BEFORE THE
STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

In the Matter of

Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation d/b/a National Grid for Electric and Gas Service.

Case Nos. 24-E-0322 & 24-G-0323

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I. INTRODUCTIONS, QUALIFICATIONS, AND RECOMMENDATIONS

Q. Please state your name and job title.

A. My name is Dustin Mulvaney. I am a Professor of Environmental Studies at San José State University.

Q. On whose behalf are you testifying?

A. I am submitting this testimony on behalf of the Alliance for a Green Economy ("AGREE").

Q. Have you previously testified in other jurisdictions?

A. Yes. I have submitted testimony to the California Public Utilities Commission ("CPUC") on life cycle assessment and environmental impact accounting for proceedings on rate design, net metering, and energy storage since 2009. In 2014 I submitted testimony to the Utah Public Service Commission about net energy metering.

Q. What is your educational background?

A. I have a Ph.D. in Environmental Studies from the University of California, Santa Cruz ("UCSC"); a Master's Degree in Environmental Policy Studies from the New Jersey Institute of Technology; and

a Bachelor of Science degree in Chemical Engineering with a minor in Applied Physics. I also undertook postdoctoral training for a year at UCSC in the Department of Electrical Engineering, as well as two years at the University of California, Berkeley, in the Department of Environmental Science, Policy, and Management.

Q. What is your professional background?

A. I have researched issues related to energy and the environment for over fifteen years. My expertise relevant to this proceeding includes greenhouse gas ("GHG") accounting and life cycle assessment standards, norms, conventions, and best practices.

My life cycle assessment consulting and research includes serving as a reviewer for the Climate Action Reserve, providing feedback on GHG leakage issues with the proposed design of an offset protocol for California agriculture, serving as a critical reviewer for the California Environmental Protection Agency's life cycle assessment of its used motor oil recycling policy, and acting as a critical

reviewer of the program for Gold Standard-certified cookstove carbon offsets. I have also been an editor for several academic journals and have reviewed research articles for over 50 academic journals, including peer-reviewing research papers on carbon market designs and GHG emissions reduction certification schemes. In addition, I have been invited to participate in CPUC workshops addressing greenhouse gas accounting.

Most recently I served on the Technical Advisory Committee for the Ultra-Low Carbon Solar Standard, which standardized an approach to life cycle assessment accounting for greenhouse gases in photovoltaics. The standard was developed by the Global Electronics Council, and is the standard used by the U.S. Environmental Protection Agency in procurement through the Federal Acquisition Regulation, which guides agencies towards sustainably made products.

II. SUMMARY OF TESTIMONY

Q. What is the purpose of your testimony?

A. This testimony explains that biomethane

production has significant GHG emissions, and so replacing fossil natural gas with biomethane does not necessarily result in emissions benefits. Specifically, the testimony explains the different sources of biomethane and discusses the impacts of biomethane preparation, processing, production, transportation, and use. Impacts discussed include both local environmental impacts and upstream and downstream greenhouse gas emissions. The testimony also explains what environmental attributes are and how they are used to make claims about emissions reductions and how they should be used to track emissions reductions and avoid double counting. I then offer my expert opinion of the greenhouse gas emissions associated with the four biomethane interconnections proposed by Niagara Mohawk ("NiMo" or "the Company") in this proceeding as well as the Company's greenhouse gas accounting methodology.

Q. Please summarize your main findings.

A. I find that the Company's claims about the interconnections' potential to reduce GHGs are

unsupported and inaccurate. While the Company asserts that the use of biomethane will reduce greenhouse gas emissions by avoiding upstream emissions associated with fossil gas, the Company fails to account for the upstream emissions of biomethane. Specifically, the Company fails to account for the greenhouse gas or local emissions associated with constructing and operating biomethane production facilities; transporting raw materials to the production sites; leakage along the new interconnections; and additional methane emissions that could result from the sale of biomethane, which incentivizes practices that increase methane emissions. In other words, although the Company claims that the interconnections will reduce GHGs by displacing fossil gas, and therefore avoiding the upstream emissions of fossil gas, the Company fails to account for or even attempt to estimate the upstream emissions of biomethane.

Comparing fossil gas and biomethane without considering the upstream emissions of both is comparing apples and oranges. The failure to

account for upstream emissions of biomethane is particularly concerning given recent research demonstrating that biomethane production is extremely GHG-intensive and that the supply chain emissions associated with biomethane is comparable to oil and gas supply chain emissions. As a result, the Company's claim that the biomethane interconnections will reduce emission is dubious at best.

Additionally, even if the interconnections do result in some emissions benefits, those benefits will be exported out of New York. The Company cannot assign itself or its customers credit for any emissions benefits or use any potential reductions to offset its own or its customers greenhouse gas emissions because the Company is not purchasing and retiring the environmental attributes associated with the biomethane. The environmental attributes will be sold to another purchaser, most likely in California, who can then claim any emissions reductions associated with the biomethane. As a result, if the Commission approves rate recovery for the interconnections, New Yorkers will be

paying for emissions benefits that are unlikely to be real, and if they are, they will be exported out of state and not help New York meet its climate targets.

Moreover, even if the interconnections did achieve emissions reductions, the Company has not conducted a benefit-cost analysis of the interconnections or considered whether more cost-effective alternatives are available for reducing emissions.

For these reasons, in my opinion the interconnections are not a prudent investment and will increase greenhouse gas emissions, and I recommend changes to the Company's rate proposal to remove rate recovery for the four proposed biomethane interconnections.

Q. What information did you use to prepare your testimony?

A. I reviewed the Company's testimony and discovery responses about the interconnections and research about biomethane production and use. I also reviewed the research and policy best practices regarding environmental attribute

separation, issues of double counting, and additionality in offsets and other market based environmental attribute trading.

Q. Are you sponsoring any exhibits with your testimony?

A. Yes. I am attaching the following exhibits:

Exhibit 1: Production of Biogas and Biomethane as Renewable Energy Sources: A Review

Exhibit 2: Understanding RNG Gas Quality through Execution at Newtown Creek WRRF RNG

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III. OVERVIEW OF BIOMETHANE PRODUCTION

Q. What is biogas?

A. Biogas is a fuel that is primarily methane, and that also contains carbon dioxide and other gasses, called "impurities." Biogas can be sourced from several places including dairies, landfills, animal feed operations, wastewater treatment facilities, and food waste processors Exhibit 1, Debora Mignogna et al., *Production of Biogas and Biomethane as Renewable Energy Sources: A Review*, 13 Applied Scis.10219 (2023); Exhibit 2, Pradheep Kileti et al., *Understanding RNG Gas Quality through Execution at Newtown Creek WRRF RNG*, 7 Annals of Civ. & Env't Eng'g 017 (2023).

Q. How is biogas produced?

A. Biogas is typically created using anaerobic digestion. The anaerobic digestion process uses microorganisms to generate methane from feedstocks that contain organic matter. Biogas feedstocks are the raw material from which biogas is made, and include livestock manure,

food waste, and wastewater sludge. Exhibit 1, Debora Mignogna, *supra*.

The processing, handling, digestion, and conditioning of feedstocks to create biogas all typically occur in the same central "anchor" facilities, to which feedstocks are transported by truck. The anaerobic digestion stage is a source of fugitive methane emissions discussed later in this testimony.

Q. What is biomethane?

A. Biomethane, also called renewable natural gas, is biogas that has been scrubbed of carbon dioxide and impurities. Biomethane is a final fuel product primarily made of methane that has the same physical characteristics as fossil natural gas so that it can be injected into pipelines.

