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December 22, 2020

**VIA ELECTRONIC FILING**

Mr. Joel H. Peck, Clerk  
c/o Document Control Center  
State Corporation Commission  
Tyler Building – First Floor  
1300 East Main Street  
Richmond, Virginia 23219

**RE: Commonwealth of Virginia, ex rel. State Corporation Commission, Ex Parte: Establishing RPS Proceeding for Appalachian Power Company**

**Case No. PUR-2020-00135**

Dear Mr. Peck:

Attached for filing in the above-referenced matter is the Direct Testimony of Karl R. Rábago, which is being submitted on behalf of Appalachian Voices ("Environmental Respondent"). Included with this testimony are Mr. Rábago's one-page summary and four attachments. This filing is being completed electronically, pursuant to the Commission's Electronic Document Filing system.

Pursuant to Rule 140 of the Commission's Rules of Practice and Procedure, Environmental Respondent is providing service of documents in this case exclusively via email unless parties request otherwise. Please let me know if you do not agree to electronic service and would like to receive hard copies of documents.

If you should have any questions regarding this filing, please do not hesitate to contact me at (434) 977-4090.

Regards,

Nathaniel Benforado

cc: Parties on Service List  
Commission Staff

COMMONWEALTH OF VIRGINIA  
STATE CORPORATION COMMISSION

APPLICATION OF APPALACHIAN )  
POWER COMPANY )

*Ex Parte: Establishing RPS Proceeding for )  
Appalachian Power Company )*

Case No. PUR-2020-00135

Summary of Direct Testimony of  
Karl R. Rábago, Rábago Energy LLC

On Behalf of  
Environmental Respondent

December 22, 2020

**Summary of Direct Testimony of Karl R. Rábago**

I am Karl R. Rábago, and I appear on behalf of Environmental Respondent. I am principal of Rábago Energy LLC, a Colorado Limited Liability Company, with a business address of 2025 E. 24<sup>th</sup> Avenue, Denver, Colorado.

I have reviewed the Company's VCEA Compliance Plan, as well as other documents and materials in this case. I conclude that the Plan as submitted by the Company is materially deficient and inadequate, failing to establish that the Plan will successfully and cost-effectively meet the requirements of the VCEA.

I recommend that the Commission direct the Company to improve subsequent plans in the following specific ways:

- The Commission should make clear that the VCEA mandates resource proposals and not specific generation and resource additions, and that such proposals must be reasonable and prudent.
- The Commission should make clear that the VCEA measures compliance with the Renewable Portfolio Standard ("RPS") through retirement of Renewable Energy Certificates ("RECs") and not through addition of generation facilities or power contracts.
- The Company should be required to prepare and evaluate multiple scenarios that would result in compliance with the VCEA. For example, the Commission should require the Company to evaluate procurement of greater or lesser amounts of utility, non-utility, and distributed resources than the minimums required by law. Evaluating a variety of procurement strategies could result in plans and actions that are more reasonable and prudent than treating statutory minimums as caps.
- Until the Company has sufficiently evaluated alternatives, which may in fact be lower-cost for customers, the Company should not be permitted to spend ratepayer dollars on plans lacking this important analysis.
- The Commission should direct the Company to provide a much more specific, concrete, and actionable VCEA compliance plan, demonstrated with competent evidence.
- The Commission should make clear that the fact that the Company operates in multiple states does not permit the Company to compromise its performance in meeting obligations under the VCEA, nor should the Company be permitted to take actions that create undue preference or unfair allocation of costs among customers in different jurisdictions.
- The Company should be required to ensure that its analysis and presentation of results in its Plan is consistent and meaningful.

COMMONWEALTH OF VIRGINIA  
STATE CORPORATION COMMISSION

APPLICATION OF APPALACHIAN  
POWER COMPANY

*Ex Parte: Establishing RPS Proceeding for  
Appalachian Power Company*

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Case No. PUR-2020-00135

**Direct Testimony of  
Karl R. Rábago, Rábago Energy LLC**

**On Behalf of  
Environmental Respondent**

**December 22, 2020**

**INTRODUCTION & OVERVIEW**

**Q 1: Please state your name, business name and address, and role with the Environmental Respondents.**

**A:** My name is Karl R. Rábago. I am the principal of Rábago Energy LLC, a Colorado limited liability company, located at 2025 E. 24<sup>th</sup> Avenue, Denver, Colorado. I appear here in my capacity as an expert witness on behalf of Appalachian Voices (the “Environmental Respondent”).

**Q 2: Please summarize your experience and expertise in the field of electric utility regulation and the renewable energy field.**

**A:** I have worked for more than 30 years in the electricity industry and related fields. I am and have been actively involved in a wide range of electric utility issues across the United States and around the world, in several different capacities. My previous employment experience includes Commissioner with the Public Utility Commission of Texas, Deputy Assistant Secretary with the U.S. Department of Energy, Vice President with Austin Energy, Director with AES Corporation, executive director of the Pace Energy and Climate Center, managing director with Rocky Mountain Institute, program manager with the Houston Advanced Research Center, and energy program manager for Environmental Defense Fund, among others. I hold a bachelor’s degree in business management, and I am trained as an attorney with a Juris Doctorate in Law and two post-doctorate Master of Laws degrees, one each in Military and Environmental Law. A detailed resume is attached as Attachment KRR-1.

1   **Q 3: Have you ever testified before the Virginia SCC or other regulatory agencies?**

2   **A:** Yes. In Virginia, I have submitted testimony in Virginia SCC Cases PUE-2012-00064,  
3       PUE-2013-00088, PUE-2014-00026, PUE-2015-00035, PUE-2015-00036, PUE-2016-  
4       00049, PUE-2016-00050, PUR-2017-00051, PUR-2017-00045, PUR-2018-00065, PUR-  
5       2019-00050, and PUR-2020-00035. I have submitted testimony, comments, or  
6       presentations in proceedings in Alabama, Arkansas, Arizona, California, Colorado,  
7       Connecticut, District of Columbia, Florida, Georgia, Guam, Hawaii, Illinois, Indiana,  
8       Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, Missouri,  
9       Nevada, New Hampshire, New York, North Carolina, Ohio, Pennsylvania, Puerto Rico,  
10      Rhode Island, Vermont, Virginia, Washington, and Wisconsin. I have also testified  
11      before the U.S. Congress and have been a participant in comments and briefs filed at  
12      several federal agencies and courts. A listing of my recent previous testimony is attached  
13      as Attachment KRR-2.

14   **Q 4: What materials did you review in preparing this testimony?**

15   **A:** I reviewed applicable sections of the Code of Virginia, the Commission Integrated  
16      Resource Planning ("IRP") Guidelines, the Company's RPS filing in this proceeding,  
17      prior Company IRP filings, and the Company's responses to requests for information  
18      from Environmental Respondents and from other parties in the case. In addition, I  
19      reviewed my testimony in prior IRP filings before the Virginia State Corporation  
20      Commission (the "SCC" or the "Commission").

1   **Q 5: What is the purpose of this testimony?**

2   **A:**   In this testimony, I document the failure by the Company to develop a reasonable and  
3       compliant plan to meet the requirements of the Virginia Clean Economy Act (“VCEA”). I  
4       detail the ways in which the Company’s approach to developing its VCEA Compliance  
5       Plan (“Plan”) fails to comply with the VCEA and fails to demonstrate that the proposed  
6       Plan represents a careful and thorough approach to achieving a least-cost, reliable, and  
7       responsible course of action.

8   **Q 6: Based on your review of the Company’s Plan, what do you conclude and**  
9       **recommend to the Commission?**

10   **A:**   I conclude that the Plan as submitted by the Company is materially deficient and  
11       inadequate, failing to establish that the Plan will successfully and cost-effectively meet  
12       the requirements of the VCEA. I recognize that the Company must file annual VCEA  
13       plans, and as such, I offer recommendations for the Commission’s adoption as directives  
14       for future filings.

15   **Q 7: What do you recommend?**

16   **A:**   The Company must make a number of changes to its approach and analysis so that in its  
17       next filing, the Commission is provided with a well-supported and cost-effective plan—  
18       one that actually complies with the VCEA and evaluates available alternatives. In  
19       particular, I recommend:

- 20       • The Commission should make clear that the VCEA mandates resource proposals—  
21       not specific generation and resource additions—and requires a showing grounded in  
22       competent evidence that such proposals result in a plan and actions that are



reasonable and prudent. In future filings, the Company must establish an approach and submit a plan that recognizes the difference between an obligation to propose generation and resource additions (which the VCEA requires) and the obligation to construct and own generation and resource additions (which the VCEA does not require).

- The Commission should make clear that the VCEA measures compliance with the Renewable Portfolio Standard (“RPS”) through retirement of Renewable Energy Certificates (“RECs”) and not through addition of generation facilities or power contracts. In choosing the appropriate path, the Company should be required to justify its proposed mix of RECs, generation, and contracts through a showing grounded in competent evidence that such mix would result in a plan and actions that are reasonable and prudent.
- The Company should be required to prepare and evaluate multiple scenarios that would result in compliance with the VCEA. For example, the Commission should require the Company to evaluate procurement of greater amounts of non-utility and distributed resources than the minimums required by law where such procurement could result in plans and actions that are more reasonable and prudent than treating statutory minimums as caps. The statutory minimums in the VCEA relating to distributed energy resources, such as distributed generation, energy efficiency, demand response, distributed storage, and others, as well as to utility scale storage and non-utility generation resources, are in fact minimums. Future plans must provide

a robust analysis of additional amounts in order to understand whether lower-cost options exist that are better for customers.

- Until the Company has sufficiently evaluated alternatives, which may in fact be lower-cost for customers, the Company should not be permitted to spend ratepayer dollars on plans lacking this important analysis.
- The Commission should direct the Company to provide a much more specific, concrete, and actionable VCEA compliance plan, demonstrated with competent evidence. The Company must understand and internalize the fact that VCEA and RPS compliance planning is a much different exercise than the planning conducted in Integrated Resource Plans (“IRPs”). IRP analysis is done on a different time scale without customer dollars at stake, and simply copying IRP analysis is insufficient here. The analysis, conclusions, and proposals contained in a VCEA compliance plan must be demonstrated with competent evidence to be reasonable and prudent as action steps to be undertaken by the Company.
- The Commission should make clear that the fact that the Company operates in multiple states does not permit the Company to compromise its performance in meeting obligations under the VCEA, nor should the Company be permitted to take actions that create undue preference or unfair allocation of costs among customers in different jurisdictions.
- The Company should be required to ensure that its analysis and presentation of results in its Plan is consistent and meaningful. That is, evaluations of costs, alternatives, rate

1 impacts, and other aspects of the Plan should be conducted and presented using  
2 consistent present-value and cumulative net worth approaches.

3 **PLANNING AND PLAN DEVELOPMENT REQUIREMENTS UNDER THE VCEA**

4 **Q 8: What plan development and submission requirements are established by the**  
5 **VCEA?**

6 **A:** The VCEA requires the Company to submit an annual plan each year from 2020 through  
7 2025.<sup>1</sup> In addition, the Company is required to petition for approval for the development  
8 of new solar and onshore wind generation capacity reflecting in the aggregate and over its  
9 duration, the requirements of the VCEA concerning allocation percentages for  
10 construction or purchase of such capacity.<sup>2</sup> The plan must include any requests for  
11 approval or update of a rate adjustment clause to recover costs.<sup>3</sup> The plan must address  
12 energy storage project targets as well.<sup>4</sup>

13 **Q 9: What standard applies to the Commission's review of the plan submitted by the**  
14 **Company?**

15 **A:** The VCEA provides that, in determining whether to approve the Company's plan and any  
16 associated requests, the Commission must determine whether the plan is reasonable and  
17 prudent and must give due consideration to RPS and carbon reduction requirements in the

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<sup>1</sup> VA Code § 56-585.5 D.4.

