

**STATE OF NEW JERSEY  
BOARD OF PUBLIC UTILITIES**

**IN THE MATTER OF THE PETITION OF  
PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
FOR APPROVAL OF ITS CLEAN ENERGY FUTURE-  
ENERGY EFFICIENCY (“CEF-EE”) PROGRAM ON A  
REGULATED BASIS**

**BPU Docket Nos. GO18101112 and EO18101113**

**REBUTTAL TESTIMONY AND EXHIBITS  
OF  
ISAAC GABEL-FRANK**

**ON BEHALF OF  
PUBLIC SERVICE ELECTRIC AND GAS COMPANY**

**APRIL 15, 2019**

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**PUBLIC SERVICE ELECTRIC AND GAS COMPANY  
REBUTTAL TESTIMONY  
OF  
ISAAC GABEL-FRANK  
VICE PRESIDENT, GABEL ASSOCIATES, INC.**

1       **I.    INTRODUCTION**

2       **Q.    Please state your name and business address.**

3       A.    My name is Isaac Gabel-Frank and my business address is 417 Denison Street, Highland  
4       Park, New Jersey, 08904. I am presently employed as a Vice President at Gabel Associates, Inc.,  
5       an energy, environmental, and public utility consulting firm.

6       **Q.    Please summarize your professional experience and educational background.**

7       A.    As a Vice President at Gabel Associates, Inc., I perform specialized economic, financial,  
8       tariff, regulatory, and marketplace analysis for various energy projects including energy  
9       efficiency, renewable energy, cogeneration, and traditional generation sources. This  
10       comprehensive analysis takes into account all critical cost/benefit factors and is designed to  
11       quantify the economic outcome of customized projects to support investment decisions.  
12       Through this work, I also monitor the electricity, natural gas, and renewable markets and offer  
13       tailored insights in that regard. Since beginning work at Gabel Associates, Inc. in 2009, I have  
14       evaluated a myriad of projects for both public and private clients and assisted in the analysis,  
15       development, and implementation for all types of technologies and contractual arrangements.  
16       This includes the development of proprietary models that evaluate the viability of projects, as  
17       well as long-term forecasts that are based on market signals and industry knowledge.

18       I use my knowledge of wholesale electricity and natural gas markets, paired with my  
19       experience working with retail tariffs, to deliver in-depth market forecasts which are used to  
20       assess and undertake project investment decisions. I am also versed on regional transmission

1 organizations (“RTOs”), including the offering of energy efficiency, demand response,  
2 renewable, and traditional generation resources into the PJM market, and was a lead contributor  
3 in the development of a proprietary statistical model that computes the risk exposure of capacity  
4 resources within the PJM and ISO-New England footprints.

5 I received a BA in Economics, Political Science, and English Writing from the University  
6 of Pittsburgh.

7 Further work experience is detailed in my resume provided in the attached Schedule IGF-  
8 CEF-EE-1.

9 **Q. What experience do you have in conducting cost-benefit analyses for energy**  
10 **efficiency programs?**

11 A. In 2018, I prepared analysis and supporting testimony for the South Jersey Gas, New  
12 Jersey Natural Gas, and Elizabethtown Gas energy efficiency filings. In 2017, I prepared Public  
13 Service Electric and Gas Company’s (“PSE&G” or “Company”) Cost-Benefit Analysis (“CBA”)  
14 using the five tests required by the New Jersey Board of Public Utilities’ (“BPU” or “Board”)  
15 Minimum Filing Requirements (“MFR”) in support of PSE&G’s 2017 Energy Efficiency  
16 Program filing, as well as provided expert testimony in relation to the CBAs. I have also  
17 completed numerous cost-benefit analyses for federal agencies across the United States, as well  
18 as a multitude of counties, municipalities, and school districts within the State of New Jersey. In  
19 addition, I am currently preparing cost-benefit analyses for other utilities in New Jersey to  
20 support their upcoming energy efficiency filings.

21 The projects I have analyzed range in type and size and represent an array of different  
22 technologies and configurations. Having performed this analysis for projects with varying  
23 degrees of complexity, I am extremely familiar with the process and methodology to formulate  
24 an objective and balanced cost-benefit study.

1 **Q. Did you prepare the cost-benefit analysis supporting the petition of PSE&G for the**  
2 **Clean Energy Future – Energy Efficiency (“CEF-EE”) filing?**

3 A. Yes. I assisted PSE&G with preparing the CBA for the CEF-EE filing, which calculates  
4 and details the results of the five tests prescribed in the MFRs as required by the BPU. This  
5 entailed developing a model that analyzed measure-specific details and computed the estimated  
6 costs and savings of each program for use in the Total Resource Cost (“TRC”) test, the  
7 Participant Cost test (“PCT”), the Program Administrator Cost (“PAC”) test, the Ratepayer  
8 Impact Measure (“RIM”) test, and the Societal Cost test (“SCT”).

9 **II. PURPOSE OF THIS TESTIMONY**

10 **Q. Please describe the purpose of your rebuttal testimony.**

11 A. The purpose of my rebuttal testimony is to respond to the concerns and adjustments  
12 proposed by Rate Counsel witnesses Ezra D. Hausman, Ph.D. and David E. Dismukes regarding  
13 the cost-benefit analysis supporting the Company’s CEF-EE filing. My rebuttal testimony only  
14 responds to the issues related to Rate Counsel’s criticisms of the cost-benefit analysis and does  
15 not address other issues raised by these witnesses. PSE&G witnesses Karen Reif, Stephen  
16 Swetz, and Daniel Hansen address additional issues in their rebuttal testimonies.

17 **Q. How is your testimony organized?**

18 A. My testimony is organized in the following manner:

- 19 • I provide a summary of my conclusions based upon my review of Dr. Hausman’s and  
20 Dr. Dismukes’ direct testimonies;
- 21 • I respond directly to the criticisms raised by Dr. Hausman;
- 22 • I respond directly to the criticisms raised by Dr. Dismukes;
- 23 • I summarize the corrections I made to the CBA;
- 24 • I provide a conclusion based upon my rebuttal of Dr. Hausman’s and Dr. Dismukes’  
25 testimonies, as well as the updates made to the CBA.

1       **III.    SUMMARY OF CONCLUSIONS**

2       **Q.    Please summarize your conclusions and recommendations for the Board in this case.**

3       A.    Based on my review of Dr. Hausman’s and Dr. Dismukes testimonies, most of their  
4 concerns are unfounded and do not change my analysis or the findings that the CEF-EE filing is  
5 cost-effective. These include:

- 6           1) Dr. Hausman claims that free measures provided to participants are not a benefit to  
7 those participants, and therefore should not be included in the PCT as a benefit. I  
8 disagree with this claim, as any incentive provided to participants is meant to  
9 encourage increased use of energy efficient measures, equipment, practices, and  
10 behavior. If the incentive had no benefit to the participant, why would it be provided  
11 at all?
- 12          2) Dr. Hausman claims that avoided wholesale supply costs should be included as a  
13 utility cost in the RIM test. I disagree with this claim. Because New Jersey is  
14 deregulated, avoided wholesale supply costs are not reallocated to ratepayers;  
15 therefore, there is no additional utility cost.
- 16          3) Dr. Hausman and Dr. Dismukes question the use of a societal discount rate in the  
17 SCT. I disagree with this criticism and provide numerous sources to support the  
18 conclusion that the SCT should be calculated using the societal discount rate.
- 19          4) Dr. Dismukes claims that market-based costs of emissions, such as RGGI allowance  
20 prices, should be used to value avoided emissions. I disagree with this criticism, and  
21 demonstrate that market-based costs do not capture all externalities. Dr. Dismukes’  
22 approach does not recognize the benefits from emissions reductions, and is  
23 inconsistent with the strong climate change policy of Governor’s Murphy  
24 administration and the Clean Energy Act.<sup>1</sup>
- 25          5) Dr. Dismukes references two previous Board Orders to justify the exclusion of the  
26 social cost of emissions, Demand Reduction Induced Price Effects (“DRIPE”)  
27 benefits, hedge volatility benefits, the avoided Renewable Portfolio Standard (“RPS”)  
28 cost forecast used in the CEF-EE filing, and the use of AURORAxmp (“AURORA”)

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<sup>1</sup> See N.J.S.A. 48:3-87.9(d)(2) (requiring utility energy efficiency programs to have a benefit-to-cost ratio of at least 1.0 at the portfolio level, “considering both economic and environmental factors”).

1 as a modeling tool. I disagree with this criticism and provide my reasoning for  
2 including these benefits, as well as for the reasonableness of using AURORA to  
3 calculate DRIPE benefits.

- 4 6) Dr. Dismukes produced an alternative CBA that, despite omitting a number of  
5 benefits and not conforming to standard cost-effectiveness practices, finds that the  
6 CEF-EE filing is cost-effective. Despite the fact that Dr. Dismukes' alternative CBA  
7 found the CEF-EE filing to be cost-effective, I disagree with his calculation methods,  
8 and believe he has significantly underestimated the benefits of the CEF-EE filing.

