GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE ATTORNEY GENERAL

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ATTORNEY GENERAL

Public Advocacy Division
Social Justice Section

E-Docketed

November 4, 2022

Ms. Brinda Westbrook, Secretary
Public Service Commission
of the District of Columbia
1325 G Street, N.W., Suite # 800
Washington, DC 20005

Re: Formal Case No. 1169 – In the Matter of the Application of Washington Gas Light Company for Authority to Increase Existing Rates and Charges for Gas Service.

Dear Ms. Westbrook:

On behalf of the District of Columbia Government, I enclose for filing the Direct Testimony of Dr. Asa S. Hopkins – Exhibit DCG (A) -- in the above-captioned proceeding. If you have any questions regarding this filing, please contact the undersigned.

Sincerely,

KARL A. RACINE
Attorney General

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BEFORE THE
PUBLIC SERVICE COMMISSION
OF THE DISTRICT OF COLUMBIA

WGL's Application for Authority to Increase Existing Rates and Charges for Gas Service in the District of Columbia

Formal Case No. 1169

Direct Testimony of
Dr. Asa S. Hopkins

On Behalf of

The District of Columbia Government

Exhibit DCG (A)

November 4, 2022

TABLE OF CONTENTS

EXHIBITS

I. INTRODUCTION AND QUALIFICATIONS

Q1 Please state your name, business address, and position.

A1 My name is Asa S. Hopkins. My business address is 485 Massachusetts Ave., Suite 3, Cambridge, Massachusetts 02139. I am a Vice President at Synapse Energy Economics, Inc. Among other work, I lead Synapse's consulting regarding the future of gas utilities, and I also work extensively in the related area of building decarbonization technology and policy.

Q2 Please describe Synapse Energy Economics.

A2 Synapse Energy Economics is a research and consulting firm specializing in energy industry regulation, planning, and analysis. Synapse works for a variety of clients, with an emphasis on consumer advocates, regulatory commissions, and environmental advocates.

Q3 Please describe your professional experience before beginning your current position at Synapse Energy Economics.

A3 Before joining Synapse Energy Economics in 2017, I was the Director of Energy Policy and Planning at the Vermont Public Service Department from 2011 to 2016. In that role, I was the director of regulated utility planning for the state's public advocate office, and the director of the state energy office. I served on the Board of Directors of the National Association of State Energy Officials. Prior to my work in Vermont, I was an AAAS Science and Technology Policy Fellow at the U.S. Department of Energy, where I worked in the Office of the Undersecretary for Science to develop the first DOE Quadrennial Technology Review. Prior to my time at the U.S. DOE, I was a postdoctoral fellow at Lawrence Berkeley National Laboratory, working on appliance energy efficiency standards. I earned my PhD and Master's degrees in physics from the California

Institute of Technology and my Bachelor of Science degree in physics from Haverford College. My resume is attached as Exhibit DCG (A)-1.

Q4 Have you previously testified before the District of Columbia Public Service Commission?

A4 Yes. I testified on behalf of the District of Columbia Government (DCG or the District) in Formal Case No. 1142 (FC 1142), *In the Matter of the Merger of AltaGas, Ltd. and Washington Gas Holdings, Inc.*

Q5 What is the purpose of your testimony?

A5 The purpose of my testimony is to review Washington Gas Light Company's (WGL) application for a rate increase from the standpoint of the District's climate and clean energy policies.

II. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q6 Please summarize your primary conclusions.

A6 My primary conclusions are summarized as follows:

- WGL continues to take a business-as-usual approach to its core business, while District policy would indicate a need for changes.

- WGL's proposals in this case would have the effect of shifting risk from the utility's investors to its customers.

- WGL's business-as-usual approach also increases risks in the future. This is illustrated by the company's continued investments in PROJECT*pipes* and its proposal to use ratepayer funds to encourage the use of efficient gas equipment, both of which increase stranded cost risk.

- WGL's proposed Climate Action Recovery Tariff (CART) mechanism would shift risk from investors to ratepayers by giving WGL an account through which it can charge ratepayers for new costs with limited review.

- The specific expenditures that WGL proposes to fund using the CART in its first year are not well justified and do not require this special regulatory treatment.

- WGL's proposal to recover costs for supposed low-carbon fuels is not well supported.

- WGL's proposed decoupling mechanism (the so-called Climate Progress Adjustment or CPA) would transfer risk to ratepayers. The details of a decoupling regime's structure matter a great deal in evaluating whether the resulting risk transfer is a good deal for the District of Columbia ratepayers.

- WGL Witness D'Ascendis's claims regarding WGL's business risk are misleading and not well supported.

Q7 Please summarize your primary recommendations.

A7 I recommend that the Commission:

- Support the development of a gas utility business model that is consistent with the District's climate and clean energy policies. This carries over beyond this case, into the Commission's consideration of utility climate plans and a shared roadmap in Formal Case No. 1167 (FC 1167), energy efficiency programs in Formal Case No. 1160 (FC 1160), and its recurring oversight of the PROJECT*pipes* program.

- Reject WGL's proposals that inappropriately shift risk from investors to customers, such as the CART mechanism, and account for any risk shifts that the Commission does approve when it is setting the allowed return on equity and capital structure.

- Reject WGL's request for pre-approval of its identified CART investments outside the test year.

III. THE DISTRICT'S CLIMATE POLICY

Q8 Please summarize the District's climate policies.

A8 The District issued its Clean Energy DC Plan in August 2018. Clean Energy DC is an aggressive climate plan to achieve at least 50 percent greenhouse gas (GHG) emissions reduction by 2032 below 2006 levels and to put the District on a path to achieve carbon neutrality by 2050 in all sectors.[1] The plan identifies specific actions that need to be taken through 2032 in the building, transportation and energy supply sectors. Subsequently, the District passed the Clean Energy DC Omnibus Amendment Act of 2018 (CEDC Act), in order to support the goals of the Clean Energy DC Plan. Some of the key policies adopted in the Act include (a) strengthening the mandate of the District's Renewable Energy Portfolio Standard to 100 percent renewable energy by 2032; (b) adopting the Building Energy Performance Standard (BEPS), which requires large buildings to reduce energy consumption by 20 percent over the 5-year compliance period; and (c) establishing a few key initiatives on transportation electrification including a transportation electrification program. The CEDC Act also proposed new programs to support workforce development, equity, and the promotion of Certified Business Enterprises.[2]

[1] Department of Energy & Environment. 2018. *Clean Energy DC*. Available at: https://doee.dc.gov/cleanenergydc

[2] Clean Energy DC Omnibus Amendment Act of 2018. Available at: https://doee.dc.gov/node/1429721.

The District recently further advanced its climate policies in 2022 by releasing its *Transportation Electrification Roadmap* (TER) and adopting the Climate Commitment Act of 2022 and the Clean Energy DC Building Code Act. The TER focuses on the transition from fossil-fuel-based vehicles to highly efficient and zero-emission electric vehicles as the key technology. It establishes short-to-medium-term emissions reduction targets for the overall vehicle fleet and for specific vehicle types, such as public and school buses, passenger vehicles, and commercial fleets.[3] The Climate Commitment Act of 2022 codified the District's updated GHG reduction goals, which include: accelerating the District's climate commitments to reach carbon neutrality by 2045; setting certain interim GHG reduction targets; prohibiting the government from installing fossil-fuel-burning heating systems by 2025; and requiring purchase or lease of only zero-emissions vehicles starting in 2026.[4] Finally, the Clean Energy DC Building Code Amendment Act of 2022 requires a net-zero-energy standard for all new construction buildings beginning in 2027.[5]

IV. WGL'S CLIMATE PLANNING IN THE DISTRICT'S CLIMATE POLICY CONTEXT

Q9 Has WGL described its proposed approach to reducing GHG emissions in the District?

A9 Yes. WGL and AltaGas prepared a *Climate Business Plan* (CBP) in response to a requirement resulting from the merger proceeding, FC 1142. WGL has subsequently filed that plan along with 5-year and longer-term action plans in FC 1167.

[3] Department of Energy & Environment. 2022. "DOEE Announces Release of 'Roadmap' to Electrify Vehicles by 2045." Available at: https://doee.dc.gov/release/doee-announces-release-%E2%80%98roadmap%E2%80%99-electrify-vehicles-2045.
[4] Climate Commitment Act of 2021. Available at: https://lims.dccouncil.gov/Legislation/B24-0267
[5] D.C. Law 24-177. Clean Energy DC Building Code Amendment Act of 2022. Available at: https://code.dccouncil.gov/us/dc/council/laws/24-177.

Q10 Has the District Government (DCG) evaluated these WGL documents?

A10 Yes. The Department of Energy and Environment (DOEE), through the Office of the Attorney General (OAG), with the assistance of Synapse Energy Economics, have filed comments on behalf of the DCG in both FC 1142[6] and FC 1167.[7]

Q11 Are you familiar with the DCG's comments in these cases?

A11 Yes. I led a team that assisted DOEE and OAG in developing these comments.

Q12 Could you summarize some of the important points from the DCG's comments on WGL's filings, as you see them?

A12 DCG's initial comments on the CBP begin with an essential point which has not been rectified through any subsequent filing or analysis presented by WGL: "the Plan presents a vision of the energy future of the District of Columbia that largely ignores the District's vision of a decarbonized future and its decarbonization policy as embodied in the Mayor's carbon neutrality pledge, the Sustainable DC plan 2.0, the Clean Energy DC Plan, and the Clean Energy DC Omnibus Amendment Act.... In short, DOEE believes, regrettably, that the Plan as submitted is incompatible with the District's climate policy and decarbonization efforts..."[8]

DCG's initial comments on the CBP also made the critical point that the CBP is not, in fact, a business plan. It does not contain the essential elements of a business plan "such as an in-depth market analysis, cost and revenue analysis and

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[6] Formal Case No. 1142 "Comments by the Department of Energy and Environment on behalf of the District of Columbia Government Concerning AltaGas Ltd.'s Climate Business Plan" (June 26, 2020) (FC 1142 Comments). Available at https://edocket.dcpsc.org/apis/api/Filing/download?attachId=105393&guidFileName=9bdbe1aa-b3f8-4282-8dbe-e5f994464caa.pdf.
And Formal Case No. 1142 "Department of Energy and Environment's Reply Comments an Altagas Ltd.'s Filing Regarding Merger Commitment Nos. 79 And 6" (September 25, 2020). Available at: https://edocket.dcpsc.org/apis/api/Filing/download?attachId=108121&guidFileName=1810f7da-a155-478f-8d3d-a7832e91ccbd.pdf.

[7] Formal Case No. 1167, "District of Columbia Government's Consolidated Reply Comments on Washington Gas Light Company's Climate Business Plan" (October 3, 2022) (FC 1167 Reply Comments).

[8] FC 1142 Comments, p. 1.

projections, and regulatory strategies."[9] While AltaGas does propose a set of sweeping changes to the regulatory paradigm for WGL, the CBP presents:

> no analysis or argumentation regarding the impact or wisdom of the changes proposed, and makes no proposal regarding how its returns to shareholders or capital structure would be impacted by these changes.... AltaGas's CBP does not describe a vision for Washington Gas as to how it will provide customer value in a non-fossil fuel world. It does not suggest innovative services or even describe a pathway to developing such services. Absent any discussion of potential 'end state' of a natural gas utility in a world without natural gas, it does not offer a transition pathway to that business. The CBP fails to include marketing or operational approaches, and critical financial issues are addressed only in the ICF Technical Study Summary Report where they are raised only to identify that they were not fully considered.[10]

In addition to identifying numerous failings in the analysis of costs and benefits of different scenarios in the CBP, DCG has also pointed out that the CBP and associated filings do not contain a benefit-cost analysis (BCA) that is consistent with the Clean Energy Act Implementation Working Group (CEAIWG) recommendations regarding BCA.[11] While the Commission has not yet formally adopted a BCA framework based on the CEAIWG recommendations, the Commission ordered WGL to provide a robust BCA in FC 1167 (which it did not do in the CBP) and DCG concluded that the filings do not meet that bar.

