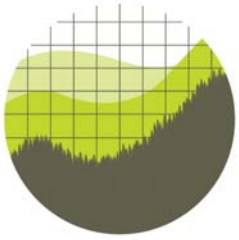

Institute *for*
Policy Integrity
new york university school of law

August 31, 2015

Hon. Brinda Westbrook-Sedgwick, Secretary
Public Service Commission of the District of Columbia
1325 G Street, NW - Suite 800
Washington, DC 20005

VIA ELECTRONIC MAIL

Attn: FC1130 - Investigation into Modernizing the Energy Delivery Structure for Increased Sustainability
Subject: Public Comments on Public Service Commission of the District of Columbia Order Opening Investigation into Modernizing the Energy Delivery Structure for Increased Sustainability, Order No.17912

Dear Secretary Westbrook-Sedgwick:

The Institute for Policy Integrity at New York University School of Law[1] ("Policy Integrity") respectfully submits the following comments on the order opening the Investigation into Modernizing the Energy Delivery Structure for Increased Sustainability. Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity has extensive experience advising stakeholders and government decisionmakers on the rational, balanced use of benefit-cost analysis, both at the federal and state level.

We are grateful for the Commission's consideration of these comments.

Sincerely,

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[1] No part of this document purports to present New York University School of Law's views, if any.

INTRODUCTION

The District of Columbia Public Service Commission ("Commission") has shown its commitment to taking the necessary steps to ensure that the District of Columbia ("District") is ready for the changes and the challenges facing the electric utilities by the Order Opening the Formal Case No. 1130 ("Order") to investigate "technologies and policies that can modernize our energy delivery system."[2] The Order affirms the Commission's commitment to achieving policy goals that are crucial for securing our energy future, such as increased sustainability, reliability, and efficiency.[3]

By requiring energy efficiency contracts to pass a societal benefit-cost test, the District has established its position among one of the nation's forward-thinking jurisdictions. As a result of its efforts in energy efficiency, the District leads all U.S. cities in the number of ENERGY STAR®-certified buildings.[4] Moreover, the District has set an example for the nation in the installation of advanced energy meters that are the first step toward dramatic reforms in the way energy is bought and sold.

In this proceeding, the Commission should build on its existing clean energy efforts, and undertake the following actions:

- Develop a societal benefit-cost analysis framework with proper granularity that can be used in decisionmaking for both demand side and supply side energy resources.
- Quantify and monetize externalities instead of relying on a percentage adder.
- Consider a concurrent rate reform to maximize benefits that could be achieved by the modernization of the District's energy delivery system.

I. The Commission should develop a societal benefit-cost analysis and should use it consistently for both demand and supply side resources, with proper granularity

The District's energy system will face tremendous challenges over the coming years. Not only will the system face external threats such as climate change and security risks, but it will also face significant change from within, as evolving technologies make distributed energy resources, microgrids, and alternative distribution utility models more prevalent. Many transactions among actors at all sides will gradually replace what is still largely a one-way market, with the bulk power system supplying energy to consumers through distribution companies. The market will grow to include not just bulk generation and transmission, but also distributed energy resources, energy efficiency, and demand response.

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[2] *Formal Case No. 1130*, In The Matter Of The Investigation Into Modernizing The Energy Delivery System For Increased Sustainability, Order No. 17912 ¶ 7 (June 12, 2015).
[3] *Id.*
[4] District of Columbia State Energy Profile, ENERGY INFO. ADMIN., http://www.eia.gov/state/print.cfm?sid=DC (last updated July 16, 2015).

The Commission now has the opportunity to carefully and thoughtfully shape a more resilient, efficient and sustainable energy future for the District that fosters all these alternative energy resources. In order to ensure that it is prepared to conduct the necessary analysis, as well as to satisfy its statutory obligations and stay at the cutting edge of forward-looking jurisdictions on these issues, the Commission should explore how to structure a comprehensive benefit-cost analysis that could value all benefits and all costs of alternative energy resources, including externalities, as part of this proceeding.

A. A comprehensive benefit-cost analysis framework should be used for all types of investment decisions

The Commission states the goal of this proceeding as "identifying technologies and policies than can modernize our energy delivery system" that will make "our system more reliable, efficient, cost-effective and interactive."[5] In economics, "efficiency" is defined as maximizing net social welfare.[6] This makes it clear that the Commission's goal is to achieve an economically efficient allocation of society's resources by choosing the investment option that achieves the maximum net benefit. Only a societal benefit-cost analysis that considers both demand side and supply side alternatives can help the Commission achieve this goal. Thus, the Commission should ensure that valuation methodology for different utility and distributed assets is a part of the grid modernization proceeding and should establish a benefit-cost analysis framework that outlines the categories of all private and external benefits and costs of alternative investment plans.[7]

In a benefit-cost analysis, the net benefits of each alternative resource, whether it is a demand- or supply-side resource, can be represented using a common metric of dollars when a net present value approach is used. Thus, as long as the benefit-cost categories are consistently quantified and monetized for each resource, comparing the net benefits of each alternative, or portfolio of alternatives, and choosing the one that yields highest net benefit will ensure that society's resources are allocated efficiently.