Q. How is biomethane produced?

A. Biogas is conditioned or purified to produce biomethane. This process concentrates biomethane from biogas, and is the stage where any remaining impurities like sulfur, siloxanes, ammonia, volatile organic compounds, water, and other constituents of concern are removed and

there are assurances of energy quality. Exhibit 2, Pradheep Kileti, *supra*, at 18. Before injection into pipelines, biomethane must also undergo an odorization process. NiMo Pre-Filed GIOP Testimony at 104. Finally, the biomethane is compressed and injected into the pipeline. *Id.*

Q. How is biomethane different from biogas?

A. Biomethane and biogas are sold to different markets. Although biogas can be used to produce electricity and heat, biomethane is more valuable because it is pipeline-ready and can be used to replace fossil natural gas. The market for biomethane is expanding as some federal and state programs have incentivized production.

IV. GREENHOUSE GAS ACCOUNTING: MEASURING METHANE'S GLOBAL WARMING POTENTIAL

Q. Please explain the idea of global warming potential for greenhouse gases.

A. Different greenhouse gases have different heat trapping properties based on how they absorb radiation. The global warming potential ("GWP") of a gas compares this heat trapping property to carbon dioxide's. Carbon dioxide has a global

warming potential of one. Methane traps more heat than carbon dioxide, and therefore has a more potent global warming potential. Methane also has a shorter residence time in the atmosphere, meaning it does not stay in the atmosphere for as long as carbon dioxide. For this reason, GWP is evaluated on both a 100-year and 20-year horizon. On a 100-year horizon, methane is equivalent to 25 carbon dioxide molecules. On a 20-year horizon, methane is considered a much more potent GHG.

Q. Please explain how New York State measures the GWP horizon for methane.

A. New York State requires the use of a 20-year GWP horizon, which raises the GWP of methane from 25 to 84. 6 NYCRR § 496.5. This much higher GWP is because of the short-term heat trapping properties of methane. Some, including states that have programs to reward producers of environmental attributes, use the 100-year time horizon.

Q. Why does it matter that different states use different GWP horizons for methane?

A. This is an important distinction because the

claims of greenhouse gas emissions reductions will vary based on which GWP time horizon is used. The purported greenhouse gas emissions avoided in New York by methane emissions will be significantly higher, for example, than in California, which uses the 100-year GWP.

Q. What are fugitive greenhouse gas emissions and why are they important to measure and accurately estimate in GHG accounting?

A. Fugitive emissions of methane are essentially methane leaks from non-point or non-identified sources such as pipelines. Because of the global warming potential of methane compared to carbon dioxide, fugitive emissions of methane can result in high GHGs and undermine claims of greenhouse gas avoidance. Grubert estimates that, assuming a GWP with a 20-year horizon, methane leakage rates of 5.0% to 6.6% and higher for any new biomethane infrastructure would result in emissions equivalent to emissions from fossil natural gas. Exhibit 3, Emily Grubert, *At Scale, Renewable Natural Gas Systems Could be Climate Intensive: The Influence of Methane Feedstocks and Leakage Rates*, 15 Env't Rsch.

Letters 084041 (2020).

V. GREENHOUSE GAS ACCOUNTING: OVERVIEW OF NEW YORK'S LIFE CYCLE ASSESSMENT FRAMEWORK

Q. What is life cycle assessment?

A. Life cycle assessment is an environmental accounting framework to quantify all of the environmental impacts of a product or process. For the purposes of this testimony, life cycle assessment refers to a framework to measure the total greenhouse gas emissions associated with producing a specific quantity of biomethane, from raw materials extraction through combustion emissions.

Q. What is gross accounting in life cycle assessment?

A. Gross life cycle greenhouse gas accounting assesses the emissions across each stage of production and assigns a product, in this case biomethane, a value based on the total greenhouse gases emitted at each stage for a specific quantity of the product. To account for all the greenhouse gases that are emitted to make energy from each different feedstock or combination of feedstocks, we trace everything

in the "system boundary" and add up all the greenhouse gases that go into the component parts and life cycle stages per some amount of energy, called the "functional unit" (e.g. a therm or a megajoule of biomethane).

Q. What is the "system boundary?"

A. The system boundary includes all of the main activities associated with the production of the product, but not activities that are only tangentially related. For example, life cycle assessments of manure-derived biomethane set the system boundary at the lagoons where the manure is held, but would not include the feed for the animals in the system boundary Exhibit 4, California Air Resources Board, Tier 1 Simplified CI Calculator Instruction Manual Biomethane from Anaerobic Digestion of Dairy and Swine Manure (June 20, 2023).

Q. What is net accounting in life cycle assessment?

A. Net GHG accounting starts from a gross accounting approach, but then subtracts GHG if activities can displace or avoid GHGs. For example, under a net accounting framework, we would consider whether biomethane was created

from methane that would otherwise have been directly emitted into the atmosphere. Under a net accounting framework, the biomethane would "get credit" for avoiding those methane emissions. Under a gross accounting framework, it would not – a gross accounting framework just looks at the emissions that result from the biomethane, not any emissions that are avoided as a result of its use.

Q. Why is gross accounting more appropriate for making claims about greenhouse gas reductions?

A. Net GHG accounting is often credited for characterizing indirect effects and is sometimes taken to be "more realistic" because it attempts to model how systems interact with each other. However, net accounting relies on many layers of assumptions. If any of those assumptions are incorrect—and they often are—then the accounting will have errors.

Most policy experts and standards organizations for life cycle assessments recommend that life cycle assessments of products be based on gross GHG accounting rules to avoid issues of double counting. The International Standards

Organization 14040 for life-cycle assessments distinguishes these as approach a (attributional) and approach b (consequential). Exhibit 5, Greenhouse Gas Protocol, Product Life Cycle Accounting and Reporting Standard (Sept. 2011).

Q. In which situations does New York State use gross greenhouse gas accounting approaches?

A. New York uses gross accounting for almost all purposes. Significantly, the Climate Leadership and Community Protection Act ("CLCPA") requires New York to reduce gross GHGs by 40% by 2030 and 85% by 2050. When tracking progress towards meeting those requirements, New York uses a gross accounting method. NYSERDA, Fossil and Biogenic Fuel Greenhouse Gas Emission Factors (Sept. 2022), https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/Energy-Analysis/22-23-Fossil-and-Biogenic-Fuel-Greenhouse-Gas-Emission-Factors.pdf; NYS DEC, 2023 Statewide GHG Emissions Report (2023), https://dec.ny.gov/sites/default/files/2023-12/summaryreportnysghgemissionsreport2023.pdf.

V. GREENHOUSE GAS ACCOUNTING: IDENTIFYING THE "BASELINE SCENARIO"

Q. Please describe the concept of a "baseline scenario" in the context of biomethane emissions accounting.

A. The "baseline scenario" is a counterfactual that is used to accurately calculate the emissions that are avoided as a result of a fuel's production and use. When someone says "methane emissions will be reduced or avoided if I am authorized to produce or inject biomethane," they should always answer the following question: "what would happen if I chose not to produce or inject this biomethane?" The answer to that question is the baseline scenario.

Q. Please provide a few examples of "baseline scenarios" to elucidate this concept.

A. Consider three potential baseline scenarios for biomethane use. In the first, the biomethane is made of methane that would have been otherwise directly emitted to the atmosphere. Under this baseline scenario, the biomethane may result in some avoided emissions because it results in methane being combusted and converted into carbon dioxide, which has a lower GWP than methane that is directly emitted into the

atmosphere.

Now consider a second baseline scenario. In this scenario, some biomethane is sourced from facilities that are otherwise flaring methane. Flaring does not destroy all the methane, but it destroys a significant portion, on the order of 95%. Crediting the biomethane that would otherwise have been flared with avoiding direct methane emissions would be a significant misrepresentation of the real-world emissions reductions. Instead, methane emissions would have been mostly destroyed through flaring. Any assumption that methane would be vented rather than destroyed also should consider existing or proposed policies requiring that methane be destroyed. Given the potency of methane, many states are taking action to reduce methane emissions, for example through composting and improved manure management practices. In other words, treating biomethane as avoiding methane emissions when it is created from methane that would otherwise have been destroyed significantly overestimates the avoided emissions.