DCG's comments in FC 1167 also quantified some of the risks facing WGL and ratepayers in the event that the utility does not change its business model from its business-as-usual approach. For example, DCG commented that WGL could face tens of millions of dollars per year in stranded costs (that is, assets that are no longer used and useful but are not fully depreciated).[12] DCG further commented that WGL's preferred approach (from its CBP) would result in substantial per-

[9] FC 1142 Comments, p. 5-6.
[10] *Id.*, p 65.
[11] FC 1167 Reply Comments, p. 5-7.
[12] *Id.*, p. 31.

customer cost increases for gas customers, which would make electrification an increasingly attractive option for building owners over time.[13]

Q13 How do WGL's proposals in this case relate to its CBP and the associated filings in FC 1167?

A13 WGL's proposals in this case reflect the same kind of business-as-usual approach to the gas utility business model that is reflected in the CBP and associated filings. In this case, as in those filings, WGL shows no interest in exploring alternate business models, and instead proposes to take incremental actions that are not commensurate with the scale, scope, or direction of the decarbonization challenge facing the District. In dollar terms, WGL's largest nominally-climate-related investment class is the continuation of PROJECT*pipes*, which is presented without any changes to reflect reductions in future demand for pipeline gas. Other proposals in this case, consistent with the CBP and associated filings, reflect business-as-usual approaches to customer equipment and incremental changes in infrastructure, operations, and fuel supply practices.

V. WGL'S PROPOSALS INAPPROPRIATELY SHIFT RISK

Q14 What impact would WGL's proposals in this proceeding have on the risk facing the company's customers, relative to its investors?

A14 In general, WGL's proposals shift risk from investors to customers.

Q15 Is it appropriate for regulators to approve a risk shift from investors to customers?

A15 The right amount of risk for each party in the regulated utility construct is a matter for some discretion and policy choice. If investors bear a larger portion of the risk of running a prudently managed company, they will demand a higher rate of return. Customers therefore might pay more, overall, for their service in

[13] FC 1167 Reply Comments, p. 33.

exchange for a lower risk exposure. The opposite case can also be true. Regulators are constantly weighing this effect to determine an appropriate amount of risk.

Q16 If customers, through their elected representatives, establish a policy direction that is proven to increase the risk facing a prudently managed utility, should customers bear a larger portion of that risk?

A16 Again, this matter is a balancing act for the regulator. However, it could be appropriate for customers to bear some of the additional risk in the case where a new risk is well supported, and the customers are responsible for the creation of that risk. I would emphasize, however, that customers should only bear the risk that cannot be mitigated by prudent utility management responding to its policy context. If a utility fails to respond prudently to its policy context and thereby creates risk for itself, customers should not be asked to pay for that risk (e.g., in the form of a higher return on capital) or foot the bill for losses the company may incur (e.g., due to imprudently incurred stranded costs).

Q17 Has WGL shown that the District's climate change policies increase its business risk?

A17 No. First, the District's climate policy advancing deep decarbonization has been clear for many years. As I testified in FC 1142, this policy creates challenges for the traditional gas utility business model. These challenges do not, however, necessarily lead to greater business risk, because prudent utility managers can take actions to mitigate the risks associated with deep decarbonization.

Q18 If WGL were to show that its actions and proposals were consistent with the District's policy and approach toward deep decarbonization, would it be appropriate for WGL's ratepayers to bear some of the risk associated with those actions and proposals?

A18 Yes, it could be appropriate to change the balance of risk between customers and investors to support prudent utility actions that are consistent with policy objectives.

Q19 Has WGL sufficiently demonstrated that its actions and proposals are consistent with the District's policy and approach toward deep decarbonization?

A19 No, it has not. As I quoted above, DCG has stated that WGL's CBP is incompatible with the District's climate policy and decarbonization efforts. WGL's subsequent filing in FC 1167 has not changed WGL's stated approach, and nothing in the present case indicates a change. It is therefore not appropriate for District of Columbia ratepayers to take on more risk, shifted from investors, in order to support WGL's incompatible actions.

Q20 Have WGL's CBP and associated filings allayed the concerns you raised in your testimony in FC 1142 that the utility's business model might need to change substantially in order to meet the District's policy objectives?

A20 No, they have not. As I pointed out in that testimony, low-carbon gas availability continues to be a major source of risk for an approach that depends on these fuels, and an electrification path would be more certain to achieve the District's objectives. WGL has not addressed the risk associated with its preferred path, and it has not developed a business model evaluation and evolution approach that addresses these risks.

Q21 Would the residents and businesses in the District of Columbia benefit from a comprehensive assessment of gas utility business model options?

A21 Yes. The complex dynamics between customers, two regulated energy utilities (WGL and the Potomac Electric Power Company), and policymakers all impact the costs and benefits that District of Columbia residents can expect in the energy transition, especially regarding the future of the gas system and space and water heating. A business model roadmap would help all players understand the lay of the land. Since WGL has not embraced the opportunity to conduct this kind of analysis in its CBP or FC 1167, the Commission or DOEE should take on this task. Unfortunately, these agencies do not have the expertise and data access that the utility has about its system, so Commission support to require data access and

transparency may be required in order for such a project to provide its full potential of benefits to the public.

Q22 You have been discussing the allocation of risk between investors and ratepayers. Does WGL's proposed approach also shift risk in other ways?

A22 Yes. Specifically, WGL's business-as-usual approach reduces costs today but at the expense of increased cost and risk in the future, when future residents and investors will need to address it.

Q23 How does a business-as-usual approach increase risk in the future?

A23 In the context of rapid change in the energy system, a business-as-usual approach puts off the date of reckoning with that change. Investing in business-as-usual assets today that have a lifetime comparable to or longer than the timeframe for change creates future stranded asset risks, which will need to be addressed by residents and investors in the future. These risks can be mitigated (such as by changing depreciation rates to match a shorter useful life and by minimizing risky investments), but that mitigation itself requires a change away from business-as-usual approaches.

Q24 If WGL's actions are increasing risk in the future, as you claim, who should bear that risk?

A24 WGL's investors should bear the increased risk. WGL's management is choosing to prepare for the future in a way that is inconsistent with the District's approach. Therefore, District of Columbia residents and businesses should not be bear the burden if WGL's choices lead to stranded costs, higher cost of capital, or other negative outcomes.

Q25 What are some examples of WGL's approach that shift risk in this way?

A25 Two clear examples are the company's continued business-as-usual approach to leak-prone pipe replacement through PROJECT*pipes*, and WGL's proposed expansion of energy efficiency programs to support traditional gas appliances.

PROJECTpipes

Q26 Please describe your first example, PROJECT*pipes*.

A26 The PROJECT*pipes* replacement program targets old, leak-prone pipes for replacement. Such replacement extends the engineering lifetime of the specific section of pipe that is replaced, by 50 years or more, and increases the physical life of the overall system or section of the system. This long engineering life is in tension with the timeline specified by the Climate Commitment Act's GHG reduction goals, which include achieving carbon neutrality by 2045. The District's comments in FC 1167, as well as other parties' comments, raise substantial concerns about the feasibility, risk, and cost of achieving these targets using WGL's preferred scenario, Fuel-Neutral Decarbonization. Despite this timing mismatch, WGL has not proposed to reduce its PROJECT*pipes* investment in its CBP, nor does it propose to do so in this rate case.

WGL's failure to adjust its PROJECT*pipes* investment means that it is not optimizing its system to account for electrification. Some level of electrification—whether in response to federal policies, District policies, heating cost differentials between electric and gas, technology improvements, or other factors—will occur over the lifetime of the new pipes that WGL proposes to install under PROJECT*pipes*. Some sections of pipe may no longer be needed due to electrification. A managed, targeted approach to electrification would allow even more sections of pipe to be retired rather than replaced.

Based on modeling presented in the District's comments in FC 1167, WGL would more than double its rate base in real terms by continuing to invest in infrastructure over the next 20 to 30 years, if it pursues a path consistent with its preferred scenario. Retiring pipe and optimizing rate base would reduce burdens on future customers. Conversely, continuing to pursue a business-as-usual approach poses a high risk of stranded assets in the future.

Energy efficiency programs

Q27 Is WGL proposing to implement any gas energy efficiency programs? If so, please describe the programs.

A27 Yes. Per the direct testimony of Joshua McClelland, WGL is planning to offer gas equipment incentive programs that were recently discontinued by the District of Columbia Sustainable Energy Utility (DCSEU). Mr. McClelland states that the intention of this proposal is "to ensure the full extent of energy savings are captured from all fuel types to better support the District's climate goals."[14] Mr. McClelland also states that the DCSEU's decision to discontinue the gas equipment incentive program "limits the DCSEU's ability to maximize its contributions to the District's ambitious climate goals."[15]

Q28 Does WGL's proposal to offer gas equipment incentives ensure the full extent of energy and emissions savings and better support the District's climate goals?

A28 No. It's quite the opposite. It is highly likely that WGL's proposal will hinder the District's initiatives from reducing energy and emissions to meet the District's climate goals in a timely manner. In fact, the DCSEU decided to discontinue gas equipment incentives in order to support the District's building decarbonization initiative by shifting the funding to provide rebates to electric heat pumps. As stated in WGL's 2021 annual report, "[i]n preparation for FY 2022 and beyond, in August the DCSEU announced it would no longer be offering rebates on natural gas heating equipment and raised rebates on electric heat pumps and heat pump water heaters as the District seeks to decarbonize."[16]

[14] Exhibit WG (K), Direct Testimony of Joshua McClelland, p. 7.
[15] *Id*., p. 6.
[16] DCSEU *2021 Annual Report*. p. 17. Available at: https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/DCSEU-AnnualReport-Final-11.30.2021.pdf.

Q29 Is WGL's proposal to offer incentives to gas equipment inconsistent with the District's climate policy?

A29 Yes, WGL's proposal is inconsistent with the District's climate policy. The Clean Energy DC Plan specifically identifies the importance of the use of high-efficiency electricity-based heat pumps to decarbonize the building sector. It also cautions against unintentionally incentivizing fuel-switching away from electricity to natural gas. As the Clean Energy DC Plan states, "[w]ithout explicit recognition of the ultimate importance of long-term and permanent GHG reductions, using GHG savings as a benchmark could unintentionally incentivize fuel switching away from electricity and towards natural gas, which would be contrary to the long-term carbon reduction goals of the District."[17] The District's increasing ambition to be carbon neutral by 2045 makes it all the more important to get near-term program design right.

Q30 Please explain why it is important to discontinue gas equipment incentives and instead offer incentives to electric heat pumps.

A30 Mr. McClelland states that the impact of removing gas incentives would be losing about 2.18 million therms of natural gas savings and 11,526 metric tons of CO_2 equivalent savings based on DCSEU's 2020 performance.[18] However, promoting the installation of heat pumps that replace the existing gas heating system would generate a substantially larger amount of energy and emissions savings than what Mr. McClelland estimated and would do a better job of "ensur[ing] the full extent of energy savings"[19] to meet the District's climate goals. Based on my high-level calculation, I estimate that heat pumps would save over three times more emissions than efficient gas heating systems would using today's grid emissions rate and about 8 times more if the grid is fully powered by renewable energy.

[17] *Id*., p. 86.
[18] Exhibit WG (K), Direct Testimony of Joshua McClelland, p. 6.
[19] *Id*., p. 7.

Q31 Please elaborate on your emissions savings calculations associated with heat pumps.

A31 If we assume that the Mr. McClelland's energy and emissions savings estimates are comparable to the difference between 85 percent and 95 percent efficient gas heating equipment, the energy and emissions savings from using 95 percent efficient equipment would be equal to about 12 percent savings. If consumers switch to heat pumps from gas heating, the total savings would be the entire gas usage, which is about 17.6 million therms of natural gas instead of just the 2.18 million that Mr. McClelland cited for the DCSEU's 2020 gas savings. From an emissions perspective, the total emissions reductions directly associated with the gas usage reduction using heat pumps would be about 93,000 metric tons of CO_2 equivalent or 8 times more CO_2 equivalent emissions savings than the savings achieved with only gas equipment efficiency improvement. These emissions reductions are not the total net reductions; we still need to take into account the emissions associated with heat pumps for their electricity usage.

