the specific "complexity" of creating a multi-attribute value function that the Sempra Utilities find highlighted by this example.

c. Please identify and explain the non-transitive pairwise comparisons that exist in the MAVF that the Sempra Utilities have presented in their RAMP reports.

SDG&E/SoCalGas Response 10:

a) In the confines of the 2021 RAMP, the pairwise relationship is consistent from a mathematical perspective - i.e., the weights and scales are the constant for the 2021 RAMP report leading to consistent relationships. But for infinite incident possibilities in a real world situation, these relationships will not always appear consistent for all situations. Please see the answer to b) for more information.

b) The true impact of incidents on the public, employees, customers, etc., cannot not be fully predicted in every possible fashion. The MAVF serves as the current representation of the measurement of impact and reduction of risk as currently agreed upon by Intervenors, CPUC and the California IOUs. The complexity is in both the prediction of said impact from methodology that can only be an approximation. Furthermore, the MAVF does not take into account all possible impacts a risk event can produce or weigh the moral, ethical, or legal choices that apply when operating a utility.

SDG&E and SoCalGas dedicated a significant amount of time to the creation of the MAVF, including a thorough sensitivity review of changing elements in the MAVF and viewing how those changes affected risk scores and RSEs. Examples of that analysis included changing the weight of attributes higher or lower or changing the maximum range of an attribute. No situation was found where a particular MAVF met all risk expectations.

SDG&E/SoCalGas Response 10:-Continued

SDG&E and SoCalGas believe that the MAVF should not be created in isolation as a purely academic endeavor, but should be considered with real and possible situations. So, although it is fine to estimate what weights and scales theoretically, they need to be considered through a real-world perspective.

The example given in the RAMP discusses a few situations that highlight how multiple attributes can lead to different results, depending how the MAVF is considered. Assume the following three incidents: 1) an electrical outage (i.e. a risk event focused on the reliability attribute) that affected the entire SDG&E service territory for 8 hours; 2) a financial-only event that cost society $1B; and 3) a safety event that results in 10 fatalities. In the current MAVF, all three of these would have similar CoRE values.

But, as considered in the isolated hypothetical, SDG&E and SoCalGas would not prefer #3 over #1 or #2, even though the MAVF would equate them. No amount of adjustments to weights and scales brought forth a real-world solution that accurately represented how SDG&E and SoCalGas would prioritize all situations.

The above 3 situations, indicate - through the preference of incident #3 not occurring - that SDG&E and SoCalGas value safety more than the MAVF reflects. Certain parties expressed that SDG&E and SoCalGas should value safety less in the MAVF, by up to a factor of 10x less. A reduction of safety valuation by 10x would suggest a preference for an 8-hour outage over to 99 fatalities. This clearly does not reflect SDG&E's and SoCalGas's preferences. Another recourse might be to lower the value of reliability as it relates to financial; but, in that case, the move would also need to be large, and therefore the connection between financial and reliability would be far different than it is now, and as of right now that connection is largely based on the industry-leading source on the subject.

In conclusion, not because of lack of trying, SDG&E and SoCalGas have not been able to create a single MAVF which consistently generates the proper valuations of risk events. What is provided in the RAMP is its best attempt at finding one. All California utilities at one time or another have commented on the difficulty of finding an MAVF that worked in all situations.

SDG&E and SoCalGas remain optimistic that improvements can be made to the MAVF creation process as more discussion involving risk tolerances and ALARP are undertaken.

SDG&E/SoCalGas Response 10:-Continued

c) One such pairwise comparison that was completed for this RAMP report compared varying levels of risk incident impact for attributes - i.e., SIFs versus monetary impact, outages, etc., with varying levels of degree of impact (i.e., significantly more important than, less important than, etc.) with Subject Matter Experts to build an accurate profile of how certain impacts should be weighted. This comparison used in conjunction with industry research helped build the SDG&E and SoCalGas MAVFs. Please see the response to b) for more discussion.

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Question 11:
The Sempra Utilities' RAMP filing, pp. C-5 to C-6, Tables 1 to 4, provide the ranges of attributes and sub-attributes in the utilities' MAVF. Please provide all information requested below in Excel on an annual basis, and include all workpapers, assumptions, and calculations:

a. For each safety sub-attribute (Table 2) please provide the observed measurement from 2010-2020.

b. For each reliability sub-attribute (Tables 3 and 4) please provide the observed measurement from 2010-2020.

c. For the Financial Attribute (Table 1) please provide the observed measurement from 2010-2020.