Finally, consider a third baseline scenario. In this third baseline scenario some biomethane is made from intentionally produced biomethane. These are facilities or infrastructures that would not exist if not for the ability to sell biomethane and the associated environmental attributes. In these cases, the biomethane should not be treated as avoiding emissions at all, but rather, as creating additional emissions associated with leakage and combustion, as well as with the energy use to create the biomethane. This approach would be consistent with the gross accounting method required by New York to measure progress towards climate action goals.

VI. ENVIRONMENTAL ATTRIBUTES AND GREENHOUSE GAS EMISSIONS TRADING MARKETS

Q. What are emissions trading markets?

A. An emissions trading market is a market-based approach used to reduce pollution by allowing some polluters to pay others to reduce their emissions. "Cap and trade" and "pollution allowance trading" are types of emissions

trading markets. My testimony discusses greenhouse gas emissions trading, but there are also emissions trading markets for other types of air pollution.

Greenhouse gas emissions trading markets sometimes emerge where a state or other jurisdiction has set an overall target for "emissions intensity" (i.e. the GHGs emitted per unit of energy). Some fuel producers find it economically advantageous to produce fuels well below the required GHG emissions intensity, and then sell credits. The credits are essentially permits to emit pollution to another producer that is unable or unwilling to meet the required emissions target.

Q. What are environmental attributes and what role do they play in greenhouse gas emissions trading markets?

A. Environmental attributes represent the benefits of low carbon energy in greenhouse gas emissions

trading markets. Producers of low carbon fuels generate environmental attributes, which represent GHG reduction credits. Environmental attributes are a kind of offset that GHG polluters can buy in order to claim that they have reduced emissions or complied with emissions standards. Polluters can buy an environmental attribute in order to comply with a regulatory requirement to reduce emissions, rather than actually reducing emissions themselves.

Credits for avoided greenhouse gas reductions have become the most widespread environmental attributes sold in emissions trading markets. These take the form of tradeable commodities bought and sold as carbon offsets, renewable energy credit or certificates, or renewable identification numbers. Some of these are sold in regulated markets whereas others are voluntary.

Q. Who buys environmental attributes and why?

A. Environmental attributes are bought for a number of reasons including: regulatory compliance, marketing and self-promotion, and companies' commitments to consumers or shareholders to buy renewable energy. Environmental attributes are traded in carbon offset and renewable energy certificate markets. The basic idea is that you can pay someone else to reduce emissions, instead of reducing emissions yourself.

In some regulated environmental attribute markets, like California's Low Carbon Fuel Standard ("LCFS") and the federal Renewable Fuel Standard ("RFS"), credits are bought by transportation fuel providers and oil refineries that are legally required to reduce emissions and find it more affordable to purchase environmental attributes than to reduce emissions themselves.

In voluntary markets, buyers are not subject to any regulatory requirement, but they purchase environmental attributes to demonstrate emissions reductions voluntarily. Some of the largest companies in the world—Amazon,

Microsoft, Google, and Meta—are some of the largest buyers of voluntary renewable energy certificates (a type of environmental attribute credit) that they use to make claims about GHG emissions reductions from their operations. Importantly, these companies using voluntary certificates are often buying the attributes of renewable energy, not the actual renewable energy.

Q. What is the effect of purchasing environmental attribute credits?

A. When a purchaser buys and then retires environmental attribute credits it can take credit for reducing emissions from its own operations, even when its own facilities or the energy it buys have seen no actual emissions reductions. Simply purchasing credits may be a cheaper option for these companies than taking tangible steps to reduce their own on-site emissions by, for example, weatherizing energy inefficient offices or electrifying their fleets.

Q. Can biomethane producers sell environmental attributes?

A. Biomethane can generate environmental attribute credits that producers can sell to fuel suppliers who need to comply with one of several regulations, most notably the California LCFS and the federal RFS. *See* Exhibit 6, NiMo Response to AGREE Interrogatory 017 (explaining that Interconnection 1 will enable the biomethane developer to sell credits into the markets for the Renewable Fuel Standard and the Low Carbon Fuel Standard); *see also* Exhibit 7, NiMO Response to AGREE Interrogatory 018 (same for Interconnection 2); Exhibit 8, NiMo Response to AGREE Interrogatory 019 (same for Interconnection 3); Exhibit 9, NiMo Response to AGREE Interrogatory 20, (same for Interconnection 4).

Biomethane attributes can also be bought and sold in voluntary renewable energy credit, carbon credit, or carbon offset markets managed by private organizations like Green-e or TerraPass or in markets managed by public agencies like the Low-Carbon Fuel Standard run by the California Air Resources Board.

Q. What do the environmental attributes associated

with greenhouse gas credits represent?

A. Environmental attributes represent some quantity of greenhouse gas emissions per unit of energy, volume, or mass depending on the market.

Q. What does it mean to say an environmental attribute has been "unbundled"?

A. A bundled environmental attribute is one that stays "attached" to its initial energy source because the same entity buys both the fuel and the attribute. An unbundled environmental attribute has been separated from the fuel that generated it. The developer of a renewable energy source can sell the actual energy to one customer, and the attributes to another.

When attributes of biomethane have been "unbundled" from the actual fuel, the buyer of that fuel cannot claim its low carbon attributes. In other words, biomethane for which the environmental attributes have been sold is no longer low-carbon from a GHG emissions accounting perspective. Instead, another entity has already used the attributes to offset other emissions.

Q. Why is it important that environmental attribute

credits are retired once they are claimed?

A. The attributes purchased by a buyer represent the avoided emissions only when they are no longer available for sale to other parties. Until they are retired, they can continue to be traded. Some can be held onto for several years before they are retired. But the attributes can only be claimed once. If the attributes were not retired, the same credit could be improperly used many times over. Retiring attributes also serves as a way to track who is able to make emissions reduction claims.

Q. Have attribute markets worked to reduce GHG emissions?

A. No. Environmental attribute markets are highly problematic. In many instances, these attribute markets fail to deliver real and meaningful emissions reductions. Exhibit 10, Gregory Trencher et al., *Demand for Low-Quality Offsets by Major Companies Undermines Climate Integrity of the Voluntary Carbon Market*, 15 Nature Commc'n 6863 (2024). There are no substitutes for real and direct emissions reductions. The development of attribute markets has been

favored by business interests, but most scholars, researchers, and journalists have uncovered significant over-reporting of reductions, windfall profits, and even outright fraud. Exhibit 11, Matthew Brander et al., *Creative Accounting: A Critical Perspective on the Market-Based Method for Reporting Purchased Electricity (Scope 2) Emissions*, 112 Energy Pol'y 29 (2018); Exhibit 12, Wayne D. Hettenbach & Lauren D. Steele, *The Past May Be Prologue: Energy Credit Fraud and Its Lessons for Carbon Credit Systems*, 69 Dep't of Just. J. Fed. L. & Prac. 79 (2021); Exhibit 13, Patrick Reilly, *False Claims, Real Climate Harm: How Whistleblowers Can Fight Fraud in the Renewable-Energy, REC, and Carbon-Offset Markets*, 35 Geo. Env't L. Rev. 541 (2022); Exhibit 10, Gregory Trencher, *supra*. Low-quality environmental attributes are particularly unsuccessful in reducing emissions.

Q. Are unbundled environmental attributes of low-quality?

A. Yes. Unbundled environmental attributes are low quality because they do not represent physical

delivery of the fuel or energy that generated them. A buyer can purchase environmental attributes of biomethane without physically injecting it into the pipeline system, and then claim the environmental benefits so long as they retire the environmental attributes. Low quality environmental attributes are also at risk of not realizing benefits—in this case, climate benefits.

Q. How well are environmental attributes tracked?

A. Markets for environmental attributes are challenging to manage because it is difficult to track who is making what claim. Some regulated markets have centralized tracking systems. The federal RFS, for example, has a registry of Renewable Identification Numbers. Other markets track credit retirements through some kind or registry. But there is no overarching registry tracking the multiple markets that a single environmental attribute can be sold into. This is particularly challenging because environmental attributes are exchanged in both regulated and voluntary markets and on the local, state, national, and global levels.