Using current average grid emission rates of 843 lbs per MWh (or 0.38 metric tons per MWh) in the District of Columbia based on data available from PJM, I estimate that the electric use emissions from heat pumps in a similarly-scaled program would be about 56,000 metric tons. This assumes total energy consumption of about 500 billion Btu or 146 GWh by these heat pumps based on an average efficiency of 300 percent (or a coefficient of performance of 3) for heat pumps and the total gas heating demand being replaced of 17.6 million therms. This means that the total net emissions reductions from heat pumps would be about 37,000 metric tons (that is, 93,000 minus 56,000 metric tons). This savings amount is 3.2 times greater than the emissions savings we would expect from simple efficiency improvements from gas heating systems. However, it is also important to note that the total emission reductions from heat pumps are expected to increase over time as the grid gets cleaner with a higher penetration of renewable energy. When the grid is powered 100 percent by renewable energy, the total avoided emissions using heat pumps would reach the entire 93,000

metric tons of CO_2 equivalent or 8 times more savings than just gas heating equipment efficiency improvements.

The incentives provided for electric heat pumps and gas heating systems are comparable to each other, but shifting the focus of heat pump incentives may require the DCSEU to increase the level of incentive.[20] If we assume that fuel-switching to heat pumps from gas requires twice as much incentive as the incentive for gas equipment, I expect that the emissions reductions from heat pumps would be reduced by half if funded at the same level. This result is still substantial, ranging from 1.6 times to 4 times greater emissions reduction than we expect from gas heating efficiency programs. This clearly shows that offering incentives to heat pumps instead of efficient gas heating systems will maximize any available funding and programmatic contributions to the District's climate goals.

Q32 Are there any other reasons why it is important to discontinue broadly available gas equipment incentives?

A32 Yes. Customers who install new long-lived gas equipment (like space and water heating equipment) are making a commitment to use gas, at whatever rates prevail, for the expected life of the equipment or face an extra early-replacement cost (that is, the customer equivalent of a stranded cost). Government-approved incentive programs, such as those run by DCSEU or proposed by WGL, send a signal to customers that the equipment supported is a suitable investment. Given the District's policy with respect to building sector decarbonization and the likelihood of escalating gas rates under all decarbonization pathways, providing a governmental blessing for risky gas equipment purchases is problematic as a matter of public policy.

[20] The incentive amounts range from $345 to $805 for gas furnaces and boilers in Maryland per WGL's own offering available at: https://wgsmartsavings.com/programs-rebates/md/home-heating. The incentive amounts for heat pumps range from $375 to $700 per the DCSEU's website, available at: https://www.dcseu.com/homes/home-heating-cooling#get-started.

Q33 Does DCG support gas equipment installation through its programs?

A33 Yes, although only in very limited circumstances. Specifically, for low-income residents, DOEE supports efficient gas equipment replacement and repair in emergency situations (where a resident would otherwise be without heat) or where there is a gas safety issue. These are customers that would be likely to also receive substantial assistance with future decarbonization actions in their buildings, such as heat pump installation and weatherization, so their increased risk is tempered by this governmental backstop.

Q34 Are there efficiency programs that WGL could implement that would be consistent with the District's climate policy and reduce, rather than increase, customer risk?

A34 Yes. In particular, programs that encourage building shell improvements, such as air sealing and insulation, are promising. WGL could add further support for DCSEU to implement those programs or work with DCSEU to identify a clear market segmentation that would increase capacity and support without adding confusion. Building shell improvements increase efficiency, comfort, and health regardless of the fuel that is used to provide heat, and they do not tie a customer to using a particular fuel.

VI. THE CART MECHANISM

Q35 Please describe WGL's Climate Action Recovery Tariff (CART) proposal.

A35 The CART would be a separate rider on customers' bills to collect funds intended to pay operating and capital costs associated with actions that WGL claims are related to climate action. The revenue requirement increase for each year would be limited to $750,000, so the CART could be $750,000 in year one, $1.5 million in year two, and $2.25 million the following year. When WGL has a rate case, its ongoing actions and capital investments would be rolled into the test year and the CART limits would reset. The CART would allow WGL to fund additional actions beyond its test year revenue requirement using ratepayer funds. WGL

proposes there would be a regulatory process to approve the CART revenue each year.

Q36 Does the CART represent a risk shift from investors to ratepayers?

A36 Yes. Without the CART, if the utility wants to take actions of the sort proposed it would have to either reduce budgets in other areas or spend shareholder funds. Then, if the expenditure proves to be prudent in the next rate case, it could be recovered going forward. This structure puts implementation risk and the risk of making prudent expenditure choices on utility management and shareholders. The CART would change this risk equation and transfer that risk on to ratepayers because it pre-approves expenditures using ratepayer money.

Q37 Are you saying that WGL should not pursue the actions described as being funded by the CART?

A37 No, not necessarily. What I'm saying is that if WGL believes that these actions are necessary and prudent, the utility can pursue them and the costs associated with these actions will be reviewed in their next rate case, just like any other expenditure is reviewed for necessity and prudency.

Q38 Has WGL laid out clear definitions for what actions are eligible for CART treatment?

A38 No. It appears that the *de facto* definition is anything that WGL would like to pursue that has a plausible link to climate change and for which the company has no other clear means for timely recovery (such as energy efficiency surcharges, purchased gas costs, inclusion in base rates, or accelerated pipeline replacement charges).

Q39 Would the proposed annual cost cap for the CART constrain utility use of this mechanism?

A39 The cost cap is a very loose cost-containment measure. First, the cap rises every year, and the incremental review of annual CART expenses is not likely to attract

the stakeholder scrutiny that they would get in a rate case. Second, WGL could take actions that go beyond the cap, create a regulatory asset for expenditures above the cap, and then ask ratepayers to pay for those actions in the future (with added profit as a return in exchange for advancing the funds for the actions). The regulatory asset approach could allow WGL to overrun cost estimates and yet still pursue recovery and a return on the excess costs from poorly managed projects and budgets.

Q40 Does the lack of a clear definition for how this charge would be used increase risk for ratepayers?

A40 Yes. If WGL can use this mechanism for any action that is plausibly related to reducing emissions, it opens the door for the company to ask ratepayers to cover a wide range of possible actions without assurance they are the most cost-effective or high-value actions related to fighting climate change. For example, WGL's proposal to replace the fuel cell at its Springfield Operations Center is driven by the end of the support contract for its existing fuel cell.[21] It happens that the vendor offers a hydrogen-compatible fuel cell, but WGL has no concrete plans to actually use hydrogen in it, and therefore there are no sure climate benefits.[22] This is a tenuous connection, at best, to meeting the District's climate change objectives, yet is being wrapped into a special "climate" tariff.

[21] F.C. 1169, WGL Response to DCG Data Request 1-2 (B), attached hereto as "Exhibit DCG (A)-2."
[22] *Ibid.*

VII. PROPOSED INFRASTRUCTURE AND OPERATION USES FOR CART FUNDS IN THIS FISCAL YEAR

Advanced leak detection

Q41 Why is advanced leak detection (ALD) important?

A41 The current practice of gas pipe replacements is that WGL replaces "leak-prone" pipes that are identified based on WGL's existing database on the type of gas pipe materials (e.g., cast iron, PVC, etc.) used in each location. This is an ineffective and costly approach to replace pipes because there is a chance that such an approach replaces pipes that do not have any leak problems, while neglecting pipes with greater risk. A better approach is to first identify methane leaks using ALD technologies and undertake a targeted pipe replacement or retirement program. This approach would minimize the cost of replacing leaky pipes and avoid unnecessary investments in new pipes. This in turn would minimize the risk of potential stranded assets as it would reduce the size of unnecessary, new investments in rate base.

Q42 Is there any utility example that relied on ALD technology to replace leaky pipes?

A42 Yes. PSE&G (New Jersey) collaborated with Environmental Defense Fund (EDF) to detect and replace leaky pipes from 2016 to 2018. The project focused on replacement of 102 miles of leaky pipes, rather than the business-as-usual practice that would have replaced 157 miles of pipe and achieved the same methane emission reduction.[23] This program thereby avoided the substantial cost of replacing 55 miles of gas pipelines: assuming the cost to replace one mile of gas pipe ranges from $1.5 million to $2 million, the reduction of 55 miles of pipe

[23] EDF. n.d. "Collaboration with PSE&G." Available at https://www.edf.org/climate/methanemaps/pseg-collaboration.

replacement would amount to about $83 million to $110 million of capital savings for ratepayers.

Q43 Please describe WGL's proposal on its ALD pilot.

A43 WGL is proposing to continue implementing a pilot program to detect methane leaks using an ALD technology that WGL has already deployed and tested for over 18 months as part of the PROJECT*pipes* 2 program. This ALD technology is a satellite-based technology developed by Satelytics. Ms. Adams states in her testimony that this ALD technology "may enable the Company to enhance emissions detection, reduction, and operational efficiency."[24] The total proposed budget for the ALD pilot program is $300,000, which represents a one-time annual total cost under the CART mechanism as shown in the table on page 8 of Ms. Adams' testimony.

Q44 Is this technology appropriate for further testing?

A44 No. WGL filed an ALD Final Report on the evaluation of this technology after 18 months of testing as directed by the Commission's Order No. 20671.[25] As DCG pointed out in its comments regarding the ALD Final Report, the ALD Final Report demonstrated that Satelytics' ALD technology is not ready to be deployed for leak detection in the District of Columbia.[26] DCG summarized that "WGL's ALD Final Report demonstrates that WGL's unexpected use of satellite-based ALD technology ("Satelytics") is not an appropriate form of ALD for the District of Columbia. Satelytics technology proved to be highly inaccurate at detecting leaks. Moreover, WGL failed to meaningfully test any other forms of ALD technology."

[24] Exhibit WG (L), Direct Testimony of Melissa Adams, p. 10.
[25] Formal Case No. 1154, WGL's Advanced Leak Detection Pilot Final Report (filed June 13, 2022).
[26] Formal Case No. 1154, District of Columbia Government's Comments in Response to Washington Gas Light Company's Advanced Leak Detection Pilot Project Filings.

Q45 Should WGL be allowed to recover the cost of further testing of the satellite-based ALD using the CART mechanism?

A45 No. WGL's ALD pilot proposal is doubling down its commitment to the satellite-based technology produced by Satelytics despite the unsuccessful result of the previous pilot. This proposed pilot, if paid for by the CART mechanism, would further shift proven performance risks to ratepayers. If WGL wishes to continue testing the same unreliable technology, WGL should recover the cost of the pilot from its investors.

Q46 Is there any other technology that WGL should use instead to detect methane leaks?

A46 Yes. WGL should employ the vehicle-mounted methane detectors that it originally proposed as part of its PROJECT*pipes* 2 plan. The Commission's Order No. 20671 summarized this plan and approved WGL's ALD technology pilot while directing the company "to establish a regulatory asset account for up to $1.4 million for the costs associated with this pilot program over the three-year approved period."[27] However, WGL instead tested a satellite-based leak detection technology in this pilot as mentioned above. The District's comments on the ALD Final Report presented a result of a District-funded 2021 study that tested a road survey using a vehicle-mounted detection technology. The District's comments compared the result from this study with the result from WGL's satellite-based ALD technology and demonstrated that the vehicle-mounted detection technology produces a substantially greater number of instances of methane emissions leak locations.[28] Based on this result, the District requested that the Commission require WGL to instead conduct a road survey of methane leaks. I concur with the District's observation of the test results and the District's recommendation for the Commission.

[27] Formal Case No. 1154, Order No. 20671, page 31.
[28] *Ibid*.

Q47 If WGL proposes to conduct an ALD pilot based on a road survey method, should the Commission approve WGL's ALD pilot under the CART mechanism?

