GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE ATTORNEY GENERAL

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Public Interest Division
Public Integrity Section

ELECTRONIC FILING

November 12, 2019

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

Re: GD2019-04-M: In the Matter of the Implementation of the 2019 Clean Energy DC Omnibus Act Compliance Requirements

Dear Ms. Westbrook-Sedgwick:

On behalf of the Department of Energy and Environment (DOEE), please find DOEE's Comments in Response to the Public Service Commission of the District of Columbia's Notice of Inquiry. If you have any questions regarding this filing, please do not hesitate to contact the undersigned.

Respectfully submitted,

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BEFORE THE PUBLIC SERVICE COMMISSION
OF THE DISTRICT OF COLUMBIA

IN THE MATTER OF THE	**)**	
IMPLEMENTATION OF THE 2019	**)**	
CLEAN ENERGY DC OMNIBUS ACT	**)**	**GD2019-04-M**
COMPLIANCE REQUIREMENTS	**)**	

Comments by the Department of Energy and Environment
on behalf of the District of Columbia Government
in Response to the Public Service Commissions' Notice of Inquiry

INTRODUCTION

The District of Columbia (the District) enacted the Clean Energy Omnibus Amendment Act of 2018 (Omnibus Act), which expands the District's Renewable Portfolio Standards (RPS) and adds new building efficiency and transportation electrification requirements. These measures build on existing commitments by the District to meet the climate goals of the Paris Climate Accord, by reducing the District of Columbia's greenhouse gas emissions by 50% by 2032, and by achieving carbon neutrality by 2050. They also strengthen the District's effort to achieve the goal of reducing its energy use by 50% by 2032 from the 2006 baseline under the Sustainable DC plan.

Notably, the Omnibus Act assigns the Public Service Commission of the District of Columbia (Commission) an expanded and more clearly defined role in helping the District to meet its ambitious climate goals. While utility regulation has long considered *local* environmental impacts and has also worked to implement the District's RPS, the Omnibus Act explicitly requires the Commission to generally consider *global* climate effects and impacts on related policy commitments in its regulation.[1] This emphasis on global climate considerations enjoys wide support across the District of Columbia, as evidenced through the vision statement adopted by stakeholders in the Modernizing the Energy Delivery System for Increased Sustainability (MEDSIS) proceeding.[2] The MEDSIS vision statement highlighted the

[1] CleanEnergy Omnibus Amendment Act of 2018

[2] Formal Case No. 1130, Order No. 19275 ("MEDSIS Vision Statement") *rel.* February 14, 2018.

importance of reducing greenhouse gas (GHG) emissions from the District of Columbia's energy sector.[3]

BACKGROUND

The District Department of Energy and Environment (DOEE) commends the Commission for the Notice of Inquiry (NOI) issued on September 26, 2019. DOEE believes that adverse impacts of climate change have become abundantly clear, from increasing and record-breaking hurricanes, tornadoes, heat waves, droughts, wild fires, to mass extinction of species and social and political destabilization around the globe.

More than 70% of global GHG emissions are attributable to consumption of goods and services—including energy—in urban centers, and the Intergovernmental Panel on Climate Change's 5th Assessment states that the global carbon budget for avoiding catastrophic consequences of climate change may be depleted in the near future. These circumstances render the decarbonization of the District of Columbia an urgent task that must be prioritized and expedited. Time is not on our side.

Given that utility services and investments in the District of Columbia's energy system have left a heavy footprint of CO_2 and methane, DOEE believes that it is essential for the Commission to have an appropriate tool for reducing the content of CO_2 and methane from these services and investments, and for requiring climate resilience from these services and investments. DOEE recognizes that this is a challenging task and applauds the Commission for its leadership. DOEE offers the following comments in response to the NOI.

[3] Id.

DISCUSSION

1) Climate change impacts relevant to the work of the Commission should be identified.

The range of impacts from climate change is overwhelmingly broad, but that range can be narrowed significantly if we examine those impacts that are addressed in the Sustainable DC plan and are within the Commission's jurisdiction. Those climate change impacts can be placed into two categories: mitigation and adaptation. For purposes of the NOI, climate change mitigation refers to reduction of GHG emissions, and climate change adaptation refers to increasing resiliency. These two categories, mitigation through GHG reductions and adaptation through energy resiliency, may require their own evaluation frameworks that may include the following elements: (1) measurement, (2) target, (3) benefit-cost tests with a cost of carbon and a cost of resiliency, and (4) tracking progress.

2) The climate change frameworks should apply to all programs and projects subject to Commission approval, subject to exceptions that the Commission may establish.

The universe of regulated activities with climate impacts is likely to be very large, and there may be programs or projects that are not readily susceptible to such a framework. DOEE believes that the Commission should adopt a phased approach to the implementation of such a framework. The Commission could first prioritize climate impacts resulting from energy system activities—such as generation or procurement of energy supply and activities relating to the electric grid, gas pipelines, or distribution infrastructure—rather than activities that are only financial or administrative in nature with indirect impacts on climate change that are difficult to quantify. The Commission could also consider establishing a monetary threshold or exempting *de minimis* expenditures.