Q. What is double counting?

A. Double counting occurs when two entities claim the same emissions benefits. For example, an oil refinery might buy renewable energy credits from a wind farm to meet its emissions reductions. If the wind farm is already selling renewable electricity to an electric utility so the utility can meet its renewable portfolio target, the result is double counting. This is highly problematic for greenhouse gas inventories, the corner stone of greenhouse gas accounting.

VII. GHG EMISSIONS GENERATED BY BIOMETHANE PRODUCTION AND CONSUMPTION

Q. Does the consumption of biomethane generate downstream GHG emissions?

A. Yes, of course. Combusting biomethane creates the same amount of greenhouse gas emissions as combusting fossil methane.

Q. Does the production of biomethane emit greenhouse gases?

A. Yes. Biomethane production emits carbon dioxide, methane, and nitrous oxides, which are all greenhouse gases. Exhibit 14, Valerio Paolini et al., *Environmental Impact of Biogas: A Short*

Review of Current Knowledge, 53 J. Env't Sci. & Health 899 (2018).

Q. At which stage of biomethane production do GHG emissions occur?

A. GHGs are emitted at all stages of biomethane production. At the initial stage, feedstocks such as manure and food waste have to be transported to the production site. Typically, this involves truck or other heavy-duty vehicle traffic, which emits carbon dioxide. Then feedstocks are used to create biogas.

Q. Does the process of creating biogas emit GHGs?

A. Yes. Anaerobic digesters used to produce biogas emit significant amounts of methane Exhibit 15, Viktoria Wechselberger et al., *Methane Losses from Different Biogas Plant technologies* 157 Waste Mgmt. 110 (2023). A recent study found that wastewater treatment facilities that have anaerobic digesters emit three times as much methane than wastewater treatment facilities that do not. Exhibit 16, Cuihong Song et al., *Methane Emissions from Municipal Wastewater Collection and Treatment Systems*, 57 *Env't Sci. & Tech. 2248* (2023). These methane emissions

result from leakage from anaerobic digesters, incomplete flaring of excess methane, the dewatering process for treated solids, leaks at pressure relief valves, and mixing tank ventilation. *Id.*

Additionally, anaerobic digestion produces a byproduct called digestate, the leftover solids and liquids after biogas is generated from feedstocks such as manure. Digestate can be a significant source of methane. Exhibit 14, Valerio Paolini et al., *supra*.

Q. Does the purification process, in which biogas is purified into biomethane, produce GHGs?

A. Yes. Carbon dioxide is removed from biogas during the purification process and is typically released, resulting in greenhouse gas emissions. Exhibit 17, Amir Izzuddin Adnan et al., *Technologies for Biogas Upgrading to Biomethane: A Review*, 6 Bioengineering 92, 9 (2019); Exhibit 2, Pradheep Kileti, *supra* at 19; *see also* Evidentiary Hearing Transcript, NY PSC Case No. 23-G-0226 at 35:4-6 (May 20, 2024).

Additionally, the purification process requires energy. If that energy is supplied by combustion fuels, as is the case at National Grid's biomethane facility in Brooklyn, it will result in additional GHG missions. *See Id.*

Q. Does the process of transporting biomethane produce GHGs?

A. Of course. As discussed below, transporting biomethane in interconnections results in methane leakage.

Q. Is it accurate to suggest that unlike fossil gas, biomethane has no upstream greenhouse gas emissions?

A. Not at all. As detailed above, biomethane production emits significant GHGs, and as a result, biomethane has significant upstream GHG emissions.

In fact, recent studies have found that upstream emissions of biomethane are significantly higher than previously believed. One study found that supply chain emissions are comparable for biomethane, fossil natural gas, and oil. Exhibit 18, Semra Bakkaloglu et al., *Methane Emissions Along Biomethane and Biogas Supply Chains are*

Underestimated, 5 One Earth 724-736 (2022). Some researchers suggest that the emissions factors currently used for upstream emissions of biomethane are significantly underestimating leakage and therefore greenhouse gas emissions. Exhibit 15, Viktoria Wechselberger, *supra*.

Q. What is the implication of the significant upstream GHGs of biomethane?

A. Using biomethane instead of fossil fuel does not necessarily achieve GHG benefits. Because biomethane and fossil gas emit the same GHGs when combusted, the only potential benefit of using biomethane is avoiding the upstream emissions of fossil gas. But there is no real benefit if the production and transportation of biomethane emits the same quantity of GHGs as the production and transportation of fossil gas. As discussed, recent research indicates that upstream emissions are comparable for biomethane and fossil natural gas.

The only way to make claims about avoided upstream greenhouse gas emissions from fossil natural gas is to compare them to the upstream emissions associated with biomethane. Without a

consistent system boundary, the analysis is comparing apples to oranges. Exhibit 19, A. Bernstad Saraiva, *System Boundary Setting in Life Cycle Assessment of Biorefineries: A Review*, 14 Int'l J. Env't Sci. & Tech. 435 (2017).

Even if the upstream GHGs of biomethane are lower than the upstream GHG of fossil gas, they are significantly higher than zero, as the Company assumes.

VIII. LOCALIZED ENVIRONMENTAL IMPACTS OF BIOMETHANE PRODUCTION AND CONSUMPTION

Q. Does biomethane production impact the local environment?

A. Biomethane production impacts the local environment at every stage. Environmental pollution occurs at the sites where feedstocks are managed, the facilities where biogas and biomethane are created, during feedstock transportation, and during end use, i.e. combustion.

Q. What kinds of impacts to water can occur from biomethane production?

A. Activities related to biomethane feedstock

preparation and biomethane production can generate water pollution. As discussed, anaerobic digestion produces a material called digestate, the leftover solids and liquids after biogas is generated from feedstocks such as manure. Digestate can be a source of nitrogen and volatile organic compounds, which can leach into groundwater. Exhibit 20, Isabelle Studer et al., *Physicochemical and Microbiological Indicators of Surface Water Body Contamination with Different Sources of Digestate from Biogas Plants*, 77 Ecological Indicators 314 (2017). Anaerobic digesters can also overflow, spill, and impair water bodies with liquid or solid waste from digestate or slurry sludge. Exhibit 21, James O'Connor et al., Environmental Implications, *Potential Value, and Future of Food-Waste Anaerobic Digestate Management: A Review*, 318 J. Env't Mgmt. 115519 (2022). Onsite generation of ammonia from manure, the anaerobic digestion process, and digestate can create water quality issues as it enters the nitrogen cycle. Exhibit 22, Anping Jiang et al., Evaluation of an Integrated Ammonia Stripping,

Recovery, and Biogas Scrubbing System for Use with Anaerobically Digested Dairy Manure, 119 Biosystems Eng'g 117 (2014).

Q. How does biomethane production impact local air quality?

A. Air pollution impacts from biogas production and biomethane processing include direct emissions of nitrogen dioxide, carbon monoxide, and ammonia. Exhibit 14, Valerio Paolini, *supra*. These pollutants can cause serious illnesses and health conditions including asthma, reduced lung function, cardiovascular illness, and cancer. Exhibit 23, Brady Seals & Andee Krasner, *Health Effects from Gas Stove Pollution* at 7 (2020) Exhibit 24, WE ACT for Environmental Justice, *Out of Gas, in with Justice* at 15–16 (2023). Ammonia, a byproduct of anaerobic digestion, is an air pollutant that can be an irritant and cause injury. Exhibit 25, Katie E.Wyer et al., *Ammonia Emissions from Agriculture and their Contribution to Fine Particulate Matter: A Review of Implications for Human Health*, 323 J. Env't Mgmt. 11628 (2022).

