

# PG&E HEARING EXHIBIT PGE-72

A.20-04-023

## PG&E'S SECURITIZATION 2020

Redline of Prepared Testimony of Mark Ellis on behalf of The Utility Reform Network from Oct. 20, 2020 to Nov. 10, 2020 [Public Version]

1 **I. Summary of Findings and Recommendations**

2 PG&E’s proposed securitization does not satisfy the standard of being “neutral, on  
3 average, to the ratepayers of the electrical corporation” and is therefore a very bad deal for  
4 customers.<sup>1</sup> TURN reaches this conclusion on two main grounds:

- 5
- 6 • The Customer Credit Trust is significantly underfunded. The value of the assets  
7 PG&E has pledged to the Trust is scarcely one-half of the value of the Recovery  
8 Bonds customers are being asked to guarantee.
- 9
- 10 • Consequently, the Trust is far riskier, in terms of the probability of fully funding  
11 the Customer Credit in each billing period over the life of the securitization, than  
12 PG&E’s analysis suggests.
- 13

14 The valuation gap and risk become clear after properly accounting for the uncertainty in  
15 PG&E’s Additional Shareholder Contributions and for more realistic expected returns on the  
16 Trust’s investments. PG&E’s income growth forecast, which determines the timing of the  
17 Additional Shareholder Contributions, is implausibly high, implying rate base growth that would  
18 result in electricity rates nearly four times the national average by the end of the Trust’s life. It is  
19 also far more uncertain than the smooth forecast assumed by PG&E, due to both the normal  
20 variability of utility income and PG&E’s three-decade track record of periodic income shocks.  
21 PG&E’s assumptions for the Customer Credit Trust’s returns are similarly overly optimistic –  
22 ~~10420~~ basis points (~~1822%~~) higher than the averagemedian forecast of eighteenover twenty  
23 reputable investment management firms.

24 Adjusting PG&E’s analysis accordingly reveals the proposed Customer Credit Trust  
25 would be underfunded by \$4.~~108~~ billion, resulting in a ~~434%~~ probability of being unable to fully  
26 fund the Customer Credit over its entire life.

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<sup>1</sup> California Public Utilities Code §3292(b)(1)(D).

1 **II. Value of Shareholder Contributions falls far short of the value of the Recovery**  
2 **Bonds**

3 The most straightforward way to assess whether PG&E’s proposed Securitization is  
4 “neutral, on average, to the ratepayers” is to compare the value of the Recovery Bonds (the  
5 liability customers are assuming) to the value of the Shareholder Contributions pledged to  
6 reimburse them. TURN uses the discounted cash flow method to estimate their respective present  
7 values, which entails (1) determining the appropriate discount rate (the cost of capital) and  
8 applying it to a (2) cash flow forecast for each asset.<sup>2</sup>

9 *The present-value cost to customers of the Recovery Bonds is higher than their nominal*  
10 *\$7.5-billion value.* Ordinarily, the present-value cost of a loan is simply equated to its nominal  
11 value. Implicit in this valuation is the assumption that the payer of interest retains the full benefit  
12 of the interest tax deduction and resulting lower effective interest cost, as is done when using the  
13 after-tax interest rate when calculating a company’s weight average cost of capital (WACC).

14 But PG&E proposes to deduct the Recovery Bond interest from its corporate taxable  
15 income, claiming the interest tax benefit for shareholders without the corresponding interest  
16 expense, which is borne by customers through the Fixed Recovery Charge (FRC). This  
17 undeserved benefit, which PG&E would not be able to claim without the Securitization, comes  
18 straight out of the pockets of customers in the form of a higher-than-necessary FRC. Discounting  
19 the full a higher effective (pre-tax) interest expenserate, (2.92%) at, instead of their true, after-  
20 tax, cost of capital, (2.10%).<sup>3</sup> Discounting the additional cost of the foregone interest tax shield  
21 at the after-tax interest rate increases the present-value cost of the Bonds to customers by \$0.85  
22 billion, to \$8.35 billion.<sup>4</sup>

23 *Additional Shareholder Contributions are riskier and will come later than PG&E’s*  
24 *analysis suggests.* The nominal \$7.59 billion of Additional Shareholder Contributions arise from

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<sup>2</sup> While PG&E also uses DCF to estimate the value of the Trust, its analysis does not value each cash flow stream separately, instead applying to the combined net cash flows of the Recovery Bonds and the Customer Credit Trust a single discount rate – PG&E’s return on rate base, 7.34% [Table 6-7, p. 6-29] – that does not accurately reflect either’s underlying risk and cost of capital.

<sup>3</sup> 2.92% x (1 – 28.0% combined Federal and State tax rate) = 2.10%.

<sup>4</sup> All present values in this testimony are as of 2021, the year of the Securitization and Initial Shareholder Contribution.

1 tax benefits that are realized in proportion to PG&E’s positive taxable income. Recognizing their  
2 link to taxable income is important for three reasons.

3 First, taxable income is net of interest, i.e., after debtholders have been paid. Because the  
4 Additional Shareholder Contributions are linked to income after interest has been deducted, they  
5 are equivalent to equity cash flows, and the appropriate discount rate is therefore 10.25% to  
6 reflect PG&E’s authorized return on equity (ROE).<sup>5</sup> Second, the link to positive taxable income  
7 will affect the *timing* of the Additional Shareholder Contributions – the number of years it will  
8 take PG&E to contribute the full \$7.59 billion to the Trust. Third, the link to taxable income  
9 means the Additional Shareholder Contributions are uncertain. As discussed below, several  
10 provisions of the Customer Credit Trust impact customers asymmetrically because they fully  
11 absorb all losses but share gains with PG&E shareholders. This asymmetry results in a loss of  
12 value to customers that is not captured in the simple comparison of Trust assets and customer  
13 liabilities. Uncertainty amplifies this loss of value.

14 *PG&E’s income growth forecast is implausible.* In the model provided in support of  
15 Table 6-2: Forecast Utilization of Shareholder Tax Benefits [PG&E testimony, p. 6-11],<sup>6</sup> PG&E  
16 projects rate base and earnings before interest and taxes (EBIT) to rise 7% annually from 2024-  
17 2030 and 5% thereafter. This rate of growth – which, when added to PG&E’s 2020-24 forecast,  
18 averages 5.83% from 2020 through 2050 – is remarkable and unrealistic considering:

- 19 • PG&E’s historical EBIT growth rate. Excluding one-off events, PG&E’s EBIT  
20 trended downward at -0.60%/year (-2.96% in real terms) over the thirty-two-year  
21 period from 1988 to 2019. PG&E’s actual earnings over that period compared  
22 with forecasted future earnings in the PG&E model are shown in Figure 1.

23

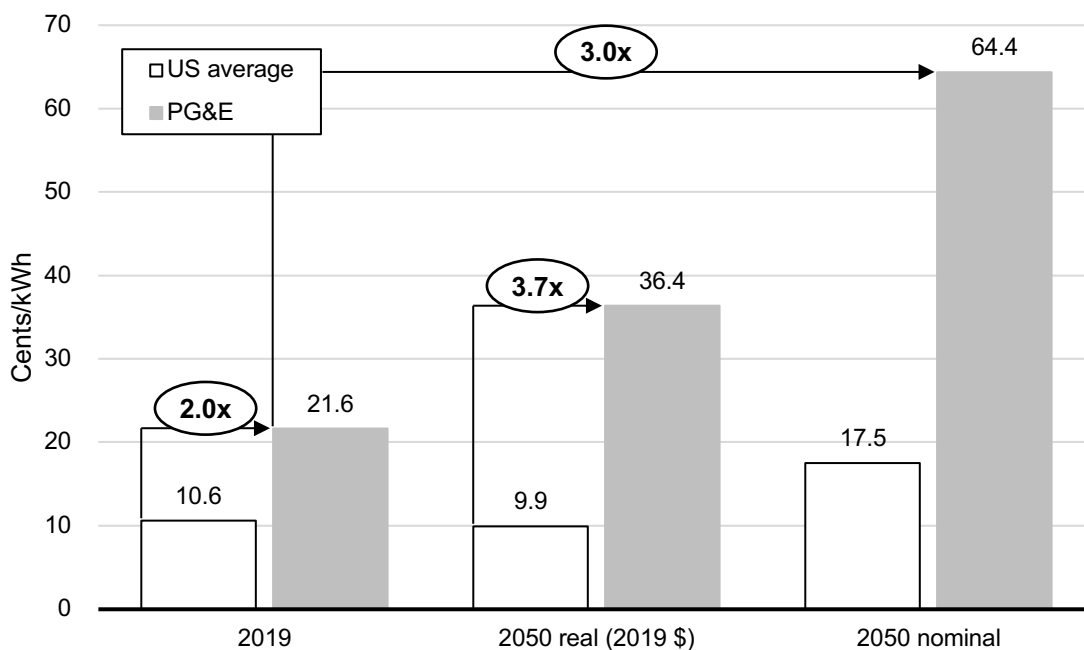
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<sup>5</sup> TURN’s approach to valuing the Additional Shareholder contributions is similar to that of investment bank Lazard. “NOL Monetization Alternatives,” an October 17, 2019, confidential presentation to PG&E provided in PG&E’s Response-response to TURN dData Request-request 1-2a. This presentation is included in Confidential Appendix E.