9 I also proposed a few minor changes to the CBA based upon the recommendations of Dr.  
10 Hausman, Dr. Dismukes, and other factors. These include:

- 11 1) I added the time value of on-bill repayment loans to participants in the PCT, PAC,  
12 and RIM tests. In the PCT, this was included as a benefit because allowing  
13 participants to avoid an up-front cost and pay back over time is a benefit. In the PAC  
14 and RIM tests, this was included as a cost.
- 15 2) I updated the source used to determine SO<sub>2</sub> and NO<sub>x</sub> emission damages and also  
16 updated the GDP deflator used to convert the forecasts from real dollars into nominal  
17 dollars. The updated GDP deflator applies to the forecasts for CO<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub>.
- 18 3) I updated the calculation of economic multiplier benefits to capture CEF-EE Program  
19 expenditures as a cost to ratepayers and the economy.
- 20 4) I adjusted the discount rate used to calculate the net-present value in the SCT to 3.0%.  
21 It had previously been calculating using a discount rate of 2.77%, equal to the yield of  
22 a 30-year treasury bond at the time of developing the CBA.

23 These updates result in some changes to the results of the CBA, which are summarized in  
24 the table below:

25 **Table 1: Updated CBA Results**

	SCT	TRC	PC	PAC	RIM
Residential Programs	4.3	1.1	12.2	1.4	0.7
C&I Programs	4.5	1.1	5.3	1.5	1.0
Low Income Programs	1.8	0.4	n/a	0.4	0.3
<b>Total Portfolio</b>	<b>4.3</b>	<b>1.0</b>	<b>6.7</b>	<b>1.4</b>	<b>0.9</b>

1 As illustrated in the table above, the CEF-EE Program is cost-effective and will generate  
2 benefits that clearly exceed costs.

3 Accordingly, I have a number of recommendations for the Board. These include:

- 4 1) Accept the use of the August 2016 Technical Update of the Social Cost of Carbon for  
5 Regulatory Impact Analysis – Interagency Working Group on Social Cost of  
6 Greenhouse Gases (“IWG”)<sup>2</sup> to value the benefits associates with avoided carbon  
7 emissions, consistent with Governor Murphy’s climate change policies and accepted  
8 studies.
- 9 2) Accept the use of the February 2018 Environmental Protection Agency (“EPA”)  
10 Technical Support Document for Estimating Benefit per Ton of Reducing PM2.5  
11 Precursors from 17 Sectors<sup>3</sup> to value the benefits associated with avoided SO<sub>2</sub> and  
12 NOx emissions.
- 13 3) Accept the calculation I propose to include the time value of money of on-bill  
14 repayment loans provided to participants as a benefit to participants in the PCT, and a  
15 cost in the PAC and RIM tests.
- 16 4) Accept the calculation I propose of economic multiplier benefits and costs related to  
17 CEF-EE expenditures.
- 18 5) Accept the inclusion of a 3.0% discount rate in the SCT.
- 19 6) Reject the findings of Dr. Hausman, including:
  - 20 a. The statement that free measures are not a benefit to participants and should  
21 not be included in the PCT;
  - 22 b. The statement that avoided wholesale supply costs are a cost to ratepayers and  
23 should be included in the RIM; and
  - 24 c. The inference that the use of a societal discount rate is inappropriate in the  
25 SCT.
- 26 7) Reject the findings of Dr. Dismukes, including:

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<sup>2</sup> [https://www.epa.gov/sites/production/files/2016-12/documents/sc\\_co2\\_tsd\\_august\\_2016.pdf](https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf)

<sup>3</sup> [https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbptsd\\_2018.pdf](https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbptsd_2018.pdf)



- 1 a. The statement that market-based emissions costs, such as those determined  
2 through RGGI auctions, are the appropriate means to measure the benefits of  
3 avoided emissions;
- 4 b. The reference to previous Board Orders and the precedent setting nature of  
5 their findings;
- 6 c. The statement that the AURORA model is inappropriate to use, particularly to  
7 calculate DRIPE benefits;
- 8 d. The statement that hedge volatility benefits should not be included in the  
9 CBA;
- 10 e. The statement that the avoided RPS forecast used in the CEF-EE filing was  
11 inappropriate; and
- 12 f. The inclusion of Dr. Dismukes' own alternative CBA, which removed certain  
13 real benefits to participants and ratepayers.
- 14 8) Accept the cost-effectiveness findings of all five tests as they are calculated in a just  
15 and reasonable manner.
- 16 9) Approve the CEF-EE filing as it is cost-effective, is in the best interest of ratepayers,  
17 and provides a clear and achievable path to meet the goals set forth in the Clean  
18 Energy Act and align with the policy positions of Governor Murphy and the  
19 Legislature.

20 **IV. RESPONSE TO DR. HAUSMAN'S DIRECT TESTIMONY**

21 **Q. Please summarize Dr. Hausman's findings regarding the cost-benefit analysis.**

22 A. Dr. Hausman was not Rate Counsel's main witness on the cost-benefit analysis, but he  
23 did offer some criticisms and proposed changes to the CBA. Dr. Hausman found that the TRC  
24 test, which indicated that the CEF-EE Program as a whole was cost-effective, was "applied in a  
25 reasonable manner."<sup>4</sup> Dr. Hausman also indicated that he believed the PCT, PAC, RIM, and  
26 SCT tests contained errors which produced unreliable results.

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<sup>4</sup> Hausman Direct Testimony, page 29, line 14.

1 **Q. Do you agree with Dr. Hausman’s assessment of the cost-benefit analysis?**

2 A. I agree that the TRC test was properly calculated; however, I disagree that the balance of  
3 the CBA was calculated in a manner that produced results that were “unreliable for assessing the  
4 cost effectiveness of the proposed programs.”<sup>5</sup>

5 **Q. What portions of the cost-benefit analysis did Dr. Hausman believe were conducted**  
6 **erroneously?**

7 A. Dr. Hausman’s criticisms focused on four main issues. These issues include:

- 8 • the analytical approach to assessing the cost-effectiveness of subprograms with on-  
9 bill repayment loans in the PCT, PAC, and RIM tests;
- 10 • inclusion of free measures as an incentive in the PCT;
- 11 • the calculation of utility costs in the RIM test; and
- 12 • the use of a societal discount rate in the SCT.

13 I address each of these concerns below.

14 **Q. Please describe Dr. Hausman’s criticism of how you considered the value of on-bill**  
15 **repayment loans in the cost-benefit analysis.**

16 A. Dr. Hausman’s primary concern with the approach used in the CEF-EE filing is that the  
17 time value of money between when on-bill repayment loans are provided to customers and when  
18 those loans are repaid by customers was not captured. This criticism applies to the PAC, RIM,  
19 and PCT tests. Dr. Hausman did not identify any issues with the TRC test, and only identified a  
20 single issue regarding the SCT, which was unrelated to the time value of money of on-bill  
21 repayment loans.

22 **Q. Did you include the time value of money of on-bill repayment loans in the PCT,**  
23 **PAC, and RIM tests?**

24 A. No, I did not. In nominal terms, the value of on-bill repayment loans is zero because the  
25 loans that are provided to customers have no interest. However, on a present value basis, the

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<sup>5</sup> Hausman Direct Testimony, page 7, lines 13-14.

1 value of loans to customers is greater than the repayments made by customers on those loans.  
2 Therefore, I have made an adjustment to the PCT, PAC, and RIM tests in the CBA to account for  
3 this value. This correction is further discussed elsewhere in my testimony.

4 For the PAC and RIM tests, this value was included as an additional cost. In the PCT,  
5 the value was included as a benefit. Being that the PCT already provides positive results, this  
6 update only further increases the cost-effectiveness of the CEF-EE filing.

7 **Q. Did Dr. Hausman raise any other concerns regarding the calculation of the PCT?**

8 A. Yes. Dr. Hausman also stated that any subprogram that provided free measures to  
9 participants resulted in overstated benefits in the PCT for the CEF-EE filing.

10 **Q. Please describe Dr. Hausman's criticism of how the CEF-EE filing accounted for**  
11 **free measures in the PCT test.**

12 A. My approach to accounting for free measures in the CBA is to include free measures as  
13 incentives to customers. Dr. Hausman disagrees with this approach and only believes a direct  
14 payment to a customer, through a rebate for example, should be considered an incentive in the  
15 PCT. According to Dr. Hausman, "energy saving investments do not have intrinsic value to the  
16 customer beyond the associated reduction in energy use"<sup>6</sup> and therefore the PCT double-counted  
17 these benefits by including both "the market value of any equipment provided to customers as a  
18 benefit, in addition to the energy savings provided by that equipment."<sup>7</sup>

19 **Q. Do you agree with the concerns raised by Dr. Hausman regarding the PCT?**

20 A. No, I disagree with Dr. Hausman's suggestion to remove the inclusion of free measures  
21 as an incentive in the PCT. Free measures are incentives in the same way a rebate is an  
22 incentive, and should be applied as such in the PCT. All incentives, including both rebates and

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<sup>6</sup> Hausman Direct Testimony, page 32 lines 13-14.

<sup>7</sup> Hausman Direct Testimony, page 32 lines 11-12.

1 free measures, are designed to entice PSE&G customers to reduce energy consumption, and both  
2 have intrinsic value for participants because the measures have an incremental value to  
3 participants, regardless of whether it was fully or partially subsidized. Under Dr. Hausman’s  
4 proposed approach, nothing would be considered an incentive because energy saving  
5 investments would not have any intrinsic value beyond the bill savings. Finally, the calculation  
6 formula for the PCT in the California Standard Practice Manual (“CSPM”) specifically includes  
7 incentives and bill reductions as a benefit to the participant.<sup>8</sup> Therefore, including both is in line  
8 with accepted practices of cost-benefit analysis and should be included in the CBA.