<sup>2</sup> *Id.*

<sup>3</sup> *Id.*

<sup>4</sup> *Id.*

VCEA, the promotion of renewable energy and storage resources within the Commonwealth, and fuel savings that would be realized as a result of the plan.<sup>5</sup>

**Q 10: What does the VCEA require from a Phase I utility regarding RPS compliance?**

**A:** The VCEA requires the Company, a Phase I utility, to participate in a renewable energy portfolio standard program, called the RPS Program.<sup>6</sup> In order to comply with the RPS Program, the Company must “procure and retire Renewable Energy Certificates (RECs) originating from renewable energy standard eligible resources.”<sup>7</sup>

**Q 11: Does the VCEA require development or contracting with renewable energy generators in order to procure compliant RECs?**

**A:** No. The VCEA states eligibility requirements relating to RECs, but does not dictate the method by which the Company must procure required REC quantities.

**Q 12: Is it important that the VCEA does not establish requirements for *how* the Company procures RPS-compliant RECs?**

**A:** Yes. The benefit of RECs as an instrument of RPS compliance is that they are traded separately from the underlying energy generation that creates them. As a result, a cost-conscious utility can develop a procurement strategy that is more flexible than one that would involve generation procurement alone. For example, the regulated utility can potentially reduce the cost of RPS Program compliance through a strategy that optimizes the roles that RECs, self-build generation, and contract-procured generation can

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<sup>5</sup> *Id.*

<sup>6</sup> Va. Code § 56-585.5 C.

<sup>7</sup> *Id.*

1           respectively play. Optimization of the portfolio is essential to proposing a reasonable and  
2           prudent RPS plan.

3   **Q 13: Does the VCEA require development or procurement of renewable energy**  
4   **generation or energy storage resources?**

5   **A:**   No, it does not. The VCEA requirements relating to renewable energy generation and  
6           energy storage that apply to the Company are contained in sections D.1. and E.1. of the  
7           statute.<sup>8</sup> Both sections state quite clearly that the Company “shall petition the  
8           Commission for the necessary approvals to construct, acquire, or [in the case of  
9           renewable energy generation,] enter into agreements to purchase the energy, capacity,  
10          and environmental attributes of” renewable energy and energy storage resources. On its  
11          face, and in light of the standard that applies to the Commission’s review of RPS plans,  
12          this means that there are at least two reasons why the procurement of or contracting with  
13          renewable energy and energy storage is not required by law. First, the plain language  
14          does not state that the Company must procure, only that it must “petition the Commission  
15          for necessary approvals.”<sup>9</sup> Second, as it relates to renewable energy, the statute plainly  
16          states that compliance with the RPS is measured by REC retirement, without conditions  
17          on the means that RECs are procured.

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<sup>8</sup> Va. Code §§ 56-585.5 D.1. & E.1.

<sup>9</sup> *Id.*

1 Q 14: There was some discussion in the recent Dominion Virginia Electric Power IRP case  
2 regarding the Commission's responsibilities regarding utility proposals for  
3 renewable energy and energy storage procurement.<sup>10</sup> Does the VCEA mandate the  
4 Commission approve everything in this RPS?

5 A: My position, that I stated in the Dominion IRP and reiterated here, is that the VCEA does  
6 not mandate the procurement of generation or other resources, by contract or otherwise.  
7 Likewise, the Commission is not required to approve any and all such procurement  
8 proposals.

9 Q 15: Please elaborate.

10 A: The VCEA, and specifically sections D.1. and E.1., require a petition by the Company, as  
11 previously discussed, but not procurement of anything except enough RECs to retire to  
12 meet RPS requirements. The VCEA also limits Commission approval of utility petitions  
13 to situations in which the Company has made a showing that the approvals it seeks are  
14 "reasonable and prudent,"<sup>11</sup> as I will further address in this testimony.

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<sup>10</sup> See, e.g., Case No. PUR-2020-00035, Hearing Transcript at 761:25-765:6 (Cross Examination of Staff Witness Abbott); See also Environmental Respondent's Response in Support of Staff's Second Motion to Compel, Case No. 2020-00035 (Sept. 4, 2020).

<sup>11</sup> Va. Code §§ 56-585.5 D.4.

1 Q 16: Is there anything in addition to the plain language of the VCEA that supports your  
2 conclusion that the VCEA does not mandate generation and storage resource  
3 procurements?

4 A: Yes. An earlier version of the VCEA that was not enacted actually did mandate  
5 procurement amounts, but the mandatory language was not included in the final bill.<sup>12</sup>

6 **REVIEW OF THE COMPANY'S VCEA COMPLIANCE PLAN**

7 Q 17: How does the Company approach its planning obligation?

8 A: Essentially, the Company approaches its planning obligations under the VCEA like it is  
9 preparing an IRP, "using the same general methods, commodity price forecasts,  
10 optimization software, load forecasts, and resource cost assumptions."<sup>13</sup>

11 Q 18: Is it reasonable that the Company offered essentially a reduced-form version of an  
12 IRP as a VCEA Compliance Plan in this case?

13 A: No, and for two broad reasons. First, the Company's rehashing of data and analysis from  
14 pre-VCEA studies and references means that the foundation for the Plan is out of date  
15 and inadequate. For example, the commodity and fundamentals forecasts used in the Plan  
16 did not reflect passage of the VCEA.<sup>14</sup> Second, an IRP is often described as a snapshot in  
17 time and a planning document that does not specifically aim to establish a foundation for  
18 the procurement or development of specific resources. The precision and thoroughness of  
19 evaluation for a proceeding in which resources are proposed for acquisition must be

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<sup>12</sup> See Attachment KRR-3, (subparagraph 2, lines 1434-1435 states that the utility "*shall* construct or acquire, or enter into agreements to purchase."). This is a significantly different obligation than was adopted in the final VCEA.

<sup>13</sup> Company Plan at § 1.0.

<sup>14</sup> Attachment KRR-4, Company Response to ER 2-05.

1 greater. The Company seeks to set a problematic precedent in this proceeding by relying  
2 on an analysis process that reflects only an IRP level of analysis. This deficiency shows  
3 up in this case in the way the Company constructs and measures against fantasy scenarios  
4 that are not VCEA-compliant and fails to robustly examine resource alternatives.

5 **Q 19: What scenarios does the Company compare in its Plan?**

6 **A:** The Company evaluated two scenarios in its Plan and considered one alternative for each  
7 scenario.<sup>15</sup> The two scenarios were: (1) a scenario that the Company called “Optimized”  
8 or “Optimal,” and (2) a scenario that the Company called “VCEA Compliant.” An  
9 alternative for each scenario was constructed using an assumption that there were no  
10 carbon dioxide compliance costs over the planning horizon, which the Company called  
11 the “No Carbon Commodity Pricing Condition.”<sup>16</sup>

12 **Q 20: How does the Company treat the required minimum percentages and quantities for**  
13 **resources contained in the VCEA?**

14 **A:** For the so-called “Optimal” plan, the Company ignores VCEA requirements. For the  
15 VCEA-compliant scenario, the Company treats minimum requirements as both  
16 minimums and caps.<sup>17</sup> That is, the Company’s VCEA-compliant scenario includes only  
17 the amounts of renewable resources, storage, and non-utility generation as required by the  
18 VCEA as point targets—both a minimum and a cap.<sup>18</sup> The Company Plan results in

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<sup>15</sup> Company Plan at § 5.0.

<sup>16</sup> *Id.*, see Table 11 at p. 27.

<sup>17</sup> See Company Response to ER 3-013, relating to energy efficiency.

<sup>18</sup> Company Plan at 28-29.



1 significant energy purchases beginning around 2030.<sup>19</sup> It is not clear whether the  
2 Company evaluated procurement of more renewable energy resources than the VCEA  
3 proposal levels in order to address this shortfall.

4 **Q 21: How does the Company treat the requirements related to REC retirements in the**  
5 **Plan?**

6 **A:** The Company treats the REC retirement requirements as requirements for generation  
7 capacity either owned or under contract.<sup>20</sup> This is problematic. RECs are widely available  
8 as unbundled resources—meaning that they can and do trade in markets separately from  
9 the underlying renewable energy generation that creates them. RECs can be obtained  
10 from generation owned by the Company or from non-utility generators, including  
11 customers. The REC market in Virginia will likely experience considerable growth in  
12 Virginia over the next few decades. As market volume increases, liquidity will also likely  
13 increase, and costs and prices for RECs could very well fall. This could mean that  
14 owning and entering long term contracts for generation in order to get all RECs for  
15 compliance is a less attractive strategic path than pursuing a more diversified portfolio  
16 approach.

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<sup>19</sup> Company Plan at Figure 18, p. 33.

<sup>20</sup> Company Plan at App. B; *see also* Company Response to ER 2-11, Attachment SELC\_2-11\_Figure4\_AppdxB, at sheet "Appendix B."

**Q 22: How does the Company reflect this opportunity to diversify its compliance portfolio strategy?**

**A:** The Company ignored this opportunity to evaluate cost savings through a more diversified portfolio of development, procurement, and REC purchases based on “theoretical” assumptions about REC values and costs.<sup>21</sup>

**Q 23: Does the Company evaluate the price of RECs over the planning timeframe?**

**A:** No. Surprisingly, even though the VCEA denominates RPS compliance in terms of REC retirements,<sup>22</sup> the Company does not evaluate or reasonably analyze the price of RECs over the planning timeframe. In its “REC Optimization” analysis,<sup>23</sup> it assumes REC forward pricing that is flat at \$5.00 per REC from 2029 through 2040. This appears to be based on pre-VCEA forward price modeling and shows no meaningful analysis of the cost of REC-based compliance.<sup>24</sup>

**Q 24: How does the Company develop its scenarios from a cost or revenue requirement perspective?**

**A:** Although not required to develop a least-cost plan under the terms of the VCEA or the Commission’s order instituting this proceeding,<sup>25</sup> the Company chose to develop its so-

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<sup>21</sup> Attachment KRR-4, Company Response to ER 3-011.

<sup>22</sup> Va. Code § 56-585.5 C.

<sup>23</sup> Company Response to ER 2-11, Attachment SELC\_2-11\_Tables 16\_17\_18\_AppdxC\_D at “REC Optimization” tab.

<sup>24</sup> See Attachment KRR-4, Company Response to ER 3-002 (stating that “The 3rd party subscription service PJM tier 1 REC price outlook utilized in part for the Company’s forward estimate of REC prices used in this filing is flat beginning in the late 2020’s going forward due to REC supply satisfying REC demand later in the curve.”).

<sup>25</sup> Order Establishing 2020 RPS Proceedings, *Ex Parte: Establishing 2020 RPS Proceeding for Appalachian Power Company*, Case No. PUR-2020-00135, (July 10 2020) .

1 called "Optimal Plan" for a path that would not be compliant with the requirements of the  
2 VCEA. In addition, the Company chose to evaluate both the non-compliant "Optimal"  
3 scenario and the VCEA-compliant scenario against an approach that ignored carbon  
4 emissions costs impacts. Beggaring the definition of the word "option," the Company  
5 called the non-compliant, no-carbon cost plan the "Least Cost Option."<sup>26</sup>

6 **Q 25: Are you saying that modeling a least cost plan is inappropriate?**

7 **A:** No. I believe that modeling a least cost plan through one or more appropriate scenarios  
8 will support the development of a reasonable and prudent plan. But such scenarios must  
9 be based in reality, and not conjured up as a collateral attack on existing law. A factually  
10 and legally irrelevant scenario provides no useful insight for that purpose and is a waste  
11 of customer revenues.

12 **Q 26: Is the evaluation of non-compliant and no-carbon cost plans a reasonable use of rate**  
13 **payer dollars or a reasonable approach to VCEA compliance planning?**

14 **A:** No. The Company's approach to the development of its so-called VCEA Compliance  
15 Plan has three of four scenarios evaluating pathways that would be specifically  
16 unreasonable and imprudent in the face of Virginia law. There is nothing Optimal about a  
17 regulated utility planning for dereliction of legal obligations or intentional ignorance of  
18 regulatory reality.

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<sup>26</sup> Company Plan at § 5.3.

1 Q 27: How does the Company treat distributed energy resources ("DER"), including  
2 distributed generation, distributed storage, demand response, energy efficiency, and  
3 other resources, in its Plan?