<sup>6</sup> PG&E testimony, p. 6-11.

times the forecast national average [(Figure 2)]. In nominal terms, PG&E’s rates would **nearly** triple, to **64.43.6** cents/kWh.<sup>7</sup>

**Figure 2: Current and estimated 2050 PG&E average bundled electric rate under PG&E’s rate base and EBIT growth forecast**



<sup>7</sup> Assumptions:

- National average rate forecast: all sectors average real growth of -0.16%/year from Energy Information Administration’s “Annual Energy Outlook 2020” (=EIA AEO-2020) Reference case all sectors average rate (reflects -0.16%/year real growth rate).
- PG&E average rate forecast:
  - Two-thirds of PG&E’s current average rate, reflecting the approximate historical share attributable to operating costs, held constant in real terms.
  - The remaining one-third escalated at PG&E’s 2020-50 average rate base growth rate (5.83%) less inflation (1.876%) less the ~~mid-range PG&E 2020 Integrated Resource Plan~~ energy for load ~~forecast growth rate forecast for PG&E from the 2020 Integrated Energy Policy Report “California Energy Demand 2019-2030 Baseline Forecast – Mid Demand Case”~~ (0.24%) = 3.765%.
- All inflation forecasts referenced in this testimony are based on the “30-year Breakeven Inflation Rate” provided by the Federal Reserve Bank of St. Louis for October 2020. “The breakeven

1           Source: PG&E; EIA; TURN analysis  
2

- 3           • PG&E's implied share of total US utility income. Currently, PG&E accounts for  
4           ~2.78% of the net income~~EBITDA~~ of all FERC Form-1 and Form-2 filers (2.45%  
5           electric/5.30% gas). Assuming PG&E's forecast is realized<sup>8</sup> while the rest of the  
6           sector's income grows commensurate with total national electricity and gas utility

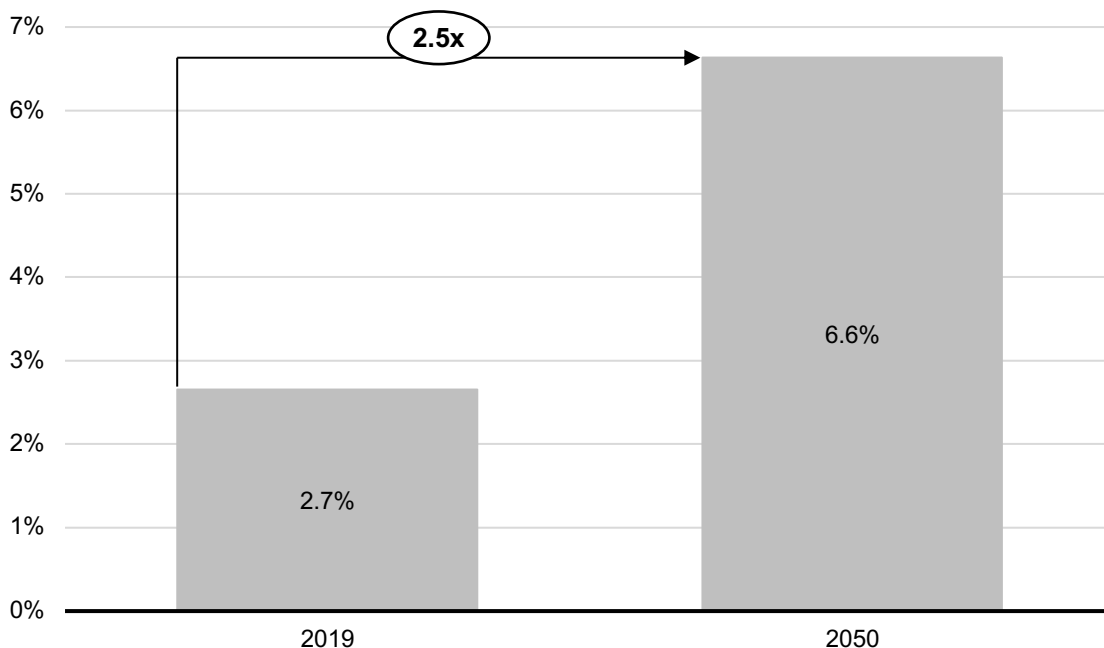
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inflation rate represents a measure of expected inflation derived from 30-Year Treasury Constant Maturity Securities (BC\_30YEAR) and 30-Year Treasury Inflation-Indexed Constant Maturity Securities (TC\_30YEAR). The latest value implies what market participants expect inflation to be in the next 30 years, on average." <https://fred.stlouisfed.org/series/T30YIEM>; last accessed November 3, 2020.

<sup>8</sup> PG&E's implied real growth rate is  $(1+5.83\%)/(1+1.876\%) - 1 = 3.94.00\%$ .

1 real revenue (0.74%),<sup>9</sup> ~~As shown in Figure 3,~~ PG&E's share of industry profit  
2 would increase 2.56 times, to ~~nearly over~~ 7%, ~~as shown in Figure 3.~~

3  
4 **Figure 3: Current and estimated 2050 PG&E share of US utility industry profit under PG&E income**  
5 **growth assumptions**



6  
7 *Source: PG&E; EIA; [FERC](#); TURN analysis*

8  
9 TURN requested any and all documentation PG&E had to support this growth forecast.  
10 None of the information provided explained the source of the 5-7% growth rate assumption; they  
11 are simply hard-coded figures in their spreadsheet model.<sup>10</sup> If there is a single “smoking gun”  
12 demonstrating the complete implausibility of PG&E’s analysis of its Securitization proposal, the  
13 forecast of future earnings is it. These future values are not the product of any legitimate analysis  
14 but are instead an invented plug to ensure that the analysis in support of the Securitization  
15 proposal shows a decent likelihood of a reasonable outcome for ratepayers.

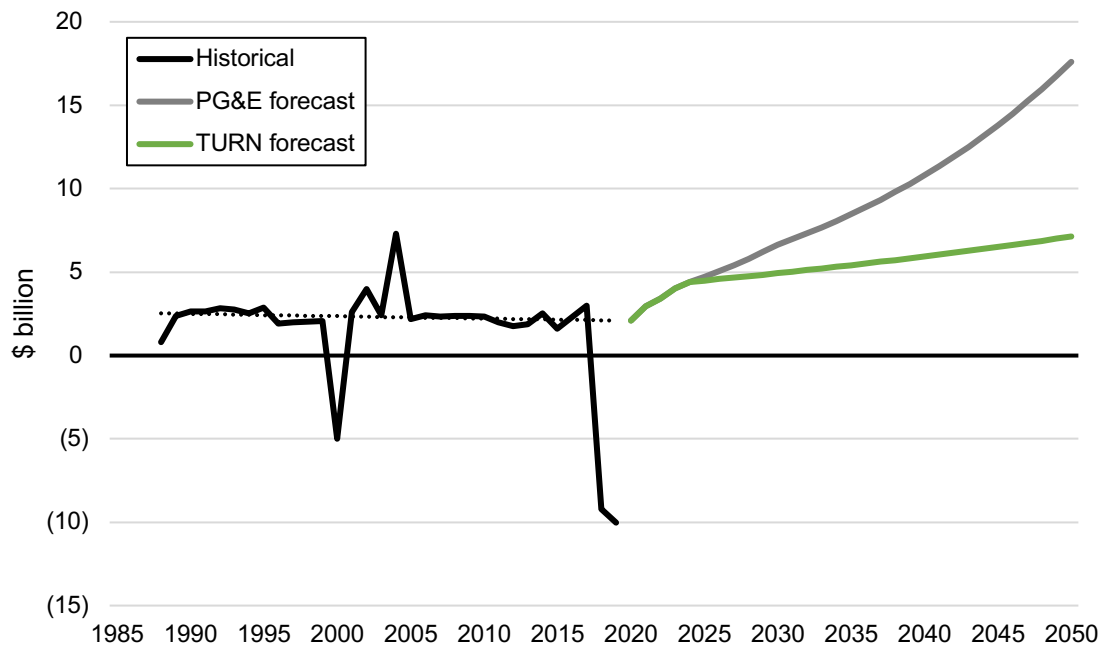
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<sup>9</sup> ~~Combined US electric and gas revenue from the Energy Information Administration Annual Energy Outlook 2020~~[EIA AEO](#) Reference case.

<sup>10</sup> PG&E’s ~~r~~Response to TURN ~~d~~Data ~~r~~Requests 1-3 and 8-1.

1           TURN developed an alternative forecast for PG&E’s future income, based on PG&E’s  
 2 the “2019-2030 Baseline Forecast – Mid Demand Case” electric and gas forecasts for PG&E  
 3 developed for the 2020 Integrated Energy Policy Report Update (weighted average of  
 4 0.156%)<sup>11</sup>; market-based inflation expectations (1.876%)<sup>12</sup> and modest efficiency gains of -  
 5 0.16% per year (i.e., profit per kWh increases slightly less than inflation)<sup>13</sup>; for a net growth rate  
 6 of 1.8677%/year-. TURN’s forecast is compared to PG&E’s forecast in Figure 4.

8           **Figure 4: Historical and forecast PG&E earnings before interest and taxes**



9           Source: FERC Form 1 via S&P Global; PG&E; TURN analysis

11 Weighted average = electric energy to serve load growth of 0.24% x 823% of income + gas demand growth of -0.22% x 187% of income. Demand growth estimates from California Energy Commission 2020 Integrated Resource Plan proceeding.

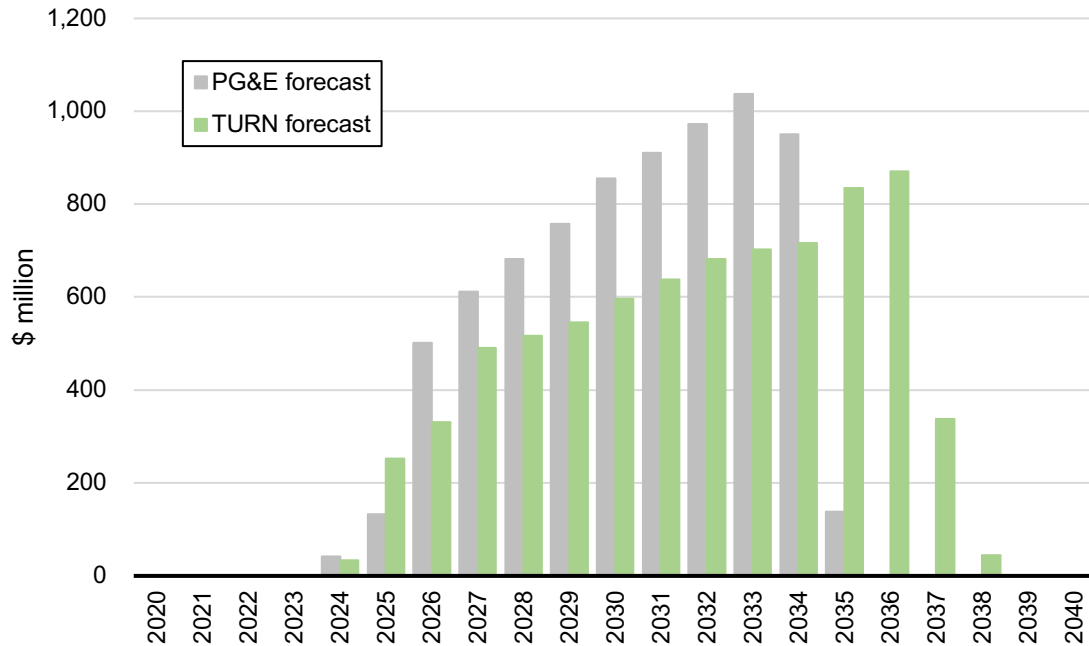
12 All inflation forecasts referenced in this testimony are based on the “30-year Breakeven Inflation Rate” provided by the Federal Reserve Bank of St. Louis for September 2020. “The breakeven inflation rate represents a measure of expected inflation derived from 30-Year Treasury Constant Maturity Securities (BC\_30YEAR) and 30-Year Treasury Inflation Indexed Constant Maturity Securities (TC\_30YEAR). The latest value implies what market participants expect inflation to be in the next 30 years, on average.” <https://fred.stlouisfed.org/series/T30YIEM>; last accessed October 3, 2020.

