

# ATTACHMENT A

**Review of Duke Energy Carolinas, LLC & Duke Energy Progress, LLC**  
**Joint Application for Approval of NEM Tariff Revisions and**  
**Recommendations for Investigation of Costs and Benefits of**  
**Customer-Sited Generation**

**NCUC Docket No. E-100, Sub. 180**

**KARL R. RÁBAGO**  
**Rábago Energy, LLC**

**March 29, 2022**

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## QUALIFICATIONS

I am an expert in electric utility regulation, organizations, including distribution and generation and transmission (“G&T”) companies, operations, and rate making. I am principal and sole employee of Rábago Energy LLC, a Colorado Limited Liability Company with a business address of 2025 East 24<sup>th</sup> Avenue, Denver, Colorado. Rábago Energy provides consulting, advisory, and expert witness services to a wide range of clients in the electric utility regulatory field.

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, Executive Director of the Pace Energy and Climate Center, Managing Director with the Rocky Mountain Institute, and Director with AES Corporation, among others. I have earned a Bachelor of Business Administration in business management from Texas A&M University and a Juris Doctorate with honors from the University of Texas School of Law. I have Master of Laws degrees in military law from the U.S. Army Judge Advocate General’s School and environmental law from the Pace University Elizabeth Haub School of Law. A copy of my CV is attached hereto as **Exhibit 1**.

I have been engaged as an advisor and expert witness in more than 140 regulatory proceedings across the country, including many relating to distributed energy resources of all kinds, rates and tariffs, low-income energy issues, grid modernization, return on equity, and other issues.

I served as a contributing author and advisor in the writing and publication of the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (“NSPM-DER”), published by the National Energy Screening Project.<sup>1</sup> The NSPM-DER sets out detailed

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<sup>1</sup> T. Woolf, et al, *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*, National Energy Screening Project (Aug. 2020). Available at:

guidance for establishing a benefit-cost analysis framework that can support jurisdictionally-specific evaluations of all manner of distributed energy resources (“DER”), which includes distributed generation (“DG”), demand response, energy efficiency, distributed storage, and others. The NSPM-DER compiled best practices guidance through an intentionally inclusive process of drafting, commenting, and revising supported by a range of authors and reviewers.

Further description of my experience relating to solar is attached as **Exhibit 2.**

## **ASSIGNMENT**

I have been retained by the Environmental Working Group (“EWG”) to review the Joint Application of Duke Energy Carolinas, LLC and Duke Energy Progress, LCC (collectively referred to as the “Companies”) for Approval of Net Energy Metering Tariffs (the “Application”) to modify existing tariffs, filed on November 29, 2021, in the above referenced docket before the North Carolina Utilities Commission (the “Commission”). I have been asked to opine regarding whether the Application, when measured against best electric utility practices for evaluation of the cost and benefits of solar and the requirements of North Carolina law, adequately demonstrates that the changed rates proposed are just and reasonable.

Even more specifically, I have been asked to help EWG address the necessary components of an investigation of the costs and benefits of customer-site generation that would ensure that net metering rates are non-discriminatory, just, and reasonable.

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<https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/>. While the NSPM-DER was published recently, it reflects best practices articulated in a prior NSPM for efficiency resources and generally recognized in the industry.

## SUMMARY OF OPINIONS

My overall opinion is that the Application fails to meet the requirements of industry best practices and the North Carolina statutory framework in several regards. In particular, I recommend that that Commission reject the Companies' Application, and further, that the Commission direct the Companies to fully investigate the costs and benefits of customer-sited generation in accordance with the law and under a comprehensive Benefit-Cost Analysis framework.

I reserve the right to change, supplement or modify my opinions based on additional information obtained through the discovery process, including data requests and other information.

## GUIDING PRINCIPALS

### Statutory Requirements

North Carolina law provides that every rate demanded or received by a public utility must be "just and reasonable."<sup>2</sup> The utility has the burden of proving that any rate change is just and reasonable.<sup>3</sup> The rates shall be non-discriminatory and established "only after an investigation of the costs and benefits of customer-site generation."<sup>4</sup> The key requirements from the law

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<sup>2</sup> N.C. Gen. Stat. § 62-131: "... (a) Every rate made, demanded or received by any public utility, or by any two or more public utilities jointly, shall be just and reasonable."

<sup>3</sup> N.C. Gen. Stat. § 62-134(c): "At any hearing involving a rate changed or sought to be changed by the public utility, the burden of proof shall be upon the public utility to show that the changed rate is just and reasonable."

<sup>4</sup> N.C. Gen. Stat. § 62-126.4: "Commission to establish net metering rates.

(a) Each electric public utility shall file for Commission approval revised net metering rates for electric customers that (i) own a renewable energy facility for that person's own primary use or (ii) are customer generator lessees.

(b) The rates shall be nondiscriminatory and established only after an investigation of the costs and benefits of customer-sited generation. The Commission shall establish net

are that the Companies bear the burden of proposing rates for net energy metering (NEM) in accordance with N.C. Gen. Stat. § 62-126.4 and demonstrating that such proposed rates are just and reasonable.

*Rate Making Principles That Offer Guidance*

For nearly 60 years, James Bonbright's treatise entitled "Principles of Public Utility Rates" has stood as a foundational reference for evaluation of rate making proposals and approaches.<sup>5</sup> A review of the Companies' proposals against Bonbright's principles serves a useful framework. The following articulation of the Bonbright principles<sup>6</sup> is useful in general and in reviewing the Application:

- Rates should be characterized by simplicity, understandability, public acceptability, and feasibility of application and interpretation.
- Rates should be effective in yielding total revenue requirements.
- Rates should support revenue and cash flow stability from year to year.
- Rate levels should be stable in themselves, with minimal unexpected changes that are seriously averse to existing customers.
- Rates should be fair in apportioning cost of service among different consumers.

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metering rates under all tariff designs that ensure that the net metering retail customer pays its full fixed cost of service. Such rates may include fixed monthly energy and demand charges.

(c) Until the rates have been approved by the Commission as required by this section, the rate shall be the applicable net metering rate in place at the time the facility interconnects. Retail customers that own and install an on-site renewable energy facility and interconnect to the grid prior to the date the Commission approves new metering rates may elect to continue net metering under the net metering rate in effect at the time of interconnection until January 1, 2027. (2017-192, s. 6(a).)"