A47 No. While it is critical for WGL to continue detecting methane leaks from its gas pipes, any activities related to leak detection should be funded as part of regular safety and pipe replacement activities in base rates and PROJECT*pipes*, rather than the CART mechanism. This regulatory treatment is consistent with Commission Order No. 20671, which directed the company to create a new regulatory account and request cost recovery in the next rate case.

Direct emissions measurement

Q48 Please describe WGL's proposed investment related to direct emissions measurement

A48 WGL proposes to participate in a multi-sector study by the Gas Technology Institute that aims to enhance the accuracy of GHG measurement and reporting. More specifically, Ms. Adams states that this project "will develop protocols for the direct measurement of GHG emissions that occur in the delivery of geologic gas at various points along the value chain."[29] WGL's total cost share for this is $150,000, of which WGL proposes to allocate $27,000 to its customers in the District of Columbia. According to the table on page 8 of Ms. Adams's testimony, WGL intends to recover the District of Columbia's share of the multi-year study cost in the first year of the proposed CART mechanism.

Q49 Should the cost of the study on direct emissions measurement be recovered through the CART mechanism?

A49 No.

[29] Exhibit WG (L), Direct Testimony of Melissa Adams, p. 11.

Q50 How should the study cost be recovered?

A50 WGL's shareholders should cover the upfront cost of this study, or WGL could fund the study by increasing the efficiency of its normal operations. WGL has not sufficiently justified that WGL's customers in the District of Columbia will benefit from the study enough to pre-approve funding outside of the base rate. Instead, the study seems primarily aimed at understanding GHG emissions from the gas industry as a whole. This information is more important for WGL's shareholders (because of its implications for future business directions) than it is for its customers. If WGL believes that the study delivers net value to District of Columbia ratepayers, it could attempt to justify the net cost and the benefit in its next rate case and ask for recovery of the cost at that time.

Methane capture and reinjection

Q51 Please describe WGL's proposed investments regarding methane capture and reinjection.

A51 WGL has combined two separate actions into this proposed line item for the CART. The first is the use of drawdown compressors to collect gas from pipe that will be subject to repair or removal from service, and the reinjection of that gas into the system rather than losing it. WGL has already invested $630,000 in these systems (included in the 2021 test year). The company has another $60,000 in costs incurred (or planned) after the test year which it would like to include in the CART. The second action is the use of vacuum technology when bringing new infrastructure into service, which similarly reduces methane loss. The company proposes to spend $50,000 in capital on piloting this technology. Together these two investments total $110,000, of which 18 percent or $19,800 of capital would be recovered from District of Columbia customers over time, at a rate of $3,911 per year.

Q52 Is the drawdown compressor technology consistent with the District's climate policy?

A52 Yes, I think it is. Reducing lost methane from gas utility operations is an appropriate objective when it can be done cost-effectively. My calculations indicate that, using WGL's numbers for avoided emissions, the GHG emissions reductions from this program are relatively inexpensive compared with the societal cost of GHG emissions or the cost of reducing emissions using other means.

Q53 Is it therefore appropriate to include these costs in the CART mechanism and allow recovery to begin immediately?

A53 No. Regulators should expect actions that represent prudent utility behavior, including between rate cases. And in each rate case, the utility has an opportunity to demonstrate the value of each of its investments and begin to collect the return of and on that investment. The existence of a regulatory lag between when costs are incurred and when cost recovery begins provides an important signal to the utility regarding cost control, risk, and the importance of striving for cost-effective implementation. This applies to promising investments such as this one as much as it does to other investments.

Fleet Compressed Natural Gas (CNG) infrastructure

Q54 Please summarize WGL's plan for its fleet CNG infrastructure.

A54 WGL proposes to enhance its CNG fueling infrastructure at a cost of $565,000.[30] According to Witness Adams, one of the objectives of this proposal appears to be accommodating more CNG vehicles by replacing aging gasoline and diesel vehicles and procure renewable natural gas (RNG) for use in WGL's CNG fueling stations.[31] Another objective, Ms. Adams mentions, is to accommodate "the

[30] *Id.*, p. 17.
[31] *Id.*, p. 16.

installation of parallel hydrogen fueling infrastructure."[32] However, her testimony is unclear about how CNG fueling stations are relevant to hydrogen fueling infrastructure.

Q55 Is this proposal consistent with the District's climate policy?

A55 No.

Q56 What is the District's climate policy for the transportation sector?

A56 As mentioned previously, the Clean Energy DC Plan set aggressive GHG reduction goals of achieving at least 50 percent GHG emissions reduction by 2032 below 2006 levels and carbon neutrality by 2050 in all sectors. For the transportation sector, Clean Energy DC put the highest priority on the increased adoption of EVs and focused on policies and programs that support a transition to EVs, including EV transit buses.[33] Further, on August 3, 2022, the DCG released its Transportation Electrification Roadmap to help the District achieve zero-emission vehicles by 2045. The roadmap "focuses on shifting private, public, and transit vehicles from traditional fossil fuels to highly efficient and zero-emission electric vehicles, using three key methods,"[34] as follows:

- "Identifying and pursuing short-term strategies for the District to achieve at least 25% zero-emission vehicle registrations by 2030.

- Informing and guiding the District's medium-term strategy for converting its public buses, high-capacity private passenger/light-duty vehicles, and commercial fleets to electric vehicles (EVs) by 2045.

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[32] *Ibid*.
[33] Department of Energy & Environment. 2018. *Clean Energy DC Plan*. Available at: https://doee.dc.gov/cleanenergydc
[34] Department of Energy & Environment. 2022. "DOEE Announces Release of 'Roadmap' to Electrify Vehicles by 2045." Available at: https://doee.dc.gov/release/doee-announces-release-%E2%80%98roadmap%E2%80%99-electrify-vehicles-2045.

- Outlining clear pathways to achieve 100% replacement of DC's school buses with electric buses at the end of their useful life."[35]

Q57 Should the Commission pre-approve WGL's proposal on CNG infrastructure?

A57 No. Because WGL's plan is not consistent with the District's climate policy as mentioned above, it would shift unnecessary risks to ratepayers from WGL's investors. Thus, the Commission should not pre-approve WGL's proposal to enhance CNG fueling stations, even if such investments lead to RNG procurement. WGL instead could make this investment using shareholder funding if it still wishes to do so. If it can show net benefits to the District of Columbia, it could request cost recovery for the investment in its next rate case.

Q58 Are there any other reasons why the District should focus on EVs instead of CNG vehicles?

A58 Yes. EV fleets have a number of advantages in terms of efficiency and local emissions over CNG fleet vehicles. First, EV fleets produce no local air pollution and thus improve air quality in communities. This is particularly important for trucks and buses because these fleets need to make frequent stops and could produce pollution if they are diesel or CNG vehicles. While CNG vehicles are known to be relatively clean, they still produce pollution. In fact, a 2015 study by University of California found that vehicles using various natural gas fuels, including CNG produce pollutants such as particulate matter and nitrogen oxide.[36] Second, EVs generally have better fuel economy, and more so for buses and waste trucks because they are required to make frequent stops, which degrade the performance for internal combustion engine vehicles. According to a 2017 study by National Renewable Energy Laboratory, CNG buses achieved an average fuel

[35] *Ibid*.
[36] Durbin, D.T., et al. 2015. Evaluation of the Performance and Air Pollutant Emissions of Vehicles Operating on Various Natural Gas Blends – Phase 2. University of California CE-CERT. Available at: https://ww2.arb.ca.gov/sites/default/files/2020-04/NG_Refuse_Hauler_Final_Report_Phase2_CARB_March_2015.pdf.

economy of about 4.34 miles per diesel gallon equivalent (mpdge) and EV buses achieved an average fuel economy of 17.35 mpdge, or over 400 percent better fuel economy.[37]

Q59 Are these disadvantages of CNG vehicles applicable to CNG vehicles using RNG?

A59 Yes. These disadvantages of CNG vehicles are generally applicable to CNG vehicles that are fueled by RNG because the chemical composition of piped and compressed RNG is the same as other pipeline-quality gas.

Hydrogen fuel cell zero emissions mobility pilot

Q60 Please summarize WGL's Zero Emissions Mobility Pilot program

A60 Under this pilot program, WGL seeks to support "the deployment of up to two to four medium-duty hydrogen fuel cell electric vehicles ("HFCEVs") into the Washington Gas fleet."[38] The total cost of this pilot is expected to be approximately $4 million. Half of this investment is associated with the cost of the generation and refueling infrastructure, and the other half is associated with the procurement of two to four medium-duty HFCEVs.[39]

Q61 Should the Commission approve this proposal on fuel cell vehicles by WGL?

A61 No.

[37] Eudy, L. and Jeffers, M. 2017. *Foothill Transit Battery Electric Bus Demonstration Results: Second Report*. National Renewable Energy Laboratory. Available at: https://www.nrel.gov/docs/fy17osti/67698.pdf.
[38] Exhibit WG (L), Direct Testimony of Melissa Adams, p. 17.
[39] *Id.,* p. 18.

Q62 Please explain why the Commission should not approve this pilot program.

A62 There are numerous reasons why WGL's proposal is ill-suited for supporting the District's climate policy, as follows:

- **District climate policy**: As I summarized the District's climate policy on the transportation sector above, the major focus of the District's transportation climate policy is to deploy EVs, not fuel cell vehicles.

- **Applicability to the District**: According to Ms. Adams, one major reason why WGL is proposing hydrogen fuel cell vehicles is that "hydrogen fuel cells are ideal for the long-haul duty cycles required by the medium[-] and heavy-duty vehicle industry."[40] This major point has very little relevance for the District of Columbia because the demand for long-haul fleets is very small in the District of Columbia. Thus, such major barriers often cited for heavy-duty vehicles are not applicable to the District of Columbia's transportation climate roadmap.

- **Cost-effectiveness:** WGL provides no justification of cost-effectiveness of the proposed hydrogen fuel cell vehicles and associated infrastructure relative to any other alternatives.

- **Lack of data on operating costs:** WGL did not provide any information about operational costs of this pilot, such as the cost of producing or procuring hydrogen (using either methane or electricity).

- **Hydrogen fuel specification:** WGL did not commit to how hydrogen will be produced for the proposed hydrogen fuel cell vehicles. This production could potentially involve emissions from methane reformation, without carbon capture.

[40] *Id.*, p. 15.

Hydrogen-compatible fuel cell for building power generation

Q63 Please describe WGL's plan on a hydrogen-compatible fuel cell for building power generation.

A63 Ms. Adams provided just two sentences in her entire testimony regarding this proposal. She states "Washington Gas plans to upgrade the fuel cell in use at its Springfield Operations Center to accommodate the introduction of up to a 50% mix of hydrogen fuel. The capital cost of this upgrade is estimated at $950,000."[41]

No other information or justification was provided to support this proposal.

Q64 Should the Commission approve this proposal?

A64 No. The Commission should reject this proposal because WGL provides no justification and little information about the project. For example, WGL does not explain why it needs an upgrade to the facility to accommodate the introduction of up to a 50 percent mix of hydrogen fuel and the company does not make any commitments or plans to actually use hydrogen fuel. WGL does not explain how it would produce or procure hydrogen and the source of fuel for the hydrogen, or even whether the 50 percent share of hydrogen blend is in terms of volume of hydrogen or energy contents of hydrogen. Given that the gas pipeline system has a blend limit of 20 percent or lower (by volume), it is unclear whether this facility could ever be fueled with a higher hydrogen blend.

VIII. PROPOSED SOURCING AND SUPPLY ACTIONS

Q65 Please describe WGL's proposals to use gas purchasing as a GHG reduction strategy.

A65 As described by Witness Adams, WGL plans to provide customers with "low-carbon energy."[42] This includes (1) fossil gas that has been third-party certified

[41] *Id.*, p. 18.
[42] *Id.*, p. 19.

for adherence to specific GHG reduction practices (i.e., certified gas), (2) RNG, and (3) "clean" hydrogen. WGL plans to develop, file, and gain approval for tariffs for purchase and delivery of RNG and other low-carbon fuels to its customers.[43] WGL intends to secure these fuels from locally produced sources and out-of-territory supply sources.[44]

Q66 Do you have concerns with these plans?