13 Equated to The average of the 1960-2019 historical and EIA AEO Reference case 2020-50 EIA forecast decline in real electricity prices (-0.65% and -0.12% per year, respectively).



1 Because the Additional Shareholder Contributions are directly proportional to income, a  
 2 lower income growth rate delays those contributions relative to PG&E’s forecast, as shown in  
 3 Figure 5. Under this more realistic forecast and using the appropriate discount rate, \$7.59 billion  
 4 ~~of (nominal) of~~ Additional Shareholder Contributions has a present value of \$2.8279 billion.

6 **Figure 5: Additional Shareholder Contributions to Customer Credit Trust<sup>14</sup>**



8 *Source: PG&E; TURN analysis*

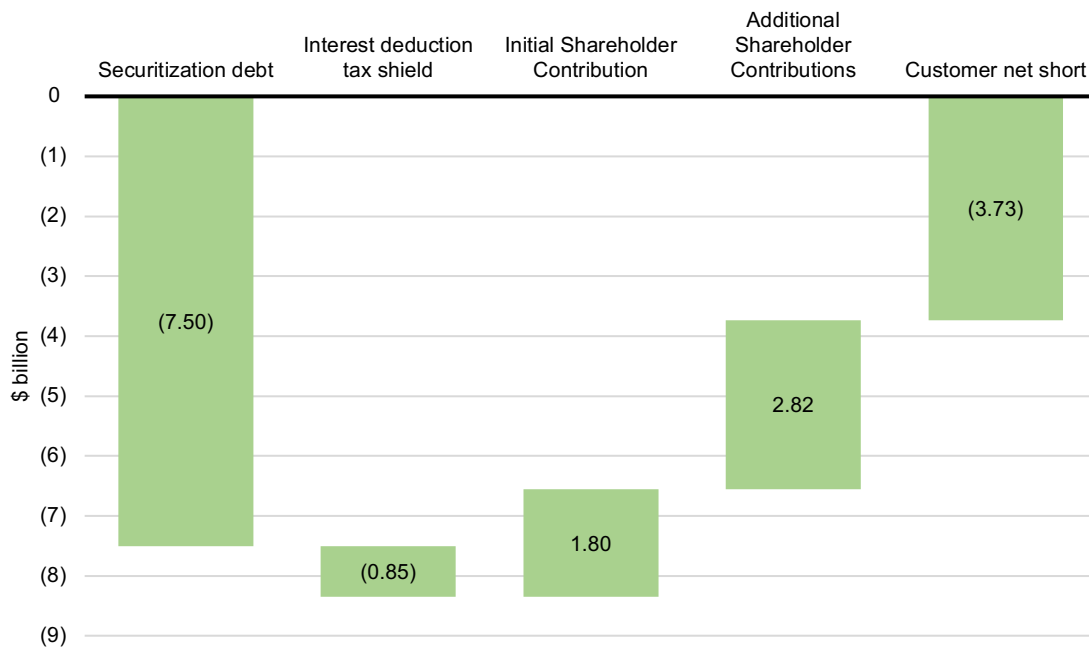
9  
 10 The few simple adjustments to PG&E’s analysis described so far – looking at each cash  
 11 flow stream individually, discounting them at their own cost of capital, and assuming a more  
 12 realistic income forecast – produce a customer net short of \$3.736 billion (Figure 6).

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<sup>14</sup> TURN identified several potential errors and inconsistencies in PG&E’s calculations of annual tax benefits which result in differences in TURN’s and PG&E’s estimates of the Additional Shareholder Contributions even during the explicit 2020-24 forecast period. TURN attempted to resolve its concerns through written ~~d~~Data ~~r~~Requests submitted to PG&E. Despite TURN’s efforts, PG&E refused to acknowledge the errors and did not provide sufficient information to explain the inconsistencies.

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**Figure 6: Breakdown of customer net short**



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5 Even before accounting for the Trust’s asymmetric provisions that erode its value to  
6 customers, to be discussed below, the Trust is effectively 45% under-funded. This yawning gap  
7 between the value of the Recovery Bonds and Shareholder Contributions is a fundamental,  
8 ~~unavoidable~~ inescapable problem with PG&E’s proposal. If it did not exist, there would be no need  
9 for the Securitization to begin with; PG&E could pledge the Shareholder Contribution cash flows  
10 as security without a customer guarantee. This under-funding translates directly into an  
11 unacceptably high risk of not satisfying the “neutral, on average, to ratepayers” standard.

12

13 **III. The Trust’s underfunding poses an unacceptably high risk of not satisfying the**  
14 **“neutral, on average, to ratepayers” standard.**

15 PG&E maintains that ratepayer-neutrality is satisfied if the Trust (1) is able to fully fund  
16 the Customer Credit in each billing period over the life of the Securitization and (2) ends in  
17 surplus. But PG&E’s own evidence in support of ratepayer-neutrality is weak. PG&E’s model  
18 output data indicate only an 84% probability of fully funding the Customer Credit in every  
19 billing period over the life of the Securitization, which translates into a one-in-six chance of a

1 shortfall at some point over the life of the Trust ~~[PG&E testimony, Table 6-7: Range of Surplus~~  
2 ~~Outcome and Year of First Shortfall, p. 6-29].~~<sup>15</sup> Similarly, PG&E’s claimed \$0.12-billion  
3 (present value) expected customer surplus – which it deems a “significant opportunity for  
4 customers” ~~[p. 1-14]~~<sup>16</sup> – is a mere 1.4% pittance relative to the \$8.36 billion present-value cost to  
5 customers of the Securitization.

6 Even these weak indicators of ratepayer-neutrality are significantly overstated. In  
7 addition to the discount-rate adjustments and delay to the Additional Shareholder Contributions  
8 discussed above, several other aspects of PG&E’s analysis understate the risks to ratepayer-  
9 neutrality and further erode the Trust’s value.

- 11 • PG&E’s return assumptions for the Trust’s three asset classes are aggressive ~~—on~~  
12 ~~average, more than~~ 1204 basis points (2018%) higher than the median average of  
13 over twentyeighteen recent public forecasts from leading investment managers  
14 and consultants.
- 15 • PG&E’s analysis only accounts for one source of uncertainty – the Trust’s  
16 returns. Another significant source of uncertainty is the outlook for PG&E’s  
17 income growth, which, as described above, determines the timing of the  
18 Additional Shareholder Contributions and, therefore, the Trust’s cash flows and  
19 prospects for fully funding the Customer Credit in every billing period.
- 20 • PG&E’s treatment of Customer Credit shortfalls and the Surplus Sharing  
21 mechanism impacts customers asymmetrically, fully burdening them with all  
22 losses (and then some) but requiring them to share gains with PG&E  
23 shareholders. This asymmetry results in a loss of value to customers that is not  
24 captured in the simple comparison of Trust assets and customer liabilities.

25  
26 Adjusting PG&E’s analysis of the Trust’s value ~~analysis~~ for each of these dramatically  
27 increases the probability of shortfall and widens the valuation gap.

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<sup>15</sup> PG&E testimony, Table 6-7: Range of Surplus Outcome and Year of First Shortfall, p. 6-29.

<sup>16</sup> PG&E testimony, p. 1-14.

1           **A.     PG&E’s CCT return assumptions are aggressively high.**

2           PG&E commissioned the investment consulting firm Callan to estimate the Trust’s future  
3 returns, value, and ability to reimburse customers for the Fixed Recovery Charge over the life of  
4 the securitization ~~based on Callan’s projections of future investment returns. TURN compared~~  
5 ~~Callan’s Table 6-4: Callan Long-Term Capital Market Projections (PG&E testimony, p. 6-27) in~~  
6 ~~PG&E’s testimony provides the key 30-year capital market projections assumptions used in~~  
7 ~~Callan’s forecast~~ for the three main asset classes in which the Trust is expected to invest<sup>17</sup>.  
8 ~~TURN to comparable ed Callan’s assumptions to the latest publicly available 30-year long-term~~  
9 forecasts from ~~eighteen twenty-five~~ reputable investment management and consulting firms  
10 (“investors”).<sup>18</sup> ~~As seen in Figures 7, 8, and 9, Callan’s are consistently in the highest quartile of~~  
11 ~~forecasts.~~<sup>19</sup> ~~For apples-to-apples comparability, Callan’s own public 10-year forecasts (which~~  
12 ~~differ slightly from its 30-year forecasts used in its CCT modeling<sup>20</sup>) are compared to these other~~  
13 ~~public forecasts in Figures 7, 8 and 9.~~

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<sup>17</sup> PG&E testimony, Table 6-4: Callan Long-Term Capital Market Projections, p. 6-27.

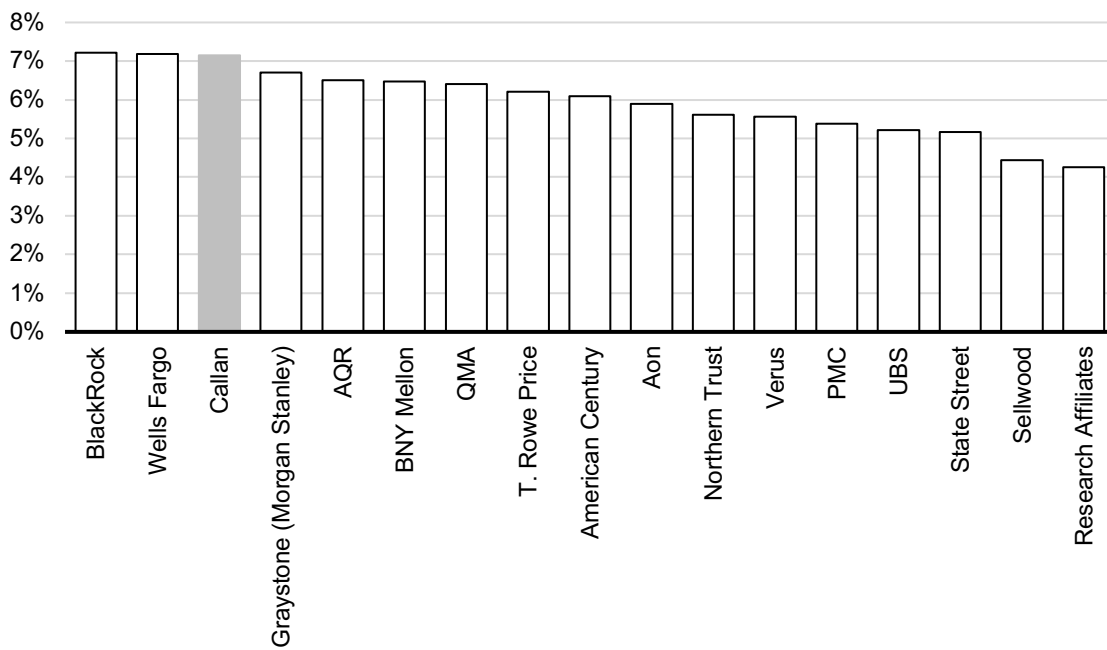
<sup>18</sup> ~~Appendix B provides a list of the forecasts reviewed and The details of TURN’s analysis list of~~  
~~forecasts used for this analysis are provided in Appendix B.~~