It is important to note that activities may impact global climate change by inducing changes in GHG emissions even if they are not directly related to the combustion of fossil fuels. For example, utility investments in grid modernization to improve hosting capacity should enable more solar photovoltaic (PV) installations to interconnect to the grid. Should an increase in PV adoption occur as a result and displace fossil-fuel based generation, the initial

infrastructure investments could plausibly be credited with reducing systemwide GHG emissions. Leakage and losses from the gas and electricity distribution systems also contribute to climate change, as does carbon produced in the course of constructing and maintaining the electric and natural gas infrastructure (such as the production of concrete, iron, and steel materials and the burning of fuel used to transport materials and maintain the systems).

The nature of the broader economy and its dependence on a fossil-fuel powered energy system means that many activities undertaken by the District of Columbia's regulated utilities are likely to have some up- or downstream climate impacts. The proximity of these indirect climate impacts in relationship to the activity under consideration should determine how these impacts should be taken into account. In general, DOEE submits that it is appropriate to account for secondary impacts (e.g., Distributed Energy Resource (DER) adoption enabled by the utilities' investments and carbon produced by the utilities' capital investment plans), but it is unnecessary to account for tertiary impacts further upstream or downstream.

3) The Commission should establish a framework for reducing GHG emissions associated with applicable programs and projects.

Measurement

There is scientific consensus that global climate change is driven by the release of GHGs, of which carbon dioxide (CO_2) and methane (CH_4) are the two that are most commonly associated with the energy sector. While carbon dioxide is emitted in far greater quantities and persists for much longer in the atmosphere, methane – associated with both the natural gas supply chain (including fugitive emissions from gas leaks) and with gas combustion – can be more damaging in the short term.

DOEE recommends that the GHG impacts of regulated activities be quantified in carbon dioxide equivalents (CO_2e). By using a standard unit to quantify impacts from different GHGs, the Commission can ensure that tracking metrics are standardized, and that outcomes can be compared across a range of contexts. Finally, requiring impacts to be reported in terms of CO_2e facilitates straightforward valuation of these impacts using a Cost of Carbon.

Further, DOEE recommends the quantification of "operational" emissions from energy

commodities, i.e., generation or purchase of electricity and fossil fuels, as well as the emissions that are "embodied" in the activities associated with delivering those commodities, such as infrastructure, buildings, and transportation.

1) Operational emissions are those associated with the operation of the energy system.

2) Embodied emissions represent the "upfront" emissions associated with the construction, extraction, transportation, and manufacturing of materials that form the foundation of the electrical grid and natural gas distribution system.

DOEE recommends that both of these types of emissions be quantified, as well as any impacts on the District's public climate commitments. In addition, other environmental impacts, including air pollution, and their associated effects on health should be quantified and monetized to the extent possible.

Quantification of Operational Emissions

Operational emissions include the emissions associated with electricity supply from fossil-fueled power plants, leakage from natural gas distribution, and electrical line losses. Operational emissions also may include the cost of maintaining the system, such as the fuel associated with utility truck rolls.

Indirect impacts on operational emissions should also be accounted for. For example, utility investments in grid modernization to improve hosting capacity may result in an increase in PV adoption, which then displaces fossil-fuel based generation. In this case, the initial infrastructure investments could plausibly be credited with indirectly reducing systemwide GHG emissions.

The nature of the broader economy and its dependence on a fossil-fuel powered energy system means that many activities undertaken by the District of Columbia's regulated utilities are likely to have some up- or downstream climate affects. The proximity of these indirect effects in relationship to the activity under consideration should determine how these impacts should be taken into account. In general, DOEE submits that it is appropriate to account for

secondary impacts (e.g., DER adoption enabled by the utilities' investments and embodied carbon in the utilities' capital investment plans) as illustrated in Figure 1. GHG Impacts of Hypothetical Proposal to Upgrade Feeder Wire, but not necessarily third-order impacts.

Quantification of Embodied Emissions

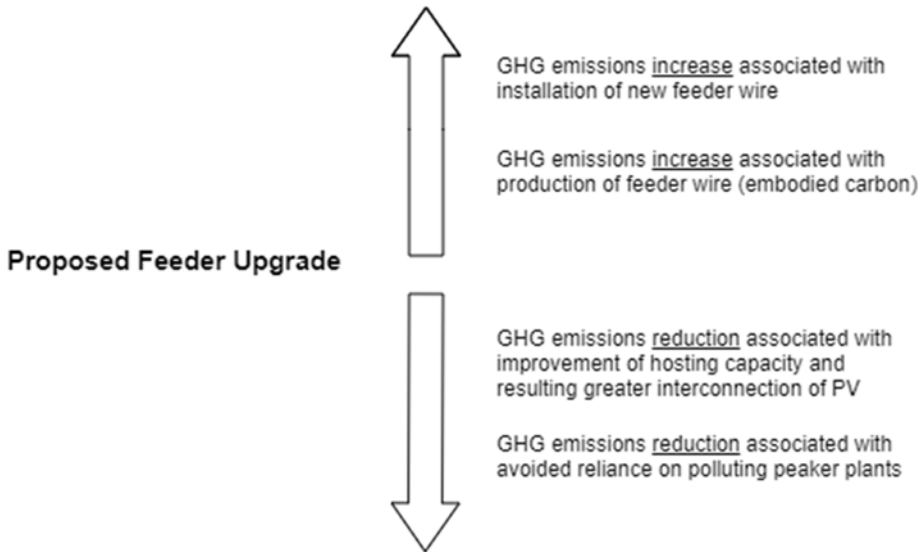
Embodied emissions include the emissions associated with the construction, extraction, transportation, and manufacturing of materials. Examples of materials containing embodied carbon include:

- Concrete, iron, and steel
- Fuel used to transport materials

Various scholars and institutions have quantified the embodied carbon in standard construction materials, and online calculators are available that help to quantify the embodied carbon in specific projects. For example, Building Transparency is releasing its Embodied Carbon in Construction Calculator (EC3 tool) this month: https://buildingtransparency.org/

. GHG Impacts of Hypothetical Proposal presents the range of primary and secondary GHG impacts for a hypothetical utility proposal to upgrade a feeder wire.