Other states are already recognizing the need to engage in comparative benefit-cost analysis when assessing grid modernization.[8] A primary stakeholder in the Massachusetts Grid Modernization Working Group argued that the state "should adopt a standardized

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[5] *Formal Case No. 1130*, Order No. 17912 ¶ 3.

[6] *See, e.g.*, N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 5 (2008) ("[E]fficiency: the property of society getting the most it can from its scarce resources.").

[7] *See, e.g.*, DEVI GLICK, ET AL., ROCKY MOUNTAIN INSTITUTE, RATE DESIGN FOR THE DISTRIBUTION EDGE: ELECTRICITY PRICING FOR A DISTRIBUTED RESOURCE FUTURE 13 (2014) *available at* http://www.rmi.org/elab_rate_design; *see also, generally,* JIM LAZAR & KEN COLBURN, REGULATORY ASSISTANCE PROJECT, RECOGNIZING THE FULL VALUE OF ENERGY EFFICIENCY (2013).

[8] In addition to the states listed below, several Gulf States also began taking preliminary steps toward cost-benefit analyses of resiliency in the wake of Hurricane Katrina, but these analyses remain less developed. *See, e.g.*, RICHARD BROWN, QUANTA TECHNOLOGY, COST-BENEFIT ANALYSIS OF THE DEPLOYMENT OF UTILITY INFRASTRUCTURE UPGRADES AND STORM HARDENING PROGRAMS, PUBLIC UTILITY COMMISSION OF TEXAS, PROJECT NO. 36375 (2009); Theodore Kury, Public Utility Research Center, Evidence-Driven Utility Policy with Regard to Storm Hardening Activities: A Model for the Cost-Benefit Analysis of Underground Electric Distribution Lines (2010) *available at* http://warrington.ufl.edu/centers/purc/purcdocs/papers/1007_Kury_Evidence_Driven_Utility.pdf.

cost-benefit framework" that "include[d] comparative cost-benefit assessments of alternative approaches . . . to grid modernization investments."[9] Maryland's Grid Resiliency Task Force also acknowledges that a benefit-cost analysis is necessary to answer "questions of how far and which improvements to select" when improving grid resiliency.[10] Likewise, New Jersey is planning to utilize benefit-cost analysis to assess its electric utilities' proposals to harden the state's energy systems.[11]

New York State is undertaking an extensive overhaul of the state's regulatory, tariff, and market designs and incentive structures to better align utility interests with the state's policy objectives of enhanced reliability to provide safe, clean, and affordable electric service.[12] New York State realizes that a benefit-cost analysis methodology "can ensure that these opportunities and technologies [to harness distributed energy resources] are subject to consistent and accurate consideration and that ratepayer funds are employed in the most efficient manner."[13] As these states recognize, benefit-cost analysis is the best way to choose among alternatives and, therefore, to achieve maximum benefits. The Commission should follow their example.

B. Using a societal benefit-cost analysis for decisionmaking is not only consistent with the Commission's previous practices but is also a statutory requirement

In addition to being the most analytically sound way to prioritize policy options in a resource-limited world, a benefit-cost analysis from a societal perspective is the optimal way for the Commission to fulfill its statutory duties of promoting the public interest and preserving environmental quality. Past orders have highlighted the importance of incorporating social externalities into project analysis, and the Commission should apply and extend their reasoning in this proceeding.

The Commission's enabling statutes—as well its own subsequent statutory interpretations—mandate the promotion of the public interest, which includes promoting public safety and environmental preservation. The Clean and Affordable Energy Act ("Act")

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[9] RAAB ASSOCIATES, LTD. & SYNAPSE ENERGY ECONOMICS, INC., MASSACHUSETTS ELECTRIC GRID MODERNIZATION STAKEHOLDER WORKING GROUP PROCESS: REPORT TO THE DEPARTMENT OF PUBLIC UTILITIES FROM THE STEERING COMMITTEE 87 (July 2013).

[10] MARYLAND GRID RESILIENCY TASK FORCE, WEATHERING THE STORM 86 (Sept. 2012).

[11] *Discussion Points for FY2013-14 Budget*, N.J. BD. OF PUB. UTIL. at 4 (Apr. 1, 2013), *available at* www.njleg.state.nj.us/legislativepub/budget_2014/BPU_response.pdf. New Jersey has begun working with experts and utilities on appropriate models for these analyses. *See, e.g.*, Frank A. Felder, Center for Energy, Economic and Environmental Policy, Analyzing the Reliability and Resiliency of New Jersey's Urban Energy Systems in Response to Climate Change, Presentation at DIMACS/CCICADA Workshop on Urban Planning for Climate Events (Sept. 23-24, 2013), *available at* http://dimacs.rutgers.edu/Workshops/Urban/Slides/Felder.pdf; Rebuttal Testimony of Dr. Peter S. Fox-Penner, *In the Matter of the Petition of Public Service Electric and Gas Company Approval of the Energy Strong Program*, New Jersey Board of Public Utilities, Docket No. EO13020155 and GO13020156 (Nov. 27, 2013

[12] About the Initiative, N.Y. DEP'T OF PUB. SERV. (Aug. 13, 2015), http://www.dps.ny.gov/REV.

