



**MRV Webinar Series**  
**The Role and Importance of MRV for Biogas Projects**  
8 September 2022, Virtual Event

**Nick Elger:**

Welcome! Thanks everyone for joining the Global Methane Initiative's webinar on measurement, reporting, and verification for biogas projects. Before we start, we want to just go over a few webinar software tips.

First, there are 3 ways to connect to the audio today. You can either listen through your computer speakers, use the "Call Me" feature to receive an automated call, or use the webinar number included in the webinar invitation. All participant lines would be muted for the duration of the webinar, regardless of audio method that you choose. And if you have any questions, you can enter them into the Q&A panel.

When submitting questions, please select all panelists from the drop-down menu before hitting, send. This will ensure that all the speakers see your question. In the text of your question, please identify which speaker your question is for.

Questions will be moderated at the end of the webinar during the question-and-answer session and final materials, including a recording and the webinar slides will be posted to the Global Methane Initiative website.

First, I'd like to introduce myself. My name is Nick Elger, and I'll be moderating today's webinar. I am the agriculture and waste lead with the Environmental Protection Agency's (EPA's) methane partnership programs and Co-chair of the Global Methane Initiative Biogas Subcommittee. With me today is Neelam Singh, a senior associate at the World Resources Institute, and Lisa Hanle, an independent consultant and former team lead for the enhanced transparency framework coordination unit of the United Nations Framework Convention on Climate Change (UNFCCC).

We have a wonderful panel of speakers that have a number of topics that are really relevant for the measurement, reporting, and verification sector. I'll kick things off with an overview of the Global Methane Initiative and the biogas sector.

Neelam will then go into the basics of measurement, reporting, and verification, and Lisa will dive into the importance of biogas MRV for national inventories in the Paris climate agreement. And I'll finish things off with a quick update on Global Method Initiatives, resources, and tools on measurement, reporting, and verification.

So, a quick background on the Global Methane Initiative. It's a public-private partnership focused on advancing the recovery and use of methane as a valuable energy source. There are 46 partner countries

of the Global Methane Initiative, and over 700 project network members. And as a founding member, the United States provides technical assistance and support to help deploy methane to energy projects around the world. And the Global Methane Initiative is focused on 3 key sectors: Biogas, oil and gas and coal mines. Countries and organizations are encouraged to join the initiative.

The biogas sector, which encompasses agriculture waste and wastewater accounts for approximately one-fifth of global anthropogenic methane emissions and capturing and utilizing biogas can have multiple benefits for people and the planet, including greenhouse gas emission reductions, producing locally produced renewable energy, and improving public health.

Just a quick overview of anaerobic digestion and biogas systems. Here's a graphic from the US EPA kind of demonstrating how these systems work. Manure, food waste, wastewater biosolids, and other organic wastes go into anaerobic digesters and 2 valuable products are produced: biogas and digestate. Biogas can be used for electricity, heat, vehicle fuel, even plastics production. And the digest state is a valuable soil amendment product. It can be used for animal bedding and other crop nutrient purposes.

Biogas systems are really a tool to manage organic wastes. Not just anaerobic digesters, but landfill gas capture systems as well. But there's environmental benefits, including methane emission reductions, and improved local air, water and soil quality. It can help produce energy independence and displacement of fossil fuels and help diversify revenue through the sale of those energy end-products.

Rapidly reducing methane emissions from agriculture in waste can help achieve near-term gains and the global goal to limit global warming to 1.5 degrees. The Global Methane Pledge, which was an agreement, signed by over 120 countries to collectively cut global methane emissions by at least 30% by 2030, is a very important initiative that the Global Methane Initiative, and a lot of our partner countries are helping to support. Measurement, reporting, and verification of biogas can provide data to help track and demonstrate progress towards achieving the global methane pledge.

Next, I'd like to turn it over to Neelam Singh. Neelam is a senior associate with the global climate program at the World Resources Institute, and she works with 2 teams within the program to support countries in designing and tracking their climate commitments at the national as well as sub-national level. Neelam focuses on building capacity in developing countries to track emissions and emission reductions, developing guidance to understand the transformational impact of climate and development policies, and enhancing the understanding of mitigation impacts of non-state and sub-national actions in a country. She's an expert in MRV and has authored WRI's MRV 101 paper that explains MRV for climate change mitigation.

Neelam, I'll pass it over to you now. Excellent.

## **Neelam Singh**

Thank you. Thank you very much, Nick. And thank you and welcome to all the participants on the webinar for your interest and time and joining us today.

So, as Nick mentioned, I will talk through a few slides on the basics of MRV.

We are very much in the post-Paris world where MRV, transparency, and enhanced transparency framework are used almost anonymously. Let's quickly spend a few minutes on understanding these before we jump on to different types of MRV, which is what most of my slides will focus on.

Transparency is absolutely critical to the international climate regime. It's foundational for many other aspects, including participating in market-based mechanisms, in carbon markets, in results-based

payments, as well as more generally in our ability to understand global progress towards tackling climate change and just raising overall ambition based on how well or not so well, we may be doing. Transparency, basically, is this general concept of promoting more openness and sharing and disclosure of information and data related to climate change efforts be it domestically, or internationally.

MRV specifically refers to the specific activities that are being undertaken in order to be transparent, be it again, at a domestic level or international level. Within domestic, at the national level, or at sub national levels. Now the enhanced transparency framework, or ETF as it is referred to, was adopted with the Paris agreement in 2015. And since then, we now have the Paris rule rulebook, which includes practical guidance on implementing the Paris agreement, including guidance on transparency, and reporting on nationally determined contributions (NDCs) through an enhanced transparency framework.