Some facilities generate sulfur dioxide

emissions and hydrogen sulfide, which can contribute to a range of local impacts from acid rain to nuisance odors. Some sources of biogas have high levels of sulfur depending on the source. These impurities must be removed before the conversion of biogas to biomethane. The biomethane processing facility will emit sulfur dioxide or hydrogen sulfide as biogas is purified, unless the biogas supplier has already removed these pollutants from the impure gas prior to delivery.

Q. How else does biomethane production lead to air pollution?

A. Biomethane processing and conditioning is energy intensive. Anaerobic digestion and purification often require the combustion of fuels directly at the facility, which results in air pollution. Combusting fossil fuels releases pollutants including particulate matter and oxides of nitrogen, which can cause asthma, cardiovascular disease, and premature death. Exhibit 24, WE ACT, *supra* at 15-16.

Additionally, transporting feedstocks such as food waste and manure to biomethane production

sites requires the use of trucks, which emit additional local air pollution.

Q. Does the use of biomethane produce air pollutants?

A. Combusting biomethane in homes and businesses creates the same harmful pollution and chemical constituents as combusting fossil methane. Exhibit 26, California Energy Commission, Air Quality Implications of Using Biogas to Replace Natural Gas in California, CEC-500-2020-034 (May 2020).

IX. ACCOUNTING FOR THE INCENTIVIZATION OF THE INTENTIONAL PRODUCTION OF BIOMETHANE

Q. What additional factors can impact the GHG emissions of biomethane production?

A. The market for biomethane has incentivized people to make methane simply for the purpose of selling it. In other words, the ability to sell biomethane and associated environmental attributes has caused dairy farmers and other businesses to undertake efforts to produce methane in order to make money. This gives lie to the idea that all biomethane is made from methane that otherwise would have been emitted

into the atmosphere—at least some is created from methane that would never have existed were it not for the biomethane market. As Grubert explains, "because biogas and biomethane can generate revenue, it is not only possible but expected to intervene in biological systems to increase methane production beyond what would have happened anyway when there is an incentive to do so." Exhibit 3, Emily Grubert, *supra* at 5. This is a point made in earlier research on environmental attribute markets that found they will "at best be expected to have a market demand effect" to produce more environmental attributes Exhibit 27, Michael Gillenwater, *Redefining RECs-Part 1: Untangling Attributes and Offsets* 36 Energy Pol'y 2109, 2118 (2008).

Q. What is the implication of intentionally produced methane?

A. The implication is that all intentionally produced biomethane introduces new leakage and fugitive emissions. In concept, new points of leakage and fugitive emissions increase overall emissions. According to Grubert, biomethane "from intentionally produced methane is always

GHG positive unless total system leakage is 0." Exhibit 3, Emily Grubert, *supra* at 4. Total system leakage is never zero.

Biomethane production can cause overall GHG emissions to increase, and it does. New activities to produce methane will be stimulated by any economic incentives for biomethane including tax breaks, the high price of biomethane, and the opportunity to sell environmental attributes.

Q. Can biomethane production incentivize practices that increase methane emissions from dairies?

A. Yes. Dairy farmers are incentivized to use manure management practices that create methane if that methane can be used to create and sell biomethane. Exhibit 28, Ruthie Lazenby, *Mitigating Emissions from California's Dairies: Considering the Role of Anaerobic Digesters in Mitigating Emissions from California's Dairies* at 16, 43 (Jan. 2024). Methane emissions from manure depend on a number of factors, including volume of manure and manure management

techniques (for example, spreading as opposed to using lagoons). *Id.* at 8-9. In other words, dairy farmers have some control over how much methane their livestock's manure produces, and they are likely to create more methane if they can make money from it.

Q. Can biomethane production incentivize practices that increase greenhouse emissions from food waste?

A. Yes. Using food waste as a biomethane feedstock dis-incentivizes food management practices that do not produce methane and that divert food waste from landfills, such as composting. Additionally, a number of factors contribute to how much methane landfills produce, including the waste composition (i.e., the percentage of waste that is organic material) and management practices such as whether the operator uses liners that will accelerate organic material decomposition by allowing more water filtration. *See* Exhibit 29, Ebun Ayandele et al., *Key Strategies for Mitigating Methane Emissions from*

Municipal Solid Waste at 19, 48-49 (July 2022). For these reasons, California has restricted landfill gas procurement to landfill facilities that stop accepting new organic waste and implement advanced landfill gas capture automation and monitoring technology to decrease fugitive methane emissions. Exhibit 30, CPUC, Decision Implementing Senate Bill 1440 Biomethane Procurement Program, Rulemaking 13-02-008 at 33 (Feb. 25, 2022). California wants to make sure that the biomethane market does not incentivize landfill operators to use practices that increase methane.

Q. Can biomethane production incentivize practices that increase methane emissions from wastewater treatment facilities?

A. Yes. There is variation in methane rates from wastewater treatment facilities, and as discussed, a recent study found that facilities with anaerobic digesters emitted methane at three times the rate as their counterparts without anaerobic digesters. If a wastewater

treatment plant is able to sell biogas to a biomethane producer, it is more likely to invest in anaerobic digesters, which could increase overall methane emissions.

X. THE COMPANY'S PROPOSED BIOMETHANE INTERCONNECTIONS AND CLAIMS ABOUT AVOIDED GREENHOUSE GAS EMISSIONS

Q. Please describe the Company's proposed biomethane interconnections.

A. The Company proposes four new interconnections to inject biomethane into its natural gas distribution system.

Interconnection 1 would inject approximately 750 dekatherms per day (dth/day) of biomethane produced from dairy manure and food waste near Adams, New York. Exhibit__(GIOP-3) at 203. The developer, AG-Grid Energy LLC, is constructing a hub and spoke style biomethane project that will collect manure from several dairies, bring it to a farm called HI Hope Farm, and combine it with food waste for processing, handling, digestion, and gas conditioning. *Id.* The Company claims that the manure and food waste that will serve as feedstocks currently emit methane directly

into the atmosphere. NiMo Pre-Filed GIOP Testimony at 105. Using a 20-year global warming potential of 84, the Company claims that Interconnection 1 will avoid 11,678 MT CO2e/year by displacing fossil natural gas. *Id.* at 106.

Interconnection 2 would be located next to a wastewater treatment plant in Saratoga, New York, and the Company expects that it will inject 250 dth/day of biomethane. *Id.* The Company claims methane and carbon dioxide emissions are currently directly vented from the wastewater treatment plant, and that the project would avoid 3,893 MT CO2e/year by displacing fossil natural gas. *Id.*

Interconnection 3 would be located at the Ideal Dairy Farm, where a company called RevLNG will develop and inject biomethane produced from manure on the farm, which the Company claims currently vents methane directly. *Id.* at 107; Exhibit __ (GIOP-3) at 215-16. That project will be capable of delivering 250 dth/day and the Company claims it will avoid 3,893 MT CO2e/year by displacing fossil natural gas. *Id.*

Interconnection 4 would inject biomethane produced from dairy manure and food waste in Watertown, NY. *Id.* at 108. The developer, AG-Grid Energy LLC, is constructing a hub and spoke style biomethane project that will collect manure from several dairies, bring it to an anchor farm, and combine it with food waste for processing, handling, digestion, and gas conditioning. Exhibit __ (GIOP-3) at 218. The Company estimates that the project will produce 950 dth/day of biomethane and claims that it will avoid 14,793 MT CO2e/year by displacing fossil natural gas. *Id.*

Q. Please opine on the Company's claims of GHG benefits.

A. The Company's claim that the interconnections will reduce GHGs is without any basis. As detailed below, the Company relies on unsupported assumptions about what would otherwise happen with the feedstocks and fails to account for greenhouse gas emissions that will occur upstream as a result of the interconnections. Additionally, even if the biomethane injected into the interconnection

produces some GHG benefit by displacing fossil gas—which is dubious given that upstream emissions from biomethane are likely to be very high—any such benefit will be transferred to whoever buys the environmental attributes generated by the biomethane.