[13] Proceeding on Motion of the Comm'n in Regard to Reforming the Energy Vision, Staff White Paper on Benefit-Cost Analysis in the Reforming Energy Vision Proceeding at 2, PSC Case No. 14-M-0101, Filing No. 392 (July 1, 2015).

of 2008 made this mandate explicit in requiring that the Commission, "in supervising and regulating utility or energy companies, [] shall consider the public safety, the economy of the District, the conservation of natural resources, and the preservation of environmental quality."[14]

The Commission has subsequently acknowledged that the public safety and environmental considerations in § 34–808.02 are mandatory duties to be carried out in its proceedings. In 2014, in approving Washington Gas Light ("WGL") Company's compressed natural gas Fueling Services Tariff, the Commission noted the decision was "consistent with the Commission's *statutory obligation* to consider the District's environmental and economic development goals as part of its decision making process."[15] Also in 2014, the Commission added a seventh factor to its review of the proposed merger between the Potomac Electric Power Company ("PEPCO") and Exelon, explicitly confirming that environmental quality factors are a necessary part of the "public interest" standard.[16]

Accounting for environmental factors through monetization and benefit-cost analyses is also a logical continuation of past commission actions, as well as being consistent with the Act. In its Fueling Services Tariff order, the Commission required WGL to prepare a "clear accounting of the environmental benefits of this program along with an accounting of the revenue and costs related to providing the CNG Fueling Service when it seeks any cost recovery for this pilot program in a rate case."[17] The Commission should similarly prepare to account for the benefits and costs of its grid modernization policies as the proceeding develops.

The Act explicitly mandates the use of a societal cost test for energy efficiency and demand response programs administered by the District's Sustainable Energy Utility ("SEU"), indicating the D.C. Council's support for this methodology.[18] Consequently, the District's request for proposals for a SEU contractor laid out a complete framework for evaluating the SEU portfolio under the Societal Benefit Test.[19] While the framework used by the SEU can and should be improved by calculating actual environmental benefits rather than relying on a blanket percent adder, it nonetheless provides crucial guidance for maximizing social benefit from the SEU projects.

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[14] D.C. Code § 34–808.02.

[15] *Gas Tariff 2013-01*, In The Matter Of The Application Of Washington Gas Light Company For Authority To Amend Rate Schedule No. 4 and Adopt Rate Schedule No. 7, Order No. 17486, ¶ 24 (May 19, 2014) (emphasis added) (citing DC Code § 34–808.02).

[16] *Formal Case No. 1119*, In The Matter Of The Joint application of Exelon Corporation, Pepco Holdings, Inc., Potomac Electric Power Company, Exelon Energy Delivery Company, LLC and New Special Purpose Entity, LLC for Authorization and Approval of Proposed Merger Transaction, Order No. 17597, ¶¶ 116-25 (Aug. 22, 2014).

[17] *Gas Tariff 2013-01*, Order No. 17486 at ¶ 25.

[18] D.C. Code § 8–1774.02(d) ("The SEU contract shall require that the SEU energy efficiency programs shall, when taken as a whole, meet the societal benefit test on an annual and contract-term basis"); District of Columbia Dep't of the Env't, Request For Proposals for Sustainable Energy Utility Contractor (July 2, 2010); *see also* D.C. Dep't of the Env't & Vt. Energy Inv. Corp., Contract DDOE-2010-SEU-0001 (Dec. 17, 2010).

[19] District of Columbia Dep't of the Env't, Request For Proposals for Sustainable Energy Utility Contractor 19 (July 2, 2010).

Cost-effectiveness review outside of the SEU context, however, has not always been held to the same level of conceptual rigor. One example is the approval process for investing in advanced energy meters.[20] Though the circumstances of the Commission's consideration of advanced meters were such that their approval was subject to a different statutory test—whether the federal funding was "sufficient" in the judgment of the Commission[21]—the Commission interpreted this "sufficiency" determination as equivalent to a cost-effectiveness requirement.[22] For utility investment in advanced metering, "cost-effective" was defined to include any investment for which benefits exceed costs.[23] Pepco's submissions appear not to have quantified externalities, and their cost-effectiveness calculations did not include discussion of environmental impacts, either negative or positive.[24] Indeed, environmental impacts were given only a cursory mention in PEPCO's request, and no mention at all in the order approving the investment.[25]

The grid modernization proceeding should include a clear framework explaining the standards for decisionmaking. Currently, the Commission states cost-effectiveness as one of the criteria in the Order. However, using a cost-effectiveness test is not the best approach to achieve the goals outlined in the Mayor's Plan for Sustainable DC or the mandates that have been laid out in the Act such as consideration of the "public safety, the economy of the District, the conservation of natural resources."[26] Instead, the Commission should clearly define the goal of benefit-cost analysis as "maximizing the net social welfare."