A66 Yes, I have concerns with each of these types of "low-carbon" energy sources.

Q67 What are your concerns with certified gas?

A67 First, certified gas is not standardized. As discussed in the District's FC 1167 reply comments on WGL's CBP, there is no single entity that certifies the gas.[45] Different certifiers use different emissions accounting systems, and their methodologies may not be well documented. This sheds doubt on whether emissions claims would actually be realized. Second, the U.S. Environmental Protection Agency is currently considering promulgating regulations on emissions by the oil and gas industry; such regulations would reduce or eliminate the benefit of certified gas.[46] Third, certified gas is not expected to provide substantial emissions reductions. As noted in the District's FC 1167 reply comments, WGL estimates that certified gas will only provide a 4 percent reduction in emissions by 2032. Given these issues, I find that certified gas' contribution to GHG reductions would be uncertain and very limited.

[43] *Id*. p. 19.
[44] *Id.*, p. 20.
[45] FC 1167 Reply Comments, p. 14.
[46] United States Environmental Protection Agency. n.d. "Controlling Air Pollution from the Oil and Natural Gas Industry." Accessed at https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry on November 2, 2022.

Q68 What concerns do you have about purchases of RNG?

A68 WGL presents RNG as a strategy for reducing emissions.[47] However, RNG's carbon intensity—that is, the amount of GHGs emitted per unit of energy—varies substantially based on a number of factors. These factors include feedstock, production methods, location of production, and how the fuel is transported to the point of injection into the distribution system.[48] Some types of RNG can reduce carbon emissions over the lifetime of the resource, under an accounting framework that considers its 100-year global warming potential. ICF's 2019 study for the American Gas Foundation found that RNG from food waste in the Mid-Atlantic region is capable of moderately reducing emissions, accounting for emissions prior to injection into the distribution system.[49] On the other hand, RNG from landfill gas may have a carbon intensity in line with fossil gas, thus producing no emissions benefits relative to conventional fossil gas supply.

Q69 What are your concerns with hydrogen?

A69 WGL uses the term "clean hydrogen" but does not describe what that means. Green hydrogen refers to hydrogen produced using renewable energy to power an electrolysis process. This method of production can reduce GHG emissions, but it is an expensive, highly energy-intensive process. The high energy demands to produce green hydrogen would require substantial and costly buildout of renewable generation, infrastructure to transport the hydrogen, or both.[50] And since hydrogen is a potent GHG (8 times more potent than CO_2), any leaks could undo the benefits of this strategy.

There are limits on how much hydrogen can be safely blended into WGL's existing system without requiring changes in end-use equipment and distribution

[47] Exhibit WG (L), Direct Testimony of Melissa Adams, p. 6.
[48] ICF 2019. *Renewable Sources of Natural Gas: Supply and Emissions Reduction Assessment*. Prepared for the American Gas Foundation. Appendix B.
[49] ICF 2019.
[50] FC 1167 Reply Comments, p. 15-16.

pipes; these limits (5 percent hydrogen by volume or 1.75 percent by heat content[51]) appear to be lower than previously deemed acceptable (20 percent by volume or 7 percent by heat content). Given those small percentages, hydrogen that is blended into other gas could only make a small contribution to emissions reductions, short of replacing the distribution system and end-use equipment to allow higher concentrations of hydrogen. Replacement of the distribution system and end-use equipment to accommodate higher concentrations of hydrogen would be an inordinately high expense and, given the concerns I raise here, likely an imprudent use of ratepayer funds.

Q70 Do you have more general concerns?

A70 Yes. Any emissions reductions from WGL's proposals may not count toward the District's GHG goals. Currently, the DC emissions inventory does not capture the upstream impacts of fossil gas extraction, processing, and transportation.[52] This means that emission reductions associated with sources that are outside of the District of Columbia will not be credited toward compliance with DC's climate policy.

Q71 Does the District plan to include upstream emissions in the inventory in the future?

A71 Yes, it does.[53] However, even if lifecycle emissions were counted, then fossil gas would have substantially higher emissions overall. As discussed above, certified gas and RNG might look only slightly better than fossil gas in terms of emissions. "Clean" hydrogen would be very costly in terms of energy use and, if used in substantial quantities, would require replacement of distribution infrastructure and

[51] Penchev, M., T. Lim, M. Todd, O. Lever, E. Lever, S. Mathaudhu, A. Martinez-Morales, and A.S.K. Raju. 2022. *Hydrogen Blending Impacts Study Final Report*. Agreement Number:19NS1662. California Public Utilities Commission. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M493/K760/493760600.PDF.

[52] DOEE, 2006-2020 Greenhouse Gas Data. Available at https://doee.dc.gov/service/greenhouse-gas-inventories, accessed November 1, 2022.

[53] FC 1167 Reply Comments.

end-use equipment. In summary, these strategies are risky and not likely to be sufficient to meet the District's climate targets.

Q72 Does WGL propose to recover the costs of these supply options as a result of this rate case?

A72 Not at this time. WGL is investigating the capital and operations costs associated with these approaches and intends on incorporating these investments and costs into future CART filings.[54] If WGL were to include long-term capital costs associated with these supply options in the CART, they would be transferring long-term supply-side fuel choice risk to the District's ratepayers. WGL is also exploring options for using its purchased gas tariffs and offering "green" tariffs to recover the costs of these fuels.[55]

Q73 Has WGL provided enough information in this case for the Commission to support procurement of "low carbon" fuels as part of a strategy for meeting the District's climate goals, and to support the recovery of associated costs?

A73 No. WGL has provided only summary and directional information in this case. The Commission should consider the full implications and need for these fuels in FC 1167, where the broader context is provided and where the Commission can establish a shared framework for climate planning across the infrastructure and supply components of both the gas and electric systems.

IX. CLIMATE PROGRESS ADJUSTMENT

Q74 What is the Climate Progress Adjustment?

A74 The Climate Progress Adjustment (CPA) is a billing adjustment factor that accounts for the difference between actual monthly base revenue and target monthly base revenue, consistent with the revenue requirement to be established

[54] Exhibit WG (L), Direct Testimony of Melissa Adams, p. 21.
[55] *Id.*, p. 19-20.

in the current rate case. The proposed CPA mechanism would reflect net customer growth.[56]

Q75 Why is WGL proposing the CPA?

A75 WGL proposes the CPA to better align its revenues, which are largely tied to volumetric (per therm) rates, with its incurrence of costs, many of which are fixed.[57] Mr. Raab's testimony points out that WGL's sales are "so dependent upon weather variations and other factors outside of management control" as another rationale for the CPA. He indicates that the impacts of weather, the CEDC Act, and COVID mean that either the utility or ratepayers will be disadvantaged by future events.[58]

Q76 Is this proposed mechanism linked to climate change?

A76 Despite the name, the CPA is only loosely tied to the *impacts of* climate change in that changes in weather patterns and warming temperatures may reduce WGL's revenues. The mechanism also does not seem to be related to *efforts to address* climate change, except to the extent that WGL's actions to support the goals of the CEDC Act may have an impact on its revenues. WGL proposed a similar mechanism previously (under the term Revenue Normalization Adjustment) in Formal Case No. 1137, and the justification was not specifically tied to climate change policy.[59]

Q77 What are your thoughts about the proposed mechanism?

A77 The CPA is a proposal to decouple revenues from sales. Implementing the CPA would provide WGL more revenue certainty and stability relative to current practices, which are only trued up in the next rate case. This would reduce WGL's

[56] Exhibit WG (N), Direct Testimony of Paul H. Raab, p. 27.
[57] *Id.*, p. 27-28.
[58] *Id.*, p. 29.
[59] Formal Case No. 1137, Exhibit WG (K), Direct Testimony of Paul Raab.

risk in the short term. It would also reduce or eliminate the incentive for WGL to increase volumetric sales and the disincentive to promote energy efficiency and conservation, which could help to advance DCG policy. However, as discussed above, however, I find that WGL's present energy efficiency proposals are not consistent with District policy.

Switching to decoupled structure is not a small matter. A well-designed decoupling mechanism requires much attention to detail, specifically with respect to multi-year rate planning and how to adjust from one year to the next, to ensure a fair outcome for consumers. I note that in Formal Case No. 1156, based on OPC's assertion that Pepco's decoupling (Bill Stabilization Adjustment (BSA)) mechanism "has structural deficiencies," the Commission recently decided to "host a technical conference to address OPC's concern about the BSA structural deficiencies due to the pandemic."[60] Given the concerns expressed by several parties on Pepco's BSA, the Commission should proceed cautiously when considering a decoupling mechanism for WGL.

Q78 Would it make WGL indifferent to electrification efforts?

A78 No. As a part of the CPA, WGL proposes a mechanism to adjust revenues for customer growth, presumably to account for the incremental costs associated with serving new customers. However, the adjustment for number of customers is problematic, because WGL can increase its revenues by increasing the number of customers. WGL would also have strong incentives to retain the customers it already has, working counter to electrification efforts. Beyond running against the objectives of the CEDC Act and the Climate Commitment Act, such incentives would encourage increasing rate base, potentially leading to stranded assets in the future.

[60] Commission Order No. 20755, ¶¶ 312 – 313.

Q79 Do you have other concerns about the CPA?

A79 Yes. While supply rates vary monthly, the distribution rate is currently fixed.[61] The CPA would fluctuate (e.g., depending on the weather) likely causing total volumetric rates to vary. In some months, rate increases from the CPA could compound with supply rate increases. This decreased predictability creates hardship and risk for customers, particularly those living month-to-month and those who must budget their expenses. Wide price swings and spikes will create affordability challenges for low- and moderate-income households, who often have no margin for expenses that are higher than planned.

X. BUSINESS RISK AND RETURN ON EQUITY

Q80 Could you please summarize Mr. D'Ascendis's testimony regarding WGL's business risk relative to the proposed proxy sample of other gas utilities?

A80 Mr. D'Ascendis makes two arguments as to why WGL should have a positive adjustment to its rate of return relative to the proxy group in order to account for business risk. His first argument is that WGL is smaller than the proxy companies, smaller companies face greater risk, and capital markets require a higher return to compensate for that risk. His second argument is that the District's regulatory environment is less "constructive" for utilities, and "less constructive environments are associated with higher levels of risk."[62]

Q81 What evidence does Mr. D'Ascendis present with respect to his argument about WGL's size?

A81 Mr. D'Ascendis compares the market capitalization of the proxy companies to the book value of the District's portion of WGL, after adjusting for the ratio between market and book values of the proxy companies. He argues that the District

[61] Washington Gas Light Company Rate Schedules and General Service Provision for Gas Service in the District of Columbia: Residential Service - Rate Schedule No. 1, Page No. 2. Issued March 9, 2021. Available at https://www.washingtongas.com/-/media/d4b8c271ea6d4b85b393cd193a5460ee.pdf#page=3.
[62] Exhibit WG (C), Direct Testimony of Dylan W. D'Ascendis, p. 51.

portion of WGL (with a "market capitalization" of about 689 million) is about 7 times smaller than the average of the proxy companies' market capitalizations ($4.81 billion).

Q82 What is WGL's regulated utility market capitalization when viewed across Maryland, Virginia, and the District?

A82 Ms. Zelond testifies (Exhibit WG (B)-6) that WGL's "total average capital structure" adds up to $3.63 billion. Of the eight companies she identifies as being in WGL's peer group, WGL has greater "total average capital structure" than five and is smaller than three.

Q83 Do the proxy companies in Ms. Zelond's and Mr. D'Ascendis's samples also have regulated utilities in more than one jurisdiction?

A83 Yes. As Mr. D'Ascendis himself shows in Exhibit WG (C)-9, Atmos Energy (which as the largest of the peer group pulls Mr. D'Ascendis's calculation of the average size up substantially) owns regulated utilities in eight states. Northwest Natural has regulated utilities in Washington and Oregon. Both ONE Gas and Spire own and operate regulated utilities in three states.

Q84 Has Mr. D'Ascendis accounted for the multi-utility composition of the peer companies when comparing them with the District-only portion of WGL?