4 A: The Company finds no net value from DERs in its Plan, but the analysis and assumptions  
5 used to reach that result is not fully documented. The Company's Plan adds only the  
6 distributed generation forecast to be added by PJM and reflected in its prior IRP, none of  
7 which contributes to VCEA compliance.<sup>27</sup> No additional distributed generation is added.  
8 The Company presented limited energy efficiency and demand response options to its  
9 IRP modeling software, with the surprising result that additions of such resources are  
10 zeroed out early in the planning timeframe.<sup>28</sup>

11 Q 28: How does the Company Plan address energy storage resources?

12 A: As with renewable energy generation, the Company considers the minimum level of  
13 storage resources required under the VCEA as the exact amount of energy storage to be  
14 added during the planning timeframe. Additional storage resources appear not to have  
15 been considered and certainly were not selected.<sup>29</sup>

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<sup>27</sup> Company Plan at § 4.5.4., Table 15.

<sup>28</sup> Company Plan at § 4.5.1, 4.5.2, Table 15.

<sup>29</sup> Company Plan at § 5.2, Table 15.

1 **Q 29: If additional storage was not modeled or selected, how does the Company Plan**  
2 **address the need for firmness or capacity in the face of increasing levels of variable**  
3 **renewable energy generation added?**

4 **A:** The Company adds 2.6 Gigawatts of new gas combustion turbine capacity in the year  
5 2040 and nearly 500 additional MW of gas generation in 2047.<sup>30</sup>

6 **Q 30: Does the Company Plan adequately explain the decision to rely upon gas generation**  
7 **to address capacity needs over the planning timeframe?**

8 **A:** No. However, in response to discovery requests, the Company stated that the Plan outputs  
9 relating to gas generation, storage, energy efficiency, distributed generation, and short-  
10 term market purchases are all essentially outputs of the assumptions and analysis from  
11 the Company's last IRP.<sup>31</sup> It is not surprising, therefore, that new gas generation appears  
12 to coincide with fossil plant retirements identified by the Company and tracks pre-VCEA  
13 planning.

14 **Q 31: Does the Company provide a retirement study with its Plan?**

15 **A:** There is no plant retirement study referenced in the Plan. In response to discovery  
16 requests, the Company stated that it did not perform a retirement analysis for coal plants  
17 as part of this VCEA Compliance Plan, and instead relied on retirement assumptions  
18 from its pre-VCEA IRP.<sup>32</sup>

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<sup>30</sup> Company Plan at Table 15.

<sup>31</sup> Attachment KRR-4, Company Response to ER 3-001.

<sup>32</sup> Attachment KRR-4, Company Response to ER 3-009.

1 **Q 32: Why is the lack of any meaningful retirement study important in this proceeding?**

2 **A:** The Company assumes a sudden and significant retirement of fossil fuel assets in 2040.  
3 Whether this is a reasonable assumption and whether alternatives will exist that are more  
4 customer-friendly and do not involve significant investments in new fossil-fuel assets like  
5 combustion turbines in 2040 will have significant effects on the entire VCEA  
6 Compliance Plan.

7 **Q 33: The Company operates generation in more than one state. Does the Company**  
8 **address the measures it will take to ensure that it avoids emissions leakage problems**  
9 **that could arise from operating generation outside of Virginia to serve customers in**  
10 **the Commonwealth?**

11 **A:** No. This is a significant impact because mitigation of emissions leakage could act to raise  
12 the cost of compliance with carbon emissions regulations associated with serving  
13 Virginia customers. It is possible that non-fossil options in place of new planned gas  
14 generation would be more cost-effective once leakage mitigation costs are fairly and fully  
15 evaluated. As noted earlier in this testimony, the Company is still in the mode of running  
16 scenarios that pretend away carbon compliance costs.

17 **Q 34: Does the Company evaluate rate impacts associated with its planning scenarios?**

18 **A:** Not in any useful way. The Company includes a cumulative incremental impacts table in  
19 the Plan.<sup>33</sup> However, this table sums the cumulative difference between the VCEA  
20 Compliant scenario and the impossible so-called "Optimal Plan." Even if such  
21 comparison had value in an IRP context, it has no place in a VCEA Compliance Plan that

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<sup>33</sup> Company Plan at Table 18.

should be evaluating the relative impacts of competing, yet compliant, planning scenarios. Moreover, the table is based on nominal and not real values out to the year 2035.<sup>34</sup> Nominal values are of no use in estimating actual rate impacts in future years out that far. Finally, there is no way to tell from the table how much of the cost impact is offset by the numerous other benefits that compliance with the VCEA will yield.

**Q 35: Do you have any other concerns about the Company's Plan?**

**A:** Yes. A major concern that is reasonably raised by the Plan and the way it was developed is whether the Company is committed to and capable of executing even the Plan that it proposes. I have already discussed the many flaws in the Company's approach to planning for VCEA and RPS compliance. It is also important to note that the Company is proposing maximum addition of new utility-owned and operated renewable energy and storage resources in spite of the fact that it lacks material experience with siting, developing, and operating such facilities. This makes it all the more important that the Company evaluate the costs and other impacts of compliant scenarios that rely on increased amounts of DERs and non-utility generation—above the statutory minimums.

**Q 36: Doesn't the Company operate as part of a large, multi-state holding company with many affiliates that have more experience?**

**A:** Yes, but the people working in those separate companies already have full-time jobs.<sup>35</sup> To meet the needs of VCEA compliance, the Company itself must develop additional skills or procure additional outside resources such as RECs, purchased power, and load-

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<sup>34</sup> Attachment KRR-4, Company Response to ER 3-005.

<sup>35</sup> Company Response to ER 2-02.

1 reduction measures like DERs. None of these options were adequately addressed in the  
2 Plan.

3 **CONCLUSIONS AND RECOMMENDATIONS**

4 **Q 37: What do you conclude based on your review of the Company's 2020 Plan?**

5 **A:** The Company's proposed 2020 Plan suffers from several significant deficiencies that  
6 render it inadequate as a planning foundation for VCEA compliance. These deficiencies  
7 relate to lack of transparency, dubious assumptions about the VCEA, and stale or limited  
8 analysis.

9 **Q 38: What do you recommend that the Commission do with this Plan?**

10 **A:** As articulated in greater detail in this testimony, I recommend:

- 11 • The Commission should make clear that the VCEA mandates resource proposals—  
12 not necessarily Company-owned generation and resource addition—and requires a  
13 showing grounded in competent evidence that such proposals result in a plan and  
14 actions that are reasonable and prudent.
- 15 • The Commission should make clear that the VCEA measures compliance with the  
16 RPS through retirement of RECs and not through addition of generation facilities or  
17 power contracts.
- 18 • The Company should be required to prepare and evaluate multiple scenarios that  
19 would result in compliance with the VCEA. For example, the Commission should  
20 require the Company to evaluate procurement of greater amounts of non-utility and  
21 distributed resources than the minimums required by law where such procurement



1 could result in plans and actions that are more reasonable and prudent than treating  
2 statutory minimums as caps.

- 3 • Until the Company has sufficiently evaluated alternative compliance approaches,  
4 which may be lower-cost for customers, it should not be permitted to spend customer  
5 dollars on plans lacking this important evidence.
- 6 • The Commission should direct the Company to provide a much more specific,  
7 concrete, and actionable VCEA compliance plan, demonstrated with competent  
8 evidence.
- 9 • The Commission should make clear that the fact the Company operates in multiple  
10 states does not permit the Company to compromise its performance in meeting  
11 obligations under the VCEA nor should these actions be allowed to create undue  
12 preference for or cost allocation among customers in different jurisdictions.
- 13 • The Company should be required to ensure that its analysis and presentation of results  
14 in its Plan is consistent and meaningful.

15 **Q 39: Does this conclude your testimony?**

16 **A:** Yes.

# Attachment KRR-1

**Karl R. Rábago****Rábago Energy LLC**2025 E. 24<sup>th</sup> Avenue, Denver, CO 80205

c/SMS: +1.512.968.7543 | e: karl@rabagoenergy.com

Nationally recognized leader and innovator in electricity and energy law, policy, and regulation. Experienced as a regulatory expert, utility executive, research and development manager, sustainability leader, senior government official, educator, and advocate. Successful track record of working with U.S. Congress, state legislatures, governors, regulators, city councils, business leaders, researchers, academia, and community groups. Nationally recognized speaker on energy, environment, and sustainable development matters. Managed staff as large as 250; responsible for operations of research facilities with staff in excess of 600. Developed and managed budgets in excess of \$300 million. Law teaching experience at Pace University Elisabeth Haub School of Law, University of Houston Law Center, and U.S. Military Academy at West Point. Military veteran.

**Employment****RÁBAGO ENERGY LLC**

Principal: July 2012—Present. Consulting practice dedicated to providing business sustainability, expert witness, and regulatory advice and services to organizations in the clean and advanced energy sectors. Prepared and submitted testimony in more than 30 states and 100 electricity and gas regulatory proceedings. Recognized national leader in development and implementation of award-winning “Value of Solar” alternative to traditional net metering. Additional information at [www.rabagoenergy.com](http://www.rabagoenergy.com).

- Chairman of the Board, Center for Resource Solutions (1997-present). CRS is a not-for-profit organization based at the Presidio in California. CRS developed and manages the Green-e Renewable Electricity Brand, a nationally and internationally recognized branding program for green power and green pricing products and programs. Past chair of the Green-e Governance Board.
- Director, Solar United Neighbors (2018-present).

**PACE ENERGY AND CLIMATE CENTER, PACE UNIVERSITY ELISABETH HAUB SCHOOL OF LAW**

Senior Policy Advisor: September 2019—September 2020. Part-time advisor and staff member. Provide expert witness, project management, and business development support on electric and gas regulatory and policy issues and activities.

Executive Director: May 2014—August 2019. Leader of a team of professional and technical experts and law students in energy and climate law, policy, and regulation. Secured funding for and managed execution of regulatory intervention, research, market development support, and advisory services. Taught Energy Law. Provided learning and development opportunities for law students. Additional activities:

- Former Director, Alliance for Clean Energy – New York (2018-2019).
- Former Director, Interstate Renewable Energy Council (IREC) (2012-2018).
- Former Co-Director and Principal Investigator, Northeast Solar Energy Market Coalition (2015-2017). The NESEMC was a US Department of Energy’s SunShot Initiative Solar Market Pathways project. Funded under a cooperative agreement between the US DOE and Pace University, the NESEMC worked to harmonize solar market policy and advance supportive policy and regulatory practices in the northeast United States.

## Karl R. Rábago

### AUSTIN ENERGY – THE CITY OF AUSTIN, TEXAS

Vice President, Distributed Energy Services: April 2009—June 2012. Executive in 8th largest public power electric utility serving more than one million people in central Texas. Responsible for management and oversight of energy efficiency, demand response, and conservation programs; low-income weatherization; distributed solar and other renewable energy technologies; green buildings program; key accounts relationships; electric vehicle infrastructure; and market research and product development. Executive sponsor of Austin Energy's participation in an innovative federally-funded smart grid demonstration project led by the Pecan Street Project. Led teams that successfully secured over \$39 million in federal stimulus funds for energy efficiency, smart grid, and advanced electric transportation initiatives. Additional activities included:

- Director, Renewable Energy Markets Association. REMA is a trade association dedicated to maintaining and strengthening renewable energy markets in the United States.
- Membership on Pedernales Electric Cooperative Member Advisory Board. Invited by the Board of Directors to sit on first-ever board to provide formal input and guidance on energy efficiency and renewable energy issues for the nation's largest electric cooperative.

### THE AES CORPORATION

Director, Government & Regulatory Affairs: June 2006—December 2008. Director, Global Regulatory Affairs, provided regulatory support and group management to AES's international electric utility operations on five continents. Managing Director, Standards and Practices, for Greenhouse Gas Services, LLC, a GE and AES venture committed to generating and marketing greenhouse gas credits to the U.S. voluntary market. Government and regulatory affairs manager for AES Wind Generation. Managed a portfolio of regulatory and legislative initiatives to support wind energy market development in Texas, across the United States, and in many international markets.

### JICARILLA APACHE NATION UTILITY AUTHORITY

Director: 1998—2008. Located in New Mexico, the JANUA was an independent utility developing profitable and autonomous utility services that provide natural gas, water utility services, low income housing, and energy planning for the Nation. Authored "First Steps" renewable energy and energy efficiency strategic plan with support from U.S. Department of Energy.