<sup>19</sup> ~~Not all reports had comparable data for all three asset classes.~~

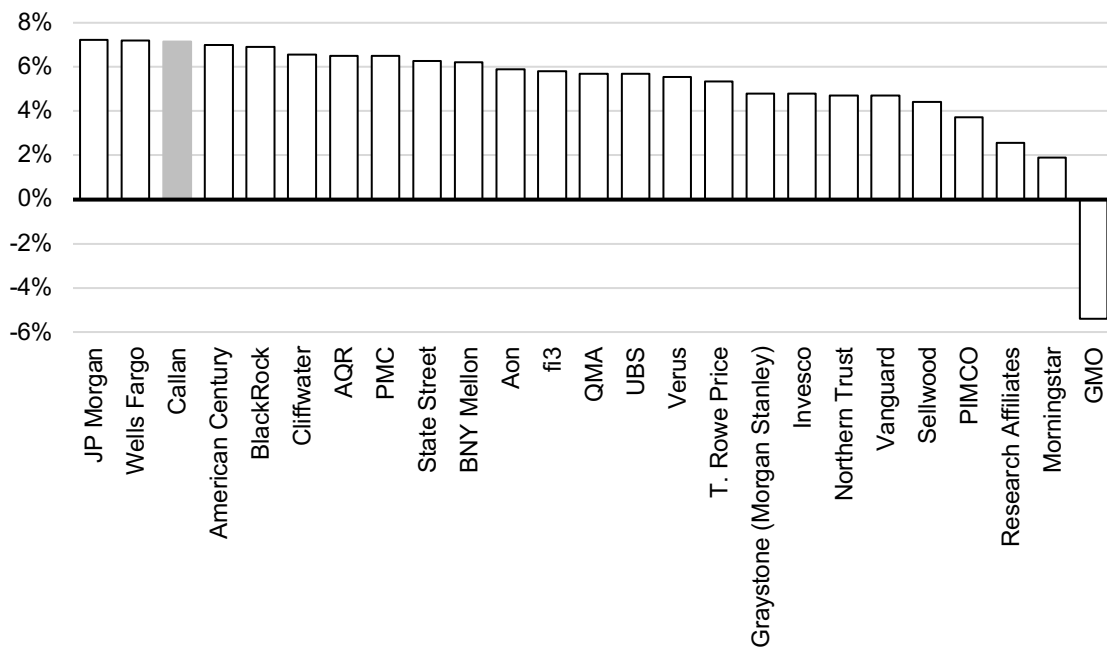
<sup>20</sup> ~~PG&E Testimony Table 6-4 (p. 6-26) gives 30-year projections of 7.15% and 3.60% for Non-US equity~~  
~~and US fixed income, respectively.~~

1

Figure 7: Expected ~~long-term~~30-year geometric return – broad US equity



2



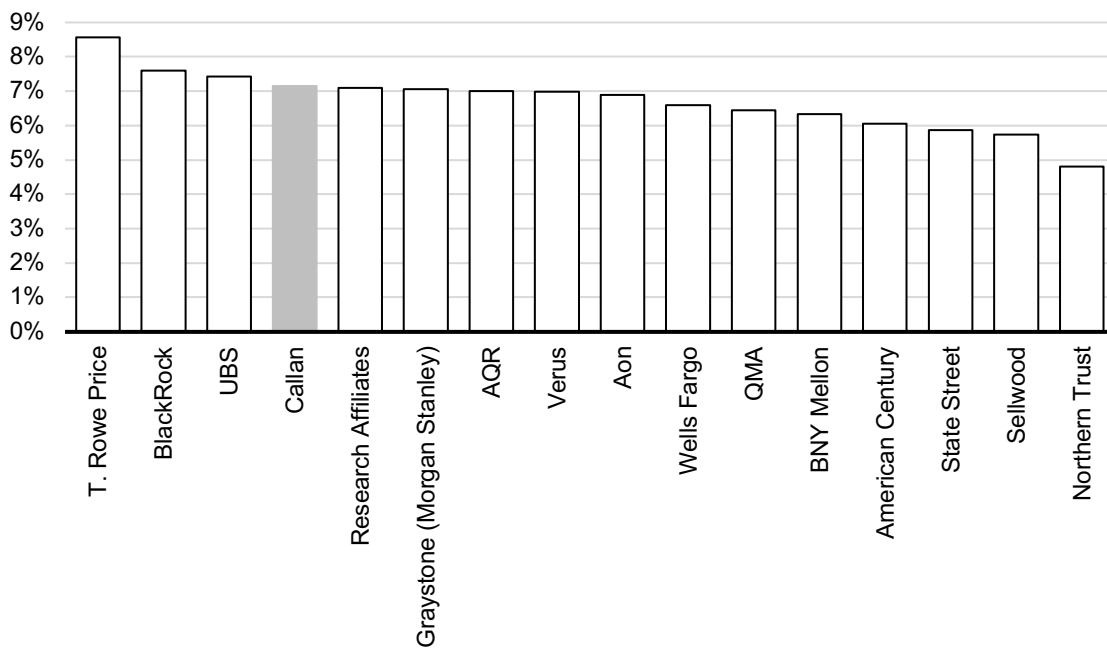
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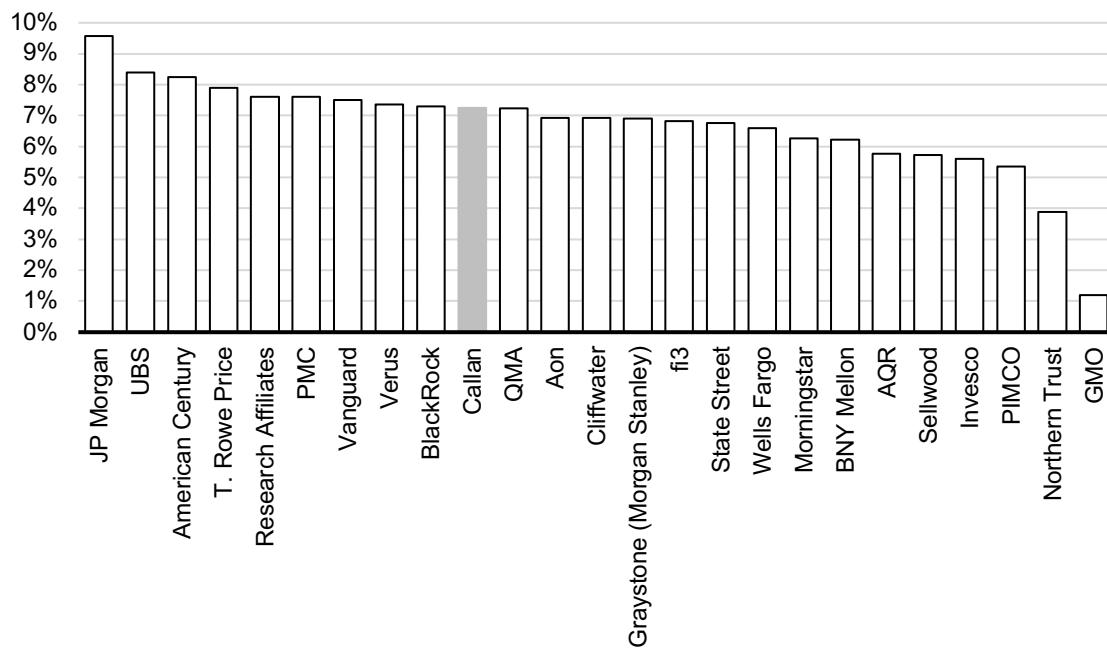
Source: Investment manager and consultant reports; TURN analysis

