GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE ATTORNEY GENERAL

Public Interest Division
Public Advocacy Section

ELECTRONIC FILING

August 31, 2015

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

Re: Formal Case No. 1130 – In the Matter of the Investigation into Modernizing the Energy Delivery System for Increased Sustainability.

Dear Ms. Westbrook-Sedgwick:

Enclosed, please find for filing an original and three (3) copies of the District of Columbia Government's Comments on the Scope of this Proceeding. If you have any questions regarding this filing, please do not hesitate to contact the undersigned.

Respectfully submitted,

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Before the District of Columbia Public Service Commission

Formal Case 1130
In the Matter of the Investigation into Modernizing the Energy Delivery System for Increased Sustainability
Order No. 17912

Comment on the Scope of the Proceeding
By the District of Columbia Government
August 31, 2015

1. Summary

The District of Columbia Government ("District Government"), through the Department of Energy and Environment ("DOEE"), commends the District of Columbia Public Service Commission ("Commission") for leading the discussion on the future of the District of Columbia's ("District") energy system. This discussion is both timely and necessary. The District relies on an aging electricity grid fueled largely by coal and natural gas, and must endure increasingly extreme weather events like the Derecho and the Polar Vortex that can cause widespread outages, causing harm to millions of people. Therefore, climate change has made it imperative that our energy system be sustainable and resilient at the highest levels. This imperative comes to us at a time when the energy infrastructure must be upgraded at a high cost to ratepayers, and when there have been remarkable breakthroughs in technologies that have rendered clean and resilient energy more affordable and that empower customers to reduce their energy use and costs. While these developments pose challenges to the operation and economics of the existing energy system, they open new opportunities to meet the challenges posed by climate change by achieving affordability, carbon reduction, and resiliency. In short, there is a need to equip our energy distribution system with capabilities that can capture and deliver these important values, and supplement such effort with incentives, rules, and designs to stabilize the impact on grid functions. DOEE believes that this proceeding can address that need, and offers the following elaboration on the scope of the proceeding as set forth by the Commission.

- The proceeding should focus on clean distributed energy, customer empowerment, and grid reliability and resiliency delivered through Integrated Distribution Planning ("IDP").[1]

[1] The term "Integrated Distribution Planning" refers to a type of Integrated Resource Planning, which has been defined as "a utility planning process for meeting forecasted annual peak and energy demand, plus some established reserve margin, through a combination of supply-side and demand-side resources over a specified future period." *See* www.raponline.org/document/download/id/6608. IDP would specifically focus on planning at the level of the distribution system.

DOEE strongly supports the scope of the proceeding as set forth by the Commission in Order No. 17912, Formal Case 1130, and shares the commitment indicated therein to achieve "increased sustainability, reliability, efficiency, and interactivity" of the District's energy system.[2] Those objectives are well-aligned with the Sustainable DC Plan and DOEE's priorities that will guide its effort on completing its Comprehensive Energy Plan. The objectives set forth in Order No. 17912 and DOEE's energy priorities—which will be further discussed in the Comment—both point to a shared understanding that the energy distribution system can and should play a much greater role in modernizing the overall energy system. The modernization for the District, in other words, should focus on deployment of distributed energy resources ("DER")[3] and increasing resiliency and reliability of the energy system through an integrated planning process that can optimize customer-controlled resources. For the purpose of this proceeding, DOEE defines DER broadly as including the following: End-use and grid energy efficiency, demand response, distributed storage, distributed generation, microgrids, and electric vehicles. DER will principally be located on customer premises, but may also be located on distribution system facilities. These objectives—clean local energy, affordability, and resiliency—could be achieved through a grid reliability framework that enables customers' energy generation and management.

- <u>The proceeding should address the three main topics of planning, technology, and policy/regulation and propose implementation actions to achieve the objectives.</u>

Specifically, DOEE fully agrees with the Commission's preliminary topics to be discussed, which can be characterized as (1) system planning and review, (2) technologies for DER and the smart grid,[4] and (3) enabling policy and regulation. System planning with meaningful input from stakeholders and data sharing is critical to an optimized integration of DER. This discussion should holistically examine the impact and value of DER integration on grid economics and operation, viewing the distribution system and DER as evolving segments of the overall grid architecture. Also important is identifying appropriate technologies that can best enhance the grid capabilities for DER and resiliency against extreme weather events. And successful implementation of a modernized energy system depends on effective rules, rates, and incentives that are informed by careful consideration of costs, benefits, and equity. A full discussion of these topics should result in a set of near-term and long-term implementation actions to achieve the proceeding's objectives through DER and a smart grid. DOEE will elaborate on the scope and the list of the Commission's topics in the sections that follow.

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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, "Order Opening Investigation," June 12, 2015.

[3] CASE 14-M-0101 Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, p.3, FN 3.

[4] The National Institute of Standards and Technology defines "smart grid" as "a modernized grid that enables bidirectional flows of energy and uses two-way communication and control capabilities that will lead to an array of new functionalities and applications." http://www.nist.gov/smartgrid/beginnersguide.cfm

2. Background

- Worsening climate change, aging infrastructure, and innovative DER call for immediate action.