9 **Q. Did Dr. Hausman identify any additional issues with the calculation of the RIM**  
10 **test?**

11 A. Yes. Dr. Hausman also raises a concern regarding the calculation of lifetime utility costs,  
12 stating that “the Company is claiming a benefit for ratepayers from foregone wholesale  
13 purchases of gas and electricity, but then ignoring the lost revenue from not selling that gas and  
14 electricity to its distribution customers.”<sup>9</sup>

15 **Q. Do you agree with Dr. Hausman’s critique of the RIM test calculations?**

16 A. No. The use of the lifetime utility cost is meant to capture all costs that would be avoided  
17 by participants and redistributed to ratepayers. Because New Jersey’s electric and natural gas  
18 wholesale supply is deregulated and separate from utility distribution, the reduction of wholesale  
19 supply is not redistributed to ratepayers by the utility and is therefore not a cost that should be  
20 considered in the RIM test. All electric and natural gas supply costs, even after embedding  
21 wholesale costs into retail prices, are either a pass-through cost from the utility, or billed  
22 separately by a third-party supplier. This fact means that Dr. Hausman’s statement that the RIM

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<sup>8</sup> CSPM, page 8.

<sup>9</sup> Hausman Direct Testimony page 34 lines 4-7.

1 test should include “utility costs at the full retail rate, with the rationale that the utility’s margin  
2 is not funded by EE program participants (because they are using less energy) and will ultimately  
3 have to be funded by nonparticipants through higher rates”<sup>10</sup> is incorrect because the full retail  
4 rate would not be recovered from nonparticipants.

5 **Q. Finally, did Dr. Hausman have concerns regarding the use of a social discount rate**  
6 **in the SCT?**

7 A. Yes. Dr. Hausman states that:

8 *PSE&G has applied a very low (“societal”) discount rate of 2.77% for the SCT to*  
9 *account for the time value of money, versus the utility discount rate of 6.8% that it*  
10 *applied for the TRC and all other tests. This discrepancy alone produces much*  
11 *higher calculated benefit-to-cost ratios, because most of the costs of the*  
12 *Company’s programs occur at the beginning, while the benefits occur over a*  
13 *projected measure life of 10 to 20 years. There is nothing in the CEA that directs*  
14 *utilities to use a “societal” discount rate when performing cost-benefit*  
15 *analyses.*<sup>11</sup>

16 **Q. Do you agree with Dr. Hausman’s intimation that the societal discount rate was**  
17 **used incorrectly?**

18 A. No. This is in direct conflict with the CSPM, which Dr. Hausman acknowledges  
19 “[p]ractitioners generally rely on...for standard definitions”<sup>12</sup> of the five most common cost-  
20 benefit tests. Specifically, the CSPM states that “[t]he Societal Test differs from the TRC test in  
21 that it includes the effects of externalities (e.g., environmental, national security), excludes tax  
22 credit benefits, and **uses a different (societal) discount rate.**”<sup>13</sup>

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<sup>10</sup> Hausman Direct Testimony page 33 lines 18-20.

<sup>11</sup> Hausman Direct Testimony, page 31, lines 6-13.

<sup>12</sup> Hausman Direct Testimony page 29, lines 10-11.

<sup>13</sup> CSPM, page 18 (emphasis added).

1 Consistent with the CSPM, which states that “a societal discount rate should be used”,<sup>14</sup>  
2 the SCT filed by PSE&G in this matter incorporated a societal discount rate to represent the  
3 intergenerational nature of the benefits included in the SCT. The National Standard Practice  
4 Manual (“NSPM”) also states that “[i]t is widely accepted that the societal discount rate should  
5 be used for the SCT. This is consistent with the notion of aligning the discount rate with the  
6 relevant perspective of the test. It is also consistent with the concepts and considerations  
7 described above regarding a societal preference for achieving policy objectives and placing  
8 greater weight on long-term resource impacts.”<sup>15</sup>

9 While I have maintained the use of a societal discount rate, I have updated the value of  
10 the discount rate from 2.77% to 3.0%. This change is discussed elsewhere in my testimony.

11 **V. RESPONSE TO DR. DISMUKES’ DIRECT TESTIMONY**

12 **Q. Please summarize Dr. Dismukes’ findings regarding the cost-benefit analysis.**

13 A. Dr. Dismukes supported PSE&G’s finding that the CEF-EE proposal is cost-effective,  
14 but raised several concerns regarding the cost-benefit analysis. These concerns include:

- 15 • the use of a societal discount rate;
- 16 • the use of social emissions benefits;
- 17 • the use of the AURORA modeling tool to calculate the value of DRIPE;
- 18 • the method to determine volatility hedge benefits;
- 19 • the calculation of economic multiplier benefits; and
- 20 • the future cost of avoided RPS costs to ratepayers.

21 I will respond to each of these concerns below.

22 **Q. You noted that Dr. Dismukes supported the cost-effectiveness results of the PSE&G**  
23 **proposal. Please elaborate.**

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<sup>14</sup> CSPM, page 19.

<sup>15</sup> NSPM, page 83.

1 A. Dr. Dismukes did not directly support the results as presented by PSE&G, but he did note  
2 the programs were cost-effective.<sup>16</sup> To make this statement, Dr. Dismukes conducted his own  
3 alternative cost-benefit analysis. It appears that Dr. Dismukes relied on much of the data  
4 presented in the CEF-EE filing, but made several significant changes that depart from commonly  
5 accepted energy efficiency cost-benefit methods and the CSPM. Dr. Dismukes did not rely on  
6 any of the cost-benefit tests outlined in the MFRs, but instead created his own test. Under this  
7 alternative CBA, according to Dr. Dismukes, the Company’s CEF-EE programs “appear to be  
8 cost effective.”<sup>17</sup>

9 **Q. Are you supportive of Dr. Dismukes’ alternate approach to conduct CBA on the**  
10 **subprograms?**

11 A. No, I am not. Dr. Dismukes made the following changes to conduct his alternative CBA:

12 *First, the societal value of avoided emissions is excluded given prior Board*  
13 *precedent discussed earlier. Second, my analysis includes the economic impacts*  
14 *of the program on ratepayer bills. Third, I use a discount rate equal to the*  
15 *Company’s weighted average cost of capital. Fourth, I remove the Company’s*  
16 *estimated volatility and DRIPE benefits for reasons stated earlier in my*  
17 *testimony. Lastly, my analysis uses the renewable energy adder included in the*  
18 *CEEEP analysis which is used for evaluating energy efficiency programs in place*  
19 *of the Company’s estimates for avoided REC purchases.*<sup>18</sup>

20 The majority of the changes undertaken by Dr. Dismukes are a sharp departure from the  
21 tests prescribed by the CSPM and commonly accepted cost-benefit testing methods for utility-  
22 sector energy efficiency programs. Dr. Dismukes provides no evidence or precedent where his  
23 CBA methodology was accepted, and provides no peer reviewed analysis of his method. For

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<sup>16</sup> Dismukes Direct Testimony, page 24, line 19 to page 25, line 9.

<sup>17</sup> Dismukes Direct Testimony, page 25, line 7.

<sup>18</sup> Dismukes Direct Testimony, page 23, lines 8-15.

1 these reasons alone, his methodology should be rejected, but Dr. Dismukes also discards and  
2 fails to consider several benefits that are real, tangible benefits to customers.

3 **Q. Do you agree with all of Dr. Dismukes' critiques, changes, and recommendations?**

4 A. No. There are a number of areas in which I disagree with Dr. Dismukes' assessment.  
5 The factors discussed by Dr. Dismukes that I disagree with include:

- 6 • The use of a societal discount rate;
- 7 • The use of market-based costs for emissions;
- 8 • The inference of precedent from previous Board Orders;
- 9 • The use of AURORA to calculate DRIPE value;
- 10 • The inclusions of volatility hedge benefits;
- 11 • The use of the Rutgers Center for Energy, Economic & Environmental Policy  
12 ("CEEEP") renewable energy certificate ("REC") Forecast; and,
- 13 • The acceptance of Dr. Dismukes' alternative CBA.

14 I address each of these areas of disagreement below.

15 **Q. Dr. Dismukes claims that the "benefits to society" used in the SCT "contradict**  
16 **normal ratemaking practices."<sup>19</sup> Do you agree?**

17 A. No. The SCT, as defined by both the CSPM and the NSPM, includes "benefits to  
18 society" which are used by decision makers to understand the impacts of energy efficiency  
19 programs.

20 The CSPM states that "[t]he Societal Test differs from the TRC test in that it includes the  
21 effects of externalities (e.g., environmental, national security), excludes tax credit benefits, and  
22 uses a different (societal) discount rate."<sup>20</sup> According to Dr. Hausman, "[p]ractitioners generally

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<sup>19</sup> Dismukes Direct Testimony, page 8, lines 11-12.

<sup>20</sup> CSPM, page 18.



1 rely on a common reference known as the California Standard Practice Manual (“CSPM”) for  
2 standard definitions of these tests.”<sup>21</sup> I have also relied on the prescribed approach in the CBA.