Q. Please explain your concerns with the Company's claimed GHG benefits regarding Interconnection 1.

A. The Company's assumptions regarding the GHG benefits of Interconnection 1 are unsupported for a number of reasons. The Company has no information about baseline emissions from manure or food waste, emissions associated with feedstock transportation, or emissions associated with the construction and operation of the biomethane facilities.

Q. Please explain your concerns regarding the lack of information about baseline emissions from manure.

A. As discussed above, the biomethane market has incentivized farmers to use manure management practices that increase methane. We do not know anything about the counterfactual scenario in

which this biomethane is not produced—in other words, if dairy farmers that are currently managing their manure in ways that minimize methane production will adopt new methods in order to maximize methane production because of the opportunity to participate in the biomethane market.

The Company has no information about the baseline manure management or alternative management strategies. Notably, the Company does not know which dairy farms will supply the manure for the project; what manure management measures the dairy farms currently use; the current rate of methane emissions at the anchor farm, HI Hope Farm; or the current rate of methane emissions at any of the other farms that will supply manure to the project. Exhibit 31, NiMo Response to AGREE Interrogatory 001 at (d)(i), (ii); Exhibit 32, NiMo Response to AGREE Interrogatory 070 at (a), (b). Without information about current practices and baseline emissions, it is impossible to know whether using that manure to create biomethane will avoid emissions. The Company's assumptions

regarding the emissions benefits of creating biomethane from manure are therefore unreasonable.

Because there is no baseline, it is impossible to assess the GHG benefits or whether the interconnection could cause overall methane emissions from the dairies to increase. As discussed, different manure practices emit different quantities of methane. Additionally, states like New York have developed specific policies to reduce emissions from manure management. See Exhibit 33, New York Methane Reduction Plan (May 2017); Exhibit 34, Adam Kotin et al., Diversified Strategies for Reducing Methane Emissions from Dairy Operations (Oct. 2015). Understanding the impacts of these policies on methane emissions would provide important baseline information to make claims about further reductions owing to the development of biomethane.

Q. Please explain your concerns regarding the lack of information about baseline emissions from food waste.

A. The Company's baseline scenario for emissions

from food waste is also unsupported by evidence. The Company does not know where the food waste will come from. Exhibit 31, NiMo Response to AGREE Interrogatory 001 at (e)(i). It is not reasonable to assume that food waste will result in methane generation unless converted to biomethane. First, food waste is increasingly diverted from landfills due to emerging food waste management strategies including composting, which do not create methane. In fact, New York's Solid Waste Management Plan emphasizes the need to divert food waste through landfills using alternatives such as composting. Understanding the baseline case - how would food waste be managed absent the biomethane project - is crucial to making emissions reductions claims. NYS DEC, New York State Solid Waste Management Plan at 23, 47 (Dec. 2023), https://dec.ny.gov/sites/default/files/2024-05/finalsswmp20232.pdf.

Second, if food waste is sent to landfills where it generates methane, landfill operators often flare that methane, converting it to carbon dioxide. Therefore, it is not reasonable to

claim that, absent Interconnection 1, methane from food waste would just be vented into the atmosphere. This inaccurate assumption credits Interconnection 1 with converting methane to a less potent greenhouse gas, carbon dioxide, when it is combusted in homes and businesses. But that methane probably would have been converted to carbon dioxide through flaring anyway. Because we do not know where this food waste is coming from, we do not know the biomethane's overall effect on its emissions.

Q. Please explain your concern regarding the lack of information about transportation emissions.

A. The Company's assumptions ignore emissions that will result from trucks that collect and transport manure and food waste to the anchor farm. These embodied fossil fuel emissions would not be generated were it not for Interconnection 1. The Company does not know how much manure or food waste will be transported to HI Hope Farm, from what distance, or how it will be transported. *See* Exhibit 31, AGREE Interrogatory 001 at (d), (e); Exhibit, 35, NiMo Response to AGREE Interrogatory 144. However, the Company

recognizes that trucks will likely be used. Exhibit 35, AGREE Interrogatory 144. Unless these materials are transported using electric vehicles, the transportation will result in additional greenhouse gas emissions that are unaccounted for in the Company's analysis. In any life cycle assessment of GHGs for a fuel cycle, including the GHG emissions for these truck trips would be standard. In order to allow for a full accounting of GHGs, the Company could provide the estimated number of vehicle trips, the fuel economy of the vehicles, and distance hauled in order to complete a life cycle greenhouse gas analysis.

For these reasons, it is very unlikely that the claimed avoided GHG emissions are real.

Q. Please explain your concerns about the lack of information regarding emissions from the construction of the biomethane production facilities that will serve Interconnection 1.

A. The Company fails to account for emissions resulting from the construction of the biogas and biomethane production facilities that will be necessary in order to inject biomethane into

the Company's distribution system at Interconnection 1. *See* Exhibit 32, NiMo Response to AGREE Interrogatory 070 at (f)(h). This includes construction of anaerobic digestors, a biomethane purification facility, and associated equipment.

Q. Please explain your concerns about the lack of information regarding emissions from the production of biogas and biomethane at Interconnection 1.

A. The Company fails to account for or even try to discern the emissions associated with biogas and biomethane production at Interconnection 1.

As discussed, biomethane is created by purifying biogas. The Company has stated that manure and food waste will be brought to HI Hope Farm "for processing, handling, and digestion," but does not know what GHG emissions will result from "processing, handling, and digestion." *Id.* at (c), (d). The Company recognizes that anaerobic digestion—which creates biogas out of feedstocks—requires electricity and process heating, and yet does not know whether fossil fuels or any other emitting fuel will be used to

provide that energy. *See Id.* at (e). Nor does the Company know which purification method will be used to purify biogas into biomethane, and therefore, what emissions will occur. *See Id.* at (g).

As discussed above, anaerobic digestion and biogas purification are both significant sources of greenhouse gas emissions including methane and carbon dioxide. Without information about emissions at the processing, handling, digestion, and purification stages, the Company cannot provide a full accounting of the greenhouse gas impacts of Interconnection 1.

Q. Please summarize your conclusions regarding Interconnection 1.

A. The Company's claimed GHG reductions from Interconnection 1 are completely unsupported and unreliable. The Company takes credit for avoided upstream emissions of fossil gas, but does not take responsibility for the upstream emissions of biomethane. Without a full picture of the GHGs that will result from biomethane production, it is impossible to know the true GHG impacts of Interconnection 1. What is clear,

however, is that the Company's calculations are without merit.

Q. Is the company also overstating the GHG benefits of Interconnection 2?

A. Yes. As with Interconnection 1, the Company does not have the relevant baseline emissions. Here, the Company does not have the baseline emissions at the wastewater treatment plan to which Interconnection 2 will be connected. Exhibit 36, NiMo Response to AGREE Interrogatory 071 at (a). This makes it impossible to assess whether using wastewater sludge to create biomethane will actually result in avoided emissions, or if it will increase emissions overall.

Nor does the Company know what emissions will result from the operation of anaerobic digestion and purification facilities, which, as discussed above, are significant sources of GHGs. *Id.* at (c), (e). In fact, recent research finds that wastewater treatment facilities that use anaerobic digestion emit three times as much methane as facilities that do not Exhibit 16, Song, *supra*. The use of anaerobic digestion at the Saratoga wastewater treatment facility is

therefore likely to increase the facility's methane emissions.

Additionally, as with Interconnection 1, the Company does not know or account for the emissions that will result from the construction of anaerobic digestion and purification facilities. Exhibit 36, AGREE Interrogatory 071 at (b)-(e). These emissions must be included in a proper accounting of Interconnection 2's emissions impacts.

In other words, the Company's claimed "emissions reductions" from Interconnection 2 are unsupported and without any basis. The Company takes credit for displacing fossil fuel, and therefore for avoiding upstream fossil fuel emissions, but has not even attempted to discern the upstream emissions of the biomethane that it will inject into Interconnection 2. This is not a real GHG accounting method, and it is impossible to know the true GHG impacts of Interconnection 2 without more information.