<sup>5</sup> James C. Bonbright, *Principles of Public Utility Rates* (Columbia Univ. Press 1961), available at: <https://www.raponline.org/knowledge-center/principles-of-public-utility-rates/>.

<sup>6</sup> This summary was derived from Jess Totten, *Tariff Development II: Rate Design for Electric Utilities*, Briefing for NARUC/INE Partnership (Feb. 1, 2008), <https://pubs.naruc.org/pub.cfm?id=538EA65C-2354-D714-5107-44736A60B037> (last visited Mar. 25, 2022).

- Rate design and application should avoid undue discrimination.
- Rates should advance economic efficiency, promote the efficient use of energy, and support market growth for competing products and services.

As they have for decades in hundreds if not thousands of rate proposals across the country and around the world, the Bonbright Principles provide a useful starting point. In addition to being simple, understandable, acceptable, free from controversy in interpretation, stable, and non-discriminatory, the principles provide the foundation for competent and substantial evidence that the Companies must provide to establish that the proposed net metering compensation rates and any proposed charges on NEM customers are grounded in actual revenue requirements, and an honest and comprehensive assessment of the costs to serve net metering customers and the benefits net metered generation creates.

#### *Adapting Bonbright to the Modern Regulatory Environment*

While the core principles remain valid, some things have changed since Bonbright published his work. Today, utilities are not the only investors with skin in the electric service game; customer-generators are significant investors, too. And customer classes are becoming more diverse, not less so. As a result, the tools and metrics of economic efficiency require attention to far more factors than the price revealed solely by a century-old approach to cost-of-service accounting. There is important work to do in ensuring that public utility rates impacting distributed generators serve and support the public interest. There are several modern adaptations of Bonbright's principles that the Commission should rely upon in reviewing the underlying methods and foundation for the Companies' proposed net metering tariffs,

and to ensure that equitable cost-of-service based rates are in place for net metered customers.<sup>7</sup> These additional considerations are:

- Full comprehension and reflection of the resource value of net metered generation in net metered generation rates.
- Rates should account for the relative market positions of the various market actors, and especially for the information asymmetries among customers, utilities, and other parties.
- Rates must be grounded in a careful assessment of the practical economic impacts of distributed energy resource (“DER”)<sup>8</sup> rates, including net metered generation rates, on all market participants.
- Net metered generation rates, like utility rates in general, must support capital attraction for beneficial investments.
- Regulation must account for the incentive effects of DER and net metered generation rates.
- Rates for net metered generation and other DERs require accurate accounting for utility costs and careful differentiation between cost causation and the potential for cost shifting.

### **THE APPLICATION FAILS TO ALIGN WITH SOUND RATE MAKING PRINCIPLES IN THE MODERN REGULATORY ENVIRONMENT**

The Application fails to align with traditional rate making principles in several regards. The proposed revised net metering tariffs are complex and practically incomprehensible to the average customer and include multiple revisions to the current tariffs as to: 1) monthly minimum charges; 2) monthly grid access fees; 3) non-bypassable charges; and 4) TOU-CPP rate provisions. The resulting chilling effect of these complex changes on the

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<sup>7</sup> K. Rábago & R. Valova, *Revisiting Bonbright’s Principles of Public Utility Rates in a DER World*, The Electricity Journal, Vol. 31, Issue 8, pp. 9-13 (Oct. 2018), available at: <https://peccpubs.pace.edu/getFileContents.php?resourceid=43bdf87a9063c34>.

<sup>8</sup> These comments and the general practice in the industry use the term “distributed energy resources” or “DER” to describe a wide range of technologies and services deployed in the distribution system to meet demand for energy services. These technologies and services include generation, storage, electric vehicles, energy efficiency and conservation, demand response, and demand management.

efficient growth of the customer-sited generation market will be adverse and lasting. The Companies propose to implement the new rates without investment in customer education or advanced metering infrastructure that will provide customers with the real time billing-quality data about their production and consumption necessary to economically optimize their systems and usage. The complexity of the proposals would impose an unfair burden on customers and market participants in North Carolina.

The Companies developed the proposed rates relying only on average cost of service data for all customers in the class and all customers with customer-sited generation. Credit proposed for capacity does not take into account locational and temporal benefits of customer-sited generation. The Companies propose credit only for avoided future builds of transmission and distribution, and the methods have not been fully and transparently vetted.

No evaluation appears to have been conducted on the extent to which customer-sited generation can extend the useful life of existing fixed assets like transformers, conductors, and substations. The Companies' proposed tariff revisions have the effect of denying customer-sited generators the full benefits of generating clean, renewable electricity at the point in the distribution system where load is served, unfairly assigning costs of lost revenues customers who reduce their load through self-generation in a discriminatory manner as compared to other customers that reduce load on site through other measures.

Without a detailed before-and-after analysis of how customer-sited generation impacts system costs at the feeder level, there is no way of knowing whether the Companies' proposals will effectively and efficiently yield the revenue requirement properly associated with serving customer-generator customers and for other customers taking service on feeders and circuits where customer-sited generation operates.



The proposed dramatic reduction in compensation or credit for net metered generation, especially when coupled with the expiration of rebate incentives,<sup>9</sup> will reduce the scope of the market and reduce the size of systems installed. While the lack of transparent analysis works well for a monopoly service provider, it will result in uneconomic under-sizing of customer-sited generation and economic waste.

## **A PATH FORWARD**

### *Regulators should fully comprehend and reflect resource value in rates*

Typically, comprehension should be supported by full assessment of costs and benefits resulting from DER and distributed generation (DG) operation, and where possible, quantification of those impacts for use in cost-of-service analysis and rate design. Regulation is complex, even more so in an era of DERs and increasingly competitive markets. Rates are often based on embedded historical costs but have their most profound impact on future behaviors and costs. The growing menu of cost-effective DER-based services and increasing customer choice compels an analysis and explicit reflection of costs, avoided costs,<sup>10</sup> and benefits in basic service and optional rates like NEM tariffs because such rates impact DER investment and utilization, and are a key mechanism for optimizing development of these clean energy resources.

Full data-driven evaluation of costs and benefits of net metered generation has been a constant theme in the work on successor rates to

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<sup>9</sup> The Companies have asked that their requested revised rates for DER go into effect on January 1, 2023, just after current Solar Rebate Riders expire on December 31, 2022. N.C. Gen. Stat. § 62-126.4 does not require new rates until Jan. 1, 2027.