SDGE/SCG Response 11:

SDG&E objects to this request to the extent it is vague and unintelligible. Subject to and without waiving this objection, SDG&E states as follows:

a) It is not clear what is being asked. Table 2 represents a portion of the MAVF that is used for all risks. The MAVF forms the basis for a risk by risk assessment, and those risks individually have observable measurements.
b) Please see the answer to a)
c) Please see the answer to a)

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Question 12:
For each attribute and sub-attribute provided in Tables 1-4 on pp. C-5 to C-6, please provide an explanation of the basis and calculation (where necessary) for the high end of the range listed in the table (e.g., 20 for Safety). Please provide all calculations and quantitative information in Excel where possible.

SDG&E/SoCalGas Response 12:

In addition to the information provided below, the ranges were typically rounded for ease of use, and were also modified to fine-tune the relationships between attributes.

Table 1

Safety: This attribute's high end value of 20 units is based on a reasonable high end for a particular risk event. This value is larger than any expected value for the annual amount of safety units in any given year. It is the expected annual value that is used in CoRE.

Table 2

The attributes in Table 2 should not be thought of as a sub-attribute in the strictest sense, as they do not have weights and ranges. However, the relationship between serious injury and fatality was derived from research performed at the US Federal Government.[2] The Acres Burned weighting was derived from fire safety work performed by various institutions with a meta-analysis performed.[3,4]

Table 3 & 4

Reliability: This attribute's high end value of 1 unit is the max value of the reliability sub-attributes.

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[2] FAA, "Treatment of the Values of Life and Injury in Economic Analysis", September 2016.
[3] Nicholas E. Clinton, Peng Gong, Klaus Scott, "Quantification of pollutants emitted from very large wildland fires in Southern California, USA", 2006, doi:10.1016/j.atmosenv.2006.02.016.

[4] AEA Technology (2005), *Damages Per Tonne Emission of PM2.5, NH3, SO2, NOx and VOCs From Each EU25 Member State*, Clean Air for Europe Programme, European Commission (http://ec.europa.eu/index_en.htm).).

SDG&E/SoCalGas Response 12:-Continued

Reliability Sub-attribute – Gas Meters SDG&E: 50,000 meters. This is based on a reasonable high end for a particular risk event, and is larger than any expected value for the annual amount of safety units in any given year. This value was developed in coordination with SoCalGas reliability numbers which had a large event in the 1990s.

Reliability Sub-attribute – Gas Meters SCG: 100,000 meters. This is based on a reasonable high end for a particular risk event, and is larger than any expected value for the annual amount of safety units in any given year. There was a large event due to the Northridge earthquake of 1994 that had approximately 100,000 meters affected, and although not used solely as the determining factor gave insight into how large gas outages can be. The number was rounded.

Reliability Sub-attribute – Gas Curtailment SDG&E: This is based on a reasonable high end for a particular risk event wherein a volume curtailment event occurs when the threshold (80 MMcfd) is exceeded. If lower than the (80 MMcfd) threshold on the high pressure system could potentially withstand the loss of this capacity by the use of alternative or looped system; however, the resulting volume over this threshold could result in a curtailment. Above the 80 MMcfd threshold is larger than any expected value; however, it was determined via historical and subject matter expertise taking into account the performance of the gas system.

Reliability Sub-attribute - Gas Curtailment SoCalGas: This is based on a reasonable high end for a particular risk event wherein a volume curtailment event occurs when the threshold (250 MMcfd) is exceeded. If lower than the (80 MMcfd) threshold the high pressure system could potentially withstand the loss of this capacity by the use of alternative or looped system; however, the resulting volume over this threshold could result in a curtailment. Above the 80 MMcfd threshold is larger than any expected value; however, it was determined via historical and subject matter expertise taking into account the performance of the gas system.

Reliability Sub-attribute – Electric SAIDI: Based on high end of recent expected value for SAIDI, which has been hovering around the 60-80 minute mark.

Reliability Sub-attribute – Electric SAIFI: Based on high end of recent expected value for SAIDI, which has been hovering around the 0.45 - 0.60 outage mark.