This proceeding comes at a critical juncture. The Intergovernmental Panel on Climate Change has recently projected worsening conditions for climate change and has called for more urgent action.[5] The District is particularly vulnerable during extreme weather events because it relies entirely on imported power and fuel, delivered via systems that are "aging and over capacity."[6] The Derecho not only deprived power to more than 25% of District residents swiftly within hours, it also spiked the electricity and natural gas prices in some areas of the wholesale market in New Jersey by as much as 2798% due to constrained capacity of the energy distribution system and a lack of resilient energy measures.[7] The dramatic price hike during the Polar Vortex seriously affected many commercial and institutional ratepayers in the District who were exposed to variable rates for electricity and natural gas.

In terms of upgrade costs, the Edison Electric Institute has estimated the cost of upgrading the existing national infrastructure at about $1.5 trillion over the next 15 years.[8] In this region, PHI's Power Delivery team projects $6 billion in infrastructure upgrade investments from 2013 to 2017.

On the other side of these challenges lies an opportunity provided by major breakthroughs in innovative technologies in the past decade that have dramatically lowered the cost of locally-generated renewable and resilient power and have increased the ability of customers to generate and better manage their energy use. These technologies enhance the grid by providing clean energy and resiliency, but they can also place stress on the grid by causing reliability issues and creating uncertainties in the traditional utility business model.[9] The convergence of these factors provides a unique opportunity to examine the District's energy distribution system to transform it into a customer-driven energy asset.

- Several leading states have begun the challenge of modernizing the energy system, and the federal government supports modernization.

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[5] http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

[6] Climate Change Projections for the District of Columbia, March 2015, Exhibit A, p.4.

[7] http://www.oe.netl.doe.gov/docs/Derecho%202012_%20Review_080612.pdf; http://energyresearchcouncil.com/downloads/CES_2013-2014_Winter_Polar_Vortex_Whitepaper.pdf.

[8] http://www.eei.org/ourissues/finance/Documents/Transforming_Americas_Power_Industry_Exec_Summary.pdf

[9] http://www.eei.org/ourissues/finance/Documents/Transforming_Americas_Power_Industry_Exec_Summary.pdf. *See also* 2015 Quadrennial Energy Review, Department of Energy, Ch.1, p.1-4.

The issue of reforming the energy system is an active topic of discussion in this country. Recently, Senator Lisa Murkowski, who chairs the U.S. Senate Committee on Energy and Natural Resources, introduced a bipartisan energy bill called the "Energy Policy Modernization Act of 2015," co-sponsored by Senator Maria Cantwell, that promotes efficiency, storage, distributed generation, and microgrids. Regarding the nation's energy system, Senator Cantwell stated: "Climate, efficiency and cybersecurity must be addressed, and we need to have a plan in place for energy transmission, distribution and storage."[10] The U.S. Department of Energy's Quadrennial Energy Review devoted a substantial portion to discussing grid modernization with a particular focus on the impact of DER. The Review pointed to DER as one of the main drivers that will lead the modernization of the electricity system, including changes to the utility business model.[11]

In addition, several states, driven by policy on climate change and infrastructure costs, have begun addressing these issues through regulatory proceedings similar to Formal Case 1130 or through other governmental actions. The State of New York has begun an ambitious proceeding, called "Reforming the Energy Vision" or "REV," to re-orient its energy system to a decentralized one that prioritizes the distribution side of the energy system and seeks to empower customers through advanced DER.[12] REV's objectives are to explore regulatory models and achieve economic efficiency, achieve system modernization for a digital economy, promote clean energy and environmental responsibility, and provide universal service. Similarly, the State of California has issued a series of orders to create a smart grid, which means the following: foster customer-driven energy use and generation; reduce greenhouse gas emissions; provide resiliency; reduce the use of petroleum by electrifying transportation; grow the green economy; and ensure reliability, efficiency, and safety.[13] Recently, the Commonwealth of Massachusetts has engaged in an effort aimed at reducing outages, optimizing demand, integrating distributed generation, and improving workforce and asset management, with a narrower focus on Advanced Metering Infrastructure deployment and default Time-Of-Use pricing.[14] In 2014, the State of Hawaii, where the grid is experiencing significant interconnection and reliability problems with 20% of residents operating solar photovoltaic systems, rejected its sole utility's Integrated Resource Plan, citing a need to develop an adaptable grid that can integrate more renewables and DER.[15] In May 2015, the Minnesota Public Utility

[10] http://www.energy.senate.gov/public/index.cfm/featured-items?ID=12405ca7-1f25-4361-916b-ddc3642cfd9a

[11] *See* 2015 Quadrennial Energy Review, Department of Energy, Ch.3, "Modernizing the Electric Grid."

[12] NY PSC, CASE 14-M-0101–Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision.

[13] http://www.cpuc.ca.gov/NR/rdonlyres/238CADA7-EBCD-418D-8CBC 390F43E645AE/0/SGFactSheet0710.pdf.

[14] http://www.mass.gov/eea/energy-utilities-clean-tech/electric-power/grid-mod/grid-modernization.html.