<sup>10</sup> Here, the term “avoided costs” means full avoided costs, including all the known and measurable costs avoided by the operation of distributed generation over the life of the generation facility. This usage stands in contrast to the much more limited usage typically employed by utilities, which quantifies avoided wholesale energy costs and little if anything more, typically derived from averages of locational marginal prices.

traditional net metering by Commissions and their Staff across the U.S.; work remains to be done in North Carolina. Regulators in many states increasingly recognize that there are significant and challenging gaps between costs, prices, and value in the electricity sector. Regulators are also seeking refinements in costs and benefits understanding based on locational and temporal characteristics of the operation of net metered generation and other DERs. Economic efficiency requires conscious engagement with objective, data-driven valuation processes.

The best course of action would be for the Commission to order a comprehensive value of solar study in the form of a Benefit-Cost Analysis (“BCA”), including analysis of the impacts of power outflows and offset consumption to support net metering rates to ensure allegiance to the rate making requirement of non-discriminatory cost of service-based rates. The study should be the comprehensive and transparent investigation of the costs and benefits of customer-sited generation that is required by North Carolina law and that the Companies did not conduct. The study should be funded by the Companies, be overseen by Commission Staff, and provide for full engagement opportunities for all stakeholders and not just a select few.

The determination of just and reasonable net metering tariff rates should account for the relative market positions of the various market actors, and especially for the information asymmetries among customers, utilities, and other parties. Utilities hold all the relevant data necessary to quantify appropriate cost of service-based rates. In this proceeding, the Companies have not sponsored or relied upon an open and transparent process, or provided stakeholders that were not part of the settlement agreement, including the Commission and Staff, with adequate time to fully evaluate the internal analysis conducted by the Companies and the assumptions and methods therein.

The Company cites its Rate Design Study as the analytical platform for its proposals in this proceeding,<sup>11</sup> as well as a negotiation process conducted in South Carolina.<sup>12</sup> However, as documented by NC WARN, the process in the Rate Design Study was unreasonably rushed, inflexible, and narrow, and appeared to be structured primarily to put a procedural gloss on approving the pre-negotiated settlement developed in South Carolina.<sup>13</sup>

Notwithstanding the Rate Design Study process, the statutory requirement for an investigation of the costs and benefits of customer-sited generation remains; the investigation has yet to be conducted and documented.

A just and reasonable DG rate must be grounded in a careful assessment of the practical economic impacts of the rate on all market participants. That includes customer-generators and other utility customers as well. There can be no reasonable doubt that the proposal from the Companies and its allies in promoting the settlement agreement will suppress the DG market and limit the number of customers that can afford to invest in self-generation. The likely market suppression effect is so great that it appears an intended outcome of the Companies' volitional acts. This outcome benefits the Companies, but there is insufficient modeling analysis and data to evaluate statewide market impacts over the coming decades. In other words, the Companies and the settling parties do not appear to have evaluated or shared an analysis of the opportunity costs of the proposed settlement. The fact that the proposals could have been even worse and were the product of non-public negotiations between a limited group of stakeholders means that the risk of unreasonably high opportunity costs and adverse market impacts is very high. Moreover, the market for customer-sited generation in North Carolina is small and will remain small under the

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<sup>11</sup> Companies' petition at 7.

<sup>12</sup> Companies' petition at 11.

<sup>13</sup> NC WARN, *Response to Duke Energy's Rate Design Study Quarterly Status Report for Third Quarter 2021*, filed in Docket Nos. E-7, Sub 1214 and E-2, Sub 1219 (Nov. 15, 2021).

Companies' proposal. The market growth curve for distributed generation is often non-linear and the rate of growth increases with each increment of deployment. The proposal from the Companies and the settling parties will suppress that growth just as economies of scale could kick in. Any net metering investment discouraged by the economic impacts of confiscatory net metering outflow compensation rates will therefore at least delay and possibly deny North Carolina the benefit of decades worth of non-polluting electricity generation. It is important to note that discouraging net metered generation investment works in opposition to the goals of the NC Carbon Plan (HB 951) and its direction to the Commission to achieve carbon neutrality by 2050.

*Rates Should Support Capital Attraction for Non-utility Market Participants*

Discouraging net metered generation investment denies all customers of the benefit of private, non-utility coverage of insurance, financing, and operational costs associated with the generation that NEM customers bring to the system and preserves more expensive monopoly control over system costs that are imposed on all customers. An unreasonably and unjustifiably low outflow compensation rate in a net metering tariff will impair the development of renewable energy markets in North Carolina and harm customers who are interested in developing net metering projects. Net metering investments require capital, and this investment represents a proportionately more-significant share of a household or business budgets than for a very large utility. Capital access and affordability for small investors is impacted by payback rates and ratios, market size, supply- and value-chain diversity and maturity, and other factors. The rate-regulated utility must provide enough competent evidence for the Commission to evaluate whether the proposed net metering tariff rate will have an unreasonable negative impact on capital attraction to support renewable energy market growth in North Carolina.

*The Commission Should Bear in Mind the Incentive Effects of Net Metering Rates*

It is a truism of economic and rate regulation that “all regulation is incentive regulation.”<sup>14</sup> Likewise, all rate design is incentive rate design. As previously explained, net metering outflow rates impact net metering investment decisions. There are other potential incentives stemming from net metering tariff rate design as well. An inadequately understood and analyzed net metering tariff approved by the Commission creates significant risk of energy waste, economic inefficiency,<sup>15</sup> and increased environmental harm, in some of the following ways:

- **A significant differential between inflow and outflow rates will encourage customer-generators to use as much generation onsite as possible.** While this might have the effect of encouraging additional investment in storage technology by the relatively few customers that can afford it, it will primarily encourage customers to time energy consumption to occur during periods of higher net-metered generation output—for example, they will charge their electric vehicles during the sunniest, hottest times of the day. As a result, valuable on-peak energy production that otherwise could have offset expensive utility generation will be unavailable to the grid at large.
- **Unreasonably low outflow rates that do not reflect the full value of exported generation will encourage uneconomic**

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<sup>14</sup> J. Lazar, *Electricity Regulation in the U.S.*, Regulatory Assistance Project (Jun. 2016). Available at: <https://www.raponline.org/knowledge-center/electricity-regulation-in-the-us-a-guide-2/>.