1

Figure 8: Expected ~~long-term~~30-year geometric return – non-US equity



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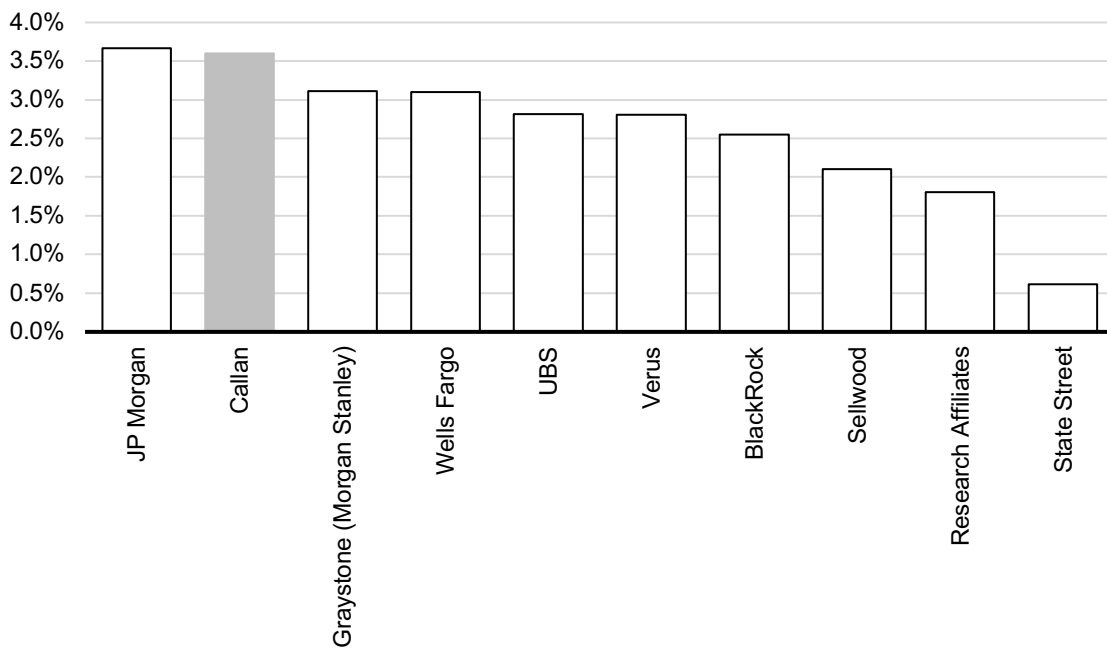
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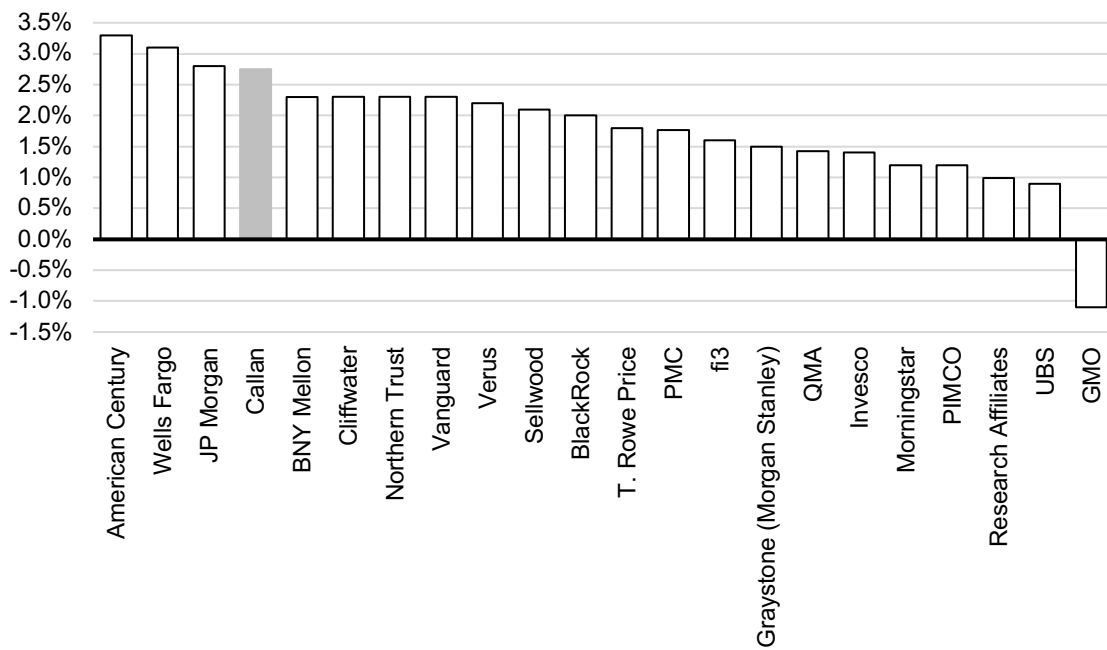
Source: Investment manager and consultant reports; TURN analysis

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Figure 9: Expected ~~long-term~~30-year geometric return – US fixed income



2



3

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Source: Investment manager and consultant reports; TURN analysis

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6

Table 1 summarizes the forecast averages and the position of Callan’s ranking10-year estimates among its industry peers. While Callan’s assumptions fall within the range of the other

7

1 forecasts, they are 0.342% to 1.1845% higher than the averagemedian forecast for each asset  
 2 class.

3  
 4

**Table 1: Summary of investors' 30-yearlong-term return forecasts and Callan's position among them**

Line no.		Broad US equity	Non-US equity	US fixed income
1	Callan public 10-year	<u>7.15%</u> 7.15%	<u>7.15%</u> 7.25%	<u>3.60%</u> 2.75%
2	Number of forecasts	<u>1725</u>	<u>1625</u>	<u>1022</u>
3	Average geometric return	<u>5.97%</u> 5.11%	<u>6.73%</u> 6.68%	<u>2.62%</u> 1.82%
4	<u>Median geometric return</u>	<u>5.70%</u>	<u>6.91%</u>	<u>1.90%</u>
45	Callan – average	<u>+1.18%</u> +2.04%	<u>+0.42%</u> +0.57%	<u>+0.98%</u> +0.93%
6	<u>Callan – median</u>	<u>+1.45%</u>	<u>+0.34%</u>	<u>+0.85%</u>
57	Standard deviation	<u>0.90%</u> 2.53%	<u>0.87%</u> 1.58%	<u>0.92%</u> 0.91%
68	Callan rank	<u>3 (18%)</u> 3 (12%)	<u>4 (25%)</u> 10 (40%)	<u>2 (20%)</u> 4 (18%)
79	Percentile	<u>9%</u> 21%	<u>31%</u> 36%	<u>14%</u> 15%

5

6 TURN believes the averagemedian of the investor forecasts represents a more realistic  
 7 and appropriate set of base case return and risk (standard deviation) assumptions. Table 2  
 8 compares Callan's key forecast assumptions to the investor averages~~presents the development of~~  
 9 ~~TURN's asset class return assumptions starting with the median of the geometric and arithmetic~~  
 10 ~~return and standard deviation assumptions found in the investor forecasts and the resulting~~  
 11 ~~figures for the Trust portfolio.~~<sup>21</sup> Callan's public 10-year and CCT 30-year forecasts are then  
 12 shown for comparison. The two sets of assumptions have slight differences in their equity returns  
 13 and a substantial 0.85% difference in US fixed income. The next set of figures are TURN's  
 14 adjustment factors, equal to the ratio of Callan's 30-year CCT forecast to its 10-year public  
 15 forecast.<sup>22</sup> The last set of figures are TURN's asset class and portfolio assumptions. For the

<sup>21</sup> TURN uses the following formula for the relationship between arithmetic ( $a$ ) and geometric ( $g$ ) returns and standard deviation ( $\sigma$ ):  $g \approx -1 + \frac{(1+a)}{\sqrt{\sigma^2/(1+a)^2}}$ . See Formula #4 in Mindlin, Dimitry, "On the Relationship between Arithmetic and Geometric Returns" (August 14, 2011), available at: <https://ssrn.com/abstract=2083915>. Due to sparse investor data on correlations, TURN uses PG&E's assumptions [Table 6-5: Callan Long Term Capital Market Projections—Correlation, p. 6-27.]

<sup>22</sup> Because the median investor forecast is ten years, TURN adjusts it to reflect the longer time horizon of Callan's 30-year CCT projection by the ratio of Callan's 30-year CCT to its 10-year public forecast.



1 portfolio as a whole, the investor-average expected return, 5.59%, is 1.04 basis points (15%)  
 2 lower than PG&E's forecast with 105% less risk.<sup>23</sup>

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 4  
 5

**Table 2: TURN (Investor average) and, Callan, and TURN long-term 30-year return forecasts  
capital market assumptions**

Line no.	Asset class	Weight	30-year Geometric average return	Standard deviation	Arithmetic average return
<i>Investor median</i>					
1	Broad US equity	56%	5.70%	15.71%	6.84%
2	Non-US equity	24%	6.91%	16.40%	8.14%
3	US fixed income	20%	1.90%	3.90%	1.97%
4	Portfolio total	100%	5.49%	12.13%	6.18%
<i>Callan public 10-year</i>					
5	Broad US equity	56%	7.15%	18.10%	8.63%
6	Non-US equity	24%	7.25%	20.50%	9.13%
7	US fixed income	20%	2.75%	3.75%	2.82%
8	Portfolio total	100%	6.64%	14.34%	7.59%
<i>Callan-CCT 30-year</i>					
19	Broad US equity	56%	7.15%	18.10%	8.63%
20	Non-US equity	24%	7.15%	20.50%	9.03%
31	US fixed income	20%	3.60%	3.75%	3.67%
42	Portfolio total	100%	6.79%	14.34%	7.73%
<i>TURN adjustment factors</i>					
13	Broad US equity	56%		1.000	1.000
14	Non-US equity	24%		1.000	0.989
15	US fixed income	20%		1.000	1.301
16	Portfolio	100%			
<i>TURN forecast (investor average)</i>					
17	Broad US equity	56%	5.97% 5.70%	16.23% 15.71%	7.18% 6.84%
18	Non-US equity	24%	6.73% 6.82%	17.87% 16.40%	8.17% 8.05%
19	US fixed income	20%	2.62% 2.50%	4.26% 3.90%	2.70% 2.57%
20	Portfolio	100%	5.75% 5.59%	12.85% 12.13%	6.52% 6.27%

6

<sup>23</sup> Among the nine reports with 30-year forecasts for all three asset classes, the average portfolio return and risk were essentially the same, 5.72% and 12.87%, respectively.

1           TURN developed models for each of these three sources of uncertainty based on PG&E’s  
2 historical income and publicly available forecasts of future demand growth, inflation, and utility  
3 rates. Appendix C summarizes the key elements of TURN’s modeling approach.<sup>24</sup>

#### 4           **C.       Asymmetric Trust provisions further erode the value of the Trust**

5           The Customer Credit Trust’s ~~provisions for the~~ treatment of Customer Credit shortfalls  
6 and the Surplus Sharing mechanism impact customers asymmetrically, fully burdening them  
7 with all losses (and then some) but requiring them to share gains with PG&E shareholders. This  
8 asymmetry results in a loss of value to customers that is not captured in the simple comparison of  
9 Trust assets and customer liabilities.

10           *Tax gross-up.* In the discussion of its Trust modeling results PG&E describes an income  
11 tax gross-up mechanism for Customer Credit shortfalls ~~[PG&E testimony, p.6-28, Footnote~~  
12 ~~18]~~.<sup>25</sup>

13  
14           “During a period in which the Customer Credit is less than the FRC, any portion of the  
15 FRC that exceeds the Customer Credit and is in excess of tax deductions related to  
16 interest payments on the securitized Bonds (i.e., principal) is taxable income. Thus it is  
17 assumed that customers will reimburse PG&E for any computed tax liability created by  
18 the principal component of shortfalls. The grossed-up tax rate used on the principal  
19 component of shortfalls in the analysis was 38.9 percent.”  
20

21           Customers not only cover the shortfalls but, adding insult to injury, are also required to  
22 compensate PG&E for the associated tax liability. This represents an incremental cost to  
23 customers not reflected in the comparison of their assets and liabilities.