3 The NSPM states that in addition to the benefits included in the TRC, the SCT should  
4 include “any benefits experienced by society, including: low-income community benefits,  
5 environmental benefits, economic development benefits, and reduced health care costs.”<sup>22</sup>

6 Further, the SCT, and in fact all the cost-benefit tests, are intended to evaluate the cost-  
7 effectiveness of potential programs, not ratemaking practices.

8 **Q. What does Dr. Dismukes say about the discount rate used in the SCT?**

9 A. Dr. Dismukes states that the 2.77% discount rate used in the SCT, which was linked to  
10 the yield of the 30-year U.S. Treasury Bond, was “a rate lower than most “rules of thumb” that  
11 are commonly employed for societal discount rates of around three to four percent.”<sup>23</sup>

12 **Q. Do you agree that the discount rate used in the SCT is lower than most rules of**  
13 **thumb?**

14 A. No. The discount rate is appropriate and not significantly different than the range  
15 provided by Dr. Dismukes. The slightly lower rate, which was sourced from around the time  
16 when the CBA was developed, is indicative of recent bond market yields, which have been  
17 depressed over the past several years, dropping 39% in value between April 1, 2010 and April 1,  
18 2019.<sup>24</sup> As of February 12, 2019, the yield on the 30-year treasury bond was equal to 2.97%,  
19 almost identical to the 3.0% rate proposed by Dr. Dismukes. However, I have elected to update  
20 the discount rate used in the SCT to 3.0% to conform with Dr. Dismukes’ recommendation.

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<sup>21</sup> Hausman Direct Testimony, page 29, lines 10-11.

<sup>22</sup> NSPM, page 113.

<sup>23</sup> Dismukes Direct Testimony, page 8, lines 1-3.

<sup>24</sup> <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield>

1 **Q. Does Dr. Dismukes accept the use of social emissions damages in his Direct**  
2 **Testimony?**

3 A. No. Dr. Dismukes discusses why he believes that social emissions damages are difficult  
4 to quantify and why market-based costs should be used to quantify the value of emissions.

5 **Q. What does Dr. Dismukes say about social cost, economic theory, and the use of**  
6 **Regional Greenhouse Gas Initiative (“RGGI”) prices?**

7 A. Dr. Dismukes explains preference theory and economic theory, and walks through how,  
8 in his opinion, market-based approaches to emissions represent societal costs. This is summed up  
9 in the following statement by Dr. Dismukes:

10 *Market-based approaches, such as cap-and-trade programs value societal costs*  
11 *on an objective, as opposed to a subjective, basis. In these programs, valuation is*  
12 *based on the interplay between willing buyers and sellers. These values are*  
13 *furthermore verifiable and readily available. Examples of cap-and-trade markets*  
14 *include the EPA’s acid rain program and RGGI.*<sup>25</sup>

15 **Q. Are there any flaws with Dr. Dismukes statements above regarding social costs,**  
16 **economic theory, and RGGI?**

17 A. Yes. The markets used as examples by Dr. Dismukes are not free markets able to capture  
18 all benefits related to avoided emissions. As Dr. Dismukes states in response to PS-RC-DED-23,  
19 also provided as Exhibit IGF-CEF-EE-2, not all externality costs are captured in the RGGI  
20 market. As Dr. Dismukes further states in his direct testimony, the RGGI and other markets are  
21 marketplaces with prices set by the interplay between buyers and sellers, not everyday people  
22 experiencing the harmful effects of emissions and climate change. These markets are further  
23 constrained by effective price floors and ceilings that limit their ability to properly achieve  
24 equilibrium. Additionally, RGGI prices are significantly influenced by the carbon allowance  
25 budgets set by participating States; which is a decision based on policy goals and political

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<sup>25</sup> Dismukes Direct Testimony, page 12, lines 12-16.

1 agendas, not benefits of avoided emissions. Because of all of these factors, RGGI is not a true  
2 “market” for emissions benefits, but rather an administratively established proxy mechanism  
3 intended to achieve a policy goal.

4 Therefore, the market-based approach proposed by Dr. Dismukes does not properly  
5 balance emissions damages with disutility, does not capture the full social cost of emitting an  
6 additional ton of emissions, nor the full benefit of a one-ton reduction in emissions. The value of  
7 energy efficiency, renewable energy, and clean energy initiatives and programs overseen and  
8 administered by the BPU will be seriously undervalued if valued against market-based costs such  
9 as RGGI allowances.

10 In addition, Synapse Energy Economics, Inc. (“Synapse”) published the “Avoided  
11 Energy Supply Components in New England: 2018 Report”, an annual report that discusses a  
12 number of avoided costs, including emissions benefits. The report discusses Non-Embedded  
13 Environmental Costs and states that “[c]osts of GHG emissions are partially embedded in prices  
14 through RGGI allowances... However, the costs embedded by these policies represent only a  
15 portion of the total environmental impacts of GHG emissions.”<sup>26</sup>

16 **Q. Dr. Dismukes further questions the use of social costs because “societal benefit**  
17 **estimates vary widely between researchers.” Do you agree social benefit costs**  
18 **should not be used because of his view that estimates are widely varied?**

19 A. No. To support this argument, Dr. Dismukes cites a 2011 avoided cost study by Synapse  
20 (“2011 Synapse Study”), which cites a 2008 study by Richard S.J. Tol (“Tol Study”) on the  
21 social cost of carbon. I find Dr. Dismukes’ conclusion to be flawed based upon the following  
22 factors:

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<sup>26</sup> 2018 Synapse Study, page 143 ([accessible at http://www.synapse-energy.com/sites/default/files/AESC-2018-17-080.pdf](http://www.synapse-energy.com/sites/default/files/AESC-2018-17-080.pdf)).

- 1 a) The 2011 Synapse Study has since been updated and uses a marginal abatement cost  
2 methodology to estimate the social cost of carbon, which ranges between \$100 and  
3 \$318 per ton. The marginal abatement cost methodology “asserts that the value of  
4 damages avoided, at the margin, must be at least as great as the cost of the most  
5 expensive abatement technology used in a comprehensive strategy for emission  
6 reduction.”<sup>27</sup> This methodology produces costs above those of the IWG study and  
7 states that the IWG study is conservative because the models used in that analysis  
8 “minimize or ignore risks of extreme events, and rely on traditional, somewhat dated  
9 estimates of future damages.”<sup>28</sup>
- 10 b) The 2008 Tol Study does show a variety of outcomes, but on average these results  
11 show a much higher cost of carbon equal to approximately \$106 per ton, much higher  
12 than that used in the CEF-EE filing. Even when controlling for only peer reviewed  
13 studies, the average is still approximately \$77 per ton.
- 14 c) The 2008 Tol Study has data only through 2006. Much has changed in the past 13  
15 years, and the Tol Study does not reflect the most recent data or market conditions.
- 16 d) The values proposed in the CEF-EE filing, sourced from the IGW, are relatively  
17 conservative compared to the values provided in the Tol Study, and therefore  
18 represent a conservative assumption on the benefits of avoided carbon emissions.

19 Based upon these factors, as well as the fact that the social cost is needed to measure  
20 social benefits, the use of social cost is not flawed and should be accepted to value the benefits of  
21 avoided emissions.

22 **Q. After discussing the variability of prices, does Dr. Dismukes quote the EPA in**  
23 **stating that there is uncertainty in its analysis?**

24 A. Yes. On page 11 of his direct testimony, Dr. Dismukes provides a quotation from the  
25 Regulatory Impact Analysis (“RIA”) for Proposed Cross-State Air Pollution Rule (“CSAPR”)  
26 Update for the 2008 Ozone National Ambient Air Quality Standards (“NAAQS”) published by  
27 the EPA. Dr. Dismukes states that the “EPA explicitly notes that its analysis should not be

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<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

1 viewed as an estimate of the actual benefits anticipated to be found from the implementation of  
2 its proposed CSAPR regulations.”<sup>29</sup>

3 **Q. Do you agree with Dr. Dismukes’ assessment of the quotation from the EPA?**

4 A. No, in fact I read the EPA’s quote in the opposite manner as Dr. Dismukes. Specifically,  
5 the EPA states that “the estimates of benefits should be viewed as representative of the general  
6 magnitude of benefits of the regulatory control alternatives for the 2017 analysis year, rather than  
7 the actual benefits anticipated from implement[ing] the proposal.”<sup>30</sup>

8 My interpretation of this quote is that while a study conducted in 2015 cannot definitively  
9 state the actual benefits in 2017, it can provide a general range of benefits. This range provided  
10 corresponds with the social values used in the CEF-EE filing for SO<sub>2</sub> and NO<sub>x</sub>.

11 **Q. Does Dr. Dismukes refer to previous Board Orders regarding environmental**  
12 **benefits?**

13 A. Yes. Dr. Dismukes refers to the findings of the Fisherman’s Atlantic City Wind Farm,  
14 LLC (“FACW”) application from 2013, where the Board agreed with BPU Staff and Rate  
15 Counsel that “environmental benefits should be tied to market prices.”<sup>31</sup>

16 **Q. Do you believe this finding is applicable in this proceeding?**

17 A. No. The statement that Dr. Dismukes references is outdated and not consistent with  
18 current State policy on environmental benefits. Since the Order was issued, New Jersey has  
19 taken steps to become a national leader in clean and emission free energy. These steps have been  
20 made by Governor Murphy and the Legislature. The Legislature has recently passed bills  
21 including the Clean Energy Act, the Zero Emission Certificate Law, and the NJ Territorial

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<sup>29</sup> Dismukes Direct Testimony, page 11, lines 11-13.