<sup>15</sup> M. Ansarin, et al., *Economic Inefficiencies of Pricing Distributed Generation under Novel Tariff Designs*, *Applied Energy* Vol. 313 (May 1, 2022), available at: <https://www.sciencedirect.com/science/article/pii/S030626192200277X>.

**under sizing of DG systems.**<sup>16</sup> DG systems are heavily driven by fixed costs—as are utility investments—and the relative cost of incremental capacity additions is falling. It is extremely likely that a solar investment decision will not be revisited for 25 or more years, meaning that maximizing the long-term economic benefit of solar investments is essential to avoid economic waste. The Companies’ analysis does not appear to fully evaluate the long-term benefits and costs of customer-sited generation.

- **Unreasonably low outflow rates exacerbate the problem of subsidies flowing from net metered customers to the utility and other customers.** Excess energy from net metered customers, when properly planned and accounted for by the utility, backs down utility generation and reduces loading on transmission and distribution systems—often during peak hours when marginal losses are higher. These benefits are not adequately accounted for or addressed by the Companies in this proceeding. Moreover, excess generation is not stored by the utility, but immediately serves the nearest unserved load—as a simple matter of electrical physics. As the energy serves that load, it passes through a utility revenue meter, earning the utility a full billing charge at the applicable retail rate and reducing if not eliminating any claim of net lost revenues due to customer self-generation. This means that the utility collects a full retail rate’s worth of revenues, which includes allocated charges for fixed cost recovery, for every kWh of export from a net metered facility. The earnings that the Companies realize from customer-generator outflows are not fully accounted for by the Companies. Of course, if the utility chooses to ignore the injections of energy, it will waste customer money by

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<sup>16</sup> *Id.*

- continuing to generate as if the local generation was not available. And if the utility overbuilt the system contrary to reasonable predictions of increased deployment of DG by customers, it could face stranded cost problems. But these stranded costs would be the result of forecasting errors. The utility might experience lost revenues, but lost revenues do not create costs just because customers do not use the erroneously expected or class-average amount of electricity. And because billing systems have very small variable costs and the distribution system is already in place, the only amount the utility pays for the injected energy—energy that it otherwise would have had to generate or purchase, transmit, and distribute—is the net metering outflow compensation rate.
- Outflow rates that do not reflect full lifecycle environmental costs and full value of outflow have the effect of **extending and exacerbating uneconomic costs for electricity service** that fail to internalize known, measurable, and significant environmental costs associated with non-renewable generation and inefficient utility system operations.

*Careful Accounting for Utility Costs and a Distinction between Cost Causation and Cost Shifting is Important*

Just and reasonable rates for net metered generation require accurate accounting for utility costs and careful differentiation between cost causation and the potential for cost shifting. The Companies' approach to the costs of net metered generation operations is not connected to any meaningful and reliable analysis of the specific costs to serve NEM customers; instead, the Companies rely on averaged data from hundreds of diverse customer-generators. In addition, the Companies assert that customer-generators avoid paying for costs without any credible evidence of the cost-of-service basis for those assertions. During summer months especially, customer-generators typically have both lower on-peak energy requirements and lower

on-peak demand. The Companies approach does not account for the wide variation in usage and outflows except through gross averaging. The Companies correctly recognize that, all other things being equal, net metering customers don't pay as much for their utility bill as they would have without a net metered system. The Companies are also correct that, all other things being equal, net metering customers make lower contributions to fixed cost recovery than they would have prior to installing their generation system. The fundamental principle of cost-based rates is that customers who make greater use of the system pay for that greater use, and that customers who make less use of the system pay at an appropriately lower level. The question that remains unanswered is: What is the cost to serve customers with onsite generation?

What the Companies fail to provide are cost-of-service studies of NEM customers as evidence for how the cost to serve a net-metered customer changes as a result of generation operation, relying instead on broad assumptions based on system-wide averages. Customer generators seek to reduce use of utility energy services, but reduction in use does not and cannot *create* costs in a cost-of-service rate making regime. Customer use reductions compared to forecasts *may* result in a potential for a shifting of costs in a subsequent rate case, and such cost shifting *may* merit regulatory attention of several different kinds. But reduced loading impacts both sunk and future fixed and variable costs. The Companies failed to provide any evidence to support a just and reasonable quantification and treatment of any such cost shifts or to demonstrate in any meaningful way that the potential cost shifts are sufficiently significant to justify adjustment through the net metering tariff. Lost revenues are not a cost of service. If lost revenues were considered costs, then all customers would be required to pay the average *bill* for their respective class. Such socialism is not a principle of just and reasonable rates.



### Reasonable and Prudent Action to Address Potential Cost Shifts

The first step a utility should take to address potential costs shifts is to objectively quantify the potential cost shift net of the benefits produced by the customer-sited generation. That step remains to be done by the Companies, though evidence provided in discovery shows that projected NEM generation in 2026 will only account for less than 2% of total generation sales by the Companies in 2021.<sup>17</sup> There is time to do things right.

Lost revenues are not a cost. Cost shifts only occur if all of the costs avoided by the reduced use are less than the reduced revenue. A cost shift is unjust only if the net result, after a full accounting of costs and benefits, imposes unreasonable additional costs on non-participant customers or provides unreasonable payments to generating customers that exceed value. The evidence provided by the Companies in this case is in no way adequate to address these fundamental questions.

The second step is to assess the potential cost shift relating to NEM generation in the context of other potential cost shifts.<sup>18</sup> The Company has not assessed the relative magnitude and significance of any other potential cost shifts that might be associated with net metering operations.

### Other Potential Cost Shifts

Potential cost shifts arise for two major reasons. Most commonly, they arise from the averaging of costs into rates within a class of diverse customers with diverse usage patterns and the fact that few if any customers are “average.” For example, customer charges based on average costs create a cost shift by which customers in multi-family housing bear a disproportionate share of costs associated with service drops, final step-

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<sup>17</sup> Companies’ response to NCWARN DR 1-2.

