SDG&E Demand Charge Workshop for Distribution, Generation, and Transmission

May 23, 2019

Distribution – Demand Charge Research Study

SDG&E's Proposed Approach

Step 1: Examine the breakdown of Electric Distribution Capital costs to identify what percentage of Electric Distribution Capital expenditures are driven by capacity.

Step 2: Examine the demands at the relevant measurement levels (i.e. by customer class, circuit, and substation) during the currently defined on-peak TOU period and non-peak TOU periods.

Step 3: Examine the circuit and substation peak demands.

Step 1: Cost driven by capacity

Table 1 shows SDG&E's forecasted expenditures for capacity driven projects. 2.8% of all SDG&E's distribution capital projects between 2017-2019 are capacity driven.

Table 1: SDG&E Forecasted Distribution Capital Expenditures 2017-2019

SDG&E Electric Distribution Cost Allocation				
	Estimate 2017 ($000)	Estimate 2018 ($000)	Estimate 2019 ($000)	Estimate Total ($000)
Capacity Driven	$13,269	$11,002	$25,176	$49,447
Total Electric Distribution Capital	$445,116	$589,811	$702,749	$1,737,676
Percent Capacity Driven	3.0%	1.9%	3.6%	2.8%

Capacity projects needed to correct equipment loadings due to an area load growth, or those projects required to increase system capacity where highly loaded equipment will adversely impact operations and reliability.

Step 1: Cost driven by capacity (cont.)

Table 2 shows all SDG&E's Distribution Capital expenditures by cost categories

Table 2: Capital Expenditures Summary of Costs by Category[3]

ELECTRIC DISTRIBUTION Figures Shown in 2016 Dollars						
Categories of Management	Estimated 2017 ($000)	% 2017	Estimated 2018 ($000)	% 2018	Estimated 2019 ($000)	% 2019
Capacity/Expansion	13,269	3.0%	11,002	1.9%	25,176	3.6%
Equipment/Tools/Miscellaneous	4,833	1.1%	2,531	0.4%	3,029	0.4%
Franchise	34,463	7.7%	40,180	6.8%	35,190	5.0%
Mandated	33,169	7.5%	34,377	5.8%	32,662	4.6%
Materials	24,871	5.6%	26,315	4.5%	27,694	3.9%
New Business	55,317	12.4%	57,186	9.7%	60,592	8.6%
OH Pools	85,103	19.1%	120,386	20.4%	162,491	23.1%
Reliability/Improvements	74,863	16.8%	108,418	18.4%	103,448	14.7%
Safety and Risk Management	83,747	18.8%	113,497	19.2%	184,333	26.2%
Distributed Energy Resource (DER) Int.	3,298	0.7%	18,343	3.1%	18,016	2.6%
Transmission/FERC Driven Projects	32,183	7.2%	57,576	9.8%	50,118	7.1%
Totals	**445,116**	**100.0%**	**589,811**	**100.0%**	**702,749**	**100.0%**

Secondary Drivers: SDG&E's proposed capital expenditure projects are defined solely by their primary cost driver. Although there may be secondary benefits that may provide capacity attributes to other projects, including reliability/improvements, safety, power quality and regulatory compliance, the main driver for the expenditure is how the project is classified as displayed in Table 2. Any secondary drivers are often negligible and may be difficult to measure and would not have any bearing on whether SDG&E undertakes the project.

Step 2 - Effective Demand Factors

- There are two types of Effective Demand Factors (EDF), Circuit and Substation.
- Max hourly demands and coincident to circuit/substation peak demands are identified for each individual customer and aggregated by customer class.
- Effective Demand Factors are the relationship between these two demands:
- Circuit EDF = Demand at Circuit Peak/Maximum Demand
- Substation EDF = Demand at Substation Peak/Maximum Demand

Modified Effective Demand Factors

Segmented into

1.Circuits/substations peaking during 4-9 pm

2. Circuits/substations peaking outside 4-9 pm

Table 3 – 2014-2016 Average Substation and Circuit Effective Demand Factor Ratios

2014-2016 Average	Substation EDF Ratio	Circuit EDF Ratio
Residential	32%	35%
Small Commercial	43%	47%
M/L C&I	66%	71%
Agricultural	32%	34%
Lighting	35%	33%

Step 3: Examine circuit and substation peak demands

Table 4: SDG&E Circuits Peaking During On-Peak TOU Period

		Circuit	
		On-peak (4pm - 9 pm)	All Other Hours
2014	Count (%)	58.2%	41.8%
	Total (MW)	2,854	1,676
2015	Count (%)	59.1%	40.9%
	Total (MW)	2,903	1,652
2016	Count (%)	67.0%	33.0%
	Total (MW)	3,658	1,456