Figure 1. GHG Impacts of Hypothetical Proposal to Upgrade Feeder Wire



Setting a Target

The District's climate targets are stated in the Sustainable DC plan, and a roadmap to achieve those targets is developed in the Clean Energy DC Plan. Recently, the District has committed to an even more aggressive goal of carbon neutrality by 2050 and honoring the 1.5-degree goal of the Paris Climate Accord. The District is also investigating the possibility of including Scope 3 emissions, e.g., embodied carbon of infrastructure and buildings, in its GHG inventory in the future; Clean Energy DC is based on Scope 2 emissions.

Although an explicit GHG reduction target does not need to be a part of an analytical framework for evaluating climate change impacts, DOEE believes that it would be effective to establish such a target that is consistent with Clean Energy DC Plan and the Omnibus Act. As explained more below, such a target will help determine the cost of carbon using a long-run marginal abatement cost method.

In order to set a target, it would be necessary to first determine the baseline level of emissions for operational and embodied GHG.

Assigning a Cost of Carbon for benefit-cost analysis (BCA)

DOEE believes that the Commission should require all quantitative estimates of climate impacts to be monetized. Economic theory holds that the optimal level of emissions reduction is the point at which the marginal costs of abatement equal the marginal benefits of reducing emissions. Thus, the marginal abatement cost should equal the marginal benefit associated with avoiding damages from an additional ton of CO_2,[4] and either method of monetizing carbon emissions is theoretically valid.

However, assessment of the economic damage caused by global climate change on a per-GHG-unit basis is an empirically challenging and often contentious matter. Therefore, instead of measuring climate damages, DOEE recommends that the Commission explore the use of marginal abatement costs over time.

[4] Kenneth Gillingham and James Stock, "The Cost of Reducing Greenhouse Gas Emissions," *Journal of Economic Perspectives* 32, no. 4 (Fall 2018): 53–72.

The marginal abatement method asserts that the value of damages avoided, at the margin, must be at least as great as the cost of the most expensive abatement technology used in a comprehensive strategy for emission reduction. Marginal abatement costs are commonly estimated based on the costs of either capture or displacement of GHG emissions, such as through the following technologies:

- Carbon capture and storage (CCS) technologies accomplish abatement by removing carbon from the atmosphere. Recent data suggests that CCS capacity may be constructed at a cost of approximately $100 per short ton (2018$).[5]

- Renewable (non-emitting) generation technologies achieve abatement by displacing GHG emissions. For the MidAtlantic region, the technology that is likely to be installed to achieve large-scale abatement is offshore wind. Data from two offshore wind projects in Maryland that are scheduled to come online in 2020 and 2023 will provide energy at a levelized cost of $146/MWh (2018$).[6] More recent data for Massachusetts suggest prices of approximately $98/MWh (2018$).[7] Assuming the abatement technology would be displacing a natural gas power plant, which emits about 0.46 short tons of carbon dioxide per MWh (based on EIA data), the actual cost of abatement in levelized dollars for offshore wind would be approximately $318/ton CO_2 in 2020, falling to approximately $213/ton CO_2 in 2022.[8]

The marginal abatement cost approach has been adopted by numerous jurisdictions. For example, in its February 2018 decision on requirements for Integrated Resource Plans, the California Public Utilities Commission (CPUC) found that a marginal abatement cost of $150

[5] AESC 2018 Study Group. *Avoided Energy Supply Components in New England.* Pg. 142. Available at https://www.ct.gov/deep/lib/deep/energy/aesc-2018-17-080-june-1-release.pdf

[6] NREL, "2016 Offshore Wind Technologies Report." Page 57. Available at https://www.energy.gov/eere/wind/downloads/2016-offshore-wind-technologies-market-report.

[7] NREL, "2018 Offshore Wind Technologies Report." Page 54. Available at https://www.energy.gov/sites/prod/files/2019/09/f66/2018%20Offshore%20Wind%20Technologies%20Market%20Report.pdf.

[8] For Maryland, the cost of offshore wind in 2020 is $146/MWh, which is then divided 0.46 tons CO_2 abated per MWh. $146/0.46 = $317. Similarly, using costs for Massachusetts for a wind farm coming online in 2022 yields $98/0.46 = $213. These calculations are provided in 2018$.

per metric ton of avoided CO_2 would be required to meet the state's emissions reduction target.[9] The CPUC therefore proposed a GHG price for planning purposes, rising to $150 per ton by 2030.[10]

In addition, marginal abatement costs are commonly used to value the avoided carbon emissions associated with energy efficiency in New England. Specifically, the 2018 Avoided Energy Supply Component Study used a marginal abatement cost of $100/short ton of CO_2-e.[11] The parties represented in the study group include a wide range of utilities, energy efficiency program administrators, state energy offices, environmental groups, the Connecticut Department of Energy and Environmental Protection, the Massachusetts Department of Public Utilities, the Rhode Island Division of Public Utilities and Carriers, and the Vermont Department of Public Service.