<sup>18</sup> Potential cost shifts become real cost shifts only through a rate case order or other Commission order approving a rate or tariff.

down transformers, and other infrastructure associated with electricity delivery, as compared with residential customers who live in large suburban homes—a cost shift problem exacerbated by minimum system cost allocation methodologies. Customers with usage patterns that do not contribute to system peak costs as much as other customers in the class bear disproportionate costs under average rates as well. Customers that invest in major energy efficiency improvements reduce their use and contribution to fixed cost recovery if rates were set based on an assumption that they would continue their inefficient use in the rate case forecasts, setting up a potential cost shift in the next rate case. And utility economic development rates often shift costs from new load customers to existing customers based on a hope that increases in usage will lead to cost shifts in the opposite direction at some time in the future. Of course, economic development rates are designed to increase demand for energy, so that any benefits in spreading costs between rate cases are often overwhelmed by the costs of increased infrastructure investments required to serve the increased load. And utilities provide discounts in the form of credits to customers on economic development rates—that shift revenue requirements to other customers in the short-term. The magnitude of the potential cost shifts and the increased infrastructure costs associated with these examples dwarf the potential for properly calculated cost shifts associated with net metering operations even without full and fair consideration of the costs and benefits of net metered generation to the grid.

*Discriminatory Impacts of the Utility Net Metering Proposal*

In the absence of credible evidence of a significant cost shift that must be addressed to ensure just and reasonable rates for all customers, and in the face of likely greater potential cost shifts associated with other factors, the Companies' proposals are both unjustly discriminatory and unjustified as a rate proposal. A proper investigation now, to determine benefits and cost

of customer-sited solar generation and that lays the foundation for an accurate assessment of cost causation, prior to revising tariffs without such information—as proposed by the Companies in this proceeding, would advance administrative economy and efficiency.

*Action Needed to Support Just and Reasonable Rates for Customer Generators*

The Companies should deploy metering equipment and conduct research to determine how the installation and operation of net metered facilities impacts the costs to serve net metering customers and other customers on the grid and use that data to support a just and reasonable outflow rate proposal. Until the utility can produce actual data to support the proposed revised tariffs, net metering rates should remain unchanged.

**RECOMMENDED COURSE OF COMMISSION ACTION: BENEFIT-COST ANALYSIS AS A FOUNDATION FOR NET METERING RATES**

The best and most common place for the Commission to start is by compelling the Companies to base their net metering rate proposals on a transparent and comprehensive assessment of the costs and benefits of customer generation, and not rely on vague and untested assertions about negotiation positions and outcomes in settlement process. A growing number of jurisdictions, including North Carolina, have used Value of Solar analysis to inform and support net metering rate decisions.<sup>19</sup> Because the Commission

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<sup>19</sup> Many states have conducted Value of Solar studies of one form or another. States that have existing studies include: Arizona (2016 and 2013); Arkansas (2017); California (2016, 2013, 2012, 2011, 2010, 2005); Colorado (2013); Florida (2005); Hawaii (2014); Iowa (2016); Louisiana (2015); Massachusetts (2015); Maine (2015); Mississippi (2013); North Carolina (2013); Nevada (2017, 2014); New Jersey and Pennsylvania (2012); New York (2012 and 2008); South Carolina (2015); Texas (2014), including for the cities of San Antonio (2013) and Austin (2006); Utah (2014); Vermont (2014); Virginia (2014); and Wisconsin (2016). Other states have conducted dockets and processes for establishing a Value of Solar methodology or framework, such as: Minnesota (2014); Rhode Island

must ultimately decide the net metering tariff issue for each utility that it regulates, best practices across jurisdictions countenance the Commission requiring that the analysis be undertaken under a common analytical framework that can also incorporate utility-specific facts and circumstances. The development of a framework and the investigation of the costs and benefits of customer-sited generation should be led by the Commission Staff, with independent expert support as appropriate.

*Benefits of a Common Framework Approach for Benefit Cost Analysis (BCA)*

The Commission should order and adopt a common framework approach to BCA, including an updated Value of Solar analysis to support net metering rates. Among other reasons, directing multiple utilities within a single state to utilize a common framework for BCAs aligns with tenets of sound rate making, including ease of understandability and application, and provides greater confidence that rates will track cost causation and fairly apportion costs. And importantly, a common framework approach to evaluating costs and benefits will support efficient and rational statewide market development for DG and other DERs. These comments expand on the issue of a BCA framework.

*The Companies' Burden*

North Carolina law mandates that the burden for proving that a proposed rate is just and reasonable is on the public utility.<sup>20</sup> The Companies bear the responsibility of submitting sufficient and competent evidence to support the proposed tariffs and to demonstrate that the tariffs will result in

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(2015); and New York (2016). Solar Energy Industries Association, *Solar Cost-Benefit Studies*. Available at: <https://www.seia.org/initiatives/solar-cost-benefit-studies>.

<sup>20</sup> N.C. Gen. State §62-134(c).

rates that are just and reasonable. Any proposal that is based on recovering or securing costs created by net metered generation must follow rate making processes in North Carolina law and without regard for rate structures applicable to non-generator customers, that is, they must be based on cost of service data for customer generators—and not merely the summing of limited and averaged data for customer-generators.

In this proceeding, the Commission should view the Companies' proposals in light of the fact that a Value of Solar analysis has already been performed for the state of North Carolina. That study, entitled "The Benefits and Costs of Solar Generation for Electric Ratepayers in North Carolina,"<sup>21</sup> reflected an independent analysis for the Companies' service territories. The Study found that even when treating lost revenues as a cost of non-utility solar generation, and only evaluating fifteen years of system operations, the benefits of solar were greater than the costs. The Value of Solar analysis in 2013 should have been the starting point for a transparent and comprehensive analysis and update of the Value of Solar in North Carolina. The Commission should demand that the Companies reconcile their internal evaluation with the fact that independent analysis showed that fair treatment of NEM customers would recognize how those customers are subsidizing all others on the system.

*A Common Analytical Framework for BCA is Best Practice*

The concept of standardized BCA frameworks goes back nearly 40 years in the U.S., when the California Standard Practice Manual was published in 1983.<sup>22</sup> Indeed, the common use of standardized frameworks to

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<sup>21</sup> R. T. Beach & P. G. McGuire, *The Benefits and Costs of Solar Generation for Electric Ratepayers in North Carolina*, Crossborder Energy (Oct. 18, 2013).