Table 5: SDG&E Substations Peaking During On-Peak TOU Period

		Substation	
		On-peak (4pm - 9 pm)	Off-Peak
2014	Count (%)	71.1%	28.9%
	Total (MW)	2,791	1,245
2015	Count (%)	65.9%	34.1%
	Total (MW)	2,749	1,438
2016	Count (%)	76.8%	23.2%
	Total (MW)	3,590	848

Distribution – Demand Charge Study

Commission's Alternative Approach

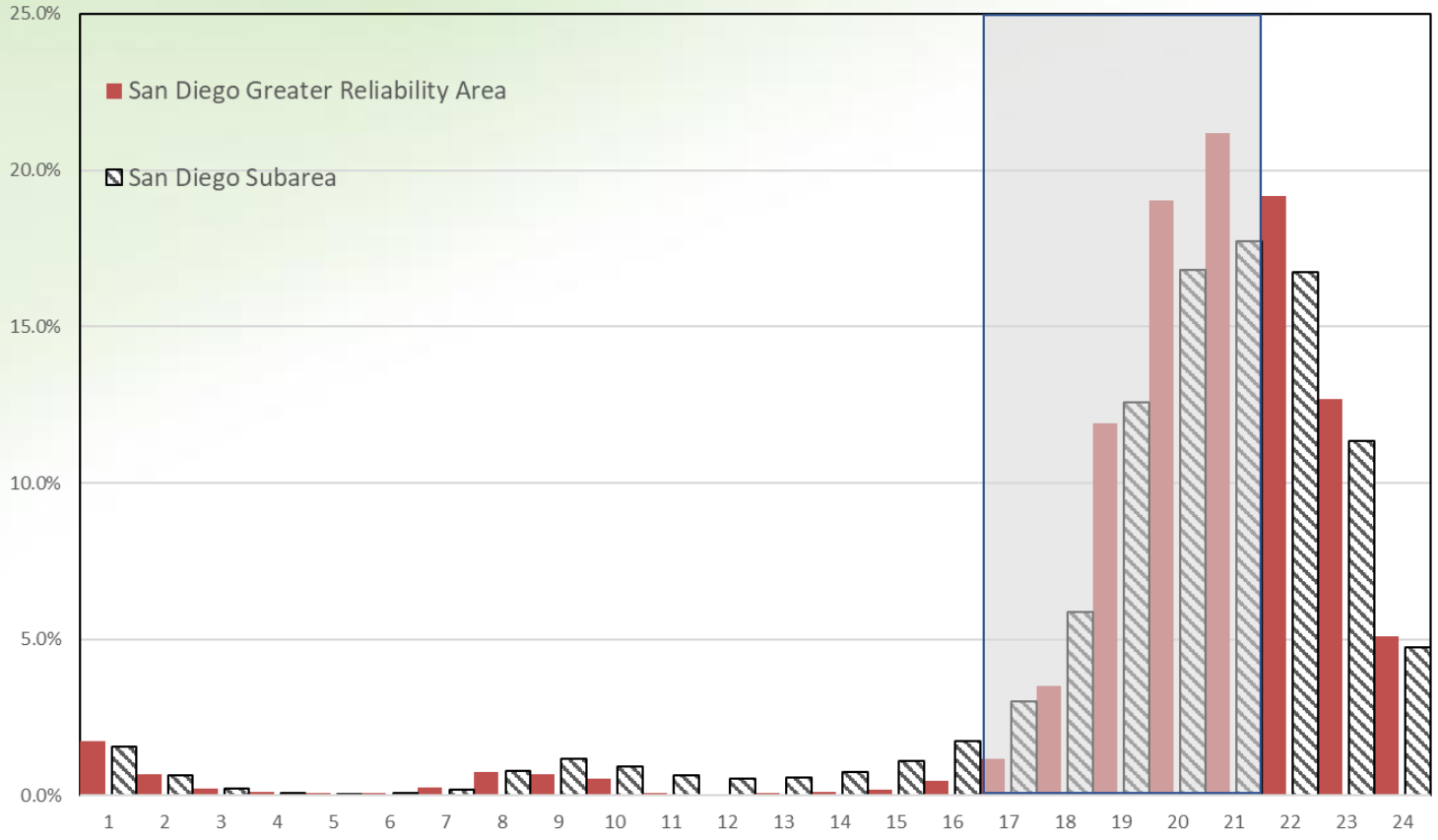
Discussion to be based on the embedded Excel file.