Q. Is the company overstating the GHG benefits of Interconnection 3?

A. Yes. The Company does not have any baseline information about current methane emissions or manure management practices at Ideal Dairy Farm. Exhibit 31, AGREE Interrogatory 001 at (d)(i). As with Interconnections 1 and 2, the Company also does not know or account for the emissions associated with constructing anaerobic digestion and purification facilities or operating those facilities. *Id.* at (c)-(e). As a result, and for the reasons discussed above, it is impossible to assess the GHG benefits from creating biomethane from manure at Ideal Dairy Farm.

Q. Do you have concerns regarding the Company's claimed greenhouse gas benefits from Interconnection 4?

A. Yes. Once again, without any information about baseline emissions or the emissions associated with construction and operation of the anaerobic digestion and purification facilities, it is impossible to assess the greenhouse gas emissions impacts of Interconnection 4. The Company does not know which dairy farms will supply the manure for the project; what manure management measures the dairy farms currently

use; the current rate of methane emissions at the anchor farm; or the current rate of methane emissions at any of the other farms that will supply manure to the project. Exhibit 37, NiMo Response to AGREE Interrogatory 005 at (d)(i), (ii); Exhibit 38, NiMo Response to AGREE Interrogatory 073 at (a).

Nor does the Company know where the food waste will come from, and therefore, it cannot provide a baseline of emissions that would otherwise occur if the food waste were not anaerobically digested and used to create biomethane. Exhibit 37, AGREE Interrogatory 005 at (f)(i). Nor does the Company even attempt to estimate the emissions associated with the construction of the anaerobic digestion and purification facilities, or the operation facilities, which, as discussed above, will require energy and are likely to emit GHGs including methane and carbon dioxide. *Id.* at (d),(f). Finally, the Company does not know where the manure and food waste will come from or how it will be transported, and therefore, cannot account for the associated emissions. *Id.* at (e),(f); Exhibit 39, NiMo

Response to AGREE Interrogatory 145. The Company admits, however, that trucks will likely be used. *Id.*

Due to these significant information gaps, the Company's estimated emissions benefits from Interconnection 4 are inaccurate and unreliable. As with Interconnections 1, 2, and 3, the Company is ignoring all of the GHGs resulting from the production of biomethane, while seeking credit for avoiding all of the upstream GHGs associated with the production of fossil gas. This apples-to-oranges comparison makes no sense. The Company cannot support its claims of avoided emissions from the interconnections.

Q. Do you have any other concerns about the Company's emissions claims?

A. Yes. The Company states that the interconnections would "reduce" emissions. *See, e.g.*, Exhibit __ (GIOP-3) at 203, 206. But as the Company recognizes, New York uses gross accounting. Under a gross accounting framework, a project can only be said to "reduce" emissions if it actually removes emissions from the atmosphere, for example, through sequestration.

Even if the use of biomethane emitted lower rates of GHGs per unit of energy than the use of fossil natural gas, it would not be appropriate or accurate to say that using biomethane *reduces* GHGs in the gross accounting framework.

Q. Do you have any other concerns about the Company's claimed emissions benefits from the interconnections?

A. Yes. In addition to failing to account for upstream GHGs associated with the biomethane production, the Company fails to account for emissions associated with biomethane leakage along the interconnections that it plans to construct and own. Exhibit 40, NiMo Response to AGREE Interrogatory 125; Exhibit 41, NiMo's Response to AGREE Interrogatory 126; Exhibit 42, NiMo's Response to AGREE Interrogatory 127; Exhibit 43, NiMo's Response to AGREE Interrogatory 128. According to the Company, an estimated 9.864 MT of CO2e/year will be emitted along the transmission piping that the Company will build for Interconnection 1; an estimated 6.074 MT of CO2e/year will be emitted along the transmission piping that the Company will build

for Interconnection 2; an estimated 29.153 MT of CO2e/year will be emitted along the transmission piping that the Company will build for Interconnection 3; an estimated 22.686 MT of CO2e/year will be emitted along the transmission piping that the Company will build for Interconnection 4. Exhibit 44, NiMo Response to AGREE Interrogatory 074; Exhibit 45, NiMo Response to AGREE Interrogatory 075; Exhibit 46, NiMo Response to AGREE Interrogatory 076; Exhibit 47, NiMo Response to AGREE Interrogatory 077.

The Company might claim that emissions from leakage are minimal as compared to what the Company asserts are the emissions benefits of using biomethane. But the Company's failure to account for emissions from interconnection leakage—emissions for which the Company actually has data, unlike all of the other emissions discussed above—just underscores the Company's failure to undertake a serious analysis of the overall impacts of using biomethane. In my opinion as a lifecycle analysis expert, the Company's approach is indefensible.

Q. Does the Company plan to purchase the environmental attributes associated with the biomethane that it will inject at the proposed interconnections?

A. No. The Company is not proposing to purchase and retire the environmental attributes associated with the biomethane that it injects into the interconnections. Exhibit 48, NiMo Response to DPS Interrogatory 449 at (1).

Q. What is the result of the Company's decision not to purchase the environmental attributes?

A. Any emissions reductions associated with the biomethane will be transported to the entities that do purchase the environmental attributes. As a result, the Company cannot claim any emissions benefits from the biomethane injected at the interconnections.

Q. Does the Company state that biomethane provides emissions benefits even if it does not purchase and retire the environmental attributes?

A. The Company asserts that under New York's gross accounting framework there is an emissions offset due to out of state emissions from the use of biomethane, regardless of whether an

entity in New York procures the environmental attributes. NiMo Pre-Filed GIOP Testimony at 106.

Q. Do you agree?

A. No. This assertion has no merit or support. If an entity outside of New York procures the environmental attributes, then that entity can claim the GHG benefits associated with the biomethane, including the avoided upstream GHGs of the displaced fossil gas. In other words, even though the asserted GHG benefits of biomethane are dubious, even these dubious benefits will be transferred to whoever buys the environmental attributes.

In fact, in its last rate case the Company agreed to "make no claims regarding decarbonization or environmental benefits" associated with biomethane because it was not purchasing the associated environmental attributes. Order Adopting Terms of Joint Proposal, Establishing Rate Plans and Reporting Requirements at 43-44, NY PSC Case Nos. 20-E-0380, 20-G-0381, 19-M-0133 (Jan. 20, 2022). This agreement is more consistent with my

understanding of the impacts of biomethane than the claims that the Company is making in this case.

XI. INCREASED GREENHOUSE GAS EMISSIONS IN NEW YORK AS A RESULT OF THE PROPOSED INTERCONNECTIONS

Q. Do you agree with the Company's claims that the interconnections will reduce greenhouse gas emissions by using biomethane to displace fossil gas?

A. No. Without more information, we cannot know whether these projects will avoid or reduce GHG emissions. The Company uses a flawed GHG accounting methodology that does not accurately represent the change in emissions associated with the adoption of these proposed interconnections.

The Company's GHG emissions accounting has severe flaws that drastically overestimate the GHG benefits of the proposed interconnection projects by ignoring upstream and fugitive emissions for the reasons discussed above.

Q. Can you please summarize why the new biomethane interconnections will result in greenhouse gas emissions.

A. As noted in the peer review research and detailed above, the biomethane interconnections will result in activities that emit GHGs including transporting feedstocks, anaerobic digestion, biomethane production, and biomethane transportation. These activities all result in significant upstream emissions. Additionally, the interconnections could result in additional methane emissions by incentivizing practices that increase methane. Consequently, the Company's claim that biomethane will reduce GHGs simply by avoiding the upstream emissions from fossil gas is doubtful at best—the Company is taking credit for avoiding fossil gas upstream emissions, but not taking responsibility for biomethane upstream emissions.