24           *Customer Credit shortfall make-up.* In its overview of the Customer Credit, PG&E refers  
25 to a Customer Credit make-up mechanism ~~[PG&E testimony, p. 6-2]~~.<sup>26</sup>  
26

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~~<sup>24</sup> TURN did not apply a random walk model, similar to that used by Callan for Trust returns, to PG&E’s income as it would have introduced an unrealistic degree of variability.~~

~~<sup>25</sup> PG&E testimony, p. 6-28, footnote 18.~~

~~<sup>26</sup> PG&E testimony, p. 6-2.~~

1 “If assets in the Customer Credit Trust are insufficient to fund a Customer Credit equal to  
2 the FRCs for a period of time, the future Customer Credit Trust balance will first be used  
3 to make up any previous shortfalls in Customer Credits.”  
4

5 The Callan model does not include such a make-up provision. Instead, it accumulates the  
6 shortfalls, including the tax gross-up described above, over time and deducts them from any  
7 Trust ending surplus before Surplus Sharing, effectively crediting them back to customers at the  
8 end of the Trust’s life. Because Callan’s model does not account for any time-value-of-money  
9 for these risky “loans” to the Trust, it understates their economic cost. To compensate, TURN  
10 added a cost-of-capital charge to the shortfall payments equivalent to PG&E’s ROE as the  
11 “loans” are only reimbursed with Additional Shareholder Contributions, which, as explained  
12 above, have the same risk profile as PG&E’s equity.

13 *Surplus Sharing.* PG&E proposes to share with customers 25% of any Customer Credit  
14 Trust surplus. The 75% of Trust surplus that goes to PG&E is a third loss of value to customers  
15 that is not reflected in the comparison of their assets and liabilities.

16 **D. More realistic assumptions and properly accounting for customer costs**  
17 **significantly reduce the probability the Securitization will be ratepayer-neutral**

18 TURN had access to Callan’s Monte Carlo simulation model and consulted with Callan  
19 through a series of information-sharing sessions organized by PG&E to assist TURN in using it.  
20 TURN re-ran the model’s ~~2,000 Monte Carlo simulations~~ with its own assumptions for PG&E’s  
21 income (Additional Shareholder Contribution timing) and Trust returns, and with the other  
22 adjustments described above.<sup>27</sup> Table 3 compares TURN’s results to those presented by PG&E in  
23 Table 6-7: Range of Surplus Outcomes and Year of First Shortfall [~~PG&E testimony, p. 6-29~~].<sup>28</sup>  
24 Under these more realistic assumptions, the Trust has a 4443% probability of shortfall over the

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<sup>27</sup> During its conversations with Callan, TURN learned that the model Callan uses to forecast return’s  
~~model~~ contains numerous “tuning” parameters that require recalibration whenever any ~~return~~-assumption  
is changed – a process Callan advised against. Instead, TURN ~~developed~~ generated a larger set of  
simulation runs (10,380, compared to Callan’s 2,000) using Callan’s assumptions, used-scaled them to its  
own return assumptions using well-known statistical techniques (normal rescaling), ~~to adjust Callan’s~~  
~~2,000-simulated return forecasts~~ and re-simulated the Trust’s performance. This approach allowed TURN  
to produce reliable results running the model ~~under different assumptions~~ on its own while still retaining  
the nuanced cross-asset and inter-temporal relationships embedded in Callan’s return forecasting models.

<sup>28</sup> PG&E testimony, p. 6-29.

1 course of its life- and a 15% probability of shortfall as early as 2029 (corresponding to the 85<sup>th</sup>  
2 percentile and shaded in gray in the table). In contrast, PG&E's analysis concludes a shortfall  
3 that early in the Trust's life is virtually impossible, with the *earliest* shortfall in its 2,000  
4 simulations occurring fourteen years later in 2043. This stark difference in the potential onset of  
5 Trust shortfalls is a clear demonstration of how PG&E's analysis grossly underestimates the  
6 Securitization's risks to ratepayer-neutrality.

7 While the expected future value of the Trust, at \$1.1950 ~~b~~million (Table 3, line 20), is  
8 positive, the customer value is -\$0.3304 billion (in 2050 dollars) ~~after~~ under the Surplus Sharing  
9 mechanism, under which customers absorb 100% of deficits but keep only 25% of surpluses.<sup>29</sup>  
10 This is just one of several asymmetric aspects of the Trust that erode its value to customers.

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<sup>29</sup> 25% x \$1,973,718 = \$0.49304 - \$0.824768 = -\$0.3308.

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**Table 3: Range of surplus outcomes and year of first shortfall under PG&E and TURN income and return assumptions**

\$ million

Line no.	Percentile	PG&E		TURN	
		Nominal surplus (deficit)	First shortfall year	Nominal surplus (deficit)	First shortfall year
1	5%	\$16,639	NA	<del>\$9,618</del> <del>\$8,386</del>	<del>NANA</del>
2	10%	\$12,642	NA	<del>\$6,829</del> <del>\$5,671</del>	<del>NANA</del>
3	15%	\$9,874	NA	<del>\$5,243</del> <del>\$4,520</del>	<del>NANA</del>
4	20%	\$8,176	NA	<del>\$4,178</del> <del>\$3,547</del>	<del>NANA</del>
5	25%	\$7,005	NA	<del>\$3,301</del> <del>\$2,943</del>	<del>NANA</del>
6	30%	\$6,034	NA	<del>\$2,628</del> <del>\$2,367</del>	<del>NANA</del>
7	35%	\$5,180	NA	<del>\$2,041</del> <del>\$1,877</del>	<del>NANA</del>
8	40%	\$4,468	NA	<del>\$1,559</del> <del>\$1,417</del>	<del>NANA</del>
9	45%	\$3,860	NA	<del>\$1,112</del> <del>\$1,029</del>	<del>NANA</del>
10	50%	\$3,276	NA	<del>\$694</del> <del>\$652</del>	<del>NANA</del>
11	55%	\$2,785	NA	<del>\$292</del> <del>\$226</del>	<del>NANA</del>
12	60%	\$2,292	NA	<del>(\$40)</del> <del>(\$148)</del>	<del>2050</del> <del>2050</del>
13	65%	\$1,809	NA	<del>(\$507)</del> <del>(\$505)</del>	<del>2049</del> <del>2049</del>
14	70%	\$1,372	NA	<del>(\$981)</del> <del>(\$976)</del>	<del>2048</del> <del>2048</del>
15	75%	\$914	NA	<del>(\$1,446)</del> <del>(\$1,346)</del>	<del>2047</del> <del>2047</del>
16	80%	\$421	NA	<del>(\$1,905)</del> <del>(\$1,696)</del>	<del>2046</del> <del>2046</del>
17	85%	(\$106)	2050	<del>(\$2,423)</del> <del>(\$2,214)</del>	<del>2029</del> <del>2029</del>
18	90%	(\$851)	2049	<del>(\$3,253)</del> <del>(\$2,917)</del>	<del>2027</del> <del>2027</del>
19	95%	(\$1,928)	2047	<del>(\$5,094)</del> <del>(\$4,785)</del>	<del>2027</del> <del>2027</del>
20	Expected value (EV)	\$4,414		<del>\$1,150</del> <del>\$950</del>	
21	EV positive outcomes	\$4,566		<del>\$1,973</del> <del>\$1,718</del>	
22	EV negative outcomes	(\$152)		<del>(\$824)</del> <del>(\$768)</del>	
23	Customer EV	\$535		<del>(\$330)</del> <del>(\$338)</del>	
24	Breakeven pre-tax return	4.04%		<del>5.17%</del> <del>4.71%</del>	
25	Probability of surplus/deficit	84%/16%		<del>60%/40%</del> <del>58%/42%</del>	
26	Probability of shortfall <sup>30</sup>	16%		<del>43%</del> <del>44%</del>	

<sup>30</sup> “Shortfall” refers to the Trust’s inability to fully fund the Customer Credit at any point in its life, a key criterion of ratepayer neutrality. “Surplus” and “deficit” refer to Trust ending values. It is possible to have

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With these modeling results ~~we can adjust our~~ the customer asset/liability calculation can be adjusted for the loss of customer value due to the Customer Credit (CC) shortfall tax gross-up (plus its time-value-of-money) and the Surplus Sharing.<sup>31</sup> The expected value in 2050 of the Customer Credit shortfall tax gross-up is \$0.207 billion. The loss of customer value due to Surplus Sharing, relative to the value of the Trust assets, is simply the difference between the Trust and customer expected values: \$1.150 billion + \$0.330 billion = \$1.480 billion. Each is discounted each back from 2050 at its respective cost of capital – PG&E’s ROE (10.25%) for the CC shortfall tax gross-up and the expected after-tax return on the Trust (5.0%) for Surplus Sharing – yields additional losses of \$0.01 billion and \$0.34 billion. As shown in Figure 11, the customer gap is now \$4.089 billion, leaving the Trust 49% under-funded.<sup>32</sup>

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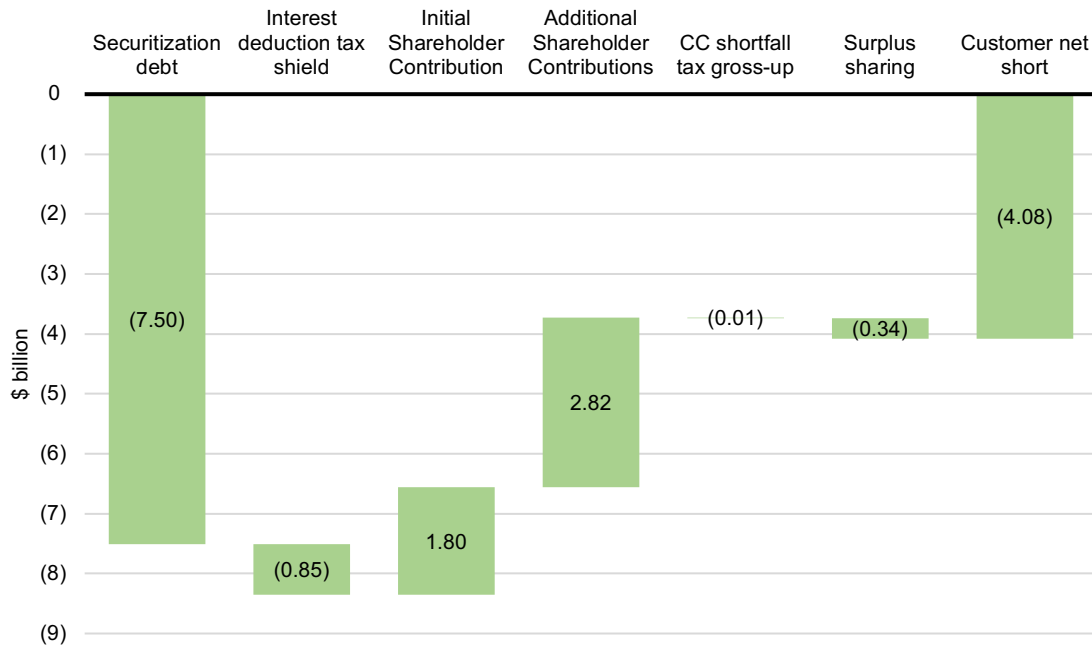
a shortfall and still end in surplus after Additional Shareholder Contributions are added to the Trust and earn a return.