Alternatively, the Commission could use the Social Cost of Carbon (SCC) as a monetization factor. The SCC is defined as the present value of the present and future damages caused by an incremental emission of one more ton of CO_2-e. It is typically estimated by running a climate economics model twice, once with and once without a one-year additional spike in emissions, and then comparing the results. SCC values therefore rest on the strengths and weaknesses of the underlying climate models and how well these models address the key problems associated with pricing damages.

By far the most widely cited numerical values are the estimates by the Interagency Working Group (IWG), a task force with representatives from ten federal agencies, first convened in 2009. The IWG released an initial set of estimates in 2010, an update in 2013, and several technical corrections to the 2013 values through 2016.[12] In each set of estimates the SCC values rise over time, because emissions that occur later, when climate change is already more advanced, will cause greater incremental damages.

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[9] California PUC, "Decision setting requirements for load serving entities filing Integrated Resource Plans", Rulemaking 16-02-007, issued February 13, 2018. See p.105 and following.

[10] *Ibid.*, Figure 7, p.106. See final recommendation in Table 5, p.116.

[11] AESC 2018 Study Group. Avoided Energy Supply Components in New England. Pg. 13. Available at https://www.ct.gov/deep/lib/deep/energy/aesc-2018-17-080-june-1-release.pdf

[12] For EPA's description of the SCC at the end of the Obama administration, see https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html. Note that all IWG publications, through 2016, report the SCC in 2007 dollars per metric ton of CO2.

However, DOEE is concerned that SCC has several weaknesses:

- The first problem is that climate change affects "priceless" values such as human life and health, natural environments, and other species. Any monetary measure of the climate externality will inevitably fail to capture the full meaning of climate-caused harms.

- Second, the pace and extent of climate damages remain uncertain. Specifically, we do not know exactly the extent to which rising emissions will affect temperatures, nor do we know how much damage is caused by a given temperature increase, and at what temperature thresholds specific catastrophic tipping points become likely.

- Third, the appropriate discount rate to use to combine present and future values into a single monetary estimate of climate damages is of much debate. How much is it worth spending today to avoid costs in the distant future?

However, if the Commission ultimately rejects the marginal abatement cost approach, which DOEE believes will provide more certainty and a robust market signal, DOEE recommends that it uses the prices on the higher range, which better track the worsening and accelerating pace of climate change. In fact, a meta-analysis of SCC estimates, focusing on the incorporation of extreme risk, found that the SCC should be at least $125 per metric ton of CO2-equivalent GHG.[13]

Discount Rate

Discount rates are an essential aspect for assessing any multi-year project or investment. They allow analysts to compare costs and benefits that occur over different time periods. The discount rate essentially reflects a particular pattern of "time preference," which is the relative importance of short- versus long-term costs and benefits. A higher discount rate gives more weight to short-term costs and benefits than to long-term costs and benefits, while a lower discount rate weighs short-term and long-term impacts more equally.

[13] J.X.J.M. van den Bergh and W.J.W. Botzen (2014), "A lower bound to the social cost of CO2 emissions," Nature Climate Change 4, 253-258, quote from p. 256.

Discounting the intergenerational impacts of public policies is ultimately an ethical choice about the relative weight we assign to our welfare today vs. the lives of future generations. A future-oriented ethic, valuing the welfare of those generations to come, requires a near-zero discount rate. For example, the Stern Review advocated use of a discount rate of 1.4%.[14]

The Commission's responsibility includes a host of policy objectives, such as:

- requiring utilities to provide safe, reliable, low-cost services to customers;
- accounting for costs and benefits that pertain to all customers as a whole;
- accounting for climate change impacts over the short, medium, and long-term;
- achieving the District's applicable environmental policy goals; and
- the responsibility to achieve outcomes that are generally in the public interest.

These objectives and responsibilities suggest that the appropriate discount rate is one that appropriately values and prioritizes avoidance of the long-term impacts of climate change. DOEE recommends a discount rate in the range of 1% - 3%.

Benefit-Cost Analysis

Quantification/monetization and BCA are complementary. Though quantitative data on individual project impacts and their associated costs are likely to be useful in their own right – to set baselines, track progress, and generally provide stakeholders with important information – results from BCA achieved through *comparison* of multiple different outcomes is likely to be more useful to the regulator.

BCA has long been a staple of utility regulation. It offers a structured, quantitative framework for comparing two or more alternative courses of action – often over a lengthy time horizon. BCA is powerful because it enables the Commission and other key stakeholders to

[14] Stern N. et al. 2007, The Economics of Climate Change, New York: Cambridge University Press.

simultaneously account for many different priorities that may inform regulation in the District, and it provides a clear approach to making sense of climate impacts that have been monetized.

In a BCA, costs and benefits of a proposed investment and its alternatives are valued in dollar terms and summed. Benefits and costs for each project may be separately added and presented as a ratio (the benefit-cost ratio or BCR) or all benefits and costs may be added together to form single project indicators, representing the net present value (NPV). In either case, comparing BCRs or NPVs across different options should produce objective results, with the highest scoring project being selected. Since multiple options have been considered, regulators should ideally be satisfied that the chosen project is not just cost-effective, but the *best* choice among all feasible alternatives.[15]

Historically, ratepayer-funded energy efficiency programs have commonly been evaluated with BCA. The aim is usually to determine whether investments in efficiency programming, provide more in benefits than in costs (i.e., to determine whether they are cost-effective). More recently, regulatory commissions nationwide have required the use of BCA to evaluate grid modernization proposals – initiatives that often involve large-scale investments and complex patterns of costs and benefits.