<sup>22</sup> See, generally, California PUC, *California Standard Practice Manual*, Regulatory Assistance Project (Oct. 1, 2001), available at: <https://www.raponline.org/knowledge-center/california-standard-practice-manual>.

evaluate energy efficiency programs has improved the stock and performance of such programs to the extent that it is now common knowledge that efficiency is the least expensive energy resource everywhere. Over the past 40 years, state regulatory commissions have developed, shared, and adopted common methods and evaluation frameworks for calculating wholesale avoided cost rates. While each state has adapted these methods to address specific local conditions and policy priorities, a strong non-utility wholesale generation sector has emerged in many states, saving all customers significant amounts of money.

*The Relationship between BCAs and Value of Solar Studies*

The Value of Solar concept is at heart a Benefit-Cost Analysis, specialized to distributed solar production. As early as 2013, the methods and metrics of best practices for Value of Solar studies were already identifiable and documented in “A Regulator’s Guidebook: Calculating the Benefits and Costs of Distributed Solar.”<sup>23</sup> That reference lists the key categories of impacts that should be assessed and describes methods to quantify those impacts. Transparent and comprehensive evaluations of the value of solar and of DER have tracked the guidance in the Regulator’s Guidebook to describe and quantify costs and benefits resulting from the production of energy by DG facilities over the useful life of facilities. It is important to note that the most useful reports employ a fairly standardized analysis framework and transparently document the methods chosen for calculating costs and benefits. The “gold standard” for such analysis is the

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<sup>23</sup> J. Keyes & K. Rábago, *A Regulator’s Guidebook: Calculating the Benefits and Costs of Distributed Solar*, Interstate Renewable Energy Council-IREC (Oct. 2013), available at: [http://www.irecusa.org/wp-content/uploads/2013/10/IREC\\_Rabago\\_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf](http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf).

work done in Minnesota, by Clean Power Research, published in 2014.<sup>24</sup> That report was the product of a transparent multi-stakeholder process and the report fully documents the methods and results. The study was reviewed multiple times by the Minnesota Public Service Commission, and the methodology was adopted for informing compensation rates for community solar projects. Unlike the Application at issue here, it was not the product of confidential settlement negotiations among a limited set of stakeholders. Today, the Minnesota Community Solar program, which bases community solar credits on regularly and publicly updated value analysis, leads the nation in DER.<sup>25</sup> For examples of BCA success stories across the nation, see **Exhibit 3**. While the examples are illustrative and not exhaustive, they reveal the benefits of using a BCA Framework approach to address many of the most important issues facing electric utility regulators and electric utilities today.

*The Benefits that North Carolina Can Realize from Adopting a BCA Framework*

A BCA Framework can lead to clarity in understanding and communication between utilities, regulators, and stakeholders about benefit and cost impacts particular to North Carolina. A BCA Framework is essential to establishing fair, just, and reasonable rates for DER services and technologies. A BCA Framework can provide a platform for evaluating and prioritizing grid modernization and other investment decisions, and for moving toward the Carbon Plan goals established by HB 951. A BCA Framework can provide a mechanism for examining interactive, portfolio,

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<sup>24</sup> Clean Power Research, *Minnesota Value of Solar: Methodology*, Minnesota Department of Commerce (Mar. 2014), available at: <https://www.cleanpower.com/research/economic-valuation-research>.

<sup>25</sup> See J. Farrell, *Why Minnesota's Community Solar Program is the Best*, Institute for Local Self-Reliance (5 Feb. 2021—updated monthly), available at: <https://ilsr.org/minnesotas-community-solar-program>.

and competitive effects between programs and rate structures. And, over the long-term, a BCA Framework can provide essential analytical rigor to agendas as big as utility sector transformation. These benefits, and the time afforded under North Carolina law<sup>26</sup> provide all the justification necessary for the Commission to direct the Companies to develop and propose a BCA Framework, by which fair, just and reasonable rates for DER services can be determined. A consistent and well-structured BCA Framework can be applied to program evaluation, investment decision making, and rate design. More directly, these efforts in other jurisdictions reveal just how far the Companies' approach in this docket is from best industry practices.

### **BCA FRAMEWORK RECOMMENDATIONS – ADOPT ESTABLISHED NATIONAL BEST PRACTICES**

Fortunately, the decades of work invested in sound BCA processes yielded a consensus among leading practitioners as to the elements of best-practices BCAs. That consensus is documented in the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources (NSPM-DER), published in August of 2020.<sup>27</sup> The Companies do not appear to have relied upon or followed the Manual's best practices guidance in formulating their net metering tariff proposals.

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<sup>26</sup> N.C. Gen. Stat. § 62-126.4(c) (Retail customers may "continue net metering under the net metering rate in effect at the time of interconnection until January 1, 2027.") However, no provision of Chapter 62 mandate revised NEM tariffs be approved before January 1, 2027.

<sup>27</sup> T. Woolf, et al, *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*, National Energy Screening Project (Aug. 2020). Available at: <https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/>. While the NSPM-DER was published recently, it reflects best practices articulated in a prior NSPM for efficiency resources and generally recognized in the industry. Mr. Rábago was a co-author of the manual.



*The Companies' Proposals are Not Based on Comprehensive Assessment of Investigation of the Costs and Benefits of Customer-Sited Generation*

North Carolina law requires an investigation of the costs and benefits of customer-sited generation.<sup>28</sup> The Companies assert that their proposals are based on a selection of embedded and marginal costs. They propose compensation for averaged exports based on wholesale energy avoided costs and limited marginal transmission and distribution costs.<sup>29</sup> The Companies have not demonstrated compliance with the requirements of the law, and their approach is not an adequate foundation for a finding that the pending proposal would result in just and reasonable rates.

*The NSPM-DER Provides a Reasonable Best-Practices Approach and Framework for Investigating the Costs and Benefits of Customer-Site Generation*

The NSPM-DER is a comprehensive document that includes guiding principles, recommended process steps, impact category lists, definitions, and specific guidance on a wide range of issues associated with developing a BCA Framework and conducting cost effectiveness analysis. It would be wise for the Companies to take advantage of the comprehensive and integrated nature of its recommendations. The entire NSPM-DER guidance document is 300 pages in length, including several appendices. For an overview of specific guidance including guiding principles, the standard five-step process, and impacts to be considered, including utility system, customer, and societal impacts, please see NSPM-DER, **Attachment C**

*Review of Companies' Proposals in Light of Best Practices Guidance*

The Companies' proposals in this proceeding fail to align with the best practices guidance from the NSPM-DER in several important ways. In regard

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<sup>28</sup> N.C. Gen. Stat. § 62-126.4.