[15] http://puc.hawaii.gov/wp-content/uploads/2014/04/Commissions-Inclinations.pdf.

Commission began an inquiry into grid modernization with a focus on distribution planning.[16] The District, through this proceeding, joins the efforts of these sister jurisdictions and can benefit from the work undertaken by them.

3. The Department of Energy and Environment's Interest

- The District Government's goals and DOEE's priorities on energy are well-aligned with the objectives of this proceeding.

The District Government is now widely-recognized as a national leader in the field of sustainable and efficient energy.[17] The District Government has established, through laws, regulation, and ambitious policy goals, one of the most progressive energy markets, and DOEE has been implementing policies and programs to address the challenges of climate change, affordability, and economic development. Under the Sustainable DC Plan, DOEE facilitates the District Government's effort on reducing greenhouse gas emissions and total energy use and meeting half of the District's overall energy demand through renewable energy.

In addition, in approaching its Comprehensive Energy Plan, DOEE has articulated four energy priorities that envision an advanced distribution system for meeting the challenges of the 21st century. These priorities are (1) reliable distribution grid, (2) clean distributed energy, (3) resilient energy systems, and (4) affordable and efficient energy. By "reliable distribution grid," DOEE anticipates that an increased use of distributed variable generation assets will require additional grid-enabling equipment to ensure reliability. The priority of "clean distributed energy" indicates DOEE's commitment to promote renewable and low-carbon energy in order to reduce greenhouse gas emissions. "Resilient energy system" indicates not only resiliency against attacks and extreme weather events using innovative technologies, but also diversified fuel sources for heating and cooling. "Affordable and efficient energy" addresses issues of equity and access, and prioritizes the avoidance of energy use. These priorities will complement and further the objectives of this proceeding.

Grid modernization would allow the District to realize the potential for energy use reduction and carbon emission reduction. Currently, the regional electric distribution system that serves the District relies on fossil fuel to meet 57% of its demand, and another 40% of that demand is met through nuclear power generation which is challenged with waste fuel and safety issues, as

[16] http://mn.gov/puc/documents/pdf_files/grid_modernization_5-12-2015.pdf

[17] The District Government has stringent green building codes and regulations that have produced the most number of Energy Star-rated building and LEED-certified projects in the nation, and it has one of the most active solar markets. The District Government, through the Department of General Services, has also contributed to the de-carbonization of the transmission grid through a wind PPA that will supply 35% of the District Government's energy demand for the next 20 years.

highlighted by the Fukushima incident.[18] The cost of fossil fuel generation is also likely to increase due to planned retirements of coal-fired generation in the PJM territory, the U.S. Environmental Protection Agency's ("EPA") Clean Power Plan, and EPA's proposed rules to reduce methane emissions. In addition, between 2012 through 2014, District ratepayers paid roughly $150 million in delivery congestion costs, which could have been better spent by investing in customer-driven energy generation and management assets; such assets would have provided relief to congestion and lower energy costs.[19] Furthermore, the electricity delivery system is overbuilt with about 43% of the system sitting idle except to serve peak demand, presenting ample opportunities to obtain significant savings through demand response.[20] And unlike Hawaii or Germany where high-levels of DER deployment are beginning to stress the grid, the grid serving the District should have ample capacity to accommodate DER.

Regarding energy efficiency, DOEE has preliminary estimates that the District could potentially achieve 20-30% in electricity savings from 2012 consumption levels by 2022; for natural gas, efficiency measures could reduce 12-25% from the 2012 consumption level by 2022.[21] Regarding solar photovoltaic systems, the technical potential in the District may be up to 13% of its 2014 consumption level.[22] In addition, the District is pursuing microgrid projects that can bring much-needed resiliency and sustainability to critical infrastructure and vulnerable neighborhoods. This proceeding could provide a path for capturing all of these potential benefits for District ratepayers.

4. The Scope and the Objective

- The objective of this proceeding is to facilitate an energy distribution system that is sustainable, reliable, affordable, and resilient.

The Commission has set forth the scope and the objective of Formal Case 1130 as follows: "[I]dentify technologies and policies that can modernize our energy delivery system for increased sustainability and will make our system more reliable, efficient, cost-effective, and

[18] *See* the fuel source mix for RFC East at http://www.epa.gov/cleanenergy/documents/egridzips/eGRID_9th_edition_V1-0_year_2010_Summary_Tables.pdf.

[19] See the PJM State of the Market Reports from 2012 through 2014.

[20] The utilization rate is for the year 2010, derived by dividing the amount of peak demand by energy consumption. The Department used the 2010 summer peak demand (2309 MW), and the 2010 total usage (11,562,000 MWh). http://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/ELECTRIC%20AND%20NATURAL%20GAS%20ENERGY%20EFFICIENCY%20AND%20DEMAND%20RESPONSE%20POTENTIAL%20FOR%20THE%20DISTRICT%20OF%20COLUMBIA.pdf. The 43% does not represent the potential for demand reduction.