<sup>31</sup>~~The loss of customer value due to Surplus Sharing, relative to the value of the Trust assets, is simply the difference between the Trust and customer expected values (\$950 + \$388 = \$1,288).~~

<sup>32</sup>~~For Surplus Sharing, the expected after tax return on the Trust (4.77%). The expected value of the Customer Credit shortfall tax gross up, \$197 million, in 2050, is discounted at PG&E’s ROE (10.25%).~~

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**Figure 11: Breakdown of customer net short**



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We can also examine ~~Figure 12 presents~~ the sequential impact effect of each of TURN's changes ~~sequentially~~ on the probability of shortfall, ~~as shown in Figure 12~~. Note that no single change to PG&E's assumptions accounts for most of the difference in shortfall probability.

7

~~Additional Shareholder Contribution delays and~~ investor returns each contribute 9%, adds the most (+10%), but Additional Shareholder Contribution delays while and income variability and unanticipated ~~shocks~~ income shocks ~~each~~ add 3% and 6%, respectively. This highlights the importance of recognizing *all* the potential risks to ratepayer neutrality, not just those that are obvious or easy to quantify.<sup>33</sup>

12

While TURN believes even PG&E's estimated shortfall probability of 16% is unacceptably risky to ratepayer neutrality, no reasonable person would conclude that a ~~434%~~ risk meets this standard. To put these figures in context, the Recovery Bonds that customers are guaranteeing are expected to obtain a AAA credit rating. Since 1980, AAA-rated bonds have had

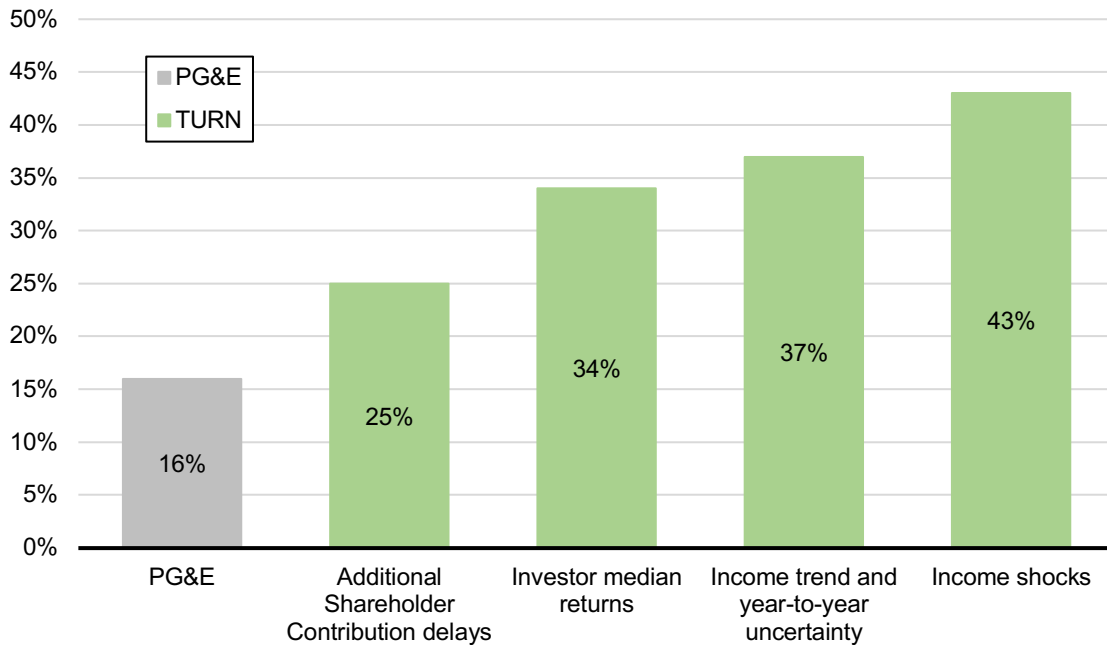
15

<sup>33</sup> TURN recognizes that this analysis does not incorporate other known risks, such as changes in tax law or corporate actions that could materially impact taxable income (e.g., asset sales, acquisitions, change of control), and ~~many~~ others yet to be identified.

1 a default rate of 0.00%. The quality of the customer guarantee to Recovery Bondholders far  
 2 exceeds that of PG&E’s pledge to customers, another reflection of the yawning gap in value  
 3 between customer assets and liabilities.

4  
 5

**Figure 12: Probability of Customer Credit shortfall under PG&E and TURN assumptions**



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8 **IV. Potential remedies**

9 PG&E’s proposed Securitization and Customer Credit Trust is clearly a very bad deal for  
 10 customers: a \$4.089-billion loss in present value terms and an unacceptably high risk of not  
 11 being ratepayer-neutral. TURN therefore recommends the CPUC reject PG&E’s application to  
 12 protect ratepayer interests.

13 Should the Commission feel compelled to approve the Securitization, TURN has  
 14 identified several potential remedies, which singly or in combination could mitigate the risk to  
 15 customers and bring PG&E’s proposal closer to ratepayer-neutrality.

16 *Increase the Initial Shareholder Contribution.* The foregoing analysis suggests two  
 17 potential criteria for determining an Initial Shareholder Contribution that is fair to customers and  
 18 has a reasonable probability of being ratepayer-neutral throughout its life. The first is to close the



1 current customer present-value net short of \$4.0~~89~~ billion. Adding this to the currently proposed  
2 \$1.8 billion brings the total Initial Shareholder Contribution to \$5.8~~89~~ billion.

3 A second criterion is to ensure a maximum specified probability of shortfall over the  
4 Trust's life (currently 4~~34~~%). Customers are providing sufficient security of payment to earn the  
5 Recovery Bonds a credit rating of AAA, which historically has corresponded to a 0% default  
6 rate. The Callan model ~~has only 1/2,000 = 0.05% resolution, but we can use the model can be~~  
7 used to estimate an Initial Shareholder Contribution that would provide customers comparable  
8 security of payment from the Trust produces a shortfall probability of less than 0.05%.

9 Figure 13, which plots the shortfall probability (in log-scale) against the Initial  
10 Shareholder Contribution (ISC), illustrates this approach. In the base case (black line), PG&E's  
11 proposed \$1.8-billion ISC has a shortfall probability ( $P_s$ ) of 4~~34~~%. As ~~we increase~~ the ISC is  
12 increased,  $P_s$  declines exponentially: at ISC = \$2.5 billion,  $P_s = 1~~20~~%, and at ISC = $3.5 billion,  
13  $P_s = 1$ %. ~~We can extend this~~ This line can be extended by increasing the ISC until ~~our~~ the target  
14  $P_s$  is met.$

15 Because the relationship between  $P_s$  and ISC is exponential, mathematically, even an  
16 infinite ISC would not reduce the shortfall probability to 0.00%. Historical AAA default rates are  
17 reported only to two decimal places, so a default rate of  $\frac{1}{2}$  of 0.01% would still be reported as  
18 0.00%. TURN useds this standard – 0.005% – as the target shortfall probability. To meet this  
19 standard, the Initial Shareholder Contribution would need to be \$6.~~04~~ billion (indicated by the  
20 open bubble at the end of the black dashed trend line), consistent with closing the present value  
21 gap.<sup>34</sup>

22 *Increase the Additional Shareholder Contributions.* This testimony has already identified  
23 one cash flow stream that rightly belongs to customers yet is not being contributed to the Trust –  
24 the interest tax shield on the Recovery Bonds, which has a present value of \$0.85 billion.  
25 TURN's analysis indicates that increasing the Additional Shareholder Contributions (ASC) by  
26 the Recovery Bond interest tax shield can reduce the probability of shortfall from 4~~34~~% to 1~~10~~%.

---

<sup>34</sup> The present value gap before the ISC is \$4.08 billion + \$1.8 billion (PG&E's proposed ISC) = \$5.9 billion.

1 Contributing the interest tax shield would benefit both PG&E and customers. As  
2 explained previously, the present value is \$0.85 billion. With the interest contribution, satisfying  
3  $P_s = 0.005\%$  would require an ISC of \$4.86 billion (indicated by the open bubble at the end of  
4 the gray dashed line representing the “Interest ASC” scenario), for a total contribution of \$5.645  
5 – \$0.365 billion less than would be required by increasing the ISC alone. A lower total  
6 shareholder contribution is required because the interest deduction would flow into the Trust  
7 over its entire life and more closely match the Trust’s expected outflows than the returns on the  
8 ISC.<sup>35</sup> This bigger “bang for the buck” can be observed in the steeper downward slope of the  
9 “Interest ASC” line relative to the base case.

10 A second potential source of cash flow that could be used to protect customers is PG&E’s  
11 dividend, which it plans to resume as early as 2023 and would distribute nearly [REDACTED] to  
12 shareholders through [REDACTED].<sup>36</sup> As a condition of approval, the CPUC could require PG&E to make  
13 a voluntary but binding commitment to dedicate some portion of its future dividends to the Trust  
14 for a specified period of time (up to and including the life of the Trust) or until Trust assets reach  
15 a specified level. TURN’s modeling indicates contributing an additional [REDACTED]  
16 [REDACTED] in future dividends can reduce the  
17 probability of shortfall over the Trust’s life to 10% and would require an ISC of \$4.96 billion to  
18 meet  $P_s = 0.005\%$ , comparable to the effect of contributing the interest tax shield (the orange line  
19 representing the “Dividend ASC” scenario in Figure 13).<sup>37</sup>

20 While the relationship between ISC and  $P_s$  for the dividend contribution is similar to that  
21 for the interest tax shield (as indicated by their overlapping plots), it is likely more expensive to

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<sup>35</sup> The Customer Credit is intended to offset the FRC, which corresponds to the Securitization debt’s interest and principal.

<sup>36</sup> PG&E testimony, Chapter 5, Exhibit 5.6, p. 5; PG&E testimony Chapter 1, Exhibit 1.5, p. 29.

<sup>37</sup> TURN estimated this amount as [REDACTED]

[REDACTED]. In TURN’s modeling, the dividend is based on the underlying income trend growth rate, before the addition of year-to-year variation or shocks, to reflect their general stability. In the event of a negative shock, the dividend is suspended for four years; 50% of positive shocks are distributed as one-time dividends.

1 PG&E. While the nominal value of the dividend contributions would be [REDACTED], the  
2 present value would be [REDACTED] at PG&E's 10.25% ROE.