A cost-effectiveness ratio can be used to determine the cheapest way to achieve a certain outcome,[27] for example a reduction in the risk of outages, and it typically focuses on a single outcome.[28] Thus, it is not an appropriate approach to calculate the net social welfare impacts of a project. The following example can demonstrate the differences between a cost-effectiveness approach and a benefit-cost analysis approach. Assume a utility could undertake one of two mutually exclusive projects to improve grid resiliency. The utility could spend $900,000 fortifying an existing substation to better resist flooding, which

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[20] *See generally, Formal Case No. 1056*, In The Matter Of The Application Of Potomac Electric Power Company For Authorization To Establish A Demand Side Management Surcharge And An Advance Metering Infrastructure Surcharge And To Establish A DSM Collaborative And An AMI Advisory Group, Order No. 15629 (Dec. 17, 2009).

[21] D.C Code § 34–1562 (Approving AMI expenditures provided that PEPCO "obtain[] a sufficient amount of federal funds for AMI implementation under the ARRA. The sufficiency of the amount of the federal funds obtained shall be determined by the Commission.")

[22] *Formal Case No. 1056*, Order No. 15629 at ¶ 8 ("A determination whether the funding is sufficient depends, in our opinion, upon whether the funding can assure cost effectiveness of the program or subject matter.").

[23] *Id.*

[24] *Formal Case No. 1056*, The Potomac Electric Power Company Response to Commission Inquiries 7-8, filed July 28, 2009.

[25] *Formal Case No. 1056*, Written Presentation of the Potomac Electric Power Company 18-22, filed June 29, 2009.

[26] D.C. Code § 34–808.02.

[27] Stephanie Riegg Cellini & James Edwin Kee, *Cost-Effectiveness and Cost-Benefit Analysis*, *in* HANDBOOK OF PRACTICAL PROGRAM EVALUATION 493, 513 (Joseph S. Wholey et al eds., 3rd ed. 2013).

[28] *Id.*

would result in a projected reduction in risk of 2 million expected event customer-hours.[29] Alternatively, the utility could spend $5 million relocating the substation to a less-flood-prone location, which would result in a projected reduction in risk of 10 million expected event customer-hours. Further assume that reducing the risk of each expected event customer-hour generates the same benefit of $1. The fortification project would cost $0.45 per reduction in risk of an expected event customer-hour, whereas the relocation project would cost $0.50 per reduction in risk of an expected event customer-hour. Under a cost-effectiveness approach, it would appear at first glance as though fortifying the substation is the preferable alternative. However, the net benefits of the relocation, which total $5 million ([10 million customer-hours * $1 in benefits] – [$5 million in costs]), are substantially larger than the net benefits of fortification, which total just $1.1 million (2 million * $1 – $900,000). Therefore the relocation project is the most desirable project from a social welfare standpoint. To ensure that the net social welfare is maximized and the project that is the most beneficial for the people of the District is chosen during grid modernization, the Commission should use a benefit-cost analysis for decisionmaking instead of a cost-effectiveness analysis.

Further, the Commission should clearly explain what the results of the benefit-cost analysis would be compared to. In a resource-constrained world, having benefits greater than costs should be a necessary but not a sufficient condition for a project to be undertaken. The alternatives and the counterfactual scenarios must be clearly identified so that the net benefits of the project or policy can be compared against the net benefits of the alternatives. A proposed policy should be undertaken only if it leads to higher net benefits than the alternatives or the net benefits that would be attained in the business-as-usual scenario.

C. The benefit-cost analysis should be granular enough to capture the locational and temporal valuations of alternative energy resources

It is important for the Commission to realize that not all energy resources are created equal, and different resources can serve different purposes. A consistent application of a benefit-cost analysis framework to evaluate alternative energy investments, whether it is an energy storage system or a microgrid or a substation, will help improve overall system efficiency by guiding resources to areas where they are most valuable. Hence, the benefit-cost analysis should be able to capture any differences among different resources, when they exist.

For example, encouraging solar panels to be installed in specific areas that are closer to requiring capacity upgrades can provide ten times more capacity value compared the

[29] This is a unit of risk that combines the likelihood of weather damage to particular infrastructure with the expected duration of the outage and the size of the affected population. *See, e.g.*, NY PSC Case 13-E-0030, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc., *Storm Hardening and Resiliency Collaborative Report* 68, 118, Filing No. 445 (Dec. 4. 2013).

installations averaged across a whole service territory.[30] While solar panels may be more valuable when installed near areas where demand peaks during the day, investing in wind turbines, which peak later in the day, may be more valuable in areas where the demand is also late peaking.[31] Battery systems provide reliability, transmission and distribution services in addition to storing cheaper energy produced during off-peak hours to be used during more expensive peak demand times.[32] Some distributed energy resources may not provide desired benefits in certain areas,[33] so reallocating funds to more effective resources in those areas may be necessary to achieve clean energy and reliability goals at the least cost. Only by using a comprehensive framework that recognizes such granular variations, can the Commission move beyond debates over specific energy technologies that may inadvertently result in inefficiently favoring one low-carbon resource over another. Instead the Commission should structure its proceeding so as determine how to use all distributed energy resources most effectively.

The Commission should also recognize that just like the resource savings associated with distributed energy resources depend on the time and location of their deployment, the amount of external benefits also vary with time and location. As both the environmental benefits[34] and the health benefits[35] of distributed generation vary with the marginal generation they displace, and the level of congestion at the particular time and location, a more granular approach to the benefit-cost analysis is required in order to achieve maximum benefits.