### HOUSTON ADVANCED RESEARCH CENTER

Group Director, Energy and Buildings Solutions: December 2003—May 2006. Leader of energy and building science staff at a mission-driven not-for-profit contract research organization based in The Woodlands, Texas. Responsible for developing, maintaining and expanding upon technology development, application, and commercialization support programmatic activities, including the Center for Fuel Cell Research and Applications; the Gulf Coast Combined Heat and Power Application Center; and the High-Performance Green Buildings Practice. Secured funding for major new initiative in carbon nanotechnology applications in the energy sector.

- President, Texas Renewable Energy Industries Association. As elected president of the statewide business association, led and managed successful efforts to secure and implement significant expansion of the state's renewable portfolio standard as well as other policy, regulatory, and market development activities.
- Director, Southwest Biofuels Initiative. Established the Initiative as an umbrella structure for a number of biofuels related projects.

## Karl R. Rábago

- Member, Committee to Study the Environmental Impacts of Windpower, National Academies of Science National Research Council. The Committee was chartered by Congress and the Council on Environmental Quality to assess the impacts of wind power on the environment.
- Advisory Board Member, Environmental & Energy Law & Policy Journal, University of Houston Law Center.

### CARGILL DOW LLC (NOW NATUREWORKS, LLC)

Sustainability Alliances Leader: April 2002—December 2003. Integrated sustainability principles into all aspects of a ground-breaking bio-based polymer manufacturing venture. Responsible for maintaining, enhancing and building relationships with stakeholders in the worldwide sustainability community, as well as managing corporate and external sustainability initiatives.

- Successfully completed Minnesota Management Institute at University of Minnesota Carlson School of Management, an alternative to an executive MBA program that surveyed fundamentals and new developments in finance, accounting, operations management, strategic planning, and human resource management.

### ROCKY MOUNTAIN INSTITUTE

Managing Director/Principal: October 1999—April 2002. Co-authored "Small Is Profitable," a comprehensive analysis of the benefits of distributed energy resources. Provided consulting and advisory services to help business and government clients achieve sustainability through application and incorporation of Natural Capitalism principles.

- President of the Board, Texas Ratepayers Organization to Save Energy. Texas R.O.S.E. is a non-profit organization advocating low-income consumer issues and energy efficiency programs.
- Co-Founder and Chair of the Advisory Board, Renewable Energy Policy Project-Center for Renewable Energy and Sustainable Technology. REPP-CREST was a national non-profit research and internet services organization.

### CH2M HILL

Vice President, Energy, Environment and Systems Group: July 1998—August 1999. Responsible for providing consulting services to a wide range of energy-related businesses and organizations, and for creating new business opportunities in the energy industry for an established engineering and consulting firm. Completed comprehensive electric utility restructuring studies for the states of Colorado and Alaska.

### PLANERGY

Vice President, New Energy Markets: January 1998—July 1998. Responsible for developing and managing new business opportunities for the energy services market. Provided consulting and advisory services to utility and energy service companies.

### ENVIRONMENTAL DEFENSE FUND

Energy Program Manager: March 1996—January 1998. Managed renewable energy, energy efficiency, and electric utility restructuring programs. Led regulatory intervention activities in Texas and California. In Texas, played a key role in crafting Deliberative Polling processes. Participated in national environmental and energy advocacy networks, including the Energy Advocates Network, the National Wind Coordinating Committee, the NCSL Advisory Committee on Energy, and the PV-COMPACT Coordinating Council. Frequently appeared before the Texas Legislature, Austin City Council, and regulatory commissions on electric restructuring issues.

## Karl R. Rábago

### UNITED STATES DEPARTMENT OF ENERGY

Deputy Assistant Secretary, Utility Technologies: January 1995–March 1996. Manager of the Department's programs in renewable energy technologies and systems, electric energy systems, energy efficiency, and integrated resource planning. Supervised technology research, development and deployment activities in photovoltaics, wind energy, geothermal energy, solar thermal energy, biomass energy, high-temperature superconductivity, transmission and distribution, hydrogen, and electric and magnetic fields. Managed, coordinated, and developed international agreements. Supervised development and deployment support activities at national laboratories. Developed, advocated, and managed a Congressional budget appropriation of approximately \$300 million.

### STATE OF TEXAS

Commissioner, Public Utility Commission of Texas. May 1992–December 1994. Appointed by Governor Ann W. Richards. Regulated electric and telephone utilities in Texas. Co-chair and organizer of the Texas Sustainable Energy Development Council. Vice-Chair of the National Association of Regulatory Utility Commissioners (NARUC) Committee on Energy Conservation. Member and co-creator of the Photovoltaic Collaborative Market Project to Accelerate Commercial Technology (PV-COMPACT).

### LAW TEACHING

**Professor for a Designated Service:** Pace University Elisabeth Haub School of Law, 2014-2019. Non-tenured member of faculty. Taught Energy Law. Supervised a student intern practice.

**Associate Professor of Law:** University of Houston Law Center, 1990–1992. Full time, tenure track member of faculty. Courses taught: Criminal Law, Environmental Law, Criminal Procedure, Environmental Crimes Seminar, Wildlife Protection Law.

**Assistant Professor:** United States Military Academy, West Point, New York, 1988–1990. Member of the faculty in the Department of Law. Honorably discharged in August 1990, as Major in the Regular Army. Courses taught: Constitutional Law, Military Law, and Environmental Law Seminar.

### LITIGATION

Trial Defense Attorney and Prosecutor, U.S. Army Judge Advocate General's Corps, Fort Polk, Louisiana, January 1985–July 1987. Assigned to Trial Defense Service and Office of the Staff Judge Advocate.

### NON-LEGAL MILITARY SERVICE

Armored Cavalry Officer, 2d Squadron 9<sup>th</sup> Armored Cavalry, Fort Stewart, Georgia, May 1978–August 1981. Served as Logistics Staff Officer (S-4). Managed budget, supplies, fuel, ammunition, and other support for an Armored Cavalry Squadron. Served as Support Platoon Leader for the Squadron (logistical support), and as line Platoon Leader in an Armored Cavalry Troop. Graduate of Airborne and Ranger Schools. Special training in Air Mobilization Planning and Nuclear, Biological and Chemical Warfare.

## Karl R. Rábago

### Formal Education

**LL.M., Environmental Law, Pace University School of Law, 1990:** Curriculum designed to provide breadth and depth in study of theoretical and practical aspects of environmental law. Courses included: International and Comparative Environmental Law, Conservation Law, Land Use Law, Seminar in Electric Utility Regulation, Scientific and Technical Issues Affecting Environmental Law, Environmental Regulation of Real Estate, Hazardous Wastes Law. Individual research with Hudson Riverkeeper Fund, Garrison, New York.

**LL.M., Military Law, U.S. Army Judge Advocate General's School, 1988:** Curriculum designed to prepare Judge Advocates for senior level staff service. Courses included: Administrative Law, Defensive Federal Litigation, Government Information Practices, Advanced Federal Litigation, Federal Tort Claims Act Seminar, Legal Writing and Communications, Comparative International Law.

**J.D. with Honors, University of Texas School of Law, 1984:** Attended law school under the U.S. Army Funded Legal Education Program, a fully funded scholarship awarded to 25 or fewer officers each year. Served as Editor-in-Chief (1983-84); Articles Editor (1982-83); Member (1982) of the Review of Litigation. Moot Court, Mock Trial, Board of Advocates. Summer internship at Staff Judge Advocate's offices. Prosecuted first cases prior to entering law school.

**B.B.A., Business Management, Texas A&M University, 1977:** ROTC Scholarship (3-yr). Member: Corps of Cadets, Parson's Mounted Cavalry, Wings & Sabers Scholarship Society, Rudder's Rangers, Town Hall Society, Freshman Honor Society, Alpha Phi Omega service fraternity.

## Karl R. Rábago

### Selected Publications

"Distributed Generation Law," contributing author, American Bar Association Environment, Energy, and Resources Section (August 2020)

"National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources," contributing author, National Energy Screening Project (August 2020)

"Achieving 100% Renewables: Supply-Shaping through Curtailment," with Richard Perez, Marc Perez, and Morgan Putnam, PV Tech Power, Vol. 19 (May 2019).

"A Radical Idea to Get a High-Renewable Electric Grid: Build Way More Solar and Wind than Needed," with Richard Perez, The Conversation, online at <http://bit.ly/2YjnM15> (May 29, 2019).

"Reversing Energy System Inequity: Urgency and Opportunity During the Clean Energy Transition," with John Howat, John Colgan, Wendy Gerlitz, and Melanie Santiago-Mosier, National Consumer Law Center, online at [www.nclc.org](http://www.nclc.org) (Feb. 26, 2019).

"Revisiting Bonbright's Principles of Public Utility Rates in a DER World," with Radina Valova, The Electricity Journal, Vol. 31, Issue 8, pp. 9-13 (Oct. 2018).

"Achieving very high PV penetration – The need for an effective electricity remuneration framework and a central role for grid operators," Richard Perez (corresponding author), Energy Policy, Vol. 96, pp. 27-35 (2016).

"The Net Metering Riddle," Electricity Policy.com, April 2016.

"The Clean Power Plan," Power Engineering Magazine (invited editorial), Vol. 119, Issue 12 (Dec. 2, 2015)

"The 'Sharing Utility:' Enabling & Rewarding Utility Performance, Service & Value in a Distributed Energy Age," co-author, 51<sup>st</sup> State Initiative, Solar Electric Power Association (Feb. 27, 2015)

"Rethinking the Grid: Encouraging Distributed Generation," Building Energy Magazine, Vol. 33, No. 1 Northeast Sustainable Energy Association (Spring 2015)

"The Value of Solar Tariff: Net Metering 2.0," The ICER Chronicle, Ed. 1, p. 46 [International Confederation of Energy Regulators] (December 2013)

"A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation," co-author, Interstate Renewable Energy Council (October 2013)

"The 'Value of Solar' Rate: Designing an Improved Residential Solar Tariff," Solar Industry, Vol. 6, No. 1 (Feb. 2013)

"Jicarilla Apache Nation Utility Authority Strategic Plan for Energy Efficiency and Renewable Energy Development," lead author & project manager, U.S. Department of Energy First Steps Toward Developing Renewable Energy and Energy Efficiency on Tribal Lands Program (2008)

"A Review of Barriers to Biofuels Market Development in the United States," 2 Environmental & Energy Law & Policy Journal 179 (2008)

"A Strategy for Developing Stationary Biodiesel Generation," Cumberland Law Review, Vol. 36, p.461 (2006)

"Evaluating Fuel Cell Performance through Industry Collaboration," co-author, Fuel Cell Magazine (2005)

"Applications of Life Cycle Assessment to NatureWorks™ Polylactide (PLA) Production," co-author, Polymer Degradation and Stability 80, 403-19 (2003)



## Karl R. Rábago

"An Energy Resource Investment Strategy for the City of San Francisco: Scenario Analysis of Alternative Electric Resource Options," contributing author, Prepared for the San Francisco Public Utilities Commission, Rocky Mountain Institute (2002)

"Small Is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size," co-author, Rocky Mountain Institute (2002)

"Socio-Economic and Legal Issues Related to an Evaluation of the Regulatory Structure of the Retail Electric Industry in the State of Colorado," with Thomas E. Feiler, Colorado Public Utilities Commission and Colorado Electricity Advisory Panel (April 1, 1999)

"Study of Electric Utility Restructuring in Alaska," with Thomas E. Feiler, Legislative Joint Committee on electric Restructuring and the Alaska Public Utilities Commission (April 1, 1999)

"New Markets and New Opportunities: Competition in the Electric Industry Opens the Way for Renewables and Empowers Customers," EEBA Excellence (Journal of the Energy Efficient Building Association) (Summer 1998)

"Building a Better Future: Why Public Support for Renewable Energy Makes Sense," Spectrum: The Journal of State Government (Spring 1998)

"The Green-e Program: An Opportunity for Customers," with Ryan Wiser and Jan Hamrin, Electricity Journal, Vol. 11, No. 1 (January/February 1998)

"Being Virtual: Beyond Restructuring and How We Get There," Proceedings of the First Symposium on the Virtual Utility, Kluwer Press (1997)

"Information Technology," Public Utilities Fortnightly (March 15, 1996)

"Better Decisions with Better Information: The Promise of GIS," with James P. Spiers, Public Utilities Fortnightly (November 1, 1993)