A84 No, he has not. By comparing the size of one jurisdiction of WGL with the composite size of the proxy group companies, Mr. D'Ascendis presents a misleading picture of the relative size of WGL. As Ms. Zelond testifies, WGL is comparable in size to the proxy group. The Commission should dismiss Mr. D'Ascendis's arguments about size and business risk.

Q85 Turning to Mr. D'Ascendis's argument regarding the regulatory component of business risk, do you agree that the Regulatory Research Associates (RRA) scores are an appropriate metric for evaluating regulatory risk for the purposes of setting the return on equity (ROE)?

A85 No, I do not. As documented in the RRA notes that Mr. D'Ascendis quotes,[63] RRA takes into account the authorized ROE as part of its regulatory rating. This means that Mr. D'Ascendis is using the Commission's history of awarding lower than average ROEs as an argument that WGL's regulatory risk is higher, and therefore it deserves a higher ROE. The Commission should dismiss this circular logic.

Q86 Mr. D'Ascendis also compares the regulatory mechanisms available to WGL in the District of Columbia with those available to the proxy group companies. Do you have any comments on this comparison?

A86 Mr. D'Ascendis's analysis does not account for WGL's numerous proposals in this case that would shift risk away from investors and to ratepayers, such as the CART and CPA mechanisms. If the Commission were to adopt the company's proposed risk-shifting approaches, by Mr. D'Ascendis's logic the Commission should commensurately reduce the authorized ROE to account for the reduction in business risk.

Q87 How does Mr. D'Ascendis claim that WGL faces "decarbonization risk" associated with the CEDC Act and associated policies?

A87 Mr. D'Ascendis states that the CEDC Act impacts WGL's business risk by (1) substantially affecting the growth of investments in the future, and (2) increasing uncertainty of recovery of and on those investments and on existing assets.[64]

[63] *Id.*, p. 52.
[64] *Id*., p. 55.

Q88 Is Mr. D'Ascendis's claim that the CEDC Act and associated policies would "substantially affect the growth of investments in the future"[65] consistent with the direction of WGL's investment plans and strategy?

A88 No. WGL's CBP describes a business-as-usual investment approach, in which the company's largest investments continue to be in pipeline replacement programs. I think that Mr. D'Ascendis is right that a more substantial change in WGL's investment approach is warranted by the District's policies; although I do not believe that this approach, when pursued prudently, need be any riskier than the company's traditional level of business risk, or than the risks faced by other prudently run gas utilities.

Q89 Would a prudently run utility operating within the District's clean energy policy environment face unusual risks for capital recovery, which should be accounted for in setting a higher ROE relative to a proxy group?

A89 There is no need for such a utility to face unusual risks. By adapting capital recovery to estimated asset lifetimes, and updating those lifetimes in response to projected changes in market conditions and customer demand, a utility should be able to recover all of its capital, with a fair return. Such a utility would also account for the policy context when making investment decisions in order to limit risk associated with new investments. To the extent that a utility does not take these kinds of prudent steps, and finds that its business risks have increased, those increased risks should not be reflected in increased allowed returns in the future. The District of Columbia's ratepayers should only be asked to pay for the recovery of and return on the capital invested and managed by prudent utilities.

[65] *Id.*, p. 55.

XI. RATE DESIGN AND EQUITY

Q90 What is the Residential Essential Service (RES) credit?

A90 Under the RES credit, customers certified by DOEE as eligible for the Low-Income Energy Assistance Program (LIHEAP) do not pay the customer charge during the heating season.

Q91 Please describe WGL's proposal to modify the RES credit.

A91 WGL is proposing to expand this credit so that LIHEAP-eligible customers would only pay 50 percent of the customer charge ($9.40 per month) in the non-heating season.[66]

Q92 What are your thoughts on this proposal?

A92 This proposal will help to reduce energy burden (the percent of household income spent on energy) for low-income customers, and it should be accepted. However, this rate proposal should be implemented as a part of a larger effort to reduce District of Columbia residents' energy burden. This larger effort should include weatherization and low-risk energy efficiency offerings. It should also include targeted electrification efforts to ensure that customers lacking financial resources are not burdened by gas bills that continue to rise as more financially secure customers electrify their end-uses and no longer contribute to meeting WGL's revenue requirements.

Q93 Does this conclude your direct testimony?

A93 Yes, it does.

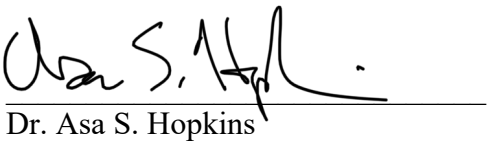
[66] Exhibit WG (A), Direct Testimony of Donald "Blue" Jenkins, p. 6.

BEFORE THE
PUBLIC SERVICE COMMISSION
OF THE DISTRICT OF COLUMBIA

IN THE MATTER OF:	**)**	
	)	
The Application of Washington Gas Light	**)**	**Formal Case No. 1169**
Company for Authority to Increase Existing	**)**	
Rates and Charges for Gas Service in the	**)**	
District of Columbia	**)**	

AFFIDAVIT

I declare under penalty of perjury that the foregoing testimony was prepared by me or under my direction and is true and correct to the best of my knowledge, information, and belief.



Dr. Asa S. Hopkins

Executed this 4th day of November, 2022.

EXHIBIT
DCG (A)-1

Asa S. Hopkins, **Ph.D.,** Vice President

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ahopkins@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. *Vice President*, April 2019 – present, *Principal Associate*, January 2017 – March 2019.

Conducts research and writes expert testimony and reports related to state energy policy and planning, energy efficiency, strategic electrification, deep decarbonization, and the present and future of electric and gas utility regulatory and business models.

Vermont Public Service Department, Montpelier, VT. *Director of Energy Policy and Planning,* October 2011 – December 2016

State energy planning and utility regulation

• Directed the year-long development of the 2016 Vermont Comprehensive Energy Plan, including stakeholder meetings, public forums, and coordination of contributions from other departments and the Governor's office. Primary author of the executive summary and five chapters.
• Led the Department's approach to establishing budgets and performance targets for energy efficiency utilities. Oversaw staff conducting program evaluation and savings verification.
• Submitted testimony and conducted analysis in support of public advocacy and negotiation in prominent litigated regulatory proceedings.

Policy development, analysis, and advocacy

• Developed the structure of Vermont's 2015 Renewable Energy Standard, including its novel "energy transformation" requirement. Worked with stakeholders to develop support for the policy and with the legislature to shepherd it to passage. This policy will result in more reduction of Vermont's GHG emissions than any others passed in the last 15 years.
• Led execution of Vermont's Total Energy Study, which examined technology and policy pathways for Vermont to meet GHG emission and renewable energy goals.
• Led cost-benefit analysis of Vermont's existing net metering structure and led the development of departmental proposals for a new structure.
• Prepared and delivered public, stakeholder, and interagency presentations, including to agency and business leaders, legislative committees, and the governor.
• Oversaw programs providing financing, technical, and process assistance to clean energy projects.

During tenure, Vermont rose in the rankings on national clean energy state scorecards: ACEEE State Energy Efficiency Scorecard from 5th to 3rd and U.S. Clean Tech Leadership Index from 10th to 3rd.

U.S. Department of Energy, Washington, DC. *Special Advisor to the Under Secretary for Science / AAAS Science and Technology Policy Fellow,* September 2010 – August 2011

Dr. Hopkins served as the assistant project director for the Department of Energy's first Quadrennial Technology Review. In this role, he coordinated a team that solicited input from Department of Energy and National Laboratory staff and scientists, ran a series of public workshops, facilitated coordination with the White House, developed a set of technology assessments, and ultimately drafted the Report on the First QTR, published Sept. 27, 2011.

Lawrence Berkeley National Laboratory, Berkeley, CA. *Environmental Energy Policy Postdoctoral Fellow*, January 2009 – August 2010

Conducted technical and economic analysis to support the Department of Energy in setting the energy efficiency standards that appliances must meet in order to be sold in the United States.

California Institute of Technology, Pasadena, CA. *Graduate Research Fellow,* 2002 – 2008

Los Alamos National Laboratory, Los Alamos, NM. *Post-Baccalaureate Researcher, Theoretical Division,* June 2001 – June 2002

EDUCATION

California Institute of Technology, Pasadena, CA
Doctor of Philosophy in Physics, 2008
Master of Science in Physics, 2007

Haverford College, Haverford, PA
Bachelor of Science *summa cum laude*, in Physics with minors in Computer Science and Growth and Structure of Cities, 2001

SELECTED PROJECTS

The Future of Gas Utilities – Dr. Hopkins leads Synapse's work in the area of the future of gas utilities. He and his team are assisting a number of clients to understand the future of gas utilities in the context of deep building decarbonization objectives. This work includes assisting Conservation Law Foundation in Massachusetts Department of Public Utilities Docket 20-80 (an investigation into "the role of gas local distribution companies as the Commonwealth achieves its target 2050 climate goals"); Natural Resources Defense Council in New York and Nevada's regulatory proceedings regarding the future of gas; the Colorado Energy Office regarding approaches to decision-making in the face of uncertainty, in the context of Colorado's regulatory proceedings regarding gas utility Clean Heat plans and building decarbonization; the County of San Diego (with the University of California San Diego) in developing the buildings and utilities portion of its Regional Decarbonization Framework; the Maryland Office of People's Counsel in modeling the impact of the state's decarbonization objectives on utility sales and

finances; and the District of Columbia Department of Energy and Environment in assessing Washington Gas Light's Climate Business Plan.

Puerto Rico Energy Bureau – Synapse has provided extensive support to Puerto Rico's electricity regulator since 2015. Dr. Hopkins has coordinated the engagement since 2018. Dr. Hopkins has led or substantially contributed to the development of Puerto Rico's first energy efficiency and demand response regulations; emergency microgrid regulations; and the review of the island's second Integrated Resource Plan and subsequent processes to optimize resilience using both transmission and distributed generation resources.

Massachusetts Comprehensive Energy Plan – On behalf of the Massachusetts Department of Energy Resources (the state energy office), Synapse and Sustainable Energy Advantage assisted DOER and its sister agencies in the development of Massachusetts's first Comprehensive Energy Plan. Dr. Hopkins assisted DOER leadership in defining the scope and approach for the CEP, to distinguish it from other state planning processes. He worked with Pat Knight to develop an approach to modeling energy transformations toward low-carbon alternatives in electricity, buildings, and transportation that are consistent with state policy and approaches while being grounded in stock turnover rates and feasible policies and programs.

Northeastern Regional Assessment of Strategic Electrification – On behalf of the Northeast Energy Efficiency Partnerships, Synapse and Meister Consultants Group identified the opportunity, costs, and benefits available if strategic electrification is adopted as a key strategy for decarbonization in New York and New England. Dr. Hopkins, Kenji Takahashi, and Pat Knight are primary authors of the resulting report, published in July 2017, which characterizes the current markets for efficiency electrification technologies (such as heat pumps and electric vehicles), identifies policies to overcome market barriers, assesses the state of electrification technologies, and models the extent of electrification both possible given market dynamics and required to meet regional greenhouse gas emission goals.

2016 Vermont Comprehensive Energy Plan – Directed the year-long development of the 2016 plan, including setting its strategic approach to current Vermont energy planning challenges and grounding it in quantitative analysis. Developed the public engagement process, then hosted expert stakeholder meetings and public forums. Adapted the results of the 2014 Total Energy Study to produce scenarios that illustrate the proposed pathways identified in the plan. Coordinated contributions from staff and leaders in other departments, and from the Governor's office. Wrote the executive summary and 5 of the 14 chapters.

Total Energy Study – Scoped and led a legislatively-mandated report on policy and technology pathways to meet Vermont's renewable energy and greenhouse gas emission goals. Designed and facilitated a focus-group-based stakeholder engagement process to identify technology and policy visions for analysis. Retained outside modeling consultant, then worked closely with them to build credible business-as-usual and policy case models of Vermont's energy economy to the year 2050 using the TIMES/FACETS integrated assessment model. Translated those model results to make REMI PI+

calculations of impact on Vermont GDP and jobs. Synthesized qualitative and quantitative results into intermediate and final reports identifying key outcomes for policy design.