While an energy efficiency program likely reduces the bulk demand on average, making quantification of avoided emissions relatively simple, other distributed energy resources have very different impacts depending on location and time. If, for example, the project is a distributed solar installation, this will lead to peak displacement in the early afternoon hours. Consequently, the quantity of avoided emissions will depend on the generator that is

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[30] Michael A. Cohen, Paul A. Kauzmann & Duncan S. Callaway, Economic Effects of Distributed PV Generation on California's Distribution System 16 (Energy Inst. At Haas, Working Paper No. 260, 2015), *available at* http://ei.haas.berkeley.edu/research/papers/WP260.pdf.

[31] Joseph Cullen, *Measuring the Environmental Benefits of Wind-Generated Electricity*, 5 AM. ECON. J.: ECON. POL'Y 107, 113-14 (2013).

[32] *See generally*, JUDY CHANG ET AL, THE BRATTLE GROUP, THE VALUE OF DISTRIBUTED ELECTRICITY STORAGE IN TEXAS (2014), *available at* http://www.brattle.com/system/news/pdfs/000/000/749/original/The_Value_of_Distributed_Electricity_Storage_in_Texas.pdf

[33] Eduardo Porter, *Climate Change Calls for Science, Not Hope*, N.Y. TIMES (June 23, 2015) http://www.nytimes.com/2015/06/24/business/combating-climate-change-with-science-rather-than-hope.html.

[34] For example, as natural gas is the dominant marginal fuel in California, the average carbon dioxide displacement by a solar panel there is lower than in more coal-intensive states, such as Kansas. Kyle Siler-Evans et al, *Regional Variations In The Health, Environmental, And Climate Benefits Of Wind And Solar Generation*, 110 PNAS 11768, 11770. The environmental and health benefits depend, in part, on the location and timing of distributed generation. "[T]he average solar panel in Nebraska displaces 20% more CO_2 than a panel in Arizona, although energy output from the Nebraska panel is 20% less." *Id.*

[35] Erik P. Johnson & Juan B. Moreno-Cruz, *Air-quality and Health Impacts of Electricity Congestion* (Working Paper, 2015), *available at* http://www.erik.johnson.econ.gatech.edu/docs/epjohnson_jmorenocruz_congestion.pdf.

on the margin during that time. If solar generation is displacing an emissions-free generator, this will not have any carbon emissions benefits. If the avoided generation is dirtier than average, the avoided emissions will be higher. Thus, it is important that the framework involves more temporal granularity.

II. Externalities should be quantified and monetized to the extent possible

The District is already appropriately accounting for the existence of many externalities including environmental and other non-energy benefits of cleaner energy. The societal cost test used by the DDOE for valuing energy efficiency investments[36] is to be applauded. However, as the scope of the benefit-cost analysis used for decisionmaking in grid modernization is critical for the energy future of the District, it is Commission's obligation to ensure that it is as accurate as possible. Even though it requires more effort, the only conceptually sound approach to evaluating externalities is to directly conduct a detailed calculation of net marginal effects instead of relying on a percentage adder.

A. The current DDOE practice of using percentage adders for external benefits is insufficient

The Act requires the SEU's portfolio of energy efficiency measures to meet the societal cost test.[37] In theory, this should ensure that externalities will be incorporated into the benefit-cost analysis. And indeed, the District's request for proposals for the Sustainable Energy Utility, and the subsequent contract,[38] required consideration of monetized costs and benefits, including avoided generation and capacity costs, avoided transmission line losses, and avoided infrastructure costs.[39] However, the request for proposal also allowed for percentage adders to represent other societal benefits such as environmental benefits of energy efficiency programs or other non-energy benefits.[40] This language suggests that adders are appropriate where calculation of an actual value is "too costly" or "excessively expensive,"[41] and may be used "until greater refinement in calculating those benefits is achieved."[42] But the language in the request for proposals does not specify what calculation cost is high enough to justify the use of an adder, nor does it assign the responsibility for making such a determination.

Using an arbitrarily assigned value as a percentage adder is better than leaving externalities completely unaccounted for. However it is not a substitute for actually quantifying environmental and societal impacts. The use of adders has long been

[36] See sources cited *supra* note 18.
[37] D.C. Code § 8–1774.02(d).
[38] D.C. Dep't of the Env't & VT Energy Inv. Corp., Contract DDOE-2010-SEU-0001 (Dec. 17, 2010).
[39] D.C. Dep't of the Env't, Request for Proposals for Sustainable Energy Utility Contractor § 2.4 (July 2, 2010).
[40] *Id.*
[41] *Id.*
[42] *Id.*

acknowledged as subjective and inaccurate.[43] The environmental benefit of a particular project or program, for example, depends on the specific characteristics of the energy that would otherwise have supplied the avoided load,[44] and hence requires a more granular approach.