<sup>30</sup> Dismukes Direct Testimony, page 11, line 29 – page 12, line 4 (originally EPA RIA for CSAPR update to NAAQS).

<sup>31</sup> In the Matter of the Petition of Fishermen's Atlantic City Wind Farm, LLC for the Approval of the State Waters Project and Authorizing Offshore Wind Renewable Energy Certificates, Docket No. EO11050314V, Board Decision on the Merits of the Application (12/18/18), page 23.

1 Waters Offshore Wind Law. Not only has Governor Murphy signed each of these laws, he has  
2 also issued numerous Executive Orders (“EOs”) promoting clean energy, including EO7<sup>32</sup>  
3 directing New Jersey to reenter the RGGI program, EO8<sup>33</sup> promoting offshore wind energy,  
4 EO23<sup>34</sup> addressing environmental justice issues in New Jersey’s urban communities, and EO28<sup>35</sup>  
5 to advance New Jersey’s clean energy economy.

6 It is important to note that New Jersey law states that the Board shall promote energy  
7 efficiency “taking into consideration environmental benefits.”<sup>36</sup> This is an important distinction,  
8 as market costs are not the same as environmental benefits.

9 Since the finding in the FACW case, there have also been numerous studies supporting  
10 the social cost of emissions.

11 Therefore, the Board Order cited by Dr. Dismukes is outdated, no longer reflective of  
12 New Jersey state policy, and should be rejected as not relevant to this case.

13 **Q. Because of the above justifications, should the Board disregard the dated policy**  
14 **proposed by Dr. Dismukes in evaluating the Company’s CEF-EE CBA?**

15 A. Yes. As explained above, the FACW case is not applicable to the CEF-EE filing, and  
16 does not establish any precedent for the Board’s evaluation of the CEF-EE filing.

17 **Q. Did Dr. Dismukes reference any other previous Board Orders regarding the social**  
18 **cost of carbon?**

19 A. Yes. Dr. Dismukes introduced a quotation from the Board Order that rejected the  
20 application of Nautilus Offshore Wind,<sup>37</sup> stating that:

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<sup>32</sup> <https://nj.gov/infobank/eo/056murphy/pdf/EO-7.pdf>

<sup>33</sup> <https://nj.gov/infobank/eo/056murphy/pdf/EO-8.pdf>

<sup>34</sup> <https://nj.gov/infobank/eo/056murphy/pdf/EO-23.pdf>

<sup>35</sup> <https://nj.gov/infobank/eo/056murphy/pdf/EO-28.pdf>

<sup>36</sup> N.J.S.A. 48:3-87(1)(4)

<sup>37</sup> <https://www.bpu.state.nj.us/bpu/pdf/boardorders/2018/20181218/12-18-18-8H.pdf>

1 *Nautilus relies on information related to emission benefits from a federal*  
2 *government document that has since been withdrawn by Executive Order*  
3 *(Technical Support Document, August 2016).*<sup>38</sup>

4 **Q. Do you have a response to this quote from the Nautilus Order?**

5 A. Yes. This quote is related to the IWG study. On March 28, 2017, the Trump  
6 Administration issued an EO formally disbanding the IWG and asserting that the IWG's findings  
7 on the social cost of carbon are no longer the formal federal government policy.<sup>39</sup>

8 As discussed above, Governor Murphy, his Administration, and the Legislature have all  
9 expressed a goal for New Jersey to be a leader in climate change and clean energy policy.  
10 However, it appears that in the Nautilus Order, the Board inadvertently accepted the EO  
11 withdrawing the IWG as the expulsion of its valuable and peer reviewed findings. This CEF-EE  
12 case offers the Board the opportunity to clarify and align its policy with the Governor's and  
13 Legislature's vision for New Jersey to be a leader in fighting climate change and to create a  
14 vibrant clean energy economy. By not properly valuing the benefits of reduced emissions, the  
15 Board would undermine its own policy goals.

16 In addition, even if the IWG's findings are no longer representative of federal policy,  
17 they are still highly relevant and one of the most widely regarded sources on the social cost of  
18 carbon. These findings underwent rigorous review and scrutiny over multiple years. They were  
19 also the result of a collaboration among a range of agencies and councils, including the Council  
20 of Economic Advisers, Council on Environmental Quality, Department of Agriculture,  
21 Department of Commerce, Department of Energy, Department of the Interior, Department of  
22 Transportation, Department of the Treasury, EPA, National Economic Council, Office of

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<sup>38</sup> Nautilus Order, page 13.

<sup>39</sup> <https://www.whitehouse.gov/presidential-actions/presidential-executive-order-promoting-energy-independence-economic-growth/>

1 Management and Budget, and Office of Science and Technology Policy. The findings and  
2 validity of this peer reviewed collaborative effort should not be in question just because it is no  
3 longer representative of federal policy.

4 It should be noted that the Rutgers CEEEP Energy Efficiency Cost-Benefit Analysis  
5 Avoided Cost Assumptions report,<sup>40</sup> published March 13, 2018, which is used by the BPU to  
6 evaluate the energy efficiency programs it administers, also uses IWG to value carbon emissions.  
7 This is the same study recommended by Dr. Dismukes as a source for avoided REC purchases.<sup>41</sup>  
8 And according to the Nautilus Order, Rate Counsel argued in that matter that the Board should  
9 “use the NJ Office of Clean Energy assumptions developed by the Rutgers Center for Energy  
10 Economics and Environmental Policies (“CEEEP”) which incorporate carbon values published  
11 by the U.S. Government Interagency Working Group on Social Cost of Carbon.”<sup>42</sup>

12 **Q. Did Dr. Dismukes discuss any other findings of the Nautilus Order regarding**  
13 **emissions?**

14 A. Yes. Dr. Dismukes also introduced the following conclusion by the Board in its Nautilus  
15 Order:

16 *Nautilus’ estimate of benefits flowing from the Project’s ability to avoid emissions*  
17 *of carbon and other pollutants [is] flawed.*<sup>43</sup>

18 **Q. Can you address this second quote from the Nautilus Board Order regarding**  
19 **emissions?**

20 A. Yes. This quote references the Board’s finding that the benefits from avoided emissions  
21 proposed in the Nautilus case was flawed. However, the benefits in the CEF-EE filing are not  
22 the same as those submitted in the Nautilus case.

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<sup>40</sup> [http://www.njcleanenergy.com/files/file/Library/Market%20Research/Avoided%20Cost%20Memo%20\(3-13-18\).pdf](http://www.njcleanenergy.com/files/file/Library/Market%20Research/Avoided%20Cost%20Memo%20(3-13-18).pdf)

<sup>41</sup> Dismukes Direct Testimony, page 22, lines 17-21.

<sup>42</sup> Nautilus Order, page 9.

<sup>43</sup> Nautilus Order, page 14.



1 According to the Nautilus Order, Rate Counsel argued that the “model not only included  
2 a calculating error, but that the mathematical approach was flawed.”<sup>44</sup> Specifically, “averaging  
3 empirical outcomes over different discount rates is simply not appropriate and is inconsistent  
4 with standard CBA practice.”<sup>45</sup> The CEF-EE filing does not average empirical outcomes over  
5 different discount rates and, therefore, this finding from the Nautilus case is not applicable to the  
6 CEF-EE filing, and the Board should accept the use of the IWG to value the benefits of avoided  
7 carbon emissions.

8 **Q. Is there any precedent to support the use of the values provided in IWG study?**

9 A. Yes. Since 2013, the CEEEP avoided cost study<sup>46</sup> has relied upon the IWG study to  
10 determine avoided carbon emissions benefits. This study is periodically provided to the Board  
11 and used to support the Office of Clean Energy’s Clean Energy Program energy efficiency  
12 filings.

13 In addition, in 2018, New Jersey’s Zero Emission Certificate Law codified that “[t]he  
14 social cost of carbon, as calculated by the U.S. Interagency Working Group on the Social Cost of  
15 Carbon in its August 2016 Technical Update, is an accepted measure of the cost of carbon  
16 emissions.”<sup>47</sup>

17 **Q. Based on the preceding discussion, how should the Board value emissions avoidance**  
18 **benefits?**

19 A. The Board should reject the use of market-based costs, such as RGGI allowances, for  
20 emissions benefits, reverse its cited findings in the Nautilus case as contrary to the Murphy  
21 Administration’s and State energy policy as reflected in the Executive Orders, public statements,

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<sup>44</sup> Nautilus Order, page 9.

<sup>45</sup> *Id.*

<sup>46</sup> <http://www.njcleanenergy.com/files/file/Library/Market%20Research/AvoidedCost20131.pdf>

<sup>47</sup> N.J.S.A. 48:3-87.3(b)(8).

1 and recently passed laws, and use the sources proposed within the CEF-EE filing, including the  
2 IWG study, to value emissions-avoidance benefits. Market-based costs, such as RGGI  
3 allowances, do not include all externalities related to harmful air pollution and are not a reliable  
4 source of the value of reducing these emissions.