"The Regulatory Environment for Utility Energy Efficiency Programs," Proceedings of the Meeting on the Efficient Use of Electric Energy, Inter-American Development Bank (May 1993)

"An Alternative Framework for Low-Income Electric Ratepayer Services," with Danielle Jaussaud and Stephen Benenson, Proceedings of the Fourth National Conference on Integrated Resource Planning, National Association of Regulatory Utility Commissioners (September 1992)

"What Comes Out Must Go In: The Federal Non-Regulation of Cooling Water Intakes Under Section 316 of the Clean Water Act," Harvard Environmental Law Review, Vol. 16, p. 429 (1992)

"Least Cost Electricity for Texas," State Bar of Texas Environmental Law Journal, Vol. 22, p. 93 (1992)

"Environmental Costs of Electricity," Pace University School of Law, Contributor—Impingement and Entrainment Impacts, Oceana Publications, Inc. (1990)

## Attachment KRR-2

**Testimony Submitted by Karl R. Rábago**  
**(as of 10 December 2020)**

<b>Date</b>	<b>Proceeding</b>	<b>Case/Docket #</b>	<b>On Behalf Of:</b>
Dec. 21, 2012	VA Electric & Power Special Solar Power Tariff	Virginia SCC Case # PUE-2012-00064	Southern Environmental Law Center
May 10, 2013	Georgia Power Company 2013 IRP	Georgia PSC Docket # 36498	Georgia Solar Energy Industries Association
Jun. 23, 2013	Louisiana Public Service Commission Re-examination of Net Metering Rules	Louisiana PSC Docket # R-31417	Gulf States Solar Energy Industries Association
Aug. 29, 2013	DTE (Detroit Edison) 2013 Renewable Energy Plan Review (Michigan)	Michigan PUC Case # U-17302	Environmental Law and Policy Center
Sep. 5, 2013	CE (Consumers Energy) 2013 Renewable Energy Plan Review (Michigan)	Michigan PUC Case # U-17301	Environmental Law and Policy Center
Sep. 27, 2013	North Carolina Utilities Commission 2012 Avoided Cost Case	North Carolina Utilities Commission Docket # E-100, Sub. 136	North Carolina Sustainable Energy Association
Oct. 18, 2013	Georgia Power Company 2013 Rate Case	Georgia PSC Docket # 36989	Georgia Solar Energy Industries Association
Nov. 4, 2013	PEPCO Rate Case (District of Columbia)	District of Columbia PSC Formal Case # 1103	Grid 2.0 Working Group & Sierra Club of Washington, D.C.
Apr. 24, 2014	Dominion Virginia Electric Power 2013 IRP	Virginia SCC Case # PUE-2013-00088	Environmental Respondents
May 7, 2014	Arizona Corporation Commission Investigation on the Value and Cost of Distributed Generation	Arizona Corporation Commission Docket # E-00000J-14-0023	Rábago Energy LLC (invited presentation and workshop participation)
Jul. 10, 2014	North Carolina Utilities Commission 2014 Avoided Cost Case	North Carolina Utilities Commission Docket # E-100, Sub. 140	Southern Alliance for Clean Energy
Jul. 23, 2014	Florida Energy Efficiency and Conservation Act, Goal Setting – FPL, Duke, TECO, Gulf	Florida PSC Docket # 130199-EI, 130200-EI, 130201-EI, 130202-EI	Southern Alliance for Clean Energy
Sep. 19, 2014	Ameren Missouri's Application for Authorization to Suspend Payment of Solar Rebates	Missouri PSC File No. ET-2014-0350, Tariff # YE-2014-0494	Missouri Solar Energy Industries Association
Aug. 6, 2014	Appalachian Power Company 2014 Biennial Rate Review	Virginia SCC Case # PUE-2014-00026	Southern Environmental Law Center (Environmental Respondents)

**Testimony Submitted by Karl R. Rábago**  
**(as of 10 December 2020)**

Aug. 13, 2014	Wisconsin Public Service Corp. 2014 Rate Application	Wisconsin PSC Docket # 6690-UR-123	RENEW Wisconsin and Environmental Law & Policy Center
Aug. 28, 2014	WE Energies 2014 Rate Application	Wisconsin PSC Docket # 05-UR-107	RENEW Wisconsin and Environmental Law & Policy Center
Sep. 18, 2014	Madison Gas & Electric Company 2014 Rate Application	Wisconsin PSC Docket # 3720-UR-120	RENEW Wisconsin and Environmental Law & Policy Center
Sep. 29, 2014	SOLAR, LLC v. Missouri Public Service Commission	Missouri District Court Case # 14AC-CC00316	SOLAR, LLC
Jan. 28, 2016 (date of CPUC order)	Order Instituting Rulemaking to Develop a Successor to Existing Net Energy Metering Tariffs, etc.	California PUC Rulemaking 14-07-002	The Utility Reform Network (TURN)
Mar. 20, 2015	Orange and Rockland Utilities 2015 Rate Application	New York PSC Case # 14-E-0493	Pace Energy and Climate Center
May 22, 2015	DTE Electric Company Rate Application	Michigan PSC Case # U-17767	Michigan Environmental Council, NRDC, Sierra Club, and ELPC
Jul. 20, 2015	Hawaiian Electric Company and NextEra Application for Change of Control	Hawai'i PUC Docket # 2015-0022	Hawai'i Department of Business, Economic Development, and Tourism
Sep. 2, 2015	Wisc. PSCo Rate Application	Wisconsin PSC Case # 6690-UR-124	ELPC
Sep. 15, 2015	Dominion Virginia Electric Power 2015 IRP	Virginia SCC Case # PUE-2015-00035	Environmental Respondents
Sep. 16, 2015	NYSEG & RGE Rate Cases	New York PSC Cases 15-E-0283, -0285	Pace Energy and Climate Center
Oct. 14, 2015	Florida Power & Light Application for CCPN for Lake Okeechobee Plant	Florida PSC Case 150196-EI	Environmental Confederation of Southwest Florida
Oct. 27, 2015	Appalachian Power Company 2015 IRP	Virginia SCC Case # PUE-2015-00036	Environmental Respondents
Nov. 23, 2015	Narragansett Electric Power/National Grid Rate Design Application	Rhode Island PUC Docket No. 4568	Wind Energy Development, LLC
Dec. 8, 2015	State of West Virginia, et al., v. U.S. EPA, et al.	U.S. Court of Appeals for the District of Columbia Circuit Case No. 15-1363 and Consolidated Cases	Declaration in Support of Environmental and Public Health Intervenors in Support of Movant Respondent-Intervenors' Responses in Opposition to Motions for Stay

**Testimony Submitted by Karl R. Rábago**  
(as of 10 December 2020)

Dec. 28, 2015	Ohio Power/AEP Affiliate PPA Application	PUC of Ohio Case No. 14-1693-EL-RDR	Environmental Law and Policy Center
Jan. 19, 2016	Ohio Edison Company, Cleveland Electric Illuminating Company, and Toledo Edison Company Application for Electric Security Plan (FirstEnergy Affiliate PPA)	PUC of Ohio Case No. 14-1297-EL-SSO	Environmental Law and Policy Center
Jan. 22, 2016	Northern Indiana Public Service Company (NIPSCO) Rate Case	Indiana Utility Regulatory Commission Cause No. 44688	Citizens Action Coalition and Environmental Law and Policy Center
Mar. 18, 2016	Northern Indiana Public Service Company (NIPSCO) Rate Case – Settlement Testimony	Indiana Utility Regulatory Commission Cause No. 44688	Joint Intervenor – Citizens Action Coalition and Environmental Law and Policy Center
Mar. 18, 2016	Comments on Pilot Rate Proposals by MidAmerican and Alliant	Iowa Utility Board NOI-2014-0001	Environmental Law and Policy Center
May 27, 2016	Consolidated Edison of New York Rate Case	New York PSC Case No. 16-E-0060	Pace Energy and Climate Center
June 21, 2016	Federal Trade Commission: Workshop on Competition and Consumer Protection Issues in Solar Energy	Invited workshop presentation	Pace Energy and Climate Center
Aug. 17, 2016	Dominion Virginia Electric Power 2016 IRP	Virginia SCC Case # PUE-2016-00049	Environmental Respondents
Sep. 13, 2016	Appalachian Power Company 2016 IRP	Virginia SCC Case # PUE-2016-00050	Environmental Respondents
Oct. 27, 2016	Consumers Energy PURPA Compliance Filing	Michigan PSC Case No. U-18090	Environmental Law & Policy Center, “Joint Intervenor”
Oct. 28, 2016	Delmarva, PEPCO (PHI) Utility Transformation Filing – Review of Filing & Utilities of the Future Whitepaper	Maryland PSC Case PC 44	Public Interest Advocates
Dec. 1, 2016	DTE Electric Company PURPA Compliance Filing	Michigan PSC Case No. U-18091	Environmental Law & Policy Center, “Joint Intervenor”
Dec. 16, 2016	Rebuttal of Unitil Testimony in Net Energy Metering Docket	New Hampshire Docket No. DE 16-576	New Hampshire Sustainable Energy Association (“NHSEA”)
Jan. 13, 2017	Gulf Power Company Rate Case	Florida Docket No. 160186-EI	Earthjustice, Southern Alliance for Clean Energy, League of Women Voters-Florida

**Testimony Submitted by Karl R. Rábago**  
**(as of 10 December 2020)**

Jan. 13, 2017	Alpena Power Company PURPA Compliance Filing	Michigan PSC Case No. U-18089	Environmental Law & Policy Center, "Joint Intervenors"
Jan. 13, 2017	Indiana Michigan Power Company PURPA Compliance Filing	Michigan PSC Case No. U-18092	Environmental Law & Policy Center, "Joint Intervenors"
Jan. 13, 2017	Northern States Power Company PURPA Compliance Filing	Michigan PSC Case No. U-18093	Environmental Law & Policy Center, "Joint Intervenors"
Jan. 13, 2017	Upper Peninsula Power Company PURPA Compliance Filing	Michigan PSC Case No. U-18094	Environmental Law & Policy Center, "Joint Intervenors"
Mar. 10, 2017	Eversource Energy Grid Modernization Plan	Massachusetts DPU Case No. 15-122/15-123	Cape Light Compact
Apr. 27, 2017	Eversource Rate Case & Grid Modernization Investments	Massachusetts DPU Case No. 17-05	Cape Light Compact
May 2, 2017	AEP Ohio Power Electric Security Plan	PUC of Ohio Case No. 16-1852-EL-SSO	Environmental Law & Policy Center
Jun. 2, 2017	Vectren Energy TDSIC Plan	Indiana URC Cause No. 44910	Citizens Action Coalition & Valley Watch
Jul. 28, 2017	Vectren Energy 2016-2017 Energy Efficiency Plan	Indiana URC Cause No. 44645	Citizens Action Coalition
Jul. 28, 2017	Vectren Energy 2018-2020 Energy Efficiency Plan	Indiana URC Cause No. 44927	Citizens Action Coalition
Aug. 1, 2017	Interstate Power & Light (Alliant) 2017 Rate Application	Iowa Utilities Board Docket No. RPU-2017-0001	Environmental Law & Policy Center, Iowa Environmental Council, Natural Resources Defense Council, and Solar Energy Industries Assoc.
Aug. 11, 2017	Dominion Virginia Electric Power 2017 IRP	Virginia SCC Case # PUR-2017-00051	Environmental Respondents
Aug. 18, 2017	Appalachian Power Company 2017 IRP	Virginia SCC Case # PUR-2017-00045	Environmental Respondents
Aug. 23, 2017	Pennsylvania Solar Future Project	PA Dept. of Environmental Protection - Alternative Ratemaking Webinar	Pace Energy and Climate Center
Aug. 25, 2017	Niagara Mohawk Power Co. d/b/a National Grid Rate Case	New York PSC Case # 17-E-0238, 17-G-0239	Pace Energy and Climate Center