While monetizing environmental damage at a granular level presents some difficulty, assigning the same environmental value to all projects regardless of their specific attributes fails to send correct price signals to the owners of the distributed energy assets and other market participants, and would fall short of the Commission's goal of fostering efficient allocation of resources.[45] Furthermore, in failing to consider individualized environmental impacts, the approach may fall short of the Act's requirement to "consider the public safety, the economy of the District, the conservation of natural resources, and the preservation of environmental quality."[46] Thus, the Commission should not follow the SEU's practice of adopting a percentage adder for the environmental impacts of its policy changes, but should attempt to evaluate the actual impacts of the specific policies proposed.

B. More accurate methodologies to calculate net marginal societal effects exist

It is essential for a benefit-cost analysis to quantify and monetize as many significant societal externalities as possible in order to accurately reflect the true costs and benefits of a project. Many states have already expanded their screening tests to consider a fuller range of externalities in their benefit-cost analyses. For example, for energy efficiency projects, Rhode Island monetizes various externalities, including health and safety benefits, improved comfort (thermal and noise reduction), property value benefits, and other societal impacts in its project assessments.[47] Massachusetts, the highest ranking state for energy efficiency according to ACEEE,[48] also applies an expansive cost test for energy efficiency and has considered adopting a similar test for resiliency. The state's test uses a societal discount rate and monetizes various health, safety, and environmental benefits in its analyses[49] —both hallmarks of benefit-cost methodology.[50] These practices of forward-thinking states demonstrate that it is appropriate and possible to monetize many non-energy benefits in a benefit-cost analysis.

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[43] Jeffery M. Fang & Paul S. Galen, Issues and Methods in Incorporating Environmental Externalities into the Integrated Resource Planning Process 29 (Nat'l Renewable Energy Lab. Rpt. No. NREL/TP-461-6684, Nov. 1994) *available at* http://www.nrel.gov/docs/legosti/old/6684.pdf.
[44] GLICK, ET AL., *supra* note 7, at 21 (2014).
[45] *Id.*
[46] D.C. Code § 8–1774.02(d).
[47] TIM WOOLF ET AL, SYNAPSE ENERGY ECONOMICS, INC., ENERGY EFFICIENCY COST-EFFECTIVENESS SCREENING IN THE NORTHEAST AND MID-ATLANTIC STATES 46, 57-58 (Oct. 2013) *available at* http://www.neep.org/sites/default/files/resources/EMV_Forum_C-E-Testing_Report_Synapse_2013%2010%2002%20Final.pdf.
[48] *See Executive Summary, 2014 State Energy Efficiency Scorecard*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. 4, http://aceee.org/files/pdf/summary/u1408-summary.pdf (last visited Aug. 20, 2015).
[49] WOOLF ET AL., *supra* note 47 at 43; ELIZABETH DAYKIN, ET AL., PICKING A STANDARD: IMPLICATIONS OF DIFFERING TRC REQUIREMENTS, THE CADMUS GROUP 2 (Dec. 15, 2010).
[50] *See generally*, OFFICE OF MGMT. & BUDGET. CIRCULAR A-4 at 33 (2004).

In addition to the environmental benefits, grid modernization and integration of more distributed energy resources may provide other benefits to the society. These benefits include reduced financial and security risks, health benefits, and economic development, among others. Even though some of these benefits may be difficult to quantify, methodologies exist to estimate many of the non-energy benefits of such projects,[51] and the benefit-cost analysis should reflect the best-available monetization methodologies rather than a generic adder.

Finally, the Commission should note that the categories of quantified and unquantified benefits are not immutable. Instead, they are highly permeable.[52] Empirical and analytical methods of quantification as well as computational technologies are rapidly advancing, allowing us to quantify and monetize value components that were once thought unquantifiable. Further, given the fast changing pace of the industry, there may be some value components that we cannot yet foresee. For example, if improved energy storage allows solar and wind energy to be more easily dispatchable, the cost and benefit of distributed energy resources as well as any other infrastructure investment would change significantly. Thus, it is important that the Commission and Staff review these value components and evaluation methods periodically to ensure that all relevant components are included in the benefit-cost analysis and that the quantification methods are state-of-the-art.

III. Modernization of the energy delivery system should be accompanied by a rate reform that would allow more dynamic tariffs

As distributed energy resources are becoming an important element of the nation's energy policy and utility business models are rapidly changing as a result, reforming retail electricity rates is becoming the key to achieving efficiency gains both in the retail electricity markets and the distributed energy resources market.

The lack of dynamic pricing not only insulates consumers from receiving correct signals about the true cost of electricity, it also limits the incentives for distributed energy resources to achieve maximum social benefit,[53] as existing rate designs do not capture the full value of distributed energy resources. Current tariff structures most often use one volumetric rate per kWh to recover costs that are incurred in non-volumetric ways. Additionally, these rates are flat—they do not vary with time or location—for almost all customers despite the fact that the cost of generating and delivering energy varies by time and location.[54] Current policies such as net metering are inadequate to reward distributed energy resources for the environmental and health benefits they provide from lower

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[51] See, e.g., Bruce Tonn et al, Oak Ridge Nat'l Laboratory, Evaluating the Health Benefits of Weatherization (2015) *available at* https://www.iea.org/media/workshops/2015/eeuevents/mb2004/S2Bruce_Tonn.pdf (calculating many non-energy benefits of the Weatherization Assistance Program, including health and productivity benefits).