Demand Resources Plan Proceedings – In each of three, three-year cycles, led the development of the Department of Public Service's positions regarding appropriate budgets, rate and bill impacts, and performance targets for Vermont's energy efficiency utilities. Analyzed current efficiency utility performance to calibrate expected future performance. Negotiated performance metrics that reflect policy priorities. Developed new regulatory and budget treatment of research and development for behavioral energy efficiency programs.

Quadrennial Technology Review – As Assistant Project Director, managed the project activities of the eight-person core team for the U.S. Department of Energy's first Quadrennial Technology Review. This review of DOE's energy technology activities established a robust framework and codified principles used to build DOE's energy technology portfolio (including identifying the appropriate and highest-leverage activities for DOE relative to the private sector and other government actors). Extensive collaboration and discussions within DOE, as well the public through a series of workshops with industry, government, national laboratory, and academic participation, culminated in the publication of the first DOE-QTR report in September 2011. Coordinated successful stakeholder workshops; facilitated focus groups. Drafted discussion papers that served as the basis for extensive intra- and inter-agency and White House coordination and negotiation. Primary author of the final report's section on building and industrial energy efficiency. Project was completed on schedule and on budget, and met its critical milestones.

REPORTS

Hopkins, A. S., A. Napoleon, S. Kwok. 2022. *Factsheet: Hydrogen & Low-Carbon Gases in New York's Electricity Future*. Synapse Energy Economics for Sierra Club.

Hopkins A. S., P. Eash-Gates, J. Frost, S. Kwok, J. Litynski, K. Takahashi. 2022. "Decarbonization of Buildings." In *San Diego Regional Decarbonization Framework*, edited by SDG Policy Initiative, School of Global Policy and Strategy, University of California San Diego. San Diego.

Frost, J. S. Kwok, K. Takahashi, A.S. Hopkins, A. Napoleon. 2021. *New York Heat Pump Trajectory Analy*sis. Synapse Energy Economics for NRDC.

Hopkins, A. S., A. Napoleon, K. Takahashi. 2021. *A Framework for Long-Term Gas Utility Planning in Colorado.* Synapse Energy Economics for the Colorado Energy Office.

Woolf, T., A. Napoleon, A. Hopkins, K. Takahashi. 2021. *Long-Term Planning to Support the Transition of New York's Gas Utility Industry*. Synapse Energy Economics for Natural Resources Defense Council.

Frost, J., J. Litynski, S. Letendre, A. S. Hopkins. 2021. *Economic Impacts of Climate Change on Cape Cod*. Synapse Energy Economics for Eastern Research Group and the Cape Cod Commission.

Hopkins, A.S., P. Knight, J. Frost. 2021. *Rhode Island Carbon Pricing Study.* Synapse Energy Economics and the Cadmus Group for the Rhode Island Office of Energy Resources.

Kallay, J., A.S. Hopkins, C. Odom, J. Ramey, J. Stevenson. R. Broderick, R. Jeffers, B. Garcia. 2021. *The Quest for Public Purpose Microgrids for Resilience: Considerations for Regulatory Approval.* Synapse Energy Economics for Sandia National Labs.

Takahashi, K., E. Sinclair, A. Napoleon, A. S. Hopkins, D. Goldberg. 2021. *Evaluation of EnergyWise Low-Income Energy Efficiency Program in Mississippi – Program Performance, Design, and Implications for Low-Income Efficiency Programs*. Synapse Energy Economics for Sierra Club and Gulf Coast Community Foundation.

Kallay, J., A. Napoleon, J. Hall, B. Havumaki, A. S. Hopkins, M. Whited, T. Woolf, J. Stevenson, R. Broderick, R. Jeffers, B. Garcia. 2021. *Regulatory Mechanisms to Enable Investments in Electric Utility Resilience.* Synapse Energy Economics for Sandia National Laboratories.

Kallay, J., A. Napoleon, B. Havumaki, J. Hall, C. Odom, A. S. Hopkins, M. Whited, T. Woolf, M. Chang, R. Broderick, R. Jeffers, B. Garcia. 2021. *Performance Metrics to Evaluate Utility Resilience Investments.* Synapse Energy Economics for Sandia National Laboratories.

Kallay, J., S. Letendre, T. Woolf, B. Havumaki, S. Kwok, A. S. Hopkins, R. Broderick, R. Jeffers, K. Jones, M. DeMenno. 2021*. Application of a Standard Approach to Benefit-Cost Analysis for Electric Grid Resilience Investments*. Synapse Energy Economics for Sandia National Laboratories.

Hopkins, A. S., S. Kwok, A. Napoleon, C. Roberto, K. Takahashi. 2021. *Scoping a Future of Gas Study.* Synapse Energy Economics for Conservation Law Foundation.

Kallay, J., A. S. Hopkins, A. Napoleon, B. Havumaki, J. Hall, M. Whited, M. Chang., R. Broderick, R. Jeffers, K. Jones, M. DeMenno. 2021. *The Resilience Planning Landscape for Communities and Electric Utilities.* Synapse Energy Economics for Sandia National Laboratories.

Shipley, J., A. S Hopkins, K. Takahashi, D. Farnsworth, 2021. *Renovating Regulation to Electrify Buildings: A Guide for the Handy Regulator*. Regulatory Assistance Project.

Letendre, S., E. Camp, J. Hall, B. Havumaki, A. S. Hopkins, C. Odom, S. Hackel, M. Koolbeck, M. Lord, L. Shaver, X. Zhou. 2020*. Energy Storage in Iowa: Market Analysis and Potential Economic Impact.* Prepared by Synapse Energy Economics and Slipstream for Iowa Economic Development Authority.

Eash-Gates, P., K. Takahashi, D. Goldberg, A. S. Hopkins, S. Kwok. 2021. *Boston Building Emissions Performance Standard: Technical Methods Overview.* Synapse Energy Economics for the City of Boston.

Camp, E., C. Odom, A. S. Hopkins. 2020. *Cost-Effectiveness of Proposed New Mexico Environment Department Oil and Gas Emissions Reduction Rules: Impacts and Co-Benefits of Reduced Volatile Organic Compound Emissions from the Oil and Gas Industry.* Synapse Energy Economics for Environmental Defense Fund.

Takahashi, K., J. Frost, D. Goldberg, A. S. Hopkins, K. Nishio, K. Nakano. 2020. *Survey of U.S. State and Local Building Decarbonization Policies and Programs*. Presented at the 2020 ACEEE Summer Study of Energy Efficiency in Buildings.

Hopkins, A. S., A. Napoleon, K. Takahashi. 2020. *Gas Regulation for a Decarbonized New York: Recommendations for Updating New York Gas Utility Regulation.* Synapse Energy Economics for Natural Resources Defense Council.

Takahashi, K., A. S. Hopkins, J. Rosenkrantz, D. White, S. Kwok, N. Garner. 2020. *Assessment of National Grid's Long-Term Capacity Report*. Synapse Energy Economics for the Eastern Environmental Law Center.

Camp, E., N. Garner, A. S. Hopkins. 2019. *Cost-Effectiveness of Comprehensive Oil and Gas Emissions Reduction Rules in New Mexico: Impacts of Reduced Methane and Volatile Organic Compound Emissions from the Oil and Gas Industry.* Synapse Energy Economics for the Environmental Defense Fund.

Camp, E., A. S. Hopkins, D. Bhandari, N. Garner, A. Allison, N. Peluso, B. Havumaki, D. Glick. 2019. *The Future of Energy Storage in Colorado: Opportunities, Barriers, Analysis, and Policy Recommendations.* Synapse Energy Office for the Colorado Energy Office.

Kallay, J., A. S. Hopkins, J. Frost, A. Napoleon, K. Takahashi, J. Slason, G. Freeman, D. Grover, B. Swanson. 2019. *Net Zero Energy Roadmap for the City of Burlington, Vermont*. Synapse Energy Economics and Resource Systems Group for Burlington Electric Department.

Camp, E., B. Fagan, J. Frost, D. Glick, A. S. Hopkins, A. Napoleon, N. Peluso, K. Takahashi, D. White, R. Wilson, T. Woolf. 2018. *Phase 1 Findings on Muskrat Falls Project Rate Mitigation.* Synapse Energy Economics for Board of Commissioners of Public Utilities, Province of Newfoundland and Labrador.

Hopkins, A. S., P. Knight, N. Peluso. 2018. *Massachusetts Comprehensive Energy Plan: Commonwealth and Regional Demand Analysis.* Synapse Energy Economics, Sustainable Energy Advantage, and MA DOER for the Massachusetts Department of Energy Resources.

Knight, P., D. Goldberg, E. Malone, A. S. Hopkins, D. Hurley. 2018. *Getting SMART: Making sense of the Solar Massachusetts Renewable Target (SMART) program*. Synapse Energy Economics for Cape Light Compact.

Hopkins, A. S., K. Takahashi, D. Glick, M. Whited. 2018. *Decarbonization of Heating Energy Use in California Buildings: Technology, Markets, Impacts, and Policy Solutions*. Synapse Energy Economics for the Natural Resources Defense Council.

Woolf, T., A. S. Hopkins, M. Whited, K. Takahashi, A. Napoleon. 2018. *Review of New Brunswick Power's 2018/2019 Rate Case Application.* In the Matter of the New Brunswick Power Corporation and Section 103(1) of the Electricity Act Matter No. 375. Prepared by Synapse Energy Economics for the New Brunswick Energy and Utilities Board Staff.

Hopkins, A. S., K. Takahashi. 2017. *Alternatives to Building a New Mt. Vernon Substation in Washington, DC*. Synapse Energy Economics for the District of Columbia Department of Energy and Environment.

Hopkins, A. S., S. Fields, T. Vitolo. 2017. *Policies to Cost-Effectively Retain Existing Renewables in New York*. Synapse Energy Economics for the Alliance for Clean Energy New York.

Vitolo, T., A. S. Hopkins. 2017. *The Mounting Losses at CWLP's Dallman Station: A Study of the Relative Costs of Operating Each of the Four Dallman Units*. Synapse Energy Economics for the Sierra Club.

Hopkins, A. S., A. Horowitz, P. Knight, K. Takahashi, T. Comings, P. Kreycik, N. Veilleux, J. Koo. 2017. *Northeast Regional Assessment of Strategic Electrification*. Synapse Energy Economics and Meister Consultants Group for the Northeast Energy Efficiency Partnerships.

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Vermont Public Service Department. 2013. *Total Energy Study: Report to the Vermont General Assembly on Progress Toward a Total Energy Approach to Meeting the State's Greenhouse Gas and Renewable Energy Goals.*

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Hopkins, A. S., K. Takahashi, L. David. 2018. "Challenges and Opportunities for Deep Decarbonization through Strategic Electrification under the Utility Regulatory Structures of the Northeast". Proceedings of the 2018 ACEEE Summer Study on Energy Efficiency in Buildings, August 2018.

Hopkins, A. S. Review of *Burn Out*, by Dieter Helm, *Science* 356, Issue 6339 (May 2017): 709, https://doi.org/10.1126/science.aam8696

Dunsky, P., A. S. Hopkins, K. Vaillancourt, M. Fabbri. 2016. "Achieving an Ultra-Low Carbon Future: Technology and Policy Pathways to Meet Vermont's GHG Goals," *ACEEE Summer Study on Energy Efficiency in Buildings.*

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Lutz, J.D., A. S. Hopkins, V. Letschert, V.H. Franco, A. Sturges. 2011. “Using National Survey Data to Estimate Lifetimes of Residential Appliances,” *HVAC&R Research*.

Alvarez, R.M., A. S. Hopkins, B. Sinclair. 2010. “Mobilizing Pasadena Democrats: Measuring the Effects of Partisan Campaign Contacts,” *The Journal of Politics* 72, 31.

Nielsen, A.E.B., A. S. Hopkins, H. Mabuchi. 2009. “Quantum Filter Reduction for Measurement-Feedback Control Via Unsupervised Manifold Learning,” *New Journal of Physics* 11, 105043.