**Testimony Submitted by Karl R. Rábago**  
(as of 10 December 2020)

Sep. 15, 2017	Niagara Mohawk Power Co. d/b/a National Grid Rate Case	New York PSC Case # 17-E-0238, 17-G-0239	Pace Energy and Climate Center
Oct. 20, 2017	Missouri PSC Working Case to Explore Emerging Issues in Utility Regulation	Missouri PSC File No. EW-2017-0245	Renew Missouri
Nov. 21, 2017	Central Hudson Gas & Electric Co. Electric and Gas Rates Cases	New York PSC Case # 17-E-0459, -0460	Pace Energy and Climate Center
Jan. 16, 2018	Great Plains Energy, Inc. Merger with Westar Energy, Inc.	Missouri PSC Case # EM-2018-0012	Renew Missouri Advocates
Jan. 19, 2018	U.S. House of Representatives, Energy and Commerce Committee	Hearing on "The PURPA Modernization Act of 2017," H.R. 4476	Rábago Energy LLC
Jan. 29, 2018	Joint Petition of Electric Distribution Companies for Approval of a Model SMART Tariff	Massachusetts D.P.U. Case No. 17-140	Boston Community Capital Solar Energy Advantage Inc. (Jointly authored with Sheryl Musgrove)
Feb. 21, 2018	Joint Petition of Electric Distribution Companies for Approval of a Model SMART Tariff	Massachusetts D.P.U. Case No. 17-140 - Surrebuttal	Boston Community Capital Solar Energy Advantage Inc. (Jointly authored with Sheryl Musgrove)
Apr. 6, 2018	Narragansett Electric Co., d/b/a National Grid Rate Case Filing	RI PUC Docket No. 4770	New Energy Rhode Island ("NERI")
Apr. 25, 2018	Narragansett Electric Co., d/b/a National Grid Power Sector Transformation Plan	Rhode Island PUC Docket No. 4780	New Energy Rhode Island ("NERI")
Apr. 26, 2018	U.S. EPA Proposed Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 82 Fed. Reg. 48,035 (Oct. 16, 2017) – "Clean Power Plan"	U.S. EPA Docket No. EPA-HQ-OAR-2016-0592	Karl R. Rábago
May 25, 2018	Orange & Rockland Utilities, Inc. Rate Case Filing	New York PSC Case Nos. 18-E-0067, 18-G-0068	Pace Energy and Climate Center
Jun. 15, 2018	Orange & Rockland Utilities, Inc. Rate Case Filing	New York PSC Case Nos. 18-E-0067, 18-G-0068 – Rebuttal Testimony	Pace Energy and Climate Center
Aug. 10, 2018	Dominion Virginia Electric Power 2018 IRP	Virginia SCC Case # PUR-2018-00065	Environmental Respondents

**Testimony Submitted by Karl R. Rábago**  
**(as of 10 December 2020)**

Sep. 20, 2018	Consumers Energy Company Rate Case	Michigan PSC Case No. U-20134	Environmental Law & Policy Center
Sep. 27, 2018	Potomac Electric Power Co. Notice to Construct Two 230 kV Underground Circuits	District of Columbia Public Service Commission Formal Case No. 1144	Solar United Neighbors of D.C.
Sep. 28, 2019	Arkansas Public Service Commission Investigation of Policies Related to Distributed Energy Resources	Arkansas PSC Docket No. 16-028-U	Arkansas Audubon Society & Arkansas Advanced Energy Association
Nov. 7, 2018	DTE Detroit Edison Rate Case	Michigan PSC Case No. U-20162	Natural Resources Defense Council, Michigan Environmental Council, Sierra Club
Mar. 26, 2019	Guam Power Authority Petition to Modify Net Metering	Guam PUC Docket GPA 19-04	Micronesia Renewable Energy, Inc.
Apr. 4, 2019	Community Power Network & League of Women Voters of Florida v. JEA	Circuit Court Duval County of Florida Case No. 2018-CA-002497 Div: CV-D	Earthjustice
Apr. 16, 2019	Dominion Virginia Electric Power 2018 IRP – Compliance Filing	Virginia SCC Case # PUR-2018-00065	Environmental Respondents
Apr. 25, 2019	Georgia Power 2019 IRP	Georgia PSC Docket No. 42310	GSEA & GSEIA
May 10, 2019	NV Energy NV GreenEnergy 2.0 Rider	Nevada PUC Docket Nos. 18-11015, 18-11016	Vote Solar
May 24, 2019	Consolidated Edison of New York Electric and Gas Rate Cases – Misc. Issues	New York PSC Case Nos. 19-E-0065, 19-G-0066	Pace Energy and Climate Center
May 24, 2019	Consolidated Edison of New York Electric and Gas Rate Cases – Low- and Moderate-Income Panel	New York PSC Case Nos. 19-E-0065, 19-G-0066	Pace Energy and Climate Center
May 30, 2019	Connecticut DEEP Shared Clean Energy Facility Program Proposal	Connecticut Department of Energy and Environmental Protection Docket No. 19-07-01	Connecticut Fund for the Environment
Jun. 3, 2019	New Orleans City Council Rulemaking to Establish Renewable Portfolio Standards	New Orleans City Council Docket No. UD-19-01	National Audubon Society and Audubon Louisiana
Jun. 14, 2019	Consolidated Edison of New York Electric and Gas Rate Cases – Rebuttal Testimony	New York PSC Case Nos. 19-E-0065, 19-G-0066	Pace Energy and Climate Center



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(as of 10 December 2020)

Jun. 24, 2019	Program to Encourage Clean Energy in Westchester County Pursuant to Public Service law Section 74-a; Staff Investigation into a Moratorium on New Natural Gas Services in the Consolidated Edison Company of New York, Inc. Service Territory	New York PSC Case Nos. 19-M-0265, 19-G-0080	Earthjustice and Pace Energy and Climate Center
Jul. 12, 2019	Application of Virginia Electric and Power Company for the Determination of the Fair Rate of Return on Common Equity	Virginia SCC Case # PUR-2019-00050	Virginia Poverty Law Center
Jul. 15, 2019	New Orleans City Council Rulemaking to Establish Renewable Portfolio Standards – Reply Comments	New Orleans City Council Docket No. UD-19-01	National Audubon Society and Audubon Louisiana
Aug. 1, 2019	Interstate Power and Light Company – General Rate Case	Iowa Utilities Board Docket No. RPU-2019-0001	Environmental Law & Policy Center and Iowa Environmental Council
Aug. 19, 2019	Consolidated Edison of New York Electric and Gas Rate Cases – Surrebuttal	New York PSC Case Nos. 19-E-0065, 19-G-0066	Pace Energy and Climate Center
Aug. 21, 2019	Connecticut Department of Energy and Environmental Protection and Public Utility Regulatory Authority Joint Proceeding on the Value of Distributed Energy Resources - Comments	Connecticut DEEP/PURA Docket No. 19-06-29	Connecticut Fund for the Environment and Save Our Sound
Sep. 10, 2019	Interstate Power and Light Company – General Rate Case - Rebuttal	Iowa Utilities Board Docket No. RPU-2019-0001	Environmental Law & Policy Center and Iowa Environmental Council
Sep. 18, 2019	Connecticut Department of Energy and Environmental Protection and Public Utility Regulatory Authority Joint Proceeding on the Value of Distributed Energy Resources – Comments and Response to Draft Study Outline	Connecticut DEEP/PURA Docket No. 19-06-29	Connecticut Fund for the Environment, Save Our Sound, E4theFuture, NE Clean Energy Council, NE Energy Efficiency Partnership, and Acadia Center
Sep. 20, 2019	Connecticut Department of Energy and Environmental Protection and Public Utility Regulatory Authority Joint Proceeding on the Value of Distributed Energy Resources – Participation in Technical Workshop 1	Connecticut DEEP/PURA Docket No. 19-06-29 <a href="http://www.ctn.state.ct.us/ctnplayer.asp?odID=16715">http://www.ctn.state.ct.us/ctnplayer.asp?odID=16715</a>	Connecticut Fund for the Environment and Save Our Sound

**Testimony Submitted by Karl R. Rábago**  
**(as of 10 December 2020)**

Oct. 4, 2019	Connecticut Department of Energy and Environmental Protection and Public Utility Regulatory Authority Joint Proceeding on the Value of Distributed Energy Resources – Participation in Technical Workshop 2	Connecticut DEEP/PURA Docket No. 19-06-29 <a href="http://www.ctn.state.ct.us/ctnplayer.asp?odID=16766">http://www.ctn.state.ct.us/ctnplayer.asp?odID=16766</a>	Connecticut Fund for the Environment and Save Our Sound
Oct. 15, 2019	Electronic Consideration of the Implementation of the Net Metering Act (KY SB 100)	Kentucky Public Service Commission Case No. 2019-00256	Kentuckians for the Commonwealth & Mountain Association for Community Economic Development
Oct. 15, 2019	New Orleans City Council Rulemaking to Establish Renewable Portfolio Standards – Comments on City Council Utility Advisors' Report	New Orleans City Council Docket No. UD-19-01	National Audubon Society and Audubon Louisiana, Vote Solar, 350 New Orleans, Alliance for Clean Energy, PosiGen, and Sierra Club
Oct. 17, 2019	Indiana Michigan Power Co. General Rate Case	Michigan Public Service Company Case No. U-20359	Environmental Law & Policy Center, The Ecology Center, the Solar Energy Industries Association, and Vote Solar
Dec. 4, 2019	Alabama Power Company Petition for Certificate of Convenience and Necessity	Alabama Public Service Commission Docket No. 32953	Energy Alabama and Gasp, Inc.
Dec. 5, 2019	In the Matter of Net Metering and the Implementation of Act 827 of 2015	Arkansas Public Service Commission Docket No. 16-027-R	National Audubon Society and Arkansas Advanced Energy Association
Dec. 6, 2019	Proposed Revisions to Vermont Public Utility Commission Rule 5.100	Vermont Public Utility Commission Case No. 19-0855-RULE	Renewable Energy Vermont ("REV")
Jan. 15, 2020	General Rate Case	Washington Utilities and Transportation Commission Docket Nos. UE-190529 & UG-190530	Puget Sound Energy
Feb. 11, 2020	Application of Entergy Arkansas, LLC for a Proposed Tariff Amendment: Solar Energy Purchase Option – Direct Testimony	Arkansas Public Service Commission Docket No. 19-042-TF	Arkansas Advanced Energy Association
Mar. 17, 2020	Application of Entergy Arkansas, LLC for a Proposed Tariff Amendment: Solar Energy Purchase Option – Surrebuttal Testimony	Arkansas Public Service Commission Docket No. 19-042-TF	Arkansas Advanced Energy Association

**Testimony Submitted by Karl R. Rábago**  
**(as of 10 December 2020)**

Jun. 16, 2020	PECO Energy Default Supply Plan V – Direct Testimony	Pennsylvania Public Utility Commission Docket No. P-2020-3019290	Environmental Respondents / Earthjustice
Jun. 24, 2020	Consumers Energy Company General Rate Case – Direct Testimony	Michigan Public Service Commission Case No. U-20697	Joint Clean Energy Organizations / Environmental Law & Policy Center
Jul. 14, 2020	Consumers Energy Company General Rate Case – Rebuttal Testimony	Michigan Public Service Commission Case No. U-20697	Joint Clean Energy Organizations / Environmental Law & Policy Center
July 23, 2020	PECO Energy Default Supply Plan V – Surrebuttal Testimony	Pennsylvania Public Utility Commission Docket No. P-2020-3019290	Environmental Respondents / Earthjustice
Sept. 15, 2020	Dominion Virginia Electric Power 2020 IRP – Direct Testimony	Virginia SCC Case # PUR-2020-00035	Environmental Respondents
Sept. 18, 2020	Avoided Cost Proceeding for Georgia Power – Direct Testimony	Georgia Public Service Commission Docket No. 4822	Georgia Solar Energy Industries Association, Inc.
Sept. 29, 2020	Madison Gas and Electric – General Rate Case – Affidavit in Opposition to Electric Rates Settlement	Wisconsin Public Service Commission Docket No. 3270-UR-123	Sierra Club
Sept. 30, 2020	Madison Gas and Electric – General Rate Case – Gas Rates	Wisconsin Public Service Commission Docket No. 3270-UR-123	Sierra Club
Oct. 2, 2020	Duke Energy Florida Petition for Approval of Clean Energy Connect Program	Florida Public Service Commission Docket No. 20200176-EI	League of United Latin American Citizens of Florida
Oct. 2, 2020	Ameren Illinois – Investigation re: Calculation of Distributed Generation Rebates	Illinois Commerce Commission Docket No. 20-0389	Joint Solar Parties
Dec. 9, 2020	Arkansas – In the Matter of a Rulemaking to Adopt an Evaluation, Measurement, and Verification Protocol and Propose M&V Amendments to the Commission’s Rules for Conservation and Energy Efficiency Programs; In the Matter of the Continuation, Expansion, and Enhancement of Public Utility Energy Efficiency Programs in Arkansas	Arkansas Public Service Commission Docket Nos. 10-100-R, 13-002-U	Arkansas Advanced Energy Association