<sup>29</sup> *Id.*

to core BCA principles, the Companies' proposals are deficient in several regards:

**Principle 1 - Treat DERs as a Utility System Resource:** There appears to have been no evaluation by the Companies of the broad range of resource benefits that DG deployment and operation can provide to the utility system.

**Principle 2 - Align with Policy Goals:** The Company has not accounted for alignment of its proposals, that pre-date HB 951 with all its relevant North Carolina policy goals and the Carbon Plan, nor in light of the significant reduction in market activity sure to result from the rates if implemented.

**Principle 3 - Ensure Symmetry:** The Companies' proposal does not treat customer-sited generation on a level playing field with monopoly-owned resources, ignores many beneficial impacts, and prioritizes utility profits over a competitive market for DG. Again, there is no documentation of a transparent and comprehensive analysis of the full life-cycle benefits of customer-sited generation.

**Principle 4 - Account for Relevant, Material Impact:** There is no accounting for the full range of utility impacts that the NSPM-DER identifies as resulting from DG. As this report addresses, the Companies used an internal and privately negotiated process to come up their proposals, without due regard for the statutory requirement for an investigation of costs and benefits, nor a transparent and comprehensive process to ensure that the proposed rates are just and reasonable.

**Principle 5 - Conduct Forward-Looking, Long-term, Incremental Analyses:** The Companies' proposal is limited in temporal scope, and does not align with the 25+ years of benefits that customer-sited generation can produce, especially in reducing and deferring costs of the utilities' business-as-usual approaches.

**Principle 6 - Avoid Double-Counting Impacts:** There is no explanation or documentation of efforts by the Companies' to avoid double counting costs or benefits relating to DG. The lack of transparency and severely limited opportunities for stakeholder engagement mean that the Commission simply can't tell whether the Companies' approach is objectively reliable.

**Principle 7 - Ensure Transparency:** The major failing of the internal evaluation and negotiated settlement approach chosen by the Companies is its lack of transparency. This means that the public and the Commission cannot have confidence that the Companies' proposals are just and reasonable.

**Principle 8 - Conduct BCAs Separately from Rate Impact**

**Analyses:** The Companies' overarching focus on lost-revenues shows a fatally problematic obsession with lost revenues that may or may not result from customer-sited generation. This focus on what DG means for the utility, and not for the public interest at large, is error and means the Companies' approach and proposals will not support just and reasonable rates.

**SUMMARY OF COMMENTS AND RECOMMENDATIONS**

A Benefit-Cost Analysis framework developed in accordance with best practices guidance, such as that contained in the NSPM-DER, is essential to provide a substantial and competent evidentiary foundation for the design of fair, just, and reasonable rates for customer generators. The statute requiring the investigation of the benefits and costs of customer-sited generation affords the Commission more than enough time for the task and for allowing a transparent process that provides all stakeholders with meaningful opportunity for engagement. Given that the Companies have not met their burden of supporting their proposed tariffs revisions with adequate evidence, the prescribing of the elements of a BCA Framework is

administratively efficient and will promote the statewide uniformity in approach that can support the emergence of a self-sustaining, competitive non-utility customer generation market segment as well as other DER market segments. In addition to providing cost-based analytical support for net metering compensation, such a framework can also provide broad and future benefits in supporting the development of other tariffs relating to DERs, evaluation of grid modernization investments including those relating to Advanced Metering Infrastructure, and transmission, distribution, and generation planning.

Based on the considerations outlined above, the Commission should deny the Joint Application for Approval of revised net metering tariffs. The proposed tariff revisions have not been demonstrated to be fair, just, and reasonable and in the public interest. Further, the Commission should direct that the existing net metering tariffs remain in effect until the Companies propose a successor tariff that will result in fair, just, and reasonable rates, based on the development and application of a BCA Framework. Finally, the Commission should direct Commission Staff, and such external experts as required, to develop a BCA Framework and conduct a BCA for net metered generation in accordance with the principles, process, impacts, and other guidance in the NSPM-DER. The Commission should direct the Staff to report on assumptions, methods, and results in a transparent and comprehensive manner to the interested public and provide a meaningful opportunity for stakeholder comments and suggestions. The Commission should direct the Staff to make the BCA Framework and tool available to the utilities, the public, and interested stakeholders. And any subsequent proposal for new rates relating to DERs should be grounded in the methods and evaluation of impacts established in the BCA Framework. Finally, the Commission should direct the Staff to adopt a schedule for updating the BCA Frameworks on a

regular interval—such as once every two years—in order to take advantage of evolving experience and best practices in the industry in general.

This the 29th day of March, 2022.



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Karl R. Rábago

# Rábago Exhibit 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).
- Director, Texas Solar Energy Society
- Advisor, Commission Shift

### **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.

#### **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.
- 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.

#### **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.

## 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.

## Publications

"Climate Change Law: An Introduction," contributing author (chapter on energy), Edward Elgar Publishing (2021).

"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).

"Northeast Solar Energy Market Coalition (NESEMC)," United States (Mar. 28, 2018)

"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)
- “Maine Distributed Solar Valuation Study,” Maine Public Utilities Commission (Apr. 14, 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)
- “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 Wisser 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, Klewer 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)

## Rábago Exhibit 2

### SPECIFIC EXPERIENCE RELATING TO SOLAR

I have extensive experience working in the field of distributed energy resources, a category of energy resources that includes distributed solar generation, energy efficiency, energy management, energy storage, and other technologies and related services. That experience includes regulation of electric utilities in Texas, including review and approval of rates, tariffs, plans, and programs proposed by electric utilities. While managing director at the Rocky Mountain Institute, I co-authored the seminal treatise on distributed energy resource value, entitled “Small Is Profitable”<sup>30</sup> and I have published several articles and essays relating to the topic.

As a vice president for Distributed Energy Services for Austin Energy, one of the largest municipal electric utilities in the nation, I had responsibility for all of the utility’s customer-facing programs relating to distributed solar generation, energy efficiency, demand management, low-income weatherization, energy storage, electric transportation, building energy ratings and codes, and the utility’s electric vehicle initiatives. While with Austin Energy, we developed and implemented the nation’s first distributed solar tariff based on objective and comprehensive valuation of solar generation and avoided system energy costs, often referred to as the “Value of Solar Tariff.”