[21] http://green.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/ELECTRIC%20AND%20NATURAL%20GAS%20ENERGY%20EFFICIENCY%20AND%20DEMAND%20RESPONSE%20POTENTIAL%20FOR%20THE%20DISTRICT%20OF%20COLUMBIA.pdf, p.5.

[22] The potential measurement is for rooftop solar capacity only, and does not consider any economic constraints.

interactive."[23] The term "energy delivery system" indicates that it applies to all integral components of the energy systems serving the District, including electric, natural gas, and water. This term, however, could lead to a potential confusion that the proceeding applies narrowly to physical transmission and distribution assets such as feeder lines and pipes, which would exclude consideration of appropriate matters for this case, including DER. To avoid this confusion, DOEE suggests using the term "energy distribution system." Overall, DOEE strongly supports this scope and objective, which allows for a holistic approach.

The Order further explains that the scope includes, without limitation, the following topics:

- Overview of the current energy distribution system in the District and current plans to modernize the system. DOEE characterizes this as "system planning and review."

- Examine new technologies impacting the delivery of energy in the District such as DER, and associated grid-enabling technologies. DOEE characterizes this as "technologies for DER and the smart grid."

- Identify regulatory and other policies that will enable or inhibit the modernization of the District's energy distribution system for increased sustainability, reliability, efficiency, and interactivity. DOEE characterizes this as "policy and regulation."

DOEE will elaborate, or offer its interpretation, on those topics, which should be considered together as equally critical parts of a whole.[24]

A. System Planning and Review

- A holistic approach to planning is needed in order to optimize resources for delivering sustainability, reliability, affordability, resiliency, and it should include electricity, natural gas, and water.

System resource planning is key to this proceeding. As the Commission acknowledged in its Order No. 17851, dated April 9, 2015, there is a need to "address in a more global way the future outlook for energy growth in the District of Columbia, the feasibility of deploying more energy storage facilities and increased distribution generation, and the impact of these new technologies

[23] *See* Order 17912, p.2.

[24] According to a summary of U.S. Department of Energy's workshop on "Estimating the Benefits and Costs of Distributed Energy Technologies," held from September 30 to October 1 in 2014, a participant from the Electric Power Research Institute opined that a grid modernization and optimization study requires a holistic and concurrent consideration of these three areas: (1) A framework for evaluation of grid modernization investments; (2) Interconnection technical guidelines; and (3) Integrated grid planning and operations.

on Pepco's load forecasting and construction plans for the city."[25] DOEE agrees with the Commission that distribution-side resources should be fully considered in utility infrastructure planning. This type of planning that prioritizes optimization of DER—with the potential for investment deferral or avoidance—calls for Integrated Resource Planning or, in this case, IDP, rather than traditional utility planning.

There are significant differences between the two processes. Traditional utility planning focuses on utility-owned infrastructure and assets, and relies on an internal process driven by the utility's financial needs and reliability obligations. While this type of planning well-serves those ends, it is ill-suited for optimizing available DER that are not utility-owned, and for coordinating with the planning of relevant stakeholders, resulting in missed opportunities to maximize system efficiency, sustainability, and resiliency. In contrast, IDP generally has the following characteristics: "(a) explicit consideration of energy-efficiency and load-management programs as alternatives to some power plants, (b) consideration of environmental factors as well as direct economic costs, (c) public participation, and (d) analysis of the uncertainties and risks posed by different resource portfolios and by external factors."[26]

These characteristics show that IDP is well-suited to address the noted issue in Order No. 17851. IDP would facilitate an explicit consideration of the following: (1) DER, including distributed generation, energy efficiency, demand response, and storage; (2) the carbon-intensity of energy and climate-change resiliency; (3) meaningful input from the public—and especially from the non-utility DER owners—during the planning process as well as from other relevant stakeholders; and (4) cost-effectiveness analysis, including locational benefits and costs of DER and the existing grid. DOEE recommends that the Commission embrace some version of an iterative IDP process as the primary vehicle for developing a modernized energy distribution system, and prioritize the discussion of this process. Integrating DER in the distribution system planning and operations is critical to fully realizing the value of DER and minimizing the integration costs. A recently-published white paper asserts that "DER installations in sub-optimal locations, such as the end of long feeders, may require significant feeder upgrades to avoid impacts to voltage quality," but "when strategically located, … DER may require little or no upgrade of the feeder while delivering multiple benefits."[27]

In addition, IDP could provide planning alternatives to determine whether traditional utility assets could be supplanted by DER at a particular location with greater overall benefits.

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[25] *See* Order 17851, Formal Case 1123, In the Matter of the Potomac Electric Company's Notice to Construct a 230kV/138kV/13kV Substation and Four 230 kV/138kV Underground Transmission Circuits on Buzzard Point.

[26] *Hirst, Eric; Goldman, Charles*, "Creating the Future: Integrated Resource Planning for Electric Utilities," Annu. Rev. Energy Environ. 1991. 16:91-121, p. 91.

[27] See "The Integrated Grid," Electric Power Research Institute, 2014, p.28.