## Attachment KRR-3

20109059D

## HOUSE BILL NO. 1526

## AMENDMENT IN THE NATURE OF A SUBSTITUTE

(Proposed by the Senate Committee on Commerce and Labor

on February 24, 2020)

(Patron Prior to Substitute—Delegate Sullivan)

A BILL to amend and reenact §§ 10.1-603.24, 10.1-603.25, 56-576, 56-585.1, 56-594, and 56-596.2 of the Code of Virginia and § 1 of the first enactment of Chapters 358 and 382 of the Acts of Assembly of 2013, as amended by Chapter 803 of the Acts of Assembly of 2017; to amend the Code of Virginia by adding in Chapter 13 of Title 10.1 an article numbered 4, consisting of sections numbered 10.1-1329 and 10.1-1330, by adding sections numbered 56-585.1:11, 56-585.5, and 56-585.6, and by adding in Chapter 8 of Title 63.2 a section numbered 63.2-806; and to repeal §§ 56-585.1:2 and 56-585.2 of the Code of Virginia, relating to the regulation of electric utilities; ending carbon dioxide emissions; renewable portfolio standards for electric utilities and suppliers; energy efficiency programs and standards; incremental annual energy storage deployment targets; net energy metering; third-party power purchase agreements; and the Manufacturing and Commercial Competitiveness Retention Credit.

Be it enacted by the General Assembly of Virginia:

1. That §§ 10.1-603.24, 10.1-603.25, 56-576, 56-585.1, 56-594, and 56-596.2 of the Code of Virginia and § 1 of the first enactment of Chapters 358 and 382 of the Acts of Assembly of 2013, as amended by Chapter 803 of the Acts of Assembly of 2017, are amended and reenacted and that the Code of Virginia is amended by adding in Chapter 13 of Title 10.1 an article numbered 4, consisting of sections numbered 10.1-1329 and 10.1-1330, by adding sections numbered 56-585.1:11, 56-585.5, and 56-585.6, and by adding in Chapter 8 of Title 63.2 a section numbered 63.2-806 as follows:

## Article 1.3.

## Virginia Shoreline Resiliency Community Flood Preparedness Fund.

## § 10.1-603.24. Definitions.

As used in this article, unless the context requires a different meaning:

"Authority" means the Virginia Resources Authority.

"Cost," as applied to any project financed under the provisions of this article, means the total of all costs incurred by the local government as reasonable and necessary for carrying out all works and undertakings necessary or incident to the accomplishment of any project.

"Department" means the Virginia Department of ~~Emergency Management~~ Conservation and Recreation.

"Flood prevention or protection" means the construction of hazard mitigation projects, acquisition of land, or implementation of land use controls that reduce or mitigate damage from coastal or riverine flooding.

"Flood prevention or protection study" means the conduct of a hydraulic or hydrologic study of a flood plain with historic and predicted floods, the assessment of flood risk, and the development of strategies to prevent or mitigate damage from coastal or riverine flooding.

"Fund" means the Virginia ~~Shoreline Resiliency~~ Community Flood Preparedness Fund created pursuant to § 10.1-603.25.

"Local government" means any county, city, town, municipal corporation, authority, district, commission, or political subdivision created by the General Assembly or pursuant to the Constitution of Virginia or laws of the Commonwealth.

"Low-income geographic area" means any locality, or community within a locality, that has a median household income that is not greater than 80 percent of the local median household income, or any area in the Commonwealth designated as a qualified opportunity zone by the U.S. Secretary of the Treasury via his delegation of authority to the Internal Revenue Service.

"Nature-based solution" means an approach that reduces the impacts of flood and storm events through the use of environmental processes and natural systems. A nature-based solution may provide additional benefits beyond flood control, including recreational opportunities and improved water quality.

## § 10.1-603.25. Virginia Community Flood Preparedness Fund; loan and grant program.

There shall be set apart a permanent and perpetual fund, to be known as the A. The Virginia Shoreline Resiliency Fund; ~~consisting of such~~ is hereby continued in the state treasury as a special nonreverting fund to be known as the Virginia Community Flood Preparedness Fund. The Fund shall be established on the books of the Comptroller. All sums that are designated for deposit in the Fund from revenue generated by the sale of emissions allowances pursuant to subdivision C 1 of § 10.1-1330, all

rules, regulations, or other directives necessary to administer the eligibility for this exemption.

3. For purposes of this subsection, (i) "low-income residential customer" includes any residential customer household of a Phase II Utility where the customer or a dependent is a recipient of a state-funded or federally funded public assistance program for the indigent and requests exemption from the utility from such charges and (ii) "aggregate load" means the combined electrical load associated with selected non-residential customer accounts with the same entity name or in the name of affiliated entities under a common parent company.

C. In constructing any such facility described in subsection A, the utility shall (i) identify options for utilizing local workers; (ii) identify the economic development benefits of the project for the Commonwealth, including capital investments and job creation; (iii) consult with relevant governmental entities, including the Commonwealth's Chief Workforce Development Officer and the Virginia Economic Development Partnership, on opportunities to advance the Commonwealth's workforce and economic development goals, including furtherance of apprenticeship and other workforce training programs; and (iv) give priority to the hiring of local workers, including workers from historically economically disadvantaged communities. For the purposes of this subsection, "historically economically disadvantaged community" means a community that is (i) a community in which a majority of the population are people of color or (ii) a low-income geographic area. Relevant state agencies shall identify historically economically disadvantaged communities utilizing geographic information systems, U.S. Census tract demographic and poverty threshold data for the Commonwealth, and zip code areas.

D. Any project constructed or purchased pursuant to subsection A shall (i) be subject to competitive procurement or solicitation for a substantial majority of the services and equipment, exclusive of interconnection costs, associated with the facility's construction; (ii) involve at least one experienced developer; and (iii) demonstrate the economic development benefits within the Commonwealth, including capital investments and job creation. A utility may give appropriate consideration to suppliers and developers that have demonstrated successful experience in offshore wind.

E. Any project shall include an environmental and fisheries mitigation plan for the construction and operation of such offshore wind facilities, provided that such plan includes an explicit description of the best management practices the bidder will employ, that considers the latest science at the time the proposal is made to mitigate adverse impacts to wildlife, natural resources, ecosystems, and traditional or existing water-dependent uses. The plan shall include a summary of pre-construction assessment activities, consistent with federal requirements, to determine the spatial and temporal presence and abundance of marine mammals, sea turtles, birds, bats, in the offshore wind lease area.

#### § 56-585.5. Generation of electricity from renewable and zero carbon sources.

A. As used in this section:

"Low-income qualifying projects" means a project that serves a low-income customer, as that term is defined in § 56-594.

"Previously developed project site" means any property, including related buffer areas, if any, that has been previously disturbed or developed for non-single-family residential, non-agricultural, or non-silvicultural use, regardless of whether such property currently is being used for any purpose. "Previously developed project site" includes a brownfield as defined in § 10.1-1230 or any parcel that has been previously used (i) for a retail, commercial, or industrial purpose; (ii) as a parking lot; (iii) as the site of a parking lot canopy or structure; (iv) for mining or quarrying; or (v) as a landfill.

"Retail suppliers" shall include a Phase I or Phase II Utility, as those terms are defined in subdivision A 1 of § 56-585.1, as well as other electric energy suppliers as defined by § 56-576.

"Total electric energy" means total electric energy sold to a Virginia jurisdictional retail customer by an incumbent electric utility or other retail supplier of electric energy in the previous calendar year, excluding an amount equivalent to the annual percentages of the electric energy that was supplied to such customer from nuclear generating plants located within the Commonwealth in the previous calendar year, provided such nuclear units were operating by July 1, 2020.

"Zero-carbon electricity" means electricity generated by any generating unit that does not emit carbon dioxide as a byproduct of combusting fuel to generate electricity.

B. 1. By December 31, 2024, except for any coal-fired electric generating units (i) jointly owned with a cooperative utility or (ii) owned and operated by a Phase II utility located in the coalfield region of the Commonwealth that co-fires with biomass, any Phase I and Phase II Utility shall retire all generating units principally fueled by oil with a rated capacity in excess of 500 megawatts and all coal-fired electric generating units operating in the Commonwealth.

2. By December 31, 2028, each Phase I and II Utility shall retire all biomass-fired electric generating units that do not co-fire with coal.

3. By December 31, 2030, any Phase II Utility shall retire any coal-fired electric generating units located in the coalfields region of the Commonwealth that co-fires with biomass, unless such facility can demonstrate at least 83 percent reduction in carbon emissions through capture and sequestration.

1354	2032	36%	2032	49%
1355	2033	39%	2033	52%
1356	2034	42%	2034	55%
1357	2035	45%	2035	59%
1358	2036	53%	2036	63%
1359	2037	53%	2037	67%
1360	2038	57%	2038	71%
1361	2039	61%	2039	75%
1362	2040	65%	2040	79%
1363	2041	68%	2041	83%
1364	2042	71%	2042	87%
1365	2043	74%	2043	91%
1366	2044	100%	2044	95%
1367	2045	80%	2045 and thereafter	100%
1368	2046	84%		
1369	2047	88%		
1370	2048	92%		
1371	2049	96%		
1372	2050 and thereafter	100%		

1373 Retail suppliers, except for a Phase I Utility, shall meet one percent of the RPS Program  
 1374 requirement in any given compliance year with solar, wind, or anaerobic digestion resources of one  
 1375 megawatt or less located in the Commonwealth, with no less than 25 percent of such one percent  
 1376 composed of low-income qualifying projects.

1377 Beginning with the 2025 compliance year and thereafter, at least 75 percent of all RECs used by a  
 1378 retail supplier, except for a Phase I Utility, in a compliance period shall come from resources located in  
 1379 Virginia.

1380 A retail supplier of electricity may apply renewable energy sales achieved or RECs acquired in  
 1381 excess of the sales requirement for that RPS Program to the sales requirements for future RPS Program  
 1382 requirements in the year in which it was generated and the five calendar years after the renewable  
 1383 energy was generated or the RECs were created. To the extent a retail supplier of electricity is a Phase  
 1384 I or Phase II Utility that procures RECs for RPS Program compliance from resources the utility does  
 1385 not own, the utility shall be entitled to recover the costs of such certificates, at its election pursuant to  
 1386 § 56-249.6 or subdivision A 5 d of § 56-585.1. A retail supplier of electricity other than a Phase I or  
 1387 Phase II Utility may only use RECs from facilities that produce electricity via falling water equal to or  
 1388 less than 2.9 percent of their total electric energy sold in each year from 2021 through 2035, equal to  
 1389 or less than 3.5 percent of their total electric energy sold in each year from 2036 through 2042 and  
 1390 equal to or less than four percent of their total electric energy sold in each year from 2043 through  
 1391 2050, and shall not exceed these amounts to comply with the RPS Program requirements. The  
 1392 limitations in this subsection shall apply only to facilities that produce electricity via falling water that  
 1393 is less than 65 megawatts, or that began commercial operation or added incremental generation  
 1394 representing the majority of nameplate capacity after December 31, 1979.

1395 D. Notwithstanding the provisions of subsection C or D of § 56-585.1 or any other provision of law,  
 1396 each Phase I or Phase II Utility shall procure zero-carbon electricity generating capacity as set forth in  
 1397 this subdivision and energy storage resources as set forth in subdivision E. To the extent a Phase I or  
 1398 Phase II Utility constructs or acquires new zero-carbon generating facilities or energy storage  
 1399 resources, the utility shall recover the costs of such facilities, at the utility's election, either through its  
 1400 rates for generation and distribution services or through a rate adjustment clause pursuant to  
 1401 subdivision A 6 of § 56-585.1. All costs not sought for recovery through a rate adjustment clause  
 1402 pursuant to subdivision A 6 of § 56-585.1 associated with generating facilities provided by sunlight or  
 1403 onshore or offshore wind are also eligible to be applied by the utility as a customer credit reinvestment  
 1404 offset as provided in subdivision A 8 of § 56-585.1. Costs associated with the purchase of energy,  
 1405 capacity, or environmental attributes from facilities owned by the persons other than the utility required  
 1406 by the subsection shall be recovered by the utility either through its rates for generation and distribution  
 1407 services or pursuant to § 56-249.6.