While at the U.S. Department of Energy, I was the federal executive responsible for the nation’s research, development, and deployment programs relating to renewable energy, energy efficiency, energy storage, and other advanced energy technologies in the Department’s Office of Utility Technologies.

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<sup>30</sup> Amory B. Lovins, et al., “*Small is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size*,” Rocky Mountain Institute (2003).

As executive director for the Pace Energy and Climate Center, based at the Pace University Elisabeth Haub School of Law in White Plains, New York, I led a team actively engaged as a public interest intervenor in the ground-breaking “Reforming the Energy Vision” process administered by the New York Public Service Commission.

I work with the Local Solar for All coalition, on behalf of the Coalition for Community Solar Access, a trade association for providers and developers of community solar services and facilities across the U.S. Local Solar for All has members from solar businesses and advocacy organizations.<sup>31</sup> Most notably, Local Solar for All published the “Local Solar Roadmap” in December of 2020.<sup>32</sup> The Roadmap study relied upon a modern, high-resolution analysis of the electric grid in the continental United States, and has been followed by several additional studies. The Local Solar Roadmap study, conducted by Vibrant Clean Energy using its powerful WIS:dom-P® model, found that by coordinating and optimizing DERs in production cost and capacity expansion analysis, the added deployment of 273 GW of local solar and storage could yield nearly \$500 billion in savings and create more than two million incremental jobs over the kind of business-as-usual approaches typically favored by monopoly utilities, all while eliminating 95% of carbon emissions from the grid by 2050.

I am a frequent speaker, author, and commentator on issues relating to electric utility regulation, distributed energy resource markets and technologies, and electricity sector market reform.

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<sup>31</sup> Local Solar for All. More information at <https://www.localsolarforall.org>.

<sup>32</sup> Local Solar for All, Local Solar Roadmap (Dec. 2020), available at: <https://www.localsolarforall.org/roadmap>.

## **Rábago Exhibit 3**

### **Benefit-Cost Analysis Success Stories**

During the past fifteen years, utilities have invested billions of dollars through smart grid, grid modernization, and/or power sector transformation initiatives. Standardized BCA frameworks have been central to the leading efforts in this regard. Two such processes merit the Commission’s attention. Perhaps one of the most comprehensive transformation initiatives was that initiated by New York, styled New York REV (for “Reforming the Energy Vision”). This proceeding resulted in the institution of a Value of DER proceeding and comprehensive distribution system planning processes that included a BCA Framework.<sup>33</sup> In the words of the NY Commission’s order, the BCA Framework was premised on a number of foundational principles that the Commission should adapt and adopt for North Carolina.

The BCA analysis should:

1. Be based on transparent assumptions and methodologies; list all benefits and costs including those that are localized and more granular.
2. Avoid combining or conflating different benefits and costs.
3. Assess portfolios rather than individual measures or investments (allowing for consideration of potential synergies and economies among measures).
4. Address the full lifetime of the investment while reflecting sensitivities on key assumptions.

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<sup>33</sup> See NY PSC, *Order Establishing the Benefit Cost Analysis Framework*, Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (Jan. 21, 2016), available at: <https://www3.dps.ny.gov/W/PSCWeb.nsf/All/C12C0A18F55877E785257E6F005D533E>.

5. Compare benefits and costs to traditional alternatives instead of valuing them in isolation.<sup>34</sup>

The Commission's attention is also directed to the Rhode Island Public Utilities Commission (RI PUC), Docket 4600 proceeding from 2016 to 2017.<sup>35</sup> The RI PUC initiated that proceeding, informed by a multi-party stakeholder working group's work, to determine what attributes are possible to measure on the electric system and why should they be measured. This overarching question was further broken down into three broad questions:

1. What are the costs and benefits that can be applied across any and/or all programs, identifying each and whether each is aligned with state policy;
2. At what level should these costs and benefits be quantified—where physically on the system and where in cost-allocation and rates; and
3. How can we best measure these costs and benefits at these levels—what level of visibility is required on the system and how is that visibility accomplished?<sup>36</sup>

In 2017, the RI Docket 4600 working group delivered to the RI PUC a final report that addressed: (1) how to better evaluate the benefits and costs of a wide range of technologies, programs, and investments; and (2) how rate design should evolve in Rhode

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<sup>34</sup> *Id.* at 2.

<sup>35</sup> RI PUC, *In Re: Investigation into the Changing Distribution System and the Modernization of Rates in Light of the Changing Distribution System*, Docket No. 4600. Documents available at: <http://www.ripuc.ri.gov/eventsactions/docket/4600page.html>.

<sup>36</sup> RI PUC Docket No. 4600, *Notice of Commencement of Docket and Invitation for Stakeholders Participation*, RI PUC (Mar. 18. 2016), available at: <http://www.ripuc.ri.gov/eventsactions/docket/4600page.html>.



Island over time.<sup>37</sup> The RI Docket 4600 Stakeholder Working Group, which included utility, developer, consumer, regulatory, and economic development stakeholders, delivered a report that established a Rhode Island Benefit-Cost Framework and several rate design recommendations.<sup>38</sup> The RI PUC accepted the report and issued directives for further work in July 2017.<sup>39</sup> The process and RI PUC orders set the stage for power sector transformation work that was a priority for that state.

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<sup>37</sup> Raab Associates, et al., *Docket 4600: Stakeholder Working Group Process Report to the Rhode Island Public Utilities Commission*, RI PUC Docket No. 4600 (Apr. 5, 2017), available at: [http://www.ripuc.ri.gov/eventsactions/docket/4600-WGReport\\_4-5-17.pdf](http://www.ripuc.ri.gov/eventsactions/docket/4600-WGReport_4-5-17.pdf).

<sup>38</sup> *Id.*

<sup>39</sup> RI PUC, *PUC Report and Order No. 22851 Accepting Stakeholder Report*, RI PUC Docket No. 4600 (Jul. 31, 2017), available at: [http://www.ripuc.ri.gov/eventsactions/docket/4600-NGrid-Ord22851\\_7-31-17.pdf](http://www.ripuc.ri.gov/eventsactions/docket/4600-NGrid-Ord22851_7-31-17.pdf).