5 Finally, I note that notwithstanding the foregoing, Dr. Dismukes found the CEF-EE filing  
6 to be cost-effective, even without accounting for environmental benefits.

7 **Q. Does Dr. Dismukes have any issues with the use of the AURORA platform?**

8 A. Yes. Dr. Dismukes states that “[t]he Company's DRIPE benefits are derived from the  
9 AURORA model and cannot be substantiated or validated.”<sup>48</sup> Dr. Dismukes described the  
10 Board’s position with regard to AURORA and stated that DRIPE benefits should be “excluded  
11 from the CBA”<sup>49</sup> on the basis of their calculation using the AURORA model.

12 **Q. Do you agree that the Board does not approve of the use of the AURORA model?**

13 A. No. While the Board may have disapproved of certain circumstances related to the use of  
14 AURORA in a single case, it also has expressed confidence and support for the model, stating:

15 *AURORA is the most comprehensive and reliable electricity forecasting and*  
16 *analysis tool available.*<sup>50</sup>

17 In addition, in answers to questions to the same bid solicitation, the Board stated:

18 *NJ BPU requires AuroraXMP as stated in K. of the Bid Solicitation Section 3.2*  
19 *Professional and Consultative Services.*<sup>51</sup>

20 These quotes show that the Board does accept, and even sometimes requires, the use of  
21 AURORA by its consultants, and there is no reason to believe that use of AURORA is

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<sup>48</sup> Dismukes Direct Testimony, page 17, lines 6-8

<sup>49</sup> Dismukes Direct Testimony, page 17, line 9.

<sup>50</sup> Bid Solicitation for T# 2000 Energy Consulting Services – BPU, Bid #18DPP00237, June 4, 2018, page 15.

<sup>51</sup> Bid Addendum #1 to Bid Solicitation # 18DPP00237, T2000 – Energy Consulting Services – BPU, July 23, 2018, page 3.

1 impermissible or unreliable in this matter. Further, Dr. Dismukes provided no evidence or issues  
2 regarding the actual AURORA analysis in this case, only a citation to a past finding.

3 **Q. Should the Board accept the use of AURORA to calculate DRIPE benefits?**

4 A. Yes, the Board should accept the calculation of DRIPE benefits from the AURORA  
5 model. Moreover, the Board should note that notwithstanding the foregoing, Dr. Dismukes  
6 found the CEF-EE filing to be cost-effective, even without accounting for DRIPE benefits.

7 **Q. Does Dr. Dismukes dispute that the CEF-EE Program could provide volatility hedge**  
8 **benefits?**

9 A. No. Dr. Dismukes submits a number of criticisms of the methodology used to calculate  
10 volatility hedge benefits in the CEF-EE filing; however, he does not dispute the fact that energy  
11 efficiency does act as a hedge against market volatility, or that there is a value associated with  
12 the avoidance of market volatility.

13 **Q. Does Dr. Dismukes' testimony dissuade you from using the sources provided to**  
14 **support a valuation of volatility hedge benefits?**

15 A. No. Volatility by its nature cannot be exactly predicted or categorized. While energy  
16 and gas markets may currently be depressed, the energy efficiency measures proposed in the  
17 CEF-EE filing will be providing energy savings for a weighted average period of roughly fifteen  
18 years. With the increase in polar vortices, major hurricanes, and other extreme weather events,  
19 the likelihood of market price fluctuations can also increase. In addition, with ever changing  
20 rules at PJM, participants in these programs can limit exposure to potential capacity and  
21 transmission charges that could be passed through to ratepayers, even those served under Basic  
22 Generation Service ("BGS") contracts.

23 Therefore, the installation of energy efficiency measures allows participants to hedge the  
24 implied risk of participating in energy markets by reducing their participation in those markets.

1 **Q. What is the right value to use as a volatility hedge benefit in this case?**

2 A. While the multiple studies provided in support of the 10% hedge volatility factor  
3 illustrate the variability in potential outcomes, the range of benefits is spread between a  
4 minimum of 7.5% and a maximum of 24%. When compared against this range, the 10% figure  
5 used in the analysis appears rather modest, and at the conservative end of the spectrum. As such,  
6 the Board should accept the use of a 10% volatility hedge benefit factor. And again, I note that  
7 notwithstanding the foregoing, Dr. Dismukes found the CEF-EE filing to be cost-effective, even  
8 without accounting for volatility hedge benefits.

9 **Q. Does Dr. Dismukes discuss the avoided RPS purchase forecast?**

10 A. Yes. Dr. Dismukes questions the forecast used in the CEF-EE filing and states that the  
11 analysis should be based upon the values provided in the CEEEP avoided cost study. The basis  
12 for this recommendation is again the finding of the Nautilus Order.

13 **Q. Do you agree that the findings in the Nautilus Order regarding Class I RECs are**  
14 **applicable in this CEF-EE case?**

15 A. No. First, the Nautilus Order pertained to only Class I RECs, not all RPS requirements  
16 such as SRECs and Class II RECs. In addition, as quoted by Dr. Dismukes, the Nautilus Order  
17 states that “a steady-state or decrease in price is more likely in the future than sharply increasing  
18 Class I REC prices.”<sup>52</sup> This is consistent with the forecast used in the CEF-EE filing; as stated  
19 by Dr. Dismukes, “[t]he Company's estimated avoided REC purchases start at \$7.00 and increase  
20 to a maximum of \$11.44 in 2027 and then gradually decrease.”<sup>53</sup> Further, the forecast used in  
21 the CEF-EE filing is not dissimilar from that in the CEEEP study, which starts at \$9.26 in 2017  
22 and increases to a maximum of \$14.56 in 2019 and then gradually decreases.

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<sup>52</sup> Nautilus Order, page 13.

<sup>53</sup> Dismukes Direct Testimony, page 22, lines 4-5.

1 **Q. Have you reviewed Dr. Dismukes alternative CEF-EE CBA?**

2 A. Yes.

3 **Q. How did Dr. Dismukes change the standard CBA to produce his alternative CBA?**

4 A. In Dr. Dismukes' own words:

5 *My alternative CBA modifies the Company's analysis in the following manner.*  
6 *First, the societal value of avoided emissions is excluded given prior Board*  
7 *precedent discussed earlier. Second, my analysis includes the economic impacts*  
8 *of the program on ratepayer bills. Third, I use a discount rate equal to the*  
9 *Company's weighted average cost of capital. Fourth, I remove the Company's*  
10 *estimated volatility and DRIPE benefits for reasons stated earlier in my*  
11 *testimony. Lastly, my analysis uses the renewable energy adder included in the*  
12 *CEEEP analysis which is used for evaluating energy efficiency programs in place*  
13 *of the Company's estimates for avoided REC purchases.<sup>54</sup>*

14 **Q. What values are ignored in Dr. Dismukes' CBA?**

15 A. Dr. Dismukes excludes avoided emissions benefits, volatility hedge benefits, and DRIPE  
16 benefits from his analysis. Despite all these changes, Dr. Dismukes still finds that the CEF-EE  
17 Program is cost-effective.

18 **Q. What are your thoughts on Dr. Dismukes' alternative CBA?**

19 A. Dr. Dismukes created a new CBA that does not conform with standard cost-benefit  
20 practices and is not consistent with the requirements of the MFR or used in any other  
21 jurisdictions to my knowledge. In fact, in response to Discovery Request PS-RC-DED-26, also  
22 provided as Exhibit IGF-CEF-EE-3, where Dr. Dismukes was asked to "provide any and all  
23 examples of other jurisdictions utilizing the ratepayer impact approach described", Dr. Dismukes  
24 was non-responsive and only stated that he believed "ratepayer impacts should be considered  
25 when modeling the costs versus benefits of a program", a fact that is not disputed as the RIM test

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<sup>54</sup> Dismukes Direct Testimony, page 23, lines 8-15.

1 is designed to do just that. However, Dr. Dismukes' alternative CBA makes additional changes  
2 that ignore certain benefits to ratepayers while including supplementary economic costs.

3 **Q. Should the Board accept Dr. Dismukes' alternative CBA?**

4 A. No. Dr. Dismukes' alternative CBA is not consistent with other cost-benefit tests and  
5 does not provide a clear picture of the cost-effectiveness of the programs.

6 **VI. CORRECTIONS TO THE COST-BENEFIT ANALYSIS**

7 **Q. Have you made any updates to the cost-benefit analysis as a result of the discovery**  
8 **questions and Direct Testimonies of Dr. Hausman and Dr. Dismukes?**

9 A. Yes.

10 **Q. What changes have you made to the CBA?**

11 A. I have added the time value of loans provided to participants to the PCT, PAC, and RIM  
12 tests. I have also made an adjustment to the source for SO<sub>2</sub> and NO<sub>x</sub> societal damages and  
13 updated the GDP deflator forecast used to calculate the future values of the CO<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub>  
14 societal damages forecasts. I also amended the economic benefits formula in the SCT to capture  
15 the cost of program expenditures. Finally, I changed the discount rate used in the SCT to 3.0%,  
16 as discussed by Dr. Dismukes.