Currently, Consolidated Edison in New York is undertaking a demonstration project, called "Clean Virtual Power Plant" to determine whether DER "can be deployed to help reduce load in a constrained area and … to defer or avoid capital investments [through] transmission and distribution deferral."[28]

Therefore, an IDP process for the District should focus on cost-effectively utilizing DER, which includes solar photovoltaic systems, storage, CHP, fuel cells, energy efficiency, demand response, and microgrids. The planning should identify tools for robust deployment of DER based on locations and load profiles, existing grid conditions, land use and real estate development plans, and other federal or District Government portfolios and capital construction plans; it should also identify the current grid capacity for integrating DER and the need for additional capacity based on forecast models for cost-effective deployment of DER. Such planning would require the cooperation of public and private actors in information sharing, as well as consideration of the impact on the cost-recovery model for grid services. The utilities serving the District are forward-looking utilities that most likely have been preparing to capture these opportunities that the changing energy landscape offers, and DOEE welcomes this opportunity for collaboration.

An example of IDP illustrating its potential benefits comes from California. In 2013, California enacted legislation on distribution system planning: Section 769 of the California Public Utilities Code requires each electric utility to submit a Distributed Resources Plan ("DRP"), which must evaluate locational benefits and costs of DER; propose methods of coordinating existing programs, rates, and incentives to maximize the benefits and minimize the costs of DER; propose additional actions necessary to integrate DER into distribution planning; and identify barriers to deployment of DER. DRPs under Section 769 could identify where DER could best be deployed in terms of cost-effectiveness considering all relevant factors. In the case of the District, this Commission has already recognized the need for system planning, coordination, and optimization in Formal Case 1123, "In the Matter of the Potomac Electric Company's Notice to Construct a 230 kV/138 kV/13 kV Substation and Four 230 kV/ 138 kV/ Underground Transmission Circuits on Buzzard Point."

DOEE recognizes that the distribution grid and DER will need to coevolve through IDP and may reach a saturation point of creating a Distributed Market. The District should prepare for this possibility, in which DER, having crossed a capacity threshold, will require a platform through which it can be controlled, transacted, and interfaced with the transmission system.[29] The entity

[28] http://www.capitalnewyork.com/sites/default/files/CONEDDEMO3.pdf

[29] For a detailed analysis of this framework, please see the draft (under review) Technical Report No.2, "Distribution Systems in a High Distributed Energy Resources Future: Planning, Market Design, Operation and Oversight," August 1, 2015, by *Paul De Martini* & *Lorenzo Kristov* for the Lawrence Berkeley National Lab.

providing this platform is a neutral Distribution System Operator ("DSO"). The DSO concept should be preliminarily explored here as part of a holistic planning discussion.

- Optimized resource planning should be collaborative and will require data access.

Two points on this topic are further elaborated. First, the IDP process should use a collaborative approach. This is important because the energy resources and the delivery systems that must be considered together would include non-utility owners of DER and multiple utilities, i.e., electric, natural gas, efficiency, and water.[30] Coordinating these resources and systems requires collaboration. Certainly, the ongoing work on undergrounding in Formal Case 1116 would benefit from IDP in terms of planning coordination and optimization.[31]

Second is the issue of data-sharing. A plan optimizing energy resources and delivery systems requires coordination among the stakeholders. This coordination cannot occur without data, specifically data for location-based analysis of the costs and benefits of DER. Significantly, the California Public Utilities Commission ("CPUC") found it necessary to facilitate some form of utility data access in order to successfully implement the legislation on distributed resource planning. The CPUC requires the utilities to develop policies and procedures for sharing grid data, such as public feeder-level grid connection information, and data from new sensor systems, SCADA, and substation automation systems. Some of that information is available on the internet as an interactive load map, which could help determine the best locations for DER.[32]

In addition, in order to enable customers to better manage their energy use and reduce cost, this proceeding should explore ways to facilitate the access of user-friendly smart meter data using innovative energy management software without compromising customers' privacy.[33] In 2011, California enacted legislation that authorized access of smart meter data to third-party energy service providers who are obligated to implement and maintain security measures to protect customers' privacy.[34] Access to smart meter data could further another useful objective, and one

[30] By "efficiency," DDOE refers to the District of Columbia Sustainable Energy Utility, which has extensive experience in innovative and sustainable programs, electric and natural gas markets, and customer engagement.

[31] See Formal Case No. 1116, In the Matter of Application for Approval of Triennial Underground Infrastructure Improvement Projects Plan.

[32] *See* R 14-08-013, Assigned Commissioner's Ruling on Guidance for Public Utilities Code Section 769-Distribution Resource Planning. An example of this interactive load map can be found here: http://www.arcgis.com/home/webmap/viewer.html?webmap=e62dfa24128b4329bfc8b27c4526f6b7.

[33] The Department is aware that this proposal, if adopted by the Commission, would likely require legislative action by the District of Columbia Council.

[34] Section 8380(e)(2) of the Public Utility Code: "Nothing … shall preclude an electrical corporation or gas corporation from disclosing a customer's electrical or gas consumption data to a third party for system, grid, or operational needs, or the implementation of demand response, energy management, or energy efficiency programs, *provided that*, …, the utility has required by contract that the third party implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect the personal

with less risk to customer privacy, which is to provide customers' usage data to governmental entities under protective oversight of the Commission for the purposes of planning, policy formulation, and program development.