[52] Richard L. Revesz, Quantifying Regulatory Benefits, 102 CAL. L. REV. 1423, 1436 (2014).

[53] GLICK, ET AL., *supra* note 7 at 12.

[54] *Id.*

emissions. Such economically inefficient structure of the current retail electricity rates leads to perverse incentives for renewable energy resources and hurts successful integration of distributed generation when and where it is most valued.

The District is particularly well situated to implement a rate reform because it has one of the highest installation rates for advanced meters in nation.[55] Therefore, the Commission should continue the previous work it started and move forward with dynamic rates.

A. Correct price signals would direct the proper kind of investment to where it is needed the most

Having the right price signals would ensure an efficient allocation of resources by directing distributed energy resources investments to where they are needed the most. For example, if the peak marginal cost occurs in a particular area during the day due to heavy industrial/commercial demand and transmission congestion, it may be desirable to have distributed solar generation, which has peak generation capacity during the day. But if the price signals do not reflect the true valuation of this peak, there may be insufficient interest from solar producers. Alternatively, consider a residential area in which the demand peaksin the evening due to heavy density of urban commuters. Unless the price signal reflects the additional system strain from this demand spike, the realized investments geared toward energy generation during late evening hours may be less than the socially optimal level.

Similarly, if the temporal dimensions are not taken into account while calculating environmental and health benefits, and all distributed energy resources are rewarded based on the same average quantity of avoided emissions, then the market incentives will lead to more investment in cheaper distributed energy resources, regardless of whether they are the most beneficial for the society when externalities are taken into account.

Flat volumetric rates create perverse incentives even for customer generators. As net metered customers are compensated using the same flat rate regardless of what time they send energy to the grid, their inherent incentive is to install solar panels with the goal of maximizing their total production rather than overall system benefits. These incentives lead to most of the solar panels being installed facing south to maximize total production.[56] If, instead, the rates reflected overall systems benefits and hence customers were provided incentives to install the solar panels facing west, the production would be maximized

[55] *Formal Case No. 1056*, In The Matter Of The Application Of Potomac Electric Power Company For Authorization To Establish A Demand Side Management Surcharge And An Advance Metering Infrastructure Surcharge And To Establish A DSM Collaborative And An AMI Advisory Group, Advanced Metering Infrastructure Task Force Quarterly Update Report 2, filed July 20, 2015, (only 3,075 hard to access meters have *not* been replaced with advanced meters as of July 2015).

[56] Barry Fischer, *9% Of Solar Homes Are Doing Something Utilities Love. Will Others Follow?*, OPOWER (Dec. 1, 2014), http://blog.opower.com/2014/12/solar-homes-utilities-love/.

during the peak demand period between 2:00 p.m. and 8:00 p.m., providing more value to the system overall by curbing the need to dispatch more expensive peaker plants.[57]

If the Commission wants to capture all the benefits that could be achieved with grid modernization, it is imperative that it concurrently considers new cost-reflective retail tariff rate structures. Tariffs that provide consumers and producers proper price signals that reflect the actual cost of providing electricity, including the associated externalities outlined in the benefit-cost framework, will improve economic efficiency in several ways. First, they will ensure that when customers make their decisions about electricity consumption, they will be taking into account the true costs of electricity at that particular time and location, and hence the observed market outcome will be a socially desirable one. Second, they will ensure that market price is actually signaling the true value of electricity to the society and hence will guide investments to where they would be most valuable to the society.[58] And finally, cost-reflective tariffs that allow for valuation of several different dimensions of benefits will provide a versatile compensation tool that could reduce inefficiencies caused by attempting to integrate new and cleaner energy resources into the existing system with today's limited tariff designs.

B. Time and demand variant rates can be implemented without relying on the wholesale demand response programs

While there may have been a historical reason for using volumetric rates when the available technology did not permit the measurement of usage in real time,[59] such technological barriers no longer exist in the District.[60] Indeed, a Federal Recovery Act grant facilitating advanced meter installation was made in the context of a specific PEPCO plan to implement widespread dynamic pricing.[61] However, the dynamic pricing component of the plan has been repeatedly delayed. Most recently, the Commission suspended work on its dynamic pricing case citing uncertainty over the ability of demand response to participate in wholesale markets after the D.C. Circuit's decision in *Electric Power Supply Association v. FERC*.[62] The Commission asserts that the D.C. Circuit's decision will "impact the type of dynamic pricing programs that can effectively operate in the District of Columbia."[63] However, demand response in wholesale markets need not control decisions about dynamic pricing, as the two policies do not depend on each other.