17 **Q. How did you adjust the PCT, PAC, and RIM tests to account for the time value of**  
18 **loans provided to participants?**

19 A. To account for the time value of money between when loans are provided to participants  
20 and when they are repaid, I subtracted the calculated net present value of the cash flow of loan  
21 repayments from loan amounts provided. Because loan repayments take place over a longer  
22 duration (often five years) than the loan amounts, this net present value was lower than the loan

1 amount. The positive difference between these two net present value cost streams represents the  
2 time value of money between the loans granted and the repayment of the loans.

3 In the PCT, this value was included as an additional benefit, as participants gain this time  
4 value of money differential by avoiding the payment of the loan amount up front.

5 In the PAC and RIM tests, this value was included as an additional cost, as the utility is  
6 on the other end of this transaction with participants and provides a lump-sum up-front to cover  
7 the balance of project costs and is repaid over time.

8 Because the loans are provided at zero interest and no cost to participants, the net  
9 discount rate assumed for present value purposes was equal to the utility weighted average cost  
10 of capital discount rate used to discount values in the TRC, PCT, PAC, and RIM tests.

11 **Q. What changes did you make to the emissions damages?**

12 A. I updated the emissions damages for all three emissions evaluated in the CBA. The first  
13 and most basic change was to update the forecasted GDP deflator used to adjust damages  
14 provided in real dollars into nominal dollars. The update consisted of substituting out the GDP  
15 deflator forecast from the 2018 Energy Information Administration (“EIA”) Annual Energy  
16 Outlook (“AEO”) with the 2019 EIA AEO forecast. This was applicable for all three emissions  
17 considered: CO<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub>.

18 **Q. What source are you now recommending be used to determine SO<sub>2</sub> and NO<sub>x</sub>**  
19 **damages?**

20 A. Based upon my current opinion on the market, I believe the SO<sub>2</sub> and NO<sub>x</sub> social  
21 emissions damages should be sourced from the EPA Technical Support Document for Estimating  
22 Benefit per Ton of Reducing PM<sub>2.5</sub> Precursors from 17 Sectors.<sup>55</sup> This guidance document  
23 contains analysis and values that have been used in several Regulatory Impact Assessments,

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<sup>55</sup> [https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbpttsd\\_2018.pdf](https://www.epa.gov/sites/production/files/2018-02/documents/sourceapportionmentbpttsd_2018.pdf)

1 including assessments for the Cross-State Air Pollution and Mercury and Air Toxins Rule. The  
2 guidance document presents a range of values for a national average or damages per ton of each  
3 pollutant. I relied on the average of the high and low values to present a conservative estimate of  
4 benefits. The updated calculation of emissions is provided as Exhibit IGF-CEF-EE-4.

5 **Q. What changes did you make to the economic multiplier benefits in the SCT?**

6 A. I adjusted the economic multiplier benefits to account for the CEF-EE Program  
7 expenditures, as defined in the TRC. To do this, I built off the multiplier values already  
8 contained in the CBA, specifically the energy savings benefit. This coefficient was originally  
9 included to capture the multiplier value of bill savings to participants, as well as the negative  
10 value of lost utility costs which were assumed to be reallocated to other distribution customers.  
11 However, I have adjusted the formula to incorporate the lifetime participant costs, lifetime  
12 administration costs, and lifetime program investment costs used in the TRC. This equation now  
13 captures program expenditures, as well as bill savings to participants, and calculates the overall  
14 multiplier benefit to the economy for these savings and associated spending.

15 **Q. Why did you change the discount rate used in the SCT?**

16 A. I changed the discount rate used in the SCT to 3.0% to conform with sources provided by  
17 Dr. Dismukes in response to Discovery Request PS-RC-DED-18, also provided as Exhibit IGF-  
18 CEF-EE-5. Therein, Dr. Dismukes provides numerous sources, such as the White House Office  
19 of Management and Budget (“OMB”) Circular No. A-4, which states that “when examining the  
20 effects of regulation that do not fall exclusively or primarily on the allocation of capital... the  
21 OMB may use a three percent “societal” discount rate.” According to Dr. Dismukes, “the EPA  
22 also uses a 3 percent discount in estimating future costs and benefits.”



1 In response to Discovery Request PS-RC-DED-18, Dr. Dismukes also provided the  
 2 following documents which supported the 3% discount rate:

- 3 • PS-RC-DED-18 OMB Circular No. A-4.pdf
- 4 • PS-RC-DED-18 CSAPR, Final 2016.pdf
- 5 • PS-RC-DED-18 EPA-Discounting Future Benefits and Costs.pdf; also available  
 6 at: <https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf>
- 7 • Creedy, J. and Passi, H. Public Sector Discount Rates.pdf

8 **Q. How did the cost-effectiveness of the CEF-EE filing change based upon the updates**  
 9 **described above?**

10 A. Based upon the alterations described above, the updated CBA results, for each test, by  
 11 sector and for the CEF-EE portfolio as a whole, are described in Table 1 below:

12 **Table 2: Updated CBA Results**

	SCT	TRC	PC	PAC	RIM
Residential Programs	4.3	1.1	12.2	1.4	0.7
C&I Programs	4.5	1.1	5.3	1.5	1.0
Low Income Programs	1.8	0.4	n/a	0.4	0.3
<b>Total Portfolio</b>	<b>4.3</b>	<b>1.0</b>	<b>6.7</b>	<b>1.4</b>	<b>0.9</b>

13 The complete results of the updated CBA are provided as Exhibit IGF-CEF-EE-6.

14 I also compared the results of the CBA from the initial filing to those generated as a  
 15 result of my updates. Table 2 below illustrates the changes in CBA score for each test for by  
 16 sector, and for the CEF-EE portfolio as a whole. Note that positive numbers represent increases  
 17 in cost-effectiveness, while negative numbers represent decreases.

18 **Table 3: Changes Between Initially Filed CBA and Updated CBA**

	SCT	TRC	PC	PAC	RIM
Residential Programs	0.5	0.0	0.2	-0.1	0.0
C&I Programs	0.8	0.0	0.2	-0.2	-0.1
Low Income Programs	0.0	0.0	n/a	0.0	0.0
<b>Total Portfolio</b>	<b>0.7</b>	<b>0.0</b>	<b>0.2</b>	<b>-0.1</b>	<b>0.0</b>

1 As seen, the CEF-EE filing still screens as cost-effective in the SCT, the TRC, the PCT,  
2 and the PAC test. The results of each of these tests illustrate that the CEF-EE filing generates  
3 benefits that exceeds costs, would be a good investment, and is beneficial to the state. Finally,  
4 the RIM test shows acceptable value from a ratepayer perspective.

5 **VII. CONCLUSIONS AND RECOMMENDATION**

6 **Q. Can you summarize the results of your analysis?**

7 A. Yes. Based on my review of the Direct Testimonies of Dr. Hausman and Dr. Dismukes, I  
8 identified a series of claims with which I disagree. Both Dr. Hausman and Dr. Dismukes  
9 critiqued a number of factors related to the methodology, calculations, and assumptions of the  
10 CBA in the CEF-EE filing; however, those critiques are unwarranted and would incorrectly  
11 calculate or undervalue the benefits and overvalue the costs related to the CEF-EE filing. I  
12 provide reasonable alternatives to the recommendations of Dr. Hausman and Dr. Dismukes, all  
13 supported by rational, often conservative, and appropriate sources and assumptions.

14 I also identified a few minor updates to the CBA that would align the results with current  
15 market practices and provide more accurate results for the Board to consider in this case.

16 **Q. What is your recommendation for the Board?**

17 A. Based on my review and analysis described above, I recommend that the Board accept  
18 the CBA results I have provided and approve the CEF-EE filing, as it is cost-effective and would  
19 provide benefits that exceed its costs to those residing in the PSE&G service territory.

20 I also recommend the Board accept the use of the IWG social cost of carbon, accept the  
21 EPA Technical Support Document for Estimating Benefit per Ton of Reducing PM2.5  
22 Precursors from 17 Sectors to value the benefits associated with avoided SO<sub>2</sub> and NO<sub>x</sub>  
23 emissions, accept my updates to the PCT, PAC, and RIM tests, accept a 3.0% discount rate as

1 appropriate for the SCT, accept the methodology, calculations, and results of the updated CBA  
2 as appreciate, and reject the findings of Dr. Hausman and Dr. Dismukes, as described throughout  
3 my testimony.

4 **Q. Does this conclude your testimony?**

5 A. Yes. However, I reserve the right to update this testimony to account for additional  
6 information I may receive. Thank you.

## Isaac Gabel-Frank Vice President

### Overview of Experience

Isaac Gabel-Frank, Vice President at Gabel Associates, has over 9 years of experience supporting complex energy issues related to cost-benefit analysis, energy efficiency and renewables, energy project development, economic and tariff analysis, electric vehicles, regional transmission organizations (RTOs), and energy procurement. Mr. Gabel-Frank has also submitted expert testimony in matters regarding the cost effectiveness of energy efficiency.

Mr. Gabel-Frank is an expert on cost-benefit analytics and has supported a multitude of clients in quantifying cost and benefit dynamics related to the economic impact of energy projects. This includes past and present work for Federal agencies, state and local governments, school districts, and private sector clients on energy efficiency, renewable energy, cogeneration, and traditional generation projects. Mr. Gabel-Frank also performs sensitivity analysis to help identify risk boundaries and market deviations. This analysis is critical to investment decisions as it allows clients to understand the full value proposition associated with energy initiatives.