Hopkins, A. S., B. Lev, H. Mabuchi. 2004. “Proposed Magnetoelectrostatic Ring Trap for Neutral Atoms,” *Physical Review A* 70, 053616.

Hopkins, A. S., K. Jacobs, S. Habib, K. Schwab. 2003. “Feedback Cooling of a Nanomechanical Resonator,” *Physical Review B* 68, 235328.

TESTIMONY

New York Public Utilities Commission (Case No. 22-E-0064 and 22-G-0065): Direct and Rebuttal Testimony of Alice Napoleon and Asa Hopkins regarding Con Edison’s proposed gas-side investments as greenhouse gas mitigation strategies and gas extension allowance rule changes and the need for long-term planning for the gas system and adequacy of the company’s non-pipe alternatives framework. On behalf of Natural Resources Defense Council, May 2022.

Régie de l’énergie du Québec (R-4156-2021): Testified as an expert on the business risk facing Quebec’s natural gas utilities related to the energy transition, as part of a proceeding to set the utilities’ cost of capital and capital structure. On behalf of the Industrial Gas Users Association.

Vermont Public Utility Commission (Case No. 21-1107-PET and 21-1109-PET): Addressed the impact of GlobalFoundries proposed “self-managed utility” on the general good of the state and Vermont’s energy policy, with particular focus on the impact on environmental soundness and greenhouse gas emissions mitigation. On behalf of Conservation Law Foundation, June 2021.

Public Service Commission of Wisconsin (Docket No. 5-CG-106): Addressed the need for a pair of liquified natural gas facilities in light of the fossil fuel use reductions required to meet state and federal goals for mitigating climate change and the potential for cost-effective demand-side alternatives. On behalf of the Sierra Club, June 2021.

Vermont Senate Finance Committee: Provided expert testimony in the form of a presentation entitled “Updating Vermont’s Renewable Energy Standard” to the Vermont Senate Finance Committee in

January of 2020. Dr. Hopkins presented on the history of the standard, what has changed since 2015, and future potential.

Vermont Public Utility Commission (Case No. 17-1247-NMP): Addressed the consistency of a proposed solar generation facility with the Vermont Comprehensive Energy Plan. On behalf of Derby GLC Solar LLC, January 2018.

Washington DC Public Service Commission (FC 1142): Provided expert testimony regarding the merits of the proposed merger of Washington Gas and AltaGas, Ltd. with respect to the impact on environmental quality, with particular emphasis on the impact of utility management and its approach to climate change on the ability of the District to achieve its climate change mitigation goals. On behalf of the District of Columbia Government.

Régie de l'énergie du Québec (R-3986-2016): Provided an expert report and testimony regarding best practices in utility demand response programs, in the context of Hydro Québec Distribution's ten-year Supply Plan. On behalf of the Regroupment national des conseils régionaux de l'environment du Québec (RNCREQ).

Vermont Public Service Board (Dockets No. 8586 and 8685): Addressed the need for a proposed solar PV generator and its associated contract under PURPA rates, its economic impact on the state, and its consistency with the Vermont Electric Plan. On behalf of the Vermont Department of Public Service, July 2016.

Vermont Public Service Board (Docket No. 8684): Proposed avoided energy and capacity cost rates for use in Rule 4.100, Vermont's implementation of PURPA. On behalf of the Vermont Department of Public Service, October 2015 and May 2016.

Vermont Public Service Board (Docket No. 8600): Addressed the need for a proposed solar PV generator, its economic impact on the state, and its consistency with the Vermont Electric Plan. On behalf of the Vermont Department of Public Service, March 2016.

Vermont Public Service Board (Docket No. 8525): Introduced a memorandum of understanding between the DPS and Green Mountain Power regarding a proposed rate design, with particular focus on new critical peak price rates to be available and marketed. On behalf of the Vermont Department of Public Service, November 2015.

Vermont Public Service Board (Docket No. 7970): Addressed whether increases in the expected cost of a gas pipeline expansion project were sufficient to warrant reopening the underlying proceeding, particularly with respect to the need for the project, the economic impact on the state, and consistency with the general good of the state and the Vermont Comprehensive Energy Plan. On behalf of the Vermont Department of Public Service, May 2015.

Vermont Public Service Board (Docket No. 8311): Addressed how statutory criteria for the use of electric energy efficiency funds for electrification measures (such as heat pumps) might be met. On behalf of the Vermont Department of Public Service, January 2015.

Vermont Public Service Board (Docket No. 7862): Presented the Department's positions regarding whether Entergy Vermont Yankee should be granted a continued certificate of public good, with particular focus on the need for the plant, the economic benefit of continued operation, consistency with the Vermont Electric Plan, and whether continued operation by Entergy was in the general good of the state. On behalf of the Vermont Department of Public Service, October 2012 and April 2013.

Vermont Public Service Board (Docket No. 7833): Addressed the need for a proposed biomass electric generator and its consistency with the Vermont Electric Plan. On behalf of the Vermont Department of Public Service, October and November 2012; February and September 2013.

Vermont Public Service Board (Docket No. 7770): Addressed a number of topics related to the merger of Green Mountain Power and Central Vermont Public Service, most particularly the disposition of a windfall repayment due to ratepayers. On behalf of the Vermont Department of Public Service, January and March 2012.

Vermont Public Service Board (Docket No. 7815): Addressed consistency of a proposed long-term PPA with the Vermont Electric Plan and the utility's integrated resource plan. On behalf of the Vermont Department of Public Service, January 2012.

SELECTED PRESENTATIONS

Hopkins, A. S. "IIJA, IRA, and the Growing Federal Role in Transmission—and Why States Should Care," presented at the National Association of State Energy Officials Annual Meeting, October 2022.

Hopkins, A. S., J. Litynski, A. Takasugi. "Policy approaches to increasing electricity affordability in California," presented to various California stakeholders on behalf of Natural Resources Defense Council, February 2022.

Shipley, J., Hopkins, A. S., Takahashi, K., & Farnsworth, D. "Renovating regulation to electrify buildings: A guide for the handy regulator," presented with Regulatory Assistance Project, January 2021.

Hopkins, A. S. 2019. "Efficiency, Electrification, and Renewables in New England and Puerto Rico" at 2019 ACEEE Energy Efficiency as a Resource Conference, October 2019.

Hopkins, A. S. 2019. "Strategic electrification and winter cold snaps: A resource and a challenge" at 2019 ACEEE Energy Efficiency as a Resource Conference, October 2019.

Panelist on "Deep Dive Session on State and Local Electrification Roadmaps" at Electric Power Research Institute (EPRI)/Northeast Energy Efficiency Partnerships (NEEP) Electrification Summit, August 2019.

Hopkins. A. S., K. Takahashi, D. Lis. 2018. "Decarbonization through Strategic Electrification Meets Utilities and Regulation in the Northeast" at the 2018 ACEEE Summer Study on Energy Efficiency in Buildings, August 2018.

Hopkins, A. S. 2019. "Strategic Electrification: Impacts and approaches to meeting decarbonization goals in the northeastern states (and elsewhere)" at Lawrence Berkeley National Laboratory, Energy

Technologies Area, August 2018.

Hopkins, A. S. 2017. "Utility Performance Regulation" at the Western States Regional Meeting of the National Association of State Energy Officials, April 2017.

Panelist on "A Regulatory Perspective of Grid Transformation" at the IEEE Innovative Smart Grid Technologies Conference, September 2016.

Panelist on the "Comprehensive Energy Plan Update" at the Renewable Energy Vermont Conference, October 2015.

Hopkins, A. S. 2015. "Vermont's Total Energy Study." Presentation at the National Association of State Energy Officials Energy Policy Outlook Conference, February 2015.

Panelist on "The Role of Energy Efficiency in Mitigating Winter Peak Issues" at the Association of Energy Services Professionals (Northeast Chapter) & Northeast Energy Efficiency Council, November 2014.

Hopkins, A. S. 2014. "Total Energy Study." Presentation at the Renewable Energy Vermont Conference, October 2014.

Panelist on "State Energy & Economic Policy Impacts on Industry Transformation" at the Power Industry Transformation Summit, April 2014.

Hopkins, A. S. 2008. "Mobilizing Pasadena Democrats: Measuring the Effects of Partisan Campaign Contacts." Presentation at the American Political Science Association Annual Meeting, August 2008.

HONORS, AWARDS, AND FELLOWSHIPS

Certified Public Manager, 2014

AAAS Science and Technology Policy Fellowship, 2010 – 2011

Dean's Award for Community Service, 2009

Delegate to the 2004 Democratic National Convention

NSF Graduate Research Fellow, 2002 – 2005

Los Alamos National Laboratory Student Distinguished Performance Award, 2002

Two-time first-team Academic All American, 2000 and 2001

Barry M. Goldwater Scholar, 1999 – 2001

OTHER ACTIVITIES

NASEO - Electricity Committee: Affiliate Co-Chair, 2020-present

Newton, MA Citizens Commission on Energy, Member 2017-present

Guest on Synapse Energy Economics, Inc.'s *Energy Nerd Show,* Aug 6, 2020

Board Member, National Association of State Energy Officials, 2015-16

Industrial Advisory Board for ARPA-E-funded project "Packetized Energy Management," 2016

Burlington, VT Public Works Commission: Member 2012 –2014, Chair 2015

Resume updated October 2022.

EXHIBIT
DCG (A)-2

PUBLIC SERVICE COMMISSION OF THE DISTRICT OF COLUMBIA

WASHINGTON GAS LIGHT COMPANY

FORMAL CASE NO. 1169

WASHINGTON GAS'S RESPONSE
AND/OR NOTICE OF OBJECTION/UNAVAILABILITY TO
THE GOVERNMENT OF THE DISTRICT OF COLUMBIA

DCG DATA REQUEST NO. 1

QUESTION NO. 1-2

Q. Provide all assumptions made for the global warming potential (GWP) of the following proposed programs:

A. The hydrogen fuel cell mobility pilot program discussed throughout Witness Adams testimony -- Exhibit WG (L);

B. The hydrogen-compatible fuel cell for building power generation listed in Witness Yardley's testimony at Exhibit WG (M), page 10; and

C. Renewable Natural Gas (RNG) fuels discussed in the testimonies of Witnesses Jenkins, Adams and Yardley.

WASHINGTON GAS'S RESPONSE 10/07/2022

A.

a. The hydrogen fuel cell mobility pilot will replace 2-4 vehicles currently powered by diesel engines with similar vehicles powered by hydrogen fuel cells. Each of these vehicles consumes on average 8-12 gallons of diesel per day. By replacing diesel with hydrogen as the fuel source, on average 30-45 MT CO2e is avoided per year per vehicle. Washington Gas utilizes the combustion accounting approach under Intergovernmental Panel on Climate Change (IPCC) guidance.

b. The hydrogen-compatible fuel cell for building power generation that is currently being installed will be replacing a similar fuel cell by the same manufacturer, Bloom Energy, which is now out of support. Initially, this fuel cell will be operating on 100% natural gas, as does the unit being replaced, and hence will not initially have any global warming potential impact. Once hydrogen is blended into the fuel it is assumed that there will be an associated emission reduction;

however, further studies are required to quantify. Please see the response to DCG Data Request No. 1-5 for information about the unit being installed.

c. For the assumptions made for the global warming potential (GWP) of Renewable Natural Gas (RNG) fuels discussed in the testimonies of Witnesses Jenkins, Adams and Yardley, Washington Gas utilizes the combustion accounting approach under (IPCC) guidance. IPCC guidelines state that CO2 emissions from biogenic fuel sources (e.g., biogas- or biomass-based RNG) should not be included when accounting for emissions in combustion; only CH4 and N2O are included.

SPONSOR: Melissa Adams
Corporate Social Responsibility Officer

CERTIFICATE OF SERVICE

I hereby certify that on this 4th day of November 2022, I caused true and correct copies of the foregoing District of Columbia Government's Direct Testimony of Dr. Asa S. Hopkins – DCG (A) -- to be emailed to the following:

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