DIFFERENTIATED GAS COORDINATING COUNCIL

June 26, 2023

The Honorable Brad Crabtree
Assistant Secretary, Office of Fossil Energy and Carbon Management
U.S. Department of Energy
1000 Independence Ave. SW
Washington, DC 20585

RE: Differentiated Gas Coordinating Council's response to the Department of Energy's Request for Information on Opportunities to Reduce Greenhouse Gas Emissions and Other Air Pollutants Associated with U.S. Liquefied Natural Gas Exports. Submitted via the "ReduceGHGE_LNG_RFI@NETL.DOE.GOV" email address.

Dear Assistant Secretary Crabtree:

As requested in the request for information (RFI) referenced above, please see the contact information below.

- Company name: COEFFICIENT, representing the Differentiated Gas Coordinating Council (DGCC)
- Company contact: Michael Yancey, Director of Policy and Advocacy
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The DGCC appreciates the opportunity to respond to the U.S. Department of Energy (DOE) Office of Fossil Energy and Carbon Management's RFI titled "Opportunities to Reduce Greenhouse Gas Emissions and Other Air Pollutants Associated with U.S. Liquefied Natural Gas (LNG) Exports."[1]

The DGCC is a coalition of stakeholders across the natural gas value chain dedicated to expanding the differentiated natural gas market, including participants in the global LNG export market. The DGCC's goal is to facilitate a pathway for regulators, utilities, and gas consumers to utilize differentiated gas as an important option to meet their climate goals. We believe adopting differentiated gas is the best way to rapidly reduce methane emissions in the oil and gas sector—a win for energy producers, energy consumers, and the climate.

Differentiated gas, also known as certified gas, is natural gas that is marketed and sold based on its verifiable environmental properties, particularly the intensity of methane emissions throughout the value chain. In a world looking to reconcile climate change and the continued use of fossil fuels, energy products with smaller greenhouse gas

[1] *See* Opportunities to Reduce Greenhouse Gas Emissions and Other Air Pollutants Associated with U.S. LNG Exports.

(GHG) footprints will maintain a competitive advantage. The reliable verification of a cleaner product means that such a product can be sold at a premium, especially in the global LNG market.[2] To participate in this market, oil and gas companies track, quantify, and communicate their methane and carbon dioxide emissions to investors, customers, and regulators.

More than 70% of methane emissions in oil and gas operations are avoidable, and 45% are avoidable at no net cost.[3] Energy companies can detect and stop leaks as they occur, minimize routine flaring, and identify and replace problematic equipment. In 2019, oil and gas companies operating on U.S. public and tribal lands wasted $500 million worth of gas, and 163 billion cubic feet of methane—the equivalent of almost two million cars on the road a year.[4] Mitigating methane emissions through differentiated gas can quickly reduce emissions with little pain. Expanding America's differentiated gas market can enable the long-term viability of the LNG market and create a competitive advantage for U.S. LNG producers.

Differentiated gas is critical to credibly communicate the cleanliness of U.S. LNG to energy buyers abroad. By leveraging advanced technology and adhering to internationally accepted methodologies, it instills confidence in emissions data, underscoring the decarbonization advantages of natural gas over other energy types. For European buyers, who might encounter a Carbon Border Adjustment Mechanism for imported LNG, differentiated gas is crucial in mitigating financial risks linked to gas supply emissions.

These programs are increasingly becoming integral to long-term LNG supply agreements and may soon be a prerequisite for the most environmentally conscious international buyers. The DOE's initiative to create a best-practices framework for differentiated gas, utilizing a universally acknowledged methane quantification methodology, such as the Oil & Gas Methane Partnership 2.0 (OGMP 2.0), is vital for global recognition of the strategic benefits of American natural gas.

On the following pages, please find the DGCC's responses to certain questions posed by the DOE in its RFI.

[2] *See* Bloomberg Law's "U.S. Can Ensure Climate Security With Differentiated Natural Gas."
[3] *See* International Energy Agency's "Slashing methane emissions is crucial for the climate."
[4] *See* Environmental Defense Fund's, "New Study Quantifies Natural Gas Wasted on U.S. Public and Tribal Lands," and Environmental Protection Agency's, "Greenhouse Gas Equivalencies Calculator."