Whether or not a proposed investment is deemed cost-effective is often sensitive to the particular cost test that is used in the BCA. The range of cost tests in turn implies different perspectives, and goals, for the proposed investment:

- The Utility Cost Test accounts for costs and benefits experienced by the utility system;
- The Total Resource Cost Test includes both utility system costs and benefits and those experienced only by program participants;
- The Societal Cost Test includes both utility system costs and benefits and those experienced by society as a whole.[16]

[15] Even in instances where it is not possible to monetize all impacts, a BCA can still be completed, with unmonetized benefits included qualitatively.

[16] Note that these cost tests were codified in the *California Standard Practice Manual*, and then updated in the *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*. See *National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources*. Edition 1. Page x.

The choice of cost test is a critical variable in BCA. As noted in the Commission's NOI, BCA in the District of Columbia is usually conducted using both the Utility Cost Test and the Societal Cost Test. For purposes of evaluating climate impacts, using the more inclusive societal perspective is essential to ensure that benefits and costs impacting those beyond the utility system are still counted. In the table below, we present the utility system and societal benefits resulting from a hypothetical grid modernization investment.

Figure 2. Benefits to the Utility System and Society Resulting from Grid Modernization Investment

Benefit	Utility System	Society
Reduced O&M costs	✓	✓
Reduced generation capacity costs	✓	✓
Reduced energy costs	✓	✓
Reduced T&D costs	✓	✓
Reduced T&D losses	✓	✓
Reduced ancillary services costs	✓	✓
Increased system reliability	✓	✓
Increased safety	✓	✓
Increased resilience	✓	✓
Increased DER integration	✓	✓
Improved power quality	✓	✓
Reduced customer outages	✓	✓
Increased customer satisfaction	✓	✓
Increased customer flexibility and choice	✓	✓
Reduced environmental compliance costs	✓	✓
Other environmental benefits	-	✓
Economic development benefits	-	✓

DOEE recommends that the Commission adopt a BCA framework rather than the other models presented in the NOI (i.e. PJM, Commission rubric for utility mergers). A typical BCA is a tool for comparing all the benefits and costs that might be generated from a new investment. BCAs are also a useful tool that allows for the opportunity to quantify "intangible" benefits, or in the case of utility investments, environmental externalities such as climate and air pollution. Under a BCA framework, the Commission should decide which categories of benefits and costs should be quantified, and standardized metrics should be developed.

The BCA framework should be in place even for projects that have no feasible alternative to be compared to because quantitative data on individual project impacts and their associated costs are likely to be useful in their own right – to set baselines, track progress, and generally provide stakeholders with important information. For those projects that do have feasible alternatives, results from the BCA achieved through the comparison of multiple potential outcomes will allow the Commission to assess which potential utility investment is the most prudent for the District of Columbia given both estimated costs and environmental impacts.

Examples of instances where BCA is likely to be appropriate include, at a minimum, proposals for:

- Rate designs and tariffs
- Capital investments and O&M spending
- Energy efficiency and demand response programs
- Other utility programs for which a plausible alternative exists

To the extent that it may be difficult to establish alternative plans, or where there may be a multitude of different potential alternatives (e.g., alternative rate designs), the current, status quo should be used as a reference against which to compare the proposal BCR and/or NPV. To the extent that a proposal does not include a BCA, the onus should be on the regulated entity to demonstrate why a BCA is not appropriate.

Tracking Progress

DOEE believes that the Commission should track reductions in GHG emissions and provide a progress report at an appropriate interval. Further, the Commission should determine, at least every 5 years, whether sufficient progress is being made to achieve the reduction targets and propose remedies or corrective action where needed.

4) The Commission should establish a similar framework for increasing energy resiliency in the District.

DOEE suggests developing a framework for increasing resiliency using similar components of the framework for GHG reductions. For resiliency, the object of measurement

will be reduced risk of service outage, and a cost of resiliency will need to be established for a BCA. DOEE recognizes that quantification of resilience, let alone assigning a cost of resilience, may be difficult. However, DOEE believes that the Commission must pursue this framework, beginning with available data and concepts that can be quantified, such as the Value of Lost Load for commercial ratepayers, and setting qualitative goals where quantification becomes too challenging.

DOEE defines urban resilience as the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and thrive no matter what kinds of chronic stresses and acute shocks they experience. Resilience is directly related to climate change, as it defines the extent to which climate change impacts will affect District of Columbia residents.

Energy resilience can be increased in a number of ways:

- Development of back -up power systems and microgrids that serve critical loads, particularly those that use renewable energy and batteries
- Electric supply diversity
- Percentage of load served by distributed energy resources
- Increasing electrical infrastructure's able to withstand major storms (e.g., through elevating substations above flood levels)
- Deployment of advanced sensors, automated controls, and other strategies designed to isolate problems and restore power quickly

Measurement

DOEE recommends that specific metrics be established to track progress toward improving grid resilience, as discussed in the section below on metrics. Proposals for projects should address the extent to which they help advance progress on particular resilience metrics.