B. Technology

Much of the discussion on modernizing the energy system is enabled by the innovations in DER and grid technologies and the declining costs of these technologies. It is critical to identify and assess cost-effective DER and grid technologies that can deliver sustainability and customer empowerment while ensuring reliability and resiliency for the District. In this regard, the District can benefit from the efforts that have already been made in other jurisdictions. Much work has been done by the U.S. Department of Energy's Smart Grid Task Force and the National Institute of Standards and Technology to assess various smart grid technologies. In addition, there are numerous studies that have assessed key distributed generation technologies. Evaluation of these technologies should be governed by the overall policy objectives of this proceeding and the value proposition of each technology. This topic could be subdivided into Smart Grid and DER.

- Smart grid technologies should ensure reliability, grid-efficiency, and security.

A smart grid is generally defined as "a modernized grid that enables bidirectional flows of energy and uses two-way communication and control capabilities that will lead to an array of new functionalities and applications."[35] Key capability characteristics of a smart grid are automation, communication, and interoperability. According to the Pacific Northwest National Laboratory, the following grid technologies will be essential elements of a smart grid:[36]

- Electronic sensing and automated data extraction, which will also require new data collection and analysis tools
- Adjustable electronics for controlling grid power flows to replace existing mechanical switches
- Fast flexible bulk electric energy storage to balance various power fluctuations and mismatches
- Advanced planning and control methods and tools, i.e. high-performance computing with new control mathematics

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information from unauthorized access, destruction, use, modification, or disclosure, and prohibits the use of the data for a secondary commercial purpose … of the contract without the customer's consent."

[35] http://www.nist.gov/smartgrid/beginnersguide.cfm

[36] *See* Testimony of Dr. Jeffrey Taft, Chief Architect for Electric Grid Transformation, Pacific Northwest National Laboratory before the U.S. Senate Committee on Energy and Natural Resources, March 17, 2015.

These measures certainly should be considered in this proceeding, which will provide system-wide benefits, in concert with reliability-enhancing features such as remote-controlled switches and smart reclosers for fault detection, isolation, and restoration at the feeder level. Additionally, enhancing cyber security of the distribution grid will become more critical as the grid will rely on an increasing number of automated communication devices, and these devices should be robust and cyber-hardened to repel cyber-attacks.[37] DOEE recommends that a long-term vision guide the evaluation of these technologies to ensure that the distribution grid is adaptable, resilient, and cyber-secure.

Grid technologies that empower customers such as smart meters and related products for energy management should be carefully considered, as well as their support technologies, such as smart inverters and billing management systems. The District is a national leader in terms of the deployment rate of advanced meters nearing 100%, but to fully utilize their capabilities, any remaining issues related to interoperability should be fully resolved.

Lastly, this proceeding affords an opportunity to identify and deploy equipment that will allow for cost-effective energy conservation at the feeder level, including Volt/VAR optimization, which should further reduce energy use and carbon intensity of the distribution grid.

- <u>DER technologies should include the combination of solar and battery, Combined Heat and Power, microgrids, generators using alternative fuels, and alternative fuel-sourced heating and cooling.</u>

Regarding DER, the landscape of technological innovation is changing rapidly, and it will require an actively involved stakeholder group to monitor the developments to ensure that the modernized system will be sustainable and can adapt to foreseeable changes in the future. Distributed generation technologies could be categorized into four main categories: (1) internal combustion (e.g., reciprocating engines, microturbines, combustion gas turbine); (2) external combustion (e.g., Stirling engine for micro-CHP); (3) renewables (e.g., wind, solar, biomass); and (4) fuel cells (e.g., hydrogen).[38] Since a main objective of modernization is to achieve sustainability, an assessment of distributed generation technologies involving combustion must consider their environmental impact in terms of pollution. The District must minimize emissions of all greenhouse gas emissions, and is mindful of the fact that currently it is in nonattainment of ground-level ozone standards, and that it must continue to demonstrate attainment of Particulate Matter standards over the next 20 years.

[37] As an example of such cybersecurity measures, the Naval District of Washington D.C. helped produce a commercially available hardware called "Middleware" that could protect the communications between SCADA, building automated systems, and advanced meters from cyber-attacks.

[38] *See* "A Review of Distributed Energy Resources" for New York Independent System Operator, Sept. 2014, p.28. DOEE did not include storage as a distributed "generation," because it views storage more as a demand response and grid-stabilization measure.

In the District, the technologies that receive the most attention may be solar photovoltaic cells and battery storage, in addition to continued support for energy efficiency and demand response. The distributed solar systems' rate of deployment is expected to increase by as much as four times over the next few years, and the price of more compact and efficient batteries is rapidly declining.[39] Deployment of the combination of these technologies has the potential to radically alter how end-users approach energy and to deliver clean, resilient energy at a lower cost: the combination of rooftop solar and battery has the potential to ameliorate the intermittency problem of solar PV systems and to reduce peak load. However, it needs to be monitored for its impact on the operation and economics of the grid. The demonstration project in New York referenced earlier, "Clean Virtual Power Plant," closely examines the usefulness of this combination. In addition to these technologies, there are other critical technologies that deserve careful attention, which are microgrids, CHP, micro-turbines, and, importantly, alternative fuel sources for thermal energy including waste heat, geoexchange, biomass, and biogas.