He is currently supporting energy efficiency filings on behalf of various New Jersey utilities. He has also served the role as an expert witness and provided testimony to support the filings.

Mr. Gabel-Frank has also performed in-depth project valuation and levelized cost of energy studies to support a proposed asset transaction.

In addition, he is extremely knowledgeable on RTO issues and actively monitors activities related to energy and capacity markets, energy efficiency, demand response, ancillary services, interconnection, and general grid issues. Mr. Gabel-Frank helps clients formulate and strategize positions on current PJM rules as well as provides analysis on potential market changes. This includes development of offer and bid strategies for energy efficiency, demand response, renewable, and traditional generation resources into the PJM market.

He was a key contributor in the development of the Analytical Likelihood of Availability and Non-Performance Risk (ALAN) model, a proprietary stochastic modeling tool that computes the exposure of capacity resources within the PJM and ISO-NE footprints. ALAN uses resource outage data as well expected performance assessment event information to determine the probabilistic coincidence of outages and performance assessment events.

Mr. Gabel-Frank assists in the development of numerous renewable and energy efficiency projects including in-depth economic, technical, and utility tariff analysis, which incorporates long-term utility and energy forecasts. He has developed various tariff models from the ground up, which are customized to reflect the specific parameters of each project. He is also skilled at calculating energy savings associated with various project structures. As a result of his strong analytical skill set, Mr. Gabel-Frank has served an integral role on various progressive projects throughout the region.

He supports solar projects through the request for proposal (RFP) process as well as reviews utility tariffs and performs cost/benefit analysis. He is also knowledgeable on the solar renewable energy certificate (SREC) market.

He has specialized knowledge on demand response programs and can effectively support clients in evaluating this revenue opportunity. Mr. Gabel-Frank also developed a model that calculates energy savings and potential rebates associated with energy efficiency projects.

### Professional Qualifications

*BA., Economics, Political Science,  
English Writing  
University of Pittsburgh, 2009*



**Years of Experience: 9+**

**Gabel Associates, Inc.**

[www.gabelassociates.com](http://www.gabelassociates.com)

**In the Matter of the Petition of Public Service Electric and Gas Company  
for Approval of its Clean Energy Future-Energy Efficiency  
("CEF-EE") Program on a Regulated Basis**

**BPU Docket Nos. GO18101112 & EO18101113**

**Division of Rate Counsel RESPONSE to Public Service Electric and Gas Company**

**Witness: David E. Dismukes**

PS-RC-DED-23

Referencing page 15, lines 13-18 of Dr. Dismukes's Direct Testimony, please confirm or deny that it is Dr. Dismukes's position that all externality costs associated with carbon emissions are captured in RGGI allowance prices. If confirmed, please explain why the current RGGI prices are much lower than the peer reviewed estimates of social cost of carbon presented in Schedule DED-1. If denied, please explain what externality costs are likely not captured in RGGI market allowance prices.

RESPONSE:

Deny. An example of externality costs not captured in the RGGI market could include reductions in operating costs, fuel savings, and GHG emissions to name a few.

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**Division of Rate Counsel RESPONSE to Public Service Electric and Gas Company**

**Witness: David E. Dismukes**

PS-RC-DED-26

Referencing page 23, line 16 to page 24, line 5 of Dr. Dismukes's Direct Testimony, please provide any and all examples of other jurisdictions utilizing the ratepayer impact approach described to evaluate cost effectiveness of energy efficiency programs. Please provide all citations, studies, and other supporting documents related to the examples provided.

RESPONSE:

Dr. Dismukes has not performed this analysis. However, it is Dr. Dismukes opinion that ratepayer impacts should be considered when modeling the costs versus benefits of a program since both costs and benefits to ratepayers should be considered when conducting a CBA. Rate impacts are a direct cost that will be incurred by ratepayers and therefore should be considered in a CBA.

Year	<u>Nominal \$ Benefits per Ton</u>			<u>Emission Tons per MWh</u>			<u>Emission \$ Benefits per kWh</u>		
	CO <sub>2</sub>	SO <sub>2</sub>	NOx	CO <sub>2</sub>	SO <sub>2</sub>	NOx	CO <sub>2</sub>	SO <sub>2</sub>	NOx
2019	55.0	69,219.4	10,156.1	0.4791	0.0009	0.0004	0.0264	0.0602	0.0036
2020	57.9	72,187.2	10,467.1	0.4828	0.0008	0.0003	0.0280	0.0604	0.0036
2021	59.5	75,348.0	10,919.3	0.4776	0.0008	0.0003	0.0284	0.0615	0.0037
2022	62.4	78,532.0	11,374.5	0.4737	0.0008	0.0003	0.0296	0.0652	0.0038
2023	65.5	81,769.4	11,837.1	0.4713	0.0008	0.0003	0.0309	0.0690	0.0040
2024	68.5	85,033.2	12,303.2	0.4712	0.0009	0.0003	0.0323	0.0739	0.0041
2025	71.7	88,345.2	12,776.1	0.4739	0.0009	0.0003	0.0340	0.0818	0.0044
2026	74.9	91,747.7	13,261.7	0.4744	0.0010	0.0004	0.0355	0.0880	0.0047
2027	78.2	95,254.6	13,762.2	0.4787	0.0010	0.0004	0.0374	0.0950	0.0049
2028	81.6	98,847.9	14,274.8	0.4809	0.0010	0.0004	0.0393	0.1034	0.0052
2029	83.5	102,535.8	14,800.8	0.4869	0.0011	0.0004	0.0406	0.1113	0.0055
2030	87.0	106,269.3	15,333.1	0.4975	0.0012	0.0004	0.0433	0.1228	0.0059
2031	90.7	110,128.2	15,883.1	0.4930	0.0012	0.0004	0.0447	0.1285	0.0062
2032	94.4	114,151.7	16,456.3	0.4982	0.0012	0.0004	0.0471	0.1361	0.0065
2033	98.4	118,337.8	17,052.4	0.4977	0.0012	0.0004	0.0490	0.1401	0.0067
2034	102.4	122,682.3	17,670.8	0.4904	0.0012	0.0004	0.0502	0.1427	0.0068
2035	106.6	127,218.8	18,316.4	0.4919	0.0012	0.0004	0.0525	0.1478	0.0070
2036	111.0	131,954.2	18,990.0	0.4951	0.0012	0.0004	0.0550	0.1544	0.0073
2037	115.5	136,864.3	19,688.2	0.4890	0.0012	0.0004	0.0565	0.1583	0.0075
2038	120.2	141,955.6	20,411.8	0.4915	0.0012	0.0004	0.0591	0.1646	0.0078
2039	125.0	147,247.0	21,163.5	0.4916	0.0011	0.0004	0.0614	0.1691	0.0080
2040	130.0	152,735.6	21,942.9	0.4863	0.0011	0.0004	0.0632	0.1743	0.0082
2041	135.2	158,428.9	22,751.1	0.4867	0.0011	0.0004	0.0658	0.1793	0.0085
2042	138.3	164,334.3	23,588.9	0.4885	0.0011	0.0004	0.0675	0.1861	0.0088
2043	143.8	170,459.9	24,457.7	0.4841	0.0011	0.0004	0.0696	0.1930	0.0091
2044	149.5	176,813.7	25,358.4	0.4872	0.0011	0.0004	0.0729	0.2022	0.0095
2045	155.5	183,404.5	26,292.4	0.4889	0.0011	0.0004	0.0760	0.2097	0.0098
2046	161.7	190,240.9	27,260.7	0.4836	0.0011	0.0004	0.0782	0.2165	0.0101
2047	168.1	197,332.1	28,264.6	0.4850	0.0011	0.0004	0.0815	0.2242	0.0104
2048	174.8	204,687.6	29,305.6	0.4865	0.0011	0.0004	0.0850	0.2323	0.0108
2049	181.7	212,317.4	30,384.9	0.4821	0.0011	0.0004	0.0876	0.2413	0.0111
2050	189.0	220,231.5	31,503.9	0.4841	0.0011	0.0004	0.0915	0.2497	0.0115

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**Division of Rate Counsel RESPONSE to Public Service Electric and Gas Company**

**Witness: David E. Dismukes**

PS-RC-DED-18

Referencing page 9, lines 2-3 of Dr. Dismukes's Direct Testimony, please provide all studies and academic papers that support Dr. Dismukes's statement that three to four percent are commonly employed societal discount rates. For any academic papers behind pay walls, please provide pdf versions of such papers.

RESPONSE:

See attached documents. For example, the White House Office of Management and Budget ("OMB") publishes Circular No. A-4, which provides when examining the effects of regulation that do not fall exclusively or primarily on the allocation of capital, such as the effect on private consumption due to higher consumer prices for goods and services, the OMB may use a three percent "societal" discount rate. As the Company is aware, the EPA also uses a 3 percent discount in estimating future costs and benefits.

PS-RC-DED-18 OMB Circular No. A-4.pdf

PS-RC-DED-18 CSAPR, Final 2016.pdf

PS-RC-DED-18 EPA-Discounting Future Benefits and Costs.pdf; also available at:  
<https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf>

Creedy, J. and Passi, H. Public Sector Discount Rates.pdf