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[57] Herman K. Trabish, *How California Is Incentivizing Solar To Solve The Duck Curve*, UTILITY DIVE (Oct. 13, 2014), http://www.utilitydive.com/news/how-california-is-incentivizing-solar-to-solve-the-duck-curve/317437/.
[58] Severin Borenstein, *The Private Net Benefits Of Residential Solar PV: The Role Of Electricity Tariffs, Tax Incentives And Rebates* 17-19, (Nat'l Bureau of Econ. Research, Working Paper No. 21342, 2015).
[59] Paul L. Joskow & Catherine D. Wolfram, Dynamic Pricing of Electricity, 102 AM. ECON. REV. 381, 382 (2012).
[60] INST. FOR ELEC. INNOVATION, UTILITY-SCALE SMART METER DEPLOYMENTS 9 (Sept. 2014) *available at* http://www.edisonfoundation.net/iei/Documents/IEI_SmartMeterUpdate_0914.pdf ("Pepco has reached full deployment in the District of Columbia with 279,000 meters installed").
[61] *Formal Case No. 1056*, Written Presentation of the Potomac Electric Power Company at 2, filed June 29, 2009 (listing dynamic pricing as part of the advanced metering timeline).
[62] *Formal Case No. 1114*, In The Matter Of The Investigation Into The Issues Regarding The Implementation Of Dynamic Pricing In The District Of Columbia, Order No. 17877 ¶¶ 6-7 (May 13, 2015).
[63] *Id.*

The previously proposed dynamic pricing program in the District was a critical peak rebate program which rewarded customers for reducing their consumption below a previously established baseline level during a few "critical" days when the system demand was especially high.[64] The rebate would have been funded through the sale of the reductions as demand response into wholesale supply markets.[65] However, other critical peak rebate programs, similar to that envisioned in the suspended proceeding, operate effectively funded through the rate base, with savings opportunities for participants, and negligible or non-existent impact on non-participating customers.[66]

More importantly, critical peak rebate is only one of many different types of time-variant rate designs.[67] Critical peak rebates, which may seem desirable on the surface as they offer rebates to customers, are actually the least favored time-variant rate design in terms of economic efficiency.[68] Efficiency implications of different rate designs have been discussed extensively and are well established in the economics literature.[69] Many states across the country such as Arizona, Illinois, Massachusetts, and Oklahoma are already successfully using more efficient types of dynamic pricing programs such as time-of-use rates or real time pricing.[70] The California Public Utility Commission has recently decided to implement default time-of-use rates by 2019.[71] If the Commission is interested in preparing the District for its energy future by modernizing the existing grid to make it more reliable, more efficient, and more interactive, it is the Commission's responsibility to provide the necessary pricing tools that will help achieve the full potential of a modern grid and all the distributed energy resources that come along with it.

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[64] *Formal Case No. 1114*, Potomac Electric Power Company's presentation at Informal Hearing 14 (Apr. 23, 2014).
[65] *Formal Case No. 1114*, Order No. 17877 ¶ 2.
[66] U.S. DEP'T OF ENERGY, INTERIM REPORT ON CUSTOMER ACCEPTANCE, RETENTION, AND RESPONSE TO TIME BASED RATES FROM THE CONSUMER BEHAVIOR STUDIES 10 n. 17 (2015) *available at* http://energy.gov/oe/downloads/interim-report-customer-acceptance-retention-and-response-time-based-rates-consumer ("CPR incentive payments are typically drawn from levying slightly higher retail electric rates on all customers, not just those taking service under CPR. Because the rate increases associated with the incentive payments are spread across all customers in the class, they can be quite small on a per customer basis and are rarely noticed.").
[67] *See, generally*, AHMAD FARUQUI ET AL, THE BRATTLE GROUP, TIME-VARYING AND DYNAMIC RATE DESIGN (2012).
[68] *See, generally*, Severin Borenstein, *Time-varying retail electricity prices: Theory and practice*, *in* ELECTRICITY DEREGULATION: CHOICES AND CHALLENGES (James M. Griffin & Steven L. Puller, eds. 2005; *see also* Severin Borenstein, *Peak-Time Rebates: Money for Nothing*, GREENTECHMEDIA (May 12, 2014), http://www.greentechmedia.com/articles/read/Peak-Time-Rebates-Money-for-Nothing.
[69] *Id.*
[70] Ahmad Faruqui, The Brattle Group, Presentation delivered at N.Y.U. School of Law: Time-Variant Pricing (TVP) in New York 20-24 (Mar. 31, 2015), http://www.brattle.com/system/publications/pdfs/000/005/146/original/Time-variant_pricing_in_New_York.pdf?1427837905.
[71] Laurie Guevara-Stone, *California Rolls Out Default Time-Of-Use Rates*, CLEANTECHNICA (June 8, 2015), http://cleantechnica.com/2015/06/08/california-rolls-out-default-time-of-use-rates/; Barbara Vergetis, *A Long Time Coming: What Rate Reform Means For California IOUs*, FIERCEENERGY (July 7, 2015), http://www.fierceenergy.com/story/long-time-coming-what-rate-reform-means-california-ious/2015-07-07.

CONCLUSION

By opening this investigation into grid modernization, the Commission is taking the necessary steps to ensure that the District's electricity system is ready for the changes and challenges of the future. A societal benefit-cost analysis framework will help ensure that any grid modernization project will maximize the net benefits for the people of the District, both today and into the future. Dynamic rate designs will help capture the full value of a modern grid. Therefore, the Commission should include the establishment of a societal benefit-cost analysis framework and the implementation of dynamic pricing programs in the scope of this proceeding.