A microgrid is a neighborhood or campus-scale electric grid with defined boundaries that can distribute power from DER tied to the microgrid with black start capability, backup generation, resilient distribution lines, and islanding capability.[40] DOEE views microgrids, a type of district energy system,[41] as a valuable tool for delivering sustainability and resiliency to the distribution system because it not only sustains itself during outages in the utility grid, but also serves as a resource for grid stability and reliability during such times. The resilient nature of microgrids is widely acknowledged, and they are demonstrating the potential benefits of a modernized grid. Recent innovations have produced an advanced microgrid that could automatically dispatch or store power for peak shaving based on economic signals, or automatically switch to island-mode based on detected weather conditions.[42] The District is currently pursuing a large mixed-use microgrid development project at the former Walter Reed Army Medical Campus site, in addition to the planning and modelling scheduled for a Critical Facilities and Infrastructure microgrid at the St. Elizabeth campus. DOEE is also conducting a feasibility study of additional potential microgrid projects that could be deployed in the District. This proceeding should provide a potential roadmap for the deployment of microgrids in the District.

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[39] *See supra* FN.20, regarding the U.S. Department of Energy Workshop in which participant ICF International stated that by 2018 there will be 25 GW of distributed solar systems from the current level of 6 GW.

[40] The New York Independent System Operator's "Review of Distributed Energy Resources" defines "microgrid" as a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid and can connect and disconnect from the grid to enable it to operate in both grid connected or island mode.

[41] By "district energy system," DOEE refers generally to a system that provides any combination of heating, cooling, domestic hot water, and electricity to more than a single building.

[42] *See* http://www.greentechmedia.com/articles/read/oncor-sc-and-schneider-electric-complete-their-innovative-four-part-microgrs

CHP, a critical component of a microgrid, deserves a close look as the industry is producing CHPs with cleaner and efficient power, and innovative fuel cells may also help provide locally-generated clean energy. It would also benefit the District to explore low-carbon distributed generation that can serve as baseload generation, such as biomass, which would provide greater sustainability, reliability, and resilience through carbon reduction and fuel diversity.

Of equal importance are renewable or low-carbon thermal energy systems such as waste heat in sewer pipes or geoexchange systems, as supplements to the electricity grid and natural gas pipeline network. These systems provide heating and cooling through means other than electricity or natural gas, thereby adding source diversity—and resiliency as a result— to the District's overall energy system. They also provide affordability and efficiency especially when they operate as a district energy system.[43] And although they are at times overlooked, they could play a role in creating a "resilient energy system" that DOEE seeks by diversifying the ways in which to heat and cool buildings.[44] Currently, DC Water is exploring a pilot project to provide heat and hot water to a District public school building using recaptured waste heat from sewer pipes, and it may be worth exploring the possibility of expanding the use of that technology.

C. Policy and Regulation (Rules, Studies, Rates & Incentives)

There are numerous policy and regulatory issues that need to be examined to achieve the proceeding's objectives. The proceeding should identify, at a minimum, the following: (1) rules that can best optimize and promote DER and a smart grid; (2) rules that hinder the deployment of such resources; (3) appropriate methods for comprehensively valuing the benefits and costs of the existing distribution grid, smart grid enhancements, and DER; and (4) consistent with the foregoing findings, appropriate rate designs, incentives for stakeholders, and protective measures for low- and moderate-income ratepayers.

- Establish DER-promoting rules and reform those that deter DER deployment

Rules promoting DER should be considered for adoption by the Commission. The rules should address all aspects of the foregoing topics such as planning and technologies. The following are a few possible examples: rules to produce a collaborative IDP; rules to allow access to certain utility data necessary for location-based resource planning for DER; rules for both utilities and DER providers with respect to maintaining reliability and resiliency; rules to clarify the legal status of a multi-user microgrid owner/operator under the Commission's jurisdiction, including

[43] "District Energy System" indicates a centralized system of providing heating and cooling, and sometimes electricity, for multiple buildings.

[44] As more developers are pursuing more aggressive energy-efficient buildings and communities, including "Net Zero Energy" buildings, these non-electric/natural gas systems of heating and cooling could play a bigger role. "Net Zero" has been defined as buildings that "relay on exceptional energy conservation and on-site renewable generation to meet all of their heating, cooling and electricity needs." http://living-future.org/netzero

appropriate exceptions or modifications that should apply thereto;[45] and rules to identify and resolve regulatory conflicts that would hinder the expansion of district energy systems and their heating and cooling services. Additional consideration should be given to establishing a rule to facilitate fair and equitable access to the DER market.