Additionally, because the Company will not purchase and retire the environmental attributes associated with the biomethane, any emissions benefits that the biomethane does achieve will be transferred to whoever purchases the environmental attributes. As a result, the biomethane interconnections will result in increased overall GHGs in New York, not in an

emissions reduction as the Company claims. The Company recognized as much in the last rate case, and agreed not to claim any environmental benefits from biomethane for which it was not purchasing the environmental attributes. The Company should not be able to make an erroneous claim of environmental benefits here.

XII. PUBLIC HEALTH HARMS ASSOCIATED WITH INDOOR METHANE COMBUSTION AS A RESULT OF THE INTERCONNECTIONS

Q. Will the proposed biomethane interconnections impact the health of customers who use gas appliances in their residences?

A. Yes. Combusting fossil methane in homes and businesses causes known and severe public health problems. Allowing biomethane interconnections will continue the use of polluting stoves and other gas appliances that exacerbate and prolong these threats to New Yorkers' health due to hazardous indoor air quality. Additionally, the Company intends to bring biomethane projects "to scale" and views the four proposed interconnections as an opportunity to show "proof of concept" to "encourage others to enter the space." NiMo Pre-Filed GIOP Testimony at

112; Exhibit 49, NiMo Response to AGREE Interrogatory 060. Approving the four interconnections at issue here paves the way for the Company to procure more biomethane in the coming years, which will only prolong the unsustainable and dangerous gas distribution system. The continued promotion of biomethane as a climate solution will lock in future commitments to avoidable indoor air pollution from heat and hot water, at the expense of progress towards whole-building electrification.

Q. Are the air pollution impacts from combusting biomethane different than fossil fuel-sourced natural gas?

A. No. As mentioned above, biomethane and fossil natural gas pollutants from combustion are generally the same.

Q. What are the primary indoor air pollutants from burning methane indoors?

A. Combustion emissions and indoor air quality impacts from biomethane are generally similar to fossil fuels. Combusting methane emits carbon monoxide, particulate matter, nitrogen dioxide, sulfur oxides, formaldehyde, and benzene.

Exhibit 50, Yannai S. Kashtan et al., *Gas and Propane Combustion from Stoves Emits Benzene and Increases Indoor Air Pollution*, 57 *Env't Sci. & Tech. 9653*, (2023); Exhibit 23, Brady Seals & Andee Krasner, *supra* at 7; Exhibit 24, WE ACT for Environmental Justice, *supra* at 15–16. These pollutants can cause serious illnesses and health conditions including asthma, reduced lung function, cardiovascular illness, cancer, and even premature death. Exhibit 23, Brady Seals & Andee Krasner, *supra*.

These combustion pollution exposures reproduce environmental inequality as Black Americans have triple the mortality rate from particulate matter pollution of white Americans. Exhibit 51, Di et al., *Air Pollution and Mortality in the Medicare Population*, 376 New England J. Med. 2513 (2017).

XIII. THE PROPOSED BIOMETHANE INTERCONNECTIONS' NEGATIVE IMPACTS ON HOST COMMUNITIES

Q. How will the proposed biomethane interconnections impact the communities in which they are located?

A. As discussed, intentional methane production,

feedstock transportation and processing, construction of new facilities, and biomethane production can result in harmful impacts including local air and water pollution. The Company does not know what local pollutants will be emitted during the construction or operation of the anaerobic digestion and purification facilities required to create biomethane to serve the interconnections. *See* Exhibit 32, AGREE Interrogatory 70 at (c)(ii),(d)(ii), (f), (h); Exhibit 36, AGREE Interrogatory 71 at (c)(ii),(d)(ii), (f), (h); Exhibit 52, NiMo Response to AGREE Interrogatory 072 at (c)(ii),(d)(ii), (f), (h); Exhibit 38, AGREE Interrogatory 73 at (c)(ii),(d)(ii), (f), (h).

Moreover, three of the interconnections will require the transport of manure or food waste, or both, which will almost certainly require truck traffic, causing additional local air pollution. All of these pollution impacts will harm host communities.

XIV. RECOMMENDATIONS

Q. Do you recommend that the four proposed

biomethane interconnections go forward?

A. No. The Company's claim that the projects will reduce greenhouse gas emissions is unsupported.

Q. Please summarize why the projects would not lead to meaningful GHG reductions.

A. As detailed above, the biomethane interconnections are unlikely to achieve meaningful GHG reductions because of the upstream emissions associated with biomethane, which are significant. In fact, the upstream emissions could be almost as much or comparable to the upstream emissions of the fossil gas that the biomethane will displace.

Because the Company has not provided the information that would be needed to conduct a true comparison, it is impossible to know whether using biomethane rather than fossil gas will result in any emissions benefits. However, even if they did, those benefits would be transferred to whoever buys the environmental attributes associated with the biomethane.

As a result, New York will not experience any GHG reductions. Instead, the Company wants New

Yorkers to pay for infrastructure and for biomethane that will only provide emissions benefits, if at all, to entities outside of the state that purchase the environmental benefits. In addition to the financial cost of the interconnections and the biomethane, of course, New Yorkers will also pay with their health—as discussed, biomethane production harms host communities by creating air and water pollution and prolongs the public health harms associated with combusting methane inside homes and businesses.

Q. Do you have any other concerns about the proposed interconnections?

A. Yes. The Company has not conducted a benefit-cost analysis of any of the interconnections using the societal cost test, the utility cost test, the rate impact measure test, or any other method of quantifying the purported benefits of the interconnections. Exhibit 53, NiMo Response to AGREE Interrogatory 047; Exhibit 54, NiMo Response to AGREE Interrogatory 048; Exhibit 55, NiMo Response to AGREE Interrogatory 049; Exhibit 56, NiMo Response to AGREE Interrogatory

050. Nor did the Company conduct a benefit-cost analysis of any of the alternatives to the interconnections. Exhibit 57, NiMo Response to AGREE Interrogatory 037; Exhibit 58, NiMo Response to AGREE Interrogatory 039; Exhibit 59, NiMo Response to AGREE interrogatory 041; Exhibit 60, NiMo Response to AGREE Interrogatory 043. The Company has acknowledged that it has "not developed a detailed analysis on socioeconomic benefits of" the interconnections, and that doing so would be impossible at this time given that many important variables such as the cost of supply are unknown. Exhibit 61, NiMo Response to DPS Interrogatory 944 at (l); *see also* Exhibit 62, NiMo Response to DPS Interrogatory 945 at (l); Exhibit 63, NiMo Response to DPS Interrogatory 946 at (l); Exhibit 64, NiMo Response to DPS Interrogatory 947 at (l). As a result, even if the claimed emissions benefits of the interconnections were supported, the Company has not assessed whether more cost-effective methods of avoiding emissions are available.

Q. Has the Company provided any other justification

for the proposed interconnections?

A. The Company claims that the interconnections will improve customer satisfaction. Exhibit __ (GIOP-3) at 203, 208, 213, 218. This assertion is entirely without support. When asked about the basis for this claim, the Company stated without evidence that "[m]any Niagara Mohawk customers desire to lower their carbon footprint without bearing the capital cost of new appliances or equipment." Exhibit 65, NiMo Response to AGREE Interrogatory 044. First, as discussed, the interconnection will not reduce greenhouse gas emissions. Second, when pressed, the Company admitted that this statement was not based on a customer survey or information gathered from customer service representatives, but rather, represents the Company's assumptions "based on the Company's application of general economic principle." Exhibit 66, NiMo Response to AGREE Interrogatory 105. In other words, the Company has no evidence to support the claim that biomethane improves customer satisfaction, and it has not identified any real need for or benefit of the interconnections.

Q. Has the Company identified any need for the interconnections?

A. I am aware that the Company claims that the interconnections will help address capacity constraints. Exhibit ___ (GIOP-3) at 203, 208, 213, 218. However, as discussed, the Company has not conducted a benefit-cost analysis for the interconnections or for any alternatives that could be used to help address any capacity constraints.

Q. Does this conclude your testimony?

A. Yes.