Microsoft Excel
Worksheet

Generation Demand Charge Study

- Allocation of Generation Capacity Costs between volumetric and peak demand charges
  - Used Loss of Load Expectation (LOLE) Analysis.
  - Same analysis used to allocate marginal generation capacity costs.
  - CPUC stated that “SDG&E’s proposal to use a “Loss of Load Event (LOLE)” methodology to allocate generation capacity costs to the peak period is reasonable.
  - Load, wind and solar are varied in multiple iterations to generate a distribution of unserved energy.
  - % of unserved energy that falls within the peak period vs non-peak period determines the allocation to peak demand charge vs. non-peak volumetric charge.

Distribution of Unserved Energy



Distribution of Unserved Energy

Sum of % of 100%	Column I																						
Row Labels	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Off Peak							0.2%	0.7%	0.9%	0.6%	0.4%	0.3%	0.3%	0.4%	0.7%	1.1%						18.0%	12.0%	4.9%
On Peak																	2.1%	4.8%	12.3%	17.8%	19.5%			
Super Off Peak	1.7%	0.7%	0.2%	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%										
Grand Total	**1.7%**	**0.7%**	**0.2%**	**0.1%**	**0.1%**	**0.1%**	**0.2%**	**0.8%**	**0.9%**	**0.7%**	**0.4%**	**0.3%**	**0.3%**	**0.4%**	**0.7%**	**1.1%**	**2.1%**	**4.8%**	**12.3%**	**17.8%**	**19.5%**	**18.0%**	**12.0%**	**4.9%**

LOLE % by TOU Period

Standard TOU Periods	**Allocation**
On-peak : 4pm - 9pm daily	56.0%
Off-peak: All other hours	41.0%
Super off-peak: 12am - 6am non-holiday weekdays and 12am - 2pm weekends/holidays	3.0%
Total	100.0%

Modeling Ramping and Renewable Integration

- SDG&E's LOLE analysis does not yet incorporate ramping and renewable integration characteristics for allocation between peak and non-peak related components.
- SDG&E is participating in SCE's 2021 GRC working group established to "discuss how to incorporate a flexible generation capacity component into the revenue allocation process in addition to a peak capacity component".
- SDG&E hopes for a jointly developed methodology or at least a solid foundation to build on.

Shorter Duration Peak Demand Period

for assessing coincident peak related demand charges relative to the established TOU period

- LOLE analysis shows that SDG&E's greatest need for capacity is represented by a normal distribution spanning from 4pm-midnight.
- SDG&E's Peak TOU period gives customers price signals that are more aligned with its greatest need based on the LOLE analysis, which does not support a shorter TOU period for on-peak demand charges.
- The current five-hour on-peak period captures more of this need.

Transmission Cost Allocation

Research Plan

Classify SDG&E-owned transmission projects* into categories that describe principle drivers.

Collect information related to all SDG&E-owned transmission projects that had a capital spend during the 2012 through 2017 period.

Collect information related to all SDG&E-owned transmission projects that have a projected capital spend during the 2018 through 2022 period.

Determine the principle drivers (purpose) for each project.

Allocate project cost among principle drivers (if there is more than one principle driver).

Aggregate the capital spend by each category of principle driver.

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* The costs of transmission projects operated above 200 kV are socialized across all CAISO Load Serving Entities.

Project Classification

- Provide reliable service under peak conditions
- Interconnect new generation
- Interconnect new load
- Improve grid efficiency (reduce LCR, congestion, etc.)
- Support public policy requirements or goals (e.g. RPS)
- Upgrade, repair, or replace existing facilities
- Relocation or removal of facilities
- Customer and/or employee safety (e.g. fire hardening)
- Grid visibility, control, and measurement
- Provide reliable service under conditions not driven by peak load

Study Results

Study Period 2012 thru 2017.

- Peak Demand = 31% , Non-Peak = 69%

Study Period 2015 thru 2017.

- Peak Demand = 37% , Non-Peak = 63%

Study Period 2018 thru 2022.

- Peak Demand = 35% , Non-Peak = 65%

Category	2012 - 2017	2015 - 2017	2018 - 2022
1. Provide reliable service under peak load conditions.	31%	37%	35%
2. Interconnect new generation.	7%	7%	0%
3. Interconnect new load.	3%	2%	0%
4. Improve grid efficiency (e.g., reduce Local Capacity Requirements, reduce congestion-related costs, reduce losses).	4%	4%	0%
5. Support public policy requirements or goals (e.g., Renewable Portfolio Standard (RPS) requirements).	24%	11%	4%
6. Upgrade, repair or replacement of existing facilities (e.g., adding spare transformer, replacing old direct-buried cable).	10%	9%	16%
7. Relocation or removal of facilities (e.g., under-grounding, accommodate third-party customer construction).	8%	11%	2%
8. Customer and/or employee safety (e.g., fire-hardening).	12%	15%	41%
9. Grid visibility, control and measurement.	3%	3%	2%
10. Provide reliable service under conditions not driven by peak load.	1%	0%	0%