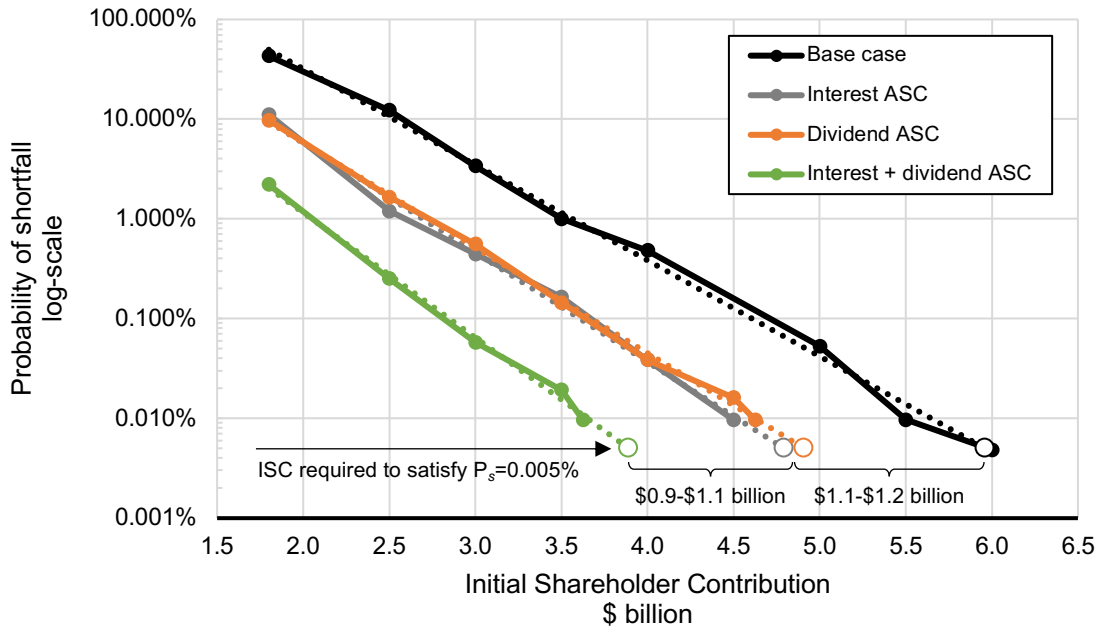
3 The interest tax benefit and dividend contributions are combined in the "Interest +  
4 dividend ASC" scenario represented by the green line in Figure 13. Combined, they reduce the  
5 required ISC by \$2.1 billion (a bit less than the sum of their individual effects<sup>38</sup>), to \$3.9 billion.

6 ~~Somewhat surprisingly, the benefits of combining the interest and dividend contributions~~  
7 ~~are not additive. We might expect that if the interest and dividend contributions each reduced the~~  
8 ~~required ISC at  $P_s = 0.005\%$  by \$1.5 billion, contributing both would reduce the required ISC by~~  
9 ~~\$3.0 billion. Combined, though, they only reduce the required ISC by \$2.3 billion, to \$3.8 billion~~  
10 ~~(the "Interest + dividend ASC" scenario represented by the green line in Figure 13).~~

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<sup>38</sup> The effects are not directly additive because the relationship between ISC and  $P_s$  is exponential. It is possible to estimate the sum of the effects of the interest and dividend contributions from their individual regression lines; the resulting estimate of the required ISC is within 2% of the estimate using the combined model results.

1 **Figure 13: Probability of CCT shortfall as a function of Initial Shareholder Contribution under**  
 2 **different Additional Shareholder Contribution scenarios**



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 5 A third potential source of incremental cash is the removal of the Customer Credit  
 6 shortfall tax gross-up described previously. According to TURN’s analysis, the expected cost of  
 7 this gross-up over the life of the Securitization is \$~~20~~<sup>19</sup>7 million (in 2050).<sup>39</sup> Worse, it adds  
 8 insult to injury since customers are already paying the difference between the Customer Credit  
 9 and the FRC. This provision should simply be removed from the Trust agreement.

10 *Change the Surplus Sharing mechanism.* This testimony previously identified one  
 11 deficiency in the Surplus Sharing mechanism: the Trust’s ending surplus/deficit does not account  
 12 for the time-value-of-money of any Customer Credit shortfalls. In its modeling, TURN added a  
 13 capital charge equal to the Trust’s after-tax expected return. This addition is one potential  
 14 remedy.

<sup>39</sup> PG&E’s testimony [p. 6-2] refers to a make-up provision(p. 6-2) that would reimburse customers for both the Customer Credit shortfall and tax gross-up from future Additional Shareholder Contributions, but details are not provided and Callan’s model does not include such a mechanism.

## Appendix B: Inventory of Capital Market Assumptions Reports

Line no.	Investment management or consulting firm	Report title	Date
1	American Century Investments	Long-Term Capital Market Assumptions: Methodology and Models Underpinning Asset Allocation Solutions	9/19
2	Aon	Capital Market Assumptions	6/20
3	AQR Capital Management	Capital Market Assumptions: Expected real returns for major asset classes	3/20
4	BlackRock Investment Institute	Capital Market Assumptions	6/20
5	BNY Mellon Wealth Management	10-Year Capital Market Assumptions: Calendar Year 2020	3/20
6	Callan Institute	Capital Market Assumptions: 2020-2029	2/20
7	Cliffwater LLC	Cliffwater Q1 2020 Long Term (10 Year) Capital Market Assumptions	1/20
8	Evestment PMC Quantitative Research Group	Capital Markets Assumptions 2020	3/20
9	fi <sup>3</sup> Financial Advisors	April 2020 Outlook	4/20
10	GMO LLC	7-Year Asset Class Real Return Forecasts	8/20
11	Graystone Consulting (Morgan Stanley)	Annual Update of GIC Capital Market Assumptions	4/20
12	Invesco Investment Solutions	2020 Long-Term Capital Market Assumptions: Q3 update	6/20
13	J.P. Morgan Asset Management	2020 Long-Term Capital Market Assumptions: LTCMA Mark-to-Market: COVID-19 - new cycle, new starting point	3/20
14	Morningstar Research	Morningstar Markets Observer	6/20
15	Northern Trust	Capital Market Assumptions: Five-Year Outlook: 2021 Edition	8/20
16	PIMCO	PIMCO's Capital Market Assumptions, June 2020	6/20
17	QMA (PGIM)	2020 Q3 Capital Market Assumptions	6/20
18	Research Affiliates	Asset Allocation Interactive	8/20
19	Sellwood Consulting LLC	2020 Capital Market Assumptions	2/20
20	State Street Global Advisors	Long Term Asset Class Forecast: Q2 2020	3/20
21	T. Rowe Price	Capital Market Assumptions: Five-Year Perspective 2020	1/20
22	UBS	Capital Market Assumption (CMA) & Strategic Asset Allocation (SAA) Updates: Strategic and equilibrium assumptions & SAA models by risk and investor characteristic	4/20
23	Vanguard Research	<a href="#"><u>Beyond the pandemic: What to expect from stocks, bonds</u></a> <a href="#"><u>Vanguard economic and market outlook for 2020: The new age of uncertainty</u></a>	<a href="#"><u>6/20</u></a> <a href="#"><u>12/19</u></a>
24	Verus Advisory	2020 Capital Market Assumptions	11/19
25	Wells Fargo Investment Institute	2020 Capital Market Assumptions: Methodology--the building-block approach	7/20

[Calculations supporting TURN's 30-year return forecasts can be found in Mr. Ellis's workpapers Excel file, tabs CMA and F7-9 T1 AppB.](#)

**Appendix C: Modeling assumptions and data sources for three sources of uncertainty TURN incorporated into PG&E’s income outlook**

Line no.	<b>EBIT growth trend</b>		
1	<b>Model</b>	Normally distributed random compound annual growth from 2024	
	<b>Input assumptions</b>	<u>Mean</u>	Standard deviation <u>(uncorrelated)</u>
2	Mean growth	1.468%	0.82%
3	= real demand	0.156%	0.6979%
4	+ efficiency	-0.16%	0.218%
5	+ inflation	1.876%	0.40%
6	<b>Years applied</b>	2025-50	
	<b>Sources</b>		
7	Demand	Weighted average (by share of PG&E income, 82 <del>3</del> %/18 <del>7</del> % electric/gas) <u>growth rate from of PG&amp;E 2020 Integrated Energy Policy Report (IEPR) Update “2020-30 <del>B</del>Baseline Forecast – Mid Demand Case” for PG&amp;E electric and natural gas demand forecast growth rates</u>	24 weighted average growth rates from 8 electric and 3 gas IEPR demand forecasts
8	Efficiency	<u>EIA AEO Reference case real electricity retail price growth rate - Energy Information Administration Annual Energy Outlook 2020 (EIA AEO 2020) Reference case</u>	22 <u>real electricity price growth rates from EIA AEO 2020 Reference and Side case real electricity price growth rates</u>
9	Inflation	<u>Federal Reserve Bank of St. Louis October 2020 monthly average 30-year breakeven inflation rate for September 2020 from Federal Reserve Bank of St. Louis</u>	22 <u>CPI growth rates from EIA AEO 2020 Reference and Side case CPI growth rates</u>
	<b>Year-to-year variation</b>		
10	<b>Model</b>	Normally distributed random yearly percentage variation from PG&E (2021-24) or TURN continuously compounded (2025-50) static EBIT forecast	
11	<b>Input assumptions</b>	Zero mean. Standard deviation (14.9%) of percentage differences in PG&E’s 1988-2019 EBIT from its underlying growth trend, excluding one-off shocks (greater than +/-50%)	
12	<b>Years applied</b>	2021-2050 with five-year linear phase-in factor (0.2 in 2021, ..., 1.0 in 2025)	
13	<b>Source</b>	FERC Form 1 via S&P Global	
	<b>Periodic shocks</b>		
14	<b>Models</b>	Exponentially distributed random event arrival times	Log-normally distributed random percentage variation from PG&E (2021-24) or TURN continuously compounded (2025-50) static EBIT forecast
15	<b>Input assumptions</b>	Average frequency of one-off shocks to PG&E EBIT, 1988-2019	Historical EBIT shocks, 1988-2019 (percentage difference from underlying growth trend greater than +/-50%)
16		<u>Mean</u> Positive: 2/32 = 0.0625 Negative: 4/32 = 0.125	<u>Mean   standard deviation</u> Positive: 145%   103% Negative: -373%   234%
17	<b>Years applied</b>	Positive: 2024-50; negative: 2021-50	
18	<b>Source</b>	FERC Form 1 via S&P Global	