Topic 1: Environmental Profile of Upstream Supplies

Question 1.1

What technologies or strategies are being used to mitigate the greenhouse gas emissions and other environmental impacts of the natural gas delivered to a liquefaction facility?

DGCC Response

Data plays a pivotal role in mitigating the GHG emissions and other environmental impacts of the natural gas delivered to a liquefaction facility. Advanced software and technology are essential for accurately measuring methane emissions and implementing cost-effective reduction strategies.

Leak detection is a key technology in this area. Optical gas imaging (OGI) cameras, continuous monitoring systems, sensing/detection technologies attached to satellites or aircraft, and other advanced technologies provide a visual representation or alert of specific methane leaks. Once these leaks are detected, they can be remedied using straightforward engineering solutions such as valve replacement or repair, contributing to the reduction of methane emissions in a timelier manner.

Current methods for collecting data on methane emissions, however, are often inaccurate and inefficient. The prevailing method, as required by regulation, relies on the use of emissions factors consisting of estimated gas-loss rates per unit of activity for specific items of equipment, with emissions calculated via formula and generic factors rather than direct observation. This approach is gradually being replaced by more robust methodologies like those prescribed by the OGMP 2.0, which calls for both equipment-specific direct measurement (i.e., "bottom-up") and engineered calculations (i.e., "top-down") across a facility as reconciled against technologies that use remote sensing to determine the concentration of methane in the atmosphere over a specific area. As this combined "bottom-up/top-down" approach, supplemented by emerging technologies, becomes more widespread, the differentiation of gas products will become more accurate and reliable.

While the technology needed to scale differentiated gas is developing rapidly, it is still in the early stages, with the primary benefit being leak detection rather than full-site quantification. Advanced detection technologies are lacking sufficient quantification capabilities for all sources of methane emissions, which requires the use of technologies such as a high-flow sampler to measure the flow rate of emissions to quantify them. Accordingly, it is crucial to encourage investment in methane detection and quantification technologies to ultimately improve performance, reduce workload by operations teams, reduce manual data collection, and drive automation, which will increase trust and transparency in the data used to determine source and site-level emissions. Additionally, continued investment will potentially make these technologies

more cost-effective and accessible, further enhancing our ability to mitigate the environmental impacts of natural gas delivered to a liquefaction facility.[5]

Several different and emerging technologies and strategies are being used to detect, quantify, and monitor GHG emissions, primarily methane, from the production, transportation, and use of natural gas. From the ground up, these include handheld technologies, stationary technologies, continuous monitoring systems, mobile technologies, and sensors attached to drones, aircraft, and satellites.[6] Challenges in reconciling multiple sources of measurement will continue to evolve as the industry shares best practices to deal with minimum detection limits under varying environmental and operating conditions, as well as addressing the gap in varying time and space datasets available from aerial surveillance.

Handheld Technologies

Handheld technologies, primarily OGI cameras, can survey individual equipment and components for methane emissions and allow the identification of very small emissions sources. However, handheld technologies require close access to equipment and components and can be very time-consuming. A single component may require detection from multiple angles to classify with high accuracy. OGI cameras are approved as an alternative work practice for surveys required under the Environmental Protection Agency's (EPA) New Source Performance Standards OOOOa regulation and are the standard way that oil and gas operators conduct methane leak detection and repair (LDAR) programs.[7]

Stationary Technologies

Fixed sensors that continuously monitor methane emissions are another form of technology being used to potentially enhance and improve the detection and quantification of specific sources of methane. The number and placement of sensors necessary to optimize detection and quantification at a site are typically developed according to a proprietary model and vary by site, geography, and equipment types. A subset of stationary technologies is continuous monitoring systems, which are used to track emissions in real-time. These systems can alert operators to sudden increases in emissions, allowing them to respond quickly and remedy large-scale leaks. Sensors are also used for high-efficiency flare combustion and can significantly reduce methane emissions and steam usage.[8] Operators can verify their flare meters remotely, quickly identify issues, and intervene promptly by having access to real-time combustion efficiency data on the production floor. Advancements are still needed to improve the accuracy in more complex operations, such as those found in midstream operations, to determine the appropriate application of technology by equipment type and improve the accuracy of detection and quantification.