1408 1. Each Phase I Utility shall construct, acquire, or enter into agreements to purchase the energy,  
 1409 capacity, and environmental attributes of 600 megawatts of generating capacity using energy derived  
 1410 from sunlight or onshore wind.

1411 a. By December 31, 2023, each Phase I Utility shall construct or acquire at least 200 megawatts of  
 1412 generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind,  
 1413 and approximately 35 percent of such generating capacity procured shall be from the purchase of  
 1414 energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons  
 1415 other than the utility, with the remainder, in the aggregate, being from construction or acquisition by  
 1416 such Phase I Utility.

b. By December 31, 2027, each Phase I Utility shall construct or acquire at least 200 megawatts of additional generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, and approximately 35 percent of such generating capacity procured shall be from the purchase of energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons other than the utility, with the remainder, in the aggregate, being from construction or acquisition by such Phase I Utility.

c. By December 31, 2030, each Phase I Utility shall construct or acquire at least 200 megawatts of additional generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, and approximately 35 percent of such generating capacity procured shall be from the purchase of energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons other than the utility, with the remainder, in the aggregate, being from construction or acquisition by such Phase I Utility.

d. Nothing in this subdivision 1 shall prohibit such Phase I Utility from construction or acquiring, or entering into agreements to purchase the energy, capacity, and environmental attributes of more than 600 megawatts of generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, provided the utility receives approval from the Commission pursuant to §§ 56-580 and 56-585.1.

2. By December 31, 2035, each Phase II Utility shall construct or acquire, or enter into agreements to purchase, the energy, capacity, and environmental attributes of, 16,100 megawatts of generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, which shall include 1,100 megawatts of solar generation of a nameplate capacity not to exceed three megawatts per individual project. At least 200 megawatts of the 16,100 megawatts shall be placed on previously developed project sites.

a. By December 31, 2024, each Phase II Utility shall construct or acquire, at least 3,000 megawatts of generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, and approximately 35 percent of such generating capacity procured shall be from the purchase of energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons other than the utility, with the remainder, in the aggregate, being from construction or acquisition by such Phase II Utility.

b. By December 31, 2027, each Phase II Utility shall construct or acquire, at least 3,000 megawatts of additional generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, and approximately 35 percent of such generating capacity procured shall be from the purchase of energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons other than the utility, with the remainder, in the aggregate, being from construction or acquisition by such Phase II Utility.

c. By December 31, 2030, each Phase II Utility shall construct or acquire, at least 4,000 megawatts of additional generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, and approximately 35 percent of such generating capacity procured shall be from the purchase of energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons other than the utility, with the remainder, in the aggregate, being from construction or acquisition by such Phase II Utility.

d. By December 31, 2035, each Phase II Utility shall construct or acquire, at least 7,300 megawatts of additional generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, and approximately 35 percent of such generating capacity procured shall be from the purchase of energy, capacity, and environmental attributes from solar or onshore wind facilities owned by persons other than the utility, with the remainder, in the aggregate, being from construction or acquisition by such Phase II Utility.

e. Nothing in this subdivision 2 shall prohibit such Phase II Utility from construction or acquiring, or entering into agreements to purchase the energy, capacity, and environmental attributes of more than 16,100 megawatts of generating capacity located in the Commonwealth using energy derived from sunlight or onshore wind, provided the utility receives approval from the Commission pursuant to §§ 56-580 and 56-585.1.

3. Nothing in this section shall prohibit a utility from petitioning the Commission to construct or acquire zero-carbon electricity or from entering into contracts to procure the energy, capacity, and environmental attributes of zero-carbon electricity generating resources in excess of the requirements in subsection B. The Commission shall determine whether to approve such petitions on a standalone basis pursuant to § 56-580 and 56-585.1, provided that the Commission's review shall also consider whether the proposed generating capacity (i) is necessary to meet the utility's native load, (ii) is likely to lower customer fuel costs, (iii) will provide economic development opportunities in the Commonwealth, and (iv) serves a need that cannot be more affordably met with demand-side or energy storage resources.

Each Phase I and Phase II Utility shall, at least once every year, conduct a request for proposals for new solar and wind resources. Such requests shall quantify and describe the utility's need for energy,



## Attachment KRR-4

COMMONWEALTH OF VIRGINIA  
STATE CORPORATION COMMISSION  
APPLICATION OF  
APPALACHIAN POWER COMPANY  
SCC CASE NO. PUR-2020-00135  
Interrogatories and Requests for the Production  
of Documents by the Southern Environmental Law Center  
SELC Set 2  
To Appalachian Power Company

Interrogatory SELC 2-05:

Reference p. 14 (§ 3.4). Please indicate whether the Company reflected VCEA-related impacts in its commodity and fundamentals forecasts used in developing its proposed RPS plan. If yes, please provide analysis showing the impacts. If not, please explain why not.

Response SELC 2-05:

The commodity and Fundamentals Forecasts are based on the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2020. EIA provided a Summary of Legislation and Regulations Included in the AEO 2020, which can be accessed at the following link: <https://www.eia.gov/outlooks/aeo/assumptions/pdf/summary.pdf>. The VCEA does not appear in that document.

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The foregoing response is made by William K. Castle, Dir Regulatory Svcs, on behalf of Appalachian Power Company.

**COMMONWEALTH OF VIRGINIA**  
**STATE CORPORATION COMMISSION**  
**APPLICATION OF**  
**APPALACHIAN POWER COMPANY**  
**SCC CASE NO. PUR-2020-00135**  
**Interrogatories and Requests for the Production**  
**of Documents by the ENVIRONMENTAL RESPONDENTS**  
**ER Set 3**  
**To Appalachian Power Company**

Interrogatory ER 3-001:

Reference § 4.3, Figure 17, and Table 15. a) Please provide a detailed explanation of the reasons and analysis supporting the Company's decision to model new gas baseload and peaking resources in its analysis. b) Please explain whether and how the Company evaluated alternatives to new gas generation, including storage and distributed energy resources (additional increments of energy efficiency, demand response, conservation, distributed generation, and other DERs) as alternatives to the addition of new gas resources. c) Please explain why storage resources do not exceed 400 MW Nameplate / 320 MW Firm in any year of the modeling. d) Please explain why new energy efficiency is reduced to zero over the timeframe modeled. e) Please explain all assumptions and drivers reflected in the amounts of new distributed generation in Table 15. f) Please explain all assumptions relating to the decline level of STMP resources in years 2041 through 2050 in Table 15.

Response ER 3-001:

- a) The Gas Baseload and Peaking resources represent dispatchable new generation resources appropriate for these types of service. As noted in response to SELC DR 2-6, the Company's economic screening process considers the cost and performance of each technology over an assumed 40 year life. These cost are then compared based on the expected duty or operational profile of the technology (e.g. Base, Intermediate and Peaking), from which, a subset of the cases/technologies screened to include in the Plexos model.
- b) Section 4.0 in the VCEA Plan filing, describes the alternatives considered in the VCEA modeling. These resources included both supply-side and demand-side resources.
- c) As described in section 5.2, page 28, Storage resources, although not economically selected, are added beginning in 2025 and include gradual increases until meeting the 400 MW minimum requirement.
- d) The Energy Efficiency resources shown in Table 15 reflect the incremental impact of this resource over the amount of this resource that is embedded in the Load Forecast. This approach ensures that the Company is not double counting Energy Efficiency resources. The Company's Load Forecast includes the ongoing impact of customer adoption of energy efficient technologies.
- e) APCo referenced a forecast conducted by IHS Inc. on behalf of PJM. (<https://arcs/GenericContent/Record.aspx?id=21348727&moduleId=532&action=%7b%22AT%22%3a6%2c%22PFI%22%3a25032%7d&pr=c8fc4affd9dd4fbc6d9717c7df7b2d5-ftnref1>) PJM solar forecast 2019: October 17, 2019. Available at

Response ER 3-001 cont'd:

<http://pjm.com/~media/committees-groups/subcommittees/las/20191203/20191203-state-zonal-breakdown-ihs-capacity-at-peak-post-meeting.ashx>.) This forecast considered the level of solar photovoltaic (PV) installations over the period of 2020-2030. The updated forecast utilized by PJM included the Net Energy Metering Reform scenario. To determine the level of DG penetration, APCo created a forecast using existing levels of DG and the incremental additions from PJM's forecast.

f) As new Solar and Wind resources were added in the referenced years to meet VCEA requirements, less STMP resources were needed. The STMP resource provides the model an option to include a short-term capacity commitment as opposed to building a long-term capacity resource.

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The foregoing response is made by Ismael Martinez, Resource Planning Analyst Staff, and William K. Castle, Dir Regulatory Svcs, on behalf of Appalachian Power Company.

**COMMONWEALTH OF VIRGINIA  
STATE CORPORATION COMMISSION  
APPLICATION OF  
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SCC CASE NO. PUR-2020-00135  
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of Documents by the ENVIRONMENTAL RESPONDENTS  
ER Set 3  
To Appalachian Power Company**

Interrogatory ER 3-002:

Reference Attachment SELC\_2-11\_Tables 16\_17\_18\_AppdxC\_D, REC Optimization Plan. a) Please explain why the assumed REC price remains constant for every year between 2029 and 2050. b) Please explain whether the assumed REC price is real or nominal. If the price is real, identify what discount rate was applied and why. If the price is nominal, explain how the assumed price is adjusted to obtain real values and provide workpapers for this adjustment.

Response ER 3-002:

- a. The 3rd party subscription service PJM tier 1 REC price outlook utilized in part for the Company's forward estimate of REC prices used in this filing is flat beginning in the late 2020's going forward due to REC supply satisfying REC demand later in the curve.
- b. The dollars are nominal, they have not been adjusted to real dollars.

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Interrogatory ER 3-005:

Reference § 6.0. Please confirm that the Company's weighted average cost of capital or other discount rate was not applied to any bill impact calculations and data presented in § 6.0.

Response ER 3-005:

Confirmed.

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Interrogatory ER 3-009:

Reference page 12 (key assumption 2). Has the Company performed any generation unit retirement analysis in developing the Company's filing? If so, please provide this analysis including any associated workpapers and explain in detail how such analysis impacted the filing. If not, explain why not and explain how the Company selected assumed retirement dates for purposes of the 2020 RPS Plan.

Response ER 3-009:

Retirement analyses for the Company's coal plants was not performed for the VCEA Plan. The assumed retirement dates of the coal plants are consistent with prior IRP submissions.

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Interrogatory ER 3-011:

Did the Company evaluate an RPS-implementation plan that focused on purchasing RECs in the market and not on adding new supply-side generation to APCo's fleet? If so, please provide the ratepayer impact analysis of such a study. If not, explain why not.

Response ER 3-011:

No. A REC-only strategy would theoretically cost the same as a ownership-contract construct over time because the REC value is generally considered to be the cost of the resource in excess of the energy and capacity value, but would have considerably more volatility. Targeted, tactical REC purchases may be made from time-to-time, if conditions warrant.

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Interrogatory ER 3-013:

Reference Table 15. Please explain why the New EE row drops from 75 in 2027 to zero by 2047. Please also confirm the units of measure for New EE is MW.

Response ER 3-013:

Energy Efficiency resources shown in Table 15 reflect optimized EE resources as well as incremental EE resources needed to meet the VCEA requirements. EE resources selected in later years are based on their beneficial value to the VCEA Plan.  
The EE Values in Table 15 are shown in MW's.

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The foregoing response is made by Ismael Martinez, Resource Planning Analyst Staff, on behalf of Appalachian Power Company.

**CERTIFICATE OF SERVICE**

I hereby certify that the following have been served with a true and accurate copy of the foregoing via electronic service:

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**DATED: December 22, 2020**