- Engage in a comprehensive evaluation of the costs and benefits of DER and smart grid technologies

DER-enabling rules should be complemented with evaluation tools for measuring the cost-effectiveness of DER and smart grid technologies. Such evaluation will require a comprehensive identification of the costs and benefits of these resources and services. Many of the costs and benefits have been generally discussed in white papers and in other state proceedings that the participants may review as a starting point.[46] On the DER side, benefits to be identified should include capital investment deferral or avoidance, carbon reduction, energy use avoidance, line-loss avoidance, peak shaving, frequency regulation, reactive power, and resiliency. On the grid side, benefits to be identified should include back-up capabilities, voltage quality, and grid interconnectivity. DER costs should include costs associated with intermittency and load volatility, while grid costs are largely associated with repair, replacement, inefficiencies, and environmental impacts. Overall, these cost-benefit valuations, guided by the ultimate objective of enabling DER, should help inform potential new rates and tariffs to align stakeholders' long-term interests and address equity for ratepayers. On any of the foregoing discrete issues, DOEE suggests that technical studies be commissioned to arrive at informed recommendations.

- Establish incentives and disincentives, based on the valuations of DER and smart grid, to align stakeholders' interests.

Finally, the proceeding should identify meaningful financial incentives and disincentives for all stakeholders to successfully deploy DER. These incentives and disincentives should inform new rates and tariffs that reflect the sustainable and resilient values of DER. DOEE suggests that, following other jurisdictions, this Commission consider forward-looking performance-based ratemaking as a way to increase the deployment of DER and incentivize the utilities.[47] Under

[45] DOEE's initial review is that most microgrids that are contemplated in the District are unlikely to have large enough generation capacity to trigger the review by the Federal Energy Regulatory Commission.

[46] See supra FNs. 20, 23, and a report titled "Accurately Valuing Distributed Energy resources," http://www.rmi.org/elab_empower. See also http://www.brattle.com/news-and-knowledge/news/study-by-brattle-economists-quantifies-the-benefits-of-utility-scale-solar-pv.

[47] New York's Reforming the Energy Vision Track 2 is examining the performance-based ratemaking, and in other jurisdictions, such as North Carolina, its utilities are rewarded for helping ratepayers achieve energy efficiency and demand response. Also, the innovative performance rate model produced in England, called RIIO (Revenue= Incentives + Innovation + Outputs), may be worth our consideration. https://www.ofgem.gov.uk/ofgem-publications/53599/1riiot1fpoverviewdec12.pdf. See also "Utility Performance Incentive Mechanisms,"

performance-based ratemaking, utilities would be allowed to recover a higher rate of return for better performance on new metrics such as carbon reduction, energy use avoidance, investment avoidance or deferral, and resiliency. In addition, rates and incentives to reduce peak demand, which determines the size of the delivery infrastructure, should be explored, including programs similar to Pepco's proposed critical peak rebate program, and Time-Of-Use rate programs to allow interested customers to reduce or shift their energy use. Incentives to increase the use of existing grid assets (i.e., the grid utilization rate) through grid efficiencies (e.g., Volt/VAR optimization) should also be considered. For microgrids, which effectively function as Virtual Power Plant,[48] it may be useful to consider a separate pilot tariff, given their complexities.

Rates and incentives should take into account not only the economic and environmental values, but social values of equity and access as well. A separate ratepayer impact on the low- and middle-income ratepayers should be performed to help establish a DER policy for those ratepayers. A DER policy on low- and middle-income ratepayers should inform the rate design of the modernized energy system, including any revenue-loss adjustment mechanisms, to prevent an undue burden on those ratepayers. In terms of interactivity, additional measures should be considered that would lower the barriers for third-party service providers to help willing customers customize and enhance their energy management through smart meters, in-home displays, and other energy management devices for residential and commercial ratepayers. [49] Lastly, to promote greater access to all ratepayers of DER, innovative tools such as On-Bill Financing should be considered to finance proven energy-saving programs, which have been adopted in many jurisdictions.[50]

5. Conclusion

A comprehensive and collaborative investigation of the aforementioned topics should pave a way for the modernization and evolution of the District's energy system toward greater sustainability. This proceeding should examine the impact and value of DER integration on grid economics and operation, viewing the distribution system and DER as evolving segments of the overall energy system. DDOE believes that an outcome of this proceeding should be to produce a set of near-term and long-term implementation actions that will facilitate a robust deployment of DER.[51]

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http://www.synapse-energy.com/sites/default/files/Utility%20Performance%20Incentive%20Mechanisms%2014-098_0.pdf.

[48] http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/ABB_Attachment.pdf

[49] Consolidated Edison is undertaking demonstration projects for the residential and commercial sectors on customized energy use management. http://www.capitalnewyork.com/sites/default/files/CONEDDEMO2.pdf; http://www.capitalnewyork.com/sites/default/files/CONEDDEMO1.pdf

[50] http://aceee.org/sector/state-policy/toolkit/on-bill-financing

[51] DOEE believes that there should be a discussion on providing adequate institutional resources to allow for robust analyses, case studies, and pilot projects where necessary.

CERTIFICATE OF SERVICE

I hereby certify that on this 31st day of August, 2015, I caused true and correct copies of the Department of Energy and Environment's Comments on the Scope of this Proceeding to be emailed to the following:

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