Metrics for resilience should measure the ability to provide services to critical populations and critical functions, including vulnerable populations, critical infrastructure providers and commercial centers. Metrics could include:

- Measures of supply diversity, including load served by DERs
- Percent of customers served by a microgrid
- Percent of vulnerable customers served by a microgrid
- Percent of critical load served by a microgrid
- Development of a joint utility-District resilience plan
- Implementation of a robust cybersecurity plan by utilities
- Percentage of feeders with advanced sensors and automated controls
- Percentage of the system that is radial versus networked
- During a major storm or other major disruption, the cumulative critical customer-hours of outages (e.g., hospitals, fire stations, police stations)
- During a major storm or other major disruption, the critical services without power for more than N hours (where N= hours of backup fuel)
- During a major storm or other major disruption, the critical customer energy demand not served (e.g. number of person-hours without power)
- During a major storm or other major disruption, the average number (or percentage) of critical loads that experience an outage
- During a major storm or other major disruption, the time to recovery
- During a major storm or other major disruption, the cost of recovery

Formulating metrics for Washington Gas Light (WGL) may be more challenging, since unlike the Potomac Electric Power Company (Pepco), WGL has fewer opportunities to profitably substitute sustainable investments for GHG-promoting ones. Nonetheless, we suggest that WGL be required to track the climate impacts of gas leakage (in CO_2e) and any incremental savings through cost-effective energy efficiency programs.

Critically, all new metrics should be presented in a single "dashboard" array and should be easily accessed online and updated promptly as new data becomes available. The Commission may also choose to attach financial incentives to some of these metrics to create Performance Incentive Mechanisms (PIMs), but we advise that this be addressed through rate case proceedings.

Setting a Target

Using the foregoing metrics should allow the Commission to set a baseline of the District's energy resilience performance. Once the baseline is set, the Commission could propose a target for reducing the risk of service outage during extreme weather events based on the metrics.[17]

Assigning a Cost of Resilience

Establishing a cost of resilience can be difficult, especially for programs and projects that serve vulnerable populations. In the commercial sector, concepts such as Value of Lost Load or Value of Lost Revenues could be explored. In FC 1130, DOEE suggested that the Commission could consider using a nominal value of resilience, for example one cent per kWh, until a more robust cost is developed. In any event, the cost should be robust enough to help reduce the risk of service outage during extreme weather events.

Benefit Cost Analysis

Similar to the GHG reduction framework, DOEE recommends that the Commission use a Societal Cost Test for comparing feasible alternatives.

Tracking Progress

Similar to the GHG reduction framework, DOEE believes that the Commission should annually track the effort regarding the risk reduction target for resiliency and provide a progress report at an appropriate interval. Further, the Commission should determine, at least every 5 years, whether sufficient progress is being made to achieve the reduction targets and propose remedies or corrective action where needed.

Suggested Guidance on Implementation

In this section, DOEE highlights several practical considerations for the Commission in implementing the Omnibus Act. We also offer suggestions for potential approaches that the Commission may take to address these issues.

[17] The District's Resilience Strategy provides guidance on improving the overall resilience in the District, and it calls for installing a microgrid in the St. Elizabeth east campus that houses critical government functions.

5) Establish standards for quantification and monetization of impacts over time

To ensure that quantification and monetization of impacts over time are conducted fairly, we recommend that the Commission establish the following standards:

(1) Where GHG impacts are from investment in an asset, they should be projected over the full expected useful life of the asset. In other cases, the Commission may determine that a shorter study duration is appropriate.

(2) The Commission should standardize the discount rate that is to be used for future benefits and costs. We recommend the use of a 3 percent per year rate, at a maximum, which is in the range of what is commonly referred to as a "societal discount rate" and the discount rate used in formulating the central estimate of the SCC. We also note that since the SCC is already discounted, the discount rate should not be applied to this value a second time when conducting the analysis.

(3) To the extent that an estimate of future benefits (GHG reductions) associated with an activity is contingent on other yet-to-be-completed activities, we stress that the Commission may choose to impose reporting requirements, potentially including project-specific tracking metrics, to ensure that future activities provide the expected benefits to customers.

In all proposals that include quantification of climate impacts, the Commission must ensure that there is no double-counting. Moreover, to the extent that individual projections of future impacts depend on specific assumptions about future load, penetration of DER, distribution system conditions, or other key parameters, it would be useful for the Commission to standardize such assumptions for all regulatory matters.

6) Provide general guidance on BCA

While BCA should be established as the preferred means of evaluating proposals in the District of Columbia, a BCA is not guaranteed to produce optimal results. Rather, stakeholders must be provided with clear guidance to ensure that results are standardized, robust, and fair.

To the extent that BCA may generate contentious results, the issues are usually methodological. Every BCA must deal with several issues, including which costs and benefits to consider, how far into the future to project results, and how to quantify and monetize impacts. The choice of discount rate can also wield significant influence on the ultimate results.

Historically, BCAs have been conducted using both the utility-system and societal perspectives. It does not appear that the District has any formal standards related to perspective, but it is clear that climate impacts have not consistently been monetized. In order to comply with the Omnibus Act, climate impacts must be systematically incorporated into BCAs.

DOEE notes, for example, the BCA recently submitted by WGL in support of expediting its PROJECTpipes program.[18] While this BCA quantified expected environmental benefits (GHG and leak reductions), these effects were not monetized, and as such, the overall program did not appear to be cost effective.

We recommend that the Commission institute the following standards for BCA:

(1) Require that all BCA include analysis using a societal perspective (societal cost test)

(2) Establish a common discount rate of 3 percent for BCAs using a societal perspective

(3) Require that BCAs consider benefits and costs over the full useful life of the proposed investments, or if the useful life construct is not applicable, require benefit and cost accounting for 15 years.