[5] *See* DGCC's "Measuring Our Way to Differentiation."
[6] *See* COEFFICIENT's "Methane Quantification: Toward Differentiated Gas," also provided as a separate document.
[7] *See* EPA's Implementation of Oil and Natural Gas Air Pollution Standards.
[8] *See* Baker Hughes' "Monitor, Reduce and Control Your Emissions with flare.IQ."

Mobile Technologies (Other/Cross-Cutting)
Many sensors can be used in a variety of mobile applications, including specific aerial applications described above, and with ground-based vehicles (e.g., cars, trucks, and vans). Ground-based mobile surveys are typically limited by available roads downwind from the site or sources of methane. Operators also highlight potential safety issues from driving vehicles around sites. Mobile technologies, as with any periodic detection techniques, have limitations, such as the limited overlap in intermittent emissions events, minimum detection thresholds, etc. Correlating operational data and maintenance activities during the collection of these datasets is imperative to understanding the results of these types of surveys.

Drone-Based Surveillance:
Unmanned aerial vehicles or drones equipped with sensors and cameras can be used to monitor facilities from the air. These technologies can typically measure methane in three dimensions, including methane concentrations in the vertical atmospheric column within a methane plume. In addition, some can calculate wind speed and direction, enabling more data for calculations. The use of drones can enable more frequent inspections and can help identify leaks or other issues that may not be visible from the ground.

Plane-Based Surveillance:
Manned aircraft, ranging from larger multi-engine research planes to small single-engine general aviation aircraft and helicopters can fly at different altitudes and a longer range. High-altitude flights can target large areas while low-altitude flights can detect and measure methane from a point source. Planes and helicopters can cover a larger area than drones, making them useful for monitoring multiple facilities or large-scale operations such as pipeline rights-of-way.

Satellite-Based Surveillance:
Satellites can provide a global view of GHG emissions and are typically used for frequent, low-cost measurements over large areas. They are often used to identify super-emitters, monitor facilities over time, and verify other sources of methane estimates or measurements. Several satellites specifically focused on methane are already in operation or will be launched in the next few years. Sensors on satellites measure methane in the total atmospheric column; they are typically not able to identify a specific emissions source and are limited in detection abilities to include only larger, super-emitter types of events. This can help identify trends and hotspots and can also be used to provide insight into emissions data reported by individual facilities.

Question 1.5

What role do or could differentiated natural gas certification programs (also referred to as certified natural gas or responsibly sourced natural gas) play

in helping ensure the suppliers of natural gas sourced for export have taken measures to mitigate greenhouse gas emissions and other environmental impacts?

DGCC Response

Differentiated natural gas certification programs, also known as certified natural gas or responsibly sourced natural gas, play a crucial role in ensuring that suppliers of natural gas for export take measures to mitigate GHG emissions and other environmental impacts depending on the protocols used to achieve the certification. These programs are becoming increasingly important as the world strives to meet the Intergovernmental Panel on Climate Change's 2050 limits on global temperature change, which will require significant reductions in human-caused methane emissions to obtain.

The oil and gas industry is uniquely positioned to substantially reduce its methane emissions over the next three decades, especially related to the LNG market. Major domestic and international buyers of natural gas are increasingly seeking proof of the low-emission attributes of natural gas across the entire supply chain, to the point where demonstrated low-methane-loss gas sells at a premium or provides an unofficial "license to operate" by climate-conscious buyers. However, the challenge lies in validating the emissions data attached to the various low-emission or certified gas programs. While it is true that what gets measured gets managed, it is also true that gas producers and buyers alike must "trust but verify." This is where certification programs come into play.

Certification programs are intended to provide independent ratings and/or verifications to differentiate certified natural gas from non-certified natural gas. They use both "bottom-up" assessments of data and "top-down" datasets (i.e., measurements of the concentration of methane at a site level) to drive greater trust in the reported emissions data.[9] This verification is beneficial to the development of a voluntary market for differentiated gas so buyers can trust the climate accounting data.

The main consideration in the certified gas market today is demonstrating the low-methane intensity of produced and transported natural gas based primarily on self-reported emissions estimates. However, some buyers are looking to move beyond this standard and demonstrate the low-emissions attributes of natural gas through actual measurement and across the full supply chain. They are also beginning to demand other operational and environmental attributes like advanced monitoring technologies and rigorous emissions quantification. These attributes are becoming increasingly important as sellers seek to further differentiate their products as certified, differentiated, or responsibly sourced gas on emission trading registries.

[9] *See* the DGCC's response to question 1.1.

Certification, or proving the emissions intensity of natural gas, is becoming increasingly important to European buyers, as the European Union aims to finalize methane legislation by the end of 2023.[10] This legislation will likely require companies to submit source-level measurement, reporting, and verification (MRV) data and impose some LDAR requirements for energy imports. Thus, transparency of emissions data and certification or verification of the same is becoming increasingly valuable in a global energy marketplace.

Differentiated natural gas certification programs can play a vital role in ensuring the suppliers of natural gas for export take measures to mitigate GHG emissions and other environmental impacts. They provide independent verification of emissions data, encourage higher standards of methane abatement, and enable transactions in the market.

Question 1.6

What differentiated natural gas certification programs are LNG companies currently using? Are there any market gaps currently not filled by existing programs?

DGCC Response

LNG companies are currently using several differentiated natural gas certification programs, including those offered by Project Canary, MiQ, and Context Labs.

Project Canary is a public benefit corporation that provides certification and emission MRV services.[11] It is known for its use of continuous monitoring technology, which continuously monitors methane emissions over long periods, detecting large emission events known as "super-emitter" events. Project Canary evaluates natural gas production with site-level operational and environmental assessments (TrustWell™) paired with the Low Methane Rating. In May 2022, U.S. LNG producer NextDecade announced a 15-year purchase agreement with European energy company Engie to sell 1.75 million tonnes of LNG per year using Project Canary-certified "responsibly sourced gas."[12]

MiQ assesses emissions across basins or regions rather than at individual facilities.[13] Operators can work with a wide range of technology partners to achieve MiQ Certification. MiQ requires companies seeking its certification to undergo periodic emissions monitoring and uses a proprietary algorithm to categorize that gas into one of its six grades of methane intensity. In March 2023, MiQ launched the world's first comprehensive GHG certification and registry for LNG. This new framework will track

[10] *See* Politico Pro's "EU lawmakers back tougher rules on methane emissions."
[11] *See* ProjectCanary.com.
[12] *See* "NextDecade and ENGIE Execute 1.75 MTPA LNG Sale and Purchase Agreement," "NextDecade and Project Canary Form Pilot To Monitor Emissions From Rio Grande LNG Project," and "Energy ESG Market Leaders Turn to Next-Gen Certified Responsibly Sourced Gas."
[13] *See* MiQ.org.

all methane, carbon dioxide, and nitrous oxide emissions from every segment of the LNG supply chain—including production, gathering and boosting, processing, pipeline, liquefaction, shipping, and regasification.

Context Labs is another certifier whose mission is to improve the reliability of methane emissions detection, quantification, and reporting to enable better-informed business decisions and quantification of end-to-end emissions across the natural gas supply chain. They directly ingest and reconcile information from multiple sources in real-time, including continuous monitoring devices, aerial, satellite, and operational data directly from equipment.[14] With services provided by Context Labs, oil & gas operators can deploy capital more effectively to reduce GHG emissions and improve their operational efficiency. Although Context Labs is not yet publicly partnered with any LNG exporters, it is working with a number of leading upstream and midstream operators who are key suppliers to LNG facilities, to ensure that end-to-end full supply chain emissions are accurately measured and verified in accordance with OGMP 2.0 (Level 4/5) and Gas Technology Institute (GTI) Veritas standards, rather than estimated emissions.[15]

Some certifiers partner with blockchain carbon ledgers and digital registries. This allows for the environmental attributes of an LNG cargo to be transparently audited and communicated to buyers without fear of double counting. The goal of the LNG industry is to independently audit and certify each segment of the LNG value chain. MRV data related to each segment can be collected and then totaled through the value chain to bring a complete emissions profile to the end buyer of LNG.