Finally, in establishing BCA standards, the Commission should clearly delineate when BCA is not required. While we earlier suggested that the Commission establish thresholds for which proposals need to address climate impacts, here we are addressing a narrower matter. DOEE recommends that the main exception for BCA should be in cases in which the proposed activity has no feasible alternative.

[18] FC 1142, FC 1115, FC 1154. PROJECTpipes – Cost Benefit Analysis. Prepared by Jacobs Consultancy. 2019.

An example of such a case would be Pepco's ongoing tree-trimming initiative: This is a mainstay of utility maintenance, and a requisite for ensuring reliability. Short of undergrounding the entire distribution system, it is not clear what the alternative course of action would be. Since undergrounding the whole system would come at great cost and mean a shift in Pepco's operations, it is difficult to construe undergrounding as a reasonable alternative.[19] In this instance, a BCA is not required. However, it may still be appropriate to quantify any climate impacts associated with tree-trimming, such as the fuel used to operate tree-trimming equipment and the disposal of waste products.

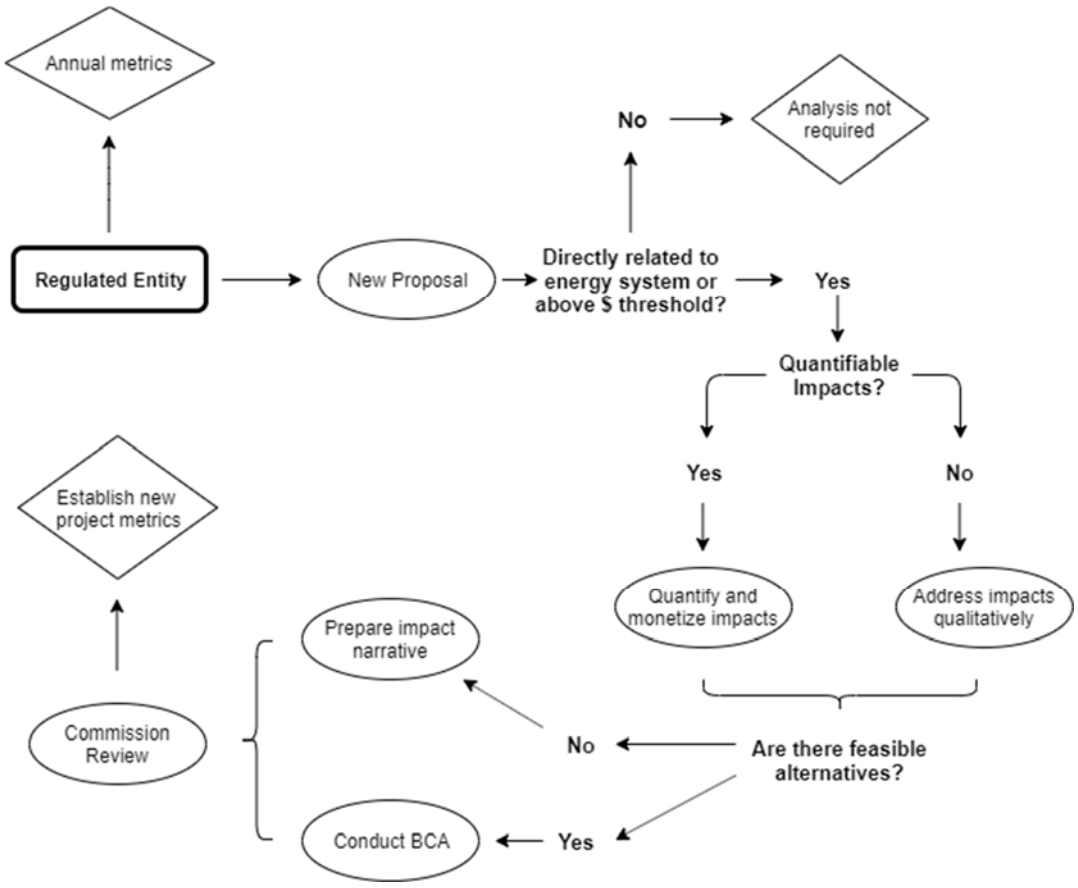
As discussed above, difficulty in quantifying or monetizing impacts is not on its face a justification for not conducting a BCA. If climate impacts are likely to occur but are difficult to quantify or monetize, they should, at a minimum, be qualitatively addressed.

The flowchart in **Error! Reference source not found.**3 below illustrates one potential framework that the Commission could use to account for climate impacts. Figure 3. Possible regulatory process for accounting for climate and related policy impacts of proposals3 shows that after a regulated entity puts forward a new proposal, there are three questions that guide this process: (1) Does the proposal directly relate to the energy system or involve spending above a certain monetary threshold? (2) Are impacts quantifiable? (3) Are there feasible alternatives?

Note that BCA may still be conducted even where impacts are not easily quantified. Similarly, the Commission may elect to assign new (quantitative) metrics as a condition of proposal approval, even if the initial proposal included only qualitative descriptions of the proposals likely effects on climate change and related policy commitments.

[19] We note that Pepco is in the process of undergrounding a share of its distribution system. See FC 1116 and FC 1145.Should note that to the extent that this is proposed in a docket, it may be in the context of other things (e.g., O&M) that do have alternatives.

Figure 3. Possible regulatory process for accounting for climate and related policy impacts of proposals



EXAMPLES FROM OTHER JURISDICTIONS

New York

New York is part of the Regional Greenhouse Gas Initiative (RGGI), which is an effort across ten states to reduce CO_2 emissions. Carbon emissions from energy purchased or injected into the grid are subject to a regional cap, and emitters must purchase allowances based on the market price. In addition, under the "Value Stack" framework, DERs are compensated for emissions reductions based on the higher of the latest Tier 1 Renewable Energy Certificate procurement price or the SCC. [20]

[20] New York Public Service Commission. Order on Net Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters, Case 15-E-0751, March 9, 2017.

The New York Department of Public Service (NYDPS) applies a BCA using the SCT as the primary cost test to four types of utility investments: 1) distribution system as platform capabilities 2) DER procurement through a selection process 3) DER procurement through tariffs, and 4) energy efficiency programs. The BCA results are filed with Distribution System Implementation Plans by each utility. The BCA framework established by the NYDPS has a fairly extensive list of costs and benefits that can provide a starting point for defining which benefits and costs should be quantified under a BCA framework, which is included in Figure 4 below. NYDPS has been clear that the costs and benefits should be evaluated at the smallest possible granularity, taking into account the location value of DER, and that the BCA should then be used to inform DER-specific tariffs. Additionally, NYDPS directed each utility to put together a BCA handbook that covers the valuation process for the costs and benefits listed in Figure 4.[21]

[21] NYDPS Order Establishing the Benefit Cost Analysis Framework. Case 14-M-0101, January 21, 2016.

Figure 4 - Example of Benefits and Costs to be Quantified.[22]

BENEFITS
Bulk System
Avoided Generation Capacity (ICAP), including Reserve Margin
Avoided Energy (LBMP)
Avoided Transmission Capacity Infrastructure and related O&M
Avoided Transmission Losses
Avoided Ancillary Services (e.g. operating reserves, regulation, etc.)
Wholesale Market Price Impacts*
Distribution System
Avoided Distribution Capacity Infrastructure
Avoided O&M
Avoided Distribution Losses
Reliability / Resiliency
Net Avoided Restoration Costs
Net Avoided Outage Costs
External
Net Avoided Green House Gases
Net Avoided Criteria Air Pollutants
Avoided Water Impacts**
Avoided Land Impacts**
Net Non-Energy Benefits (e.g. avoided service terminations, avoided uncollectible bills, health impacts, employee productivity, property values, to the extent not already included above)**
COSTS
Program Administration Costs (including rebates, costs of market interventions, and measurement & verification Costs)
Added Ancillary Service Costs
Incremental Transmission & Distribution and DSP Costs (including incremental metering and communications)
Participant DER Cost (reduced by rebates, if included above)
Lost Utility Revenue
Shareholder Incentives
Net Non-Energy Costs (e.g. indoor emissions, noise disturbance)**

Maine

In 2014, Maine enacted the Act to Support Solar Energy Development in Maine, which requires that "the societal value of the reduced environmental impacts of the energy" be calculated.[23] To comply with this statute, Maine has used the federal SCC, as well as other

[22] New York Department of Public Service, Staff White Paper on Benefit Cost Analysis in the Reforming Energy Vision Proceeding, 14-M-0101, July 1, 2015, p. 12.

23 Maine P.L ch. 562 (Apr. 24, 2014) (codified at 35-A M.R.S.A. § 3472 (2).

monetized costs and benefits, and a 3 percent discount rate to perform BCA. As in New York, Maine subtracts the cost of RGGI allowances from the SCC. [24]

Environmental Impacts in Evaluating Energy Efficiency Cost-Effectiveness

States in the Northeast generally use the Avoided Energy Supply Components Study (AESC Study), which uses a marginal abatement cost method to value reductions in climate emissions. The AESC Study calculates marginal abatement costs at the global level and at the local level. At the global level, the marginal abatement costs are approximately $100 per short ton of CO_2-e emissions, which reflects best available cost estimates for large-scale carbon capture and sequestration. In addition, the Study calculated a New England-specific marginal abatement cost of $318 per short ton based on the 2018 estimated cost of offshore wind.[25]

The SCC is often used to value the carbon emission reductions from energy efficiency. For example, states including Minnesota, Washington, Rhode Island, and New York use the SCC. Other states have developed their own values for avoided carbon emissions, such as Wisconsin, which uses a value of $15/ton.

CONCLUSION

DOEE commends the Commission for issuing an NOI in this matter. DOEE looks forward to continuing to work with the Commission and other stakeholders as the District works to implement the provisions of the Omnibus Act generally, and in particular with regards to developing a solid analytical approach for considering the impact of utility proposals on global climate change and the District's public policy commitments.

24 Iliana Paul, Peter Howard, and Jason Schwartz, "The Social Cost of Greenhouse Gases and State Policy: A Frequently Asked Questions Guide" (Institute for Policy Integrity, October 2017), https://policyintegrity.org/files/publications/SCC_State_Guidance.pdf.

25 Synapse Energy Economics et al., "Avoided Energy Supply Components in New England: 2018 Report" (Synapse Energy Economics, March 30, 2018), 142, https://www.synapse-energy.com/sites/default/files/AESC-2018-17-080.pdf.

CERTIFICATE OF SERVICE

I hereby certify that on this 12th day of November, 2019, I caused true and correct copies of the DOEE's Comments in Response to the Public Service Commission of the District of Columbia's Notice of Inquiry to be electronically transmitted to the following:

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