While these certifiers offer different approaches for differentiated gas standards, they all represent the important principle of independent verification in the voluntary market space with the universal intent of encouraging companies to achieve higher standards of methane abatement and enabling transactions in the market.

The market for natural gas certification is continually evolving, but certain gaps are becoming evident. Differentiated gas producers' and sellers' needs and requirements are often unique; these differences are not currently addressed by these programs. For instance, there may be a need for more comprehensive certification programs that consider a broader range of environmental and social factors, or for programs that offer more flexibility in terms of the technologies and methodologies used for emissions monitoring and verification. Certifications also typically focus on natural gas production facilities and may fail to account for all emissions throughout the natural gas value chain. An end-to-end, full value chain approach is needed to provide trusted and transparent emissions data of gas delivered to LNG facilities. The best solution for filling these gaps is to adopt advanced monitoring technologies, improve data

[14] *See* ContextLabs.com.
[15] *See* Veritas.GTI.energy.

transparency, and ensure the DOE's best-practices framework for differentiated gas aligns with global standards.

Question 1.7

What role do or could differentiated natural gas certification programs play in helping to create a competitive advantage for U.S. natural gas in foreign markets as compared to other sources of natural gas? Do or could such programs facilitate long-term contracting by purchasers of U.S. natural gas?

DGCC Response

Differentiated natural gas certification programs could play a significant role in creating a competitive advantage for U.S. natural gas in foreign markets, particularly in Europe. Given Russia's invasion of Ukraine, Europe is actively seeking to reduce its dependence on Russian gas exports. The U.S., with its innovative technology and commitment to reducing GHG emissions, is well-positioned to fill this gap.

Differentiated natural gas is marketed with information about the GHG emissions resulting from its production and transport. In a world increasingly concerned about climate change, a fuel with a smaller GHG footprint should receive a competitive advantage. This is where differentiated natural gas certification programs come in.

Certifiers help provide trust, transparency, and transactability, enhancing the low-emissions credentials of U.S. natural gas suppliers across the supply chain and providing credibility regarding the environmental benefits of U.S. LNG. This is especially true in Asia as developing nations continue their coal-to-gas conversion. Differentiated natural gas allows buyers to select and target the cleanest supplies available, which generates a market mechanism that drives voluntary action of emission reductions to ensure market participation and a premium value. LNG buyers can avoid exposure to potential carbon border taxes, creating an additional value driver for differentiated gas products.

Transparency is achieved using leading and emerging methane-detecting sensors and systems and blockchain-enabled carbon ledgers.[16] Trust is enhanced when these tools provide reliable data to regulators, investors, and other stakeholders making policy and investment decisions. Transactability is promoted by providing companies and governments with validated, actionable environmental performance data, which is particularly valuable for those with net-zero commitments.

These certification programs could also facilitate long-term contracting by purchasers of U.S. natural gas. By providing a clear and reliable measure of the environmental impact of natural gas, these programs can help buyers make informed decisions and commit to long-term contracts with confidence. Furthermore, the U.S. government can

[16] *See* the DGCC's response to Question 1.1.

facilitate the certification, standardization, and interoperability of high-quality data and verification needed to gain credibility in the eyes of non-governmental organizations, policymakers, and markets.

With best-in-class methane mitigation programs in place, the next step is to effectively communicate the validity of a product's low emissions data to end users. Blockchain platforms and digital registries, such as DGCC members EarnDLT and Xpansiv, are meeting this need by providing producers and certifiers the ability to securely register, trade, retire, and report emissions reductions.[17] These new functionalities are unlocking the ability to actively trade certified natural gas in a marketplace. These third parties collect and record natural gas production data, which is then complemented with certified emissions data. The use of blockchain technology eliminates double counting, improves data integrity, and enhances traceability and auditability, increasing the competitive advantage of U.S. LNG

Differentiated natural gas certification programs could play a crucial role in helping the U.S. gain a competitive advantage in foreign natural gas markets, facilitate long-term contracting by purchasers of U.S. natural gas, and promote continued decarbonization across the globe affordably and reliably. They present a unique opportunity to advance U.S. national security, domestic economic vitality, and leadership on climate issues.

Topic 4: Additional Information

Question 4.3

Is there any other information that would be relevant and necessary to assess emission reduction opportunities associated with LNG export?

DGCC Response

Earlier this year, the DOE announced its intent to establish a best-practices framework for differentiated gas, especially as it pertains to LNG exports.[18] If done correctly, this framework can play a significant role in ensuring buyer confidence in operator reporting, third-party certifications, and registries, particularly in the context of the LNG market. This can help preserve the voluntary market for differentiated natural gas.

First, the DOE needs to clarify its authority to undertake this initiative. This involves defining its jurisdiction and outlining the specific actions it can take to support the differentiated natural gas market, especially as it relates to the DOE's regulation of LNG exports.

Second, the DOE should ensure that U.S. standards align with or exceed international standards, such as the European Union's Methane Regulations.[19] This is crucial for

[17] *See* EarnDLT.com and Xpansiv.com.
[18] *See* DOE's "Natural Gas Roundtable Discussion at CERAWeek in Houston, TX."
[19] *See* European Parliament's "Fit for 55: MEPs boost methane emission reductions from the energy sector."

maintaining competitiveness in the global LNG market and ensuring that U.S. natural gas can meet the stringent environmental standards set by international bodies. Aligning the DOE's differentiated natural gas framework with monitoring frameworks that are already in development, such as the EPA's proposed supplemental methane rule is a good first step.[20] For example, the Supplemental Continuous Monitoring section of the proposed rule includes a definition for continuous monitoring that will, if the rule is adopted as proposed, be approved by the EPA. This definition, and other EPA-approved methodologies, could be a standard that consumers and governments point to as an approved methodology for monitoring.

Additionally, the DOE could consider drawing on existing frameworks such as OGMP 2.0. These principles provide a robust and widely accepted standard for emissions offset projects and could serve as a useful model for the differentiated natural gas market, including the LNG sector.

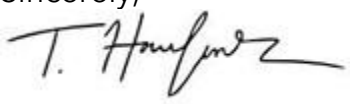
Voluntary initiatives, such as OGMP 2.0 and GTI Veritas, require measurement-informed inventories to replace inaccurate generic engineering estimates. The DGCC recommends replacing generic engineering estimates to calculate emissions inventories with measurements that are technologically agnostic, enabling innovation.

Finally, the DOE's best practices regarding accreditation processes should not hinder the speed at which the differentiated gas market develops or limit the ability of producers and certifiers to exceed existing regulatory or voluntary environmental standards. As with any emerging market, differentiated gas is growing rapidly in both size and environmental benefits. Any framework developed by the DOE should not impede that growth.

The DOE can play a pivotal role in ensuring buyer confidence in the differentiated natural gas market, particularly in the LNG sector, by clarifying its authority, aligning U.S. standards with international norms, drawing on existing frameworks and initiatives, and ensuring market growth.

Thank you for considering our thoughts as the DOE considers this proposed rule.

Sincerely,



Tom Hassenboehler
Executive Director
Differentiated Gas Coordinating Council

[20] *See* EPA's Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review.

DIFFERENTIATED GAS COORDINATING COUNCIL

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About the Differentiated Gas Coordinating Council:
Established in 2022, the DGCC is an ad hoc coalition of stakeholders across the natural gas supply chain dedicated to expanding the market for low methane, "differentiated" natural gas. Its members include academics; downstream, midstream, and upstream energy producers; gas customers; and technology companies. The DGCC's goal is to facilitate a federal pathway for state regulators, utilities, and gas consumers to accept differentiated gas as an important option to meet their climate goals. We believe that the adoption of differentiated gas is the best way to rapidly reduce methane emissions in the oil and gas sector—a win for American energy producers, energy consumers, and the climate.

More information can be found at www.DGCCouncil.com.