Even though the rule book now sort of lays down these, the guidance or guidelines on how to report, the story of transparency itself is much older and so is MRV. It existed in pre-Paris world, it exists in the post-Paris world. But in the post-Paris world, we are governed by the ETF, the enhanced transparency framework, which ensures that countries are reporting on their NDC implementation through a more standardized submission process and review process.

So as I said, the story of transparency is older than the Paris agreement, it's older than the ETF. The new system is very much based on years of practical experience, and efforts to report climate change data and information to the international community as well as the domestic community, the domestic stakeholders, the national stakeholders. There are considerations related to improvement overtime, flexibility and capacity building that are included within the ETF.

In the end, enhanced transparency MRV, all these efforts should ultimately facilitate ambitious commitments through NDCs and otherwise, while aiding the development of more robust reporting mechanisms for climate action, because only then would you know that the ambition is real, and it's not just talking or greenwashing. And we can generate that sort of evidence through MRV efforts.

So, looking a little bit more specifically into what is MRV. MRV, as I'm sure many of you know, stands for measurement, reporting, and verification. Measurement is about measuring, estimating, and monitoring emissions and emissions reductions, as well as support, financial support at times, which entails data collection (collecting activity data collecting data, collecting data on generating emission factors). Basically, collecting information to quantify emissions or emission reductions or finance, or support.

Reporting refers to the transparent and standardized compilation as well as aggregating and communicating this information.

And verification is about independently assessing the accuracy and reliability of the reported information.

So MRV is basically the sum total of all the methods and rules and procedures and guidance, and the administrators set up, the agencies that may be involved, the reporting entities, the related institutions, all of that, is part of the infrastructure or the system, as they are all necessary to perform and conduct MRV. So, it's really the entire ecosystem. Or an entire ecosystem is needed to quantify whatever it is that you are concerned with in MRV.

So, I'm sure many of you have heard this: you can only manage what you measure. Some of us may keep a log of our expenses to stay within budget or monitor our exercise routine, or sleep routine to meet our individual health goals. We do all this in our daily lives to keep us on track. Similarly, in the climate space, if you want to understand your emissions, you want to understand whether you are meeting your

goals, whether you are on the desired path as an organization, or a country, that is interested in a policy, or just across sector or cross policies, want to understand how well they are moving towards meeting their goals, the place to begin ready is by measuring and monitoring your emissions.

While doing MRV can support all these different goals here, I would also like to know that country's efforts to be transparent and the entire system as a whole isn't perfect yet. It is very much evolving and will continue to improve over time but a lot of progress has been made in terms of defining what are some of the different kinds MRV, some of the different kinds of information and systems that need to be put in place in order to be able to fulfill some of these goals that you see on the slide here in terms of understanding the impact, tracking progress, meeting international reporting obligations or enabling access to finance, et cetera.

As I mentioned, I think in some of my earlier remarks, MRV can really happen at different scales. It could be, depending on the scale that is relevant to you, your system would need to be designed accordingly, so it can serve multiple domestic or national goals and priorities while also fulfilling international obligations.

For example, at an international level, the purpose of MRV, or transparency, often is to promote trust and accountability while fulfilling any international reporting obligations. At the national level, the national greenhouse gas inventory, if you are interested in looking at MRV of emissions, the national greenhouse inventory is really the vehicle to do that, which provides a comprehensive picture of national emissions, which will feed into any international reporting obligations as well as provide information for domestic goals and priorities and policies, et cetera.

But you can also conduct, or MRV is also applicable at other levels, such as at an organizational level at a company level, or at a plant level/facility level, as well as at a project level, where it helps assess the impact of mitigation projects and track progress over time and support any public disclosure-related goals that may be there.

So, I've been referring to different types of MRV and this figure here shows the different types that currently, we are well versed with. There is often confusion between various kinds and the term MRV or transparency is used quite often without distinguishing these different types and it's often being used for MRV of emissions or say mitigation actions.

This slide shows you that there are 3 main kinds of MRV in the context of mitigation again. Again, this is only in the context of GHG emissions mitigation, not so much in adaptation where the idea of monitoring and evaluation (M&E) is more prevalent. These include MRV of emissions, MRV of mitigation actions, MRV of support (or mostly finance).

Within each of these broad categories, you can again focus on MRV of individual elements so to speak. So, while MRV of emissions helps understand the emission profile of an entity and track emissions and the growth or decline over time, or by sectors and identify where the increase is occurring or decline is occurring maybe say in energy sector or land sector, et cetera, MRV of mitigation actions at the same time looks at the specific impact of specific mitigation actions. So, what are the changes that you see in greenhouse gas emissions as a result of implementing say, and energy efficiency policy, or as a result of implementing an industrial decarbonization roadmap, et cetera. You could also include in this MRV the understanding of changes in other sustainable development indicators, such as changes in jobs, changes in health-related indicators. Those changes in equity or just-transition related indicators and that would also be part of the MRV of mitigation actions as a result of different actions being implemented—what is the progress or lack thereof that you are seeing? This can help you gain early insights into policies and

their progress and their effectiveness and, of course, improve transparency around the implementation itself.

MRV of mitigation actions can be done ex-ante (before implementing that action, or a set of actions) or ex-post (that is after implementing or during the implementation of those mitigation actions). And then, the project related would fit in here in terms of projects being one kind of GHG reduction project, being one kind of mitigation action that is being undertaken.

We also have MRV of support or finance, which includes tracking support provided by the developed world and support received, as well as the results and impact of that support. This is often not as well developed and you don't come across many examples of systems that are set up to do this, but it's still very much part of one kind of MRV.

I also want to underline here that even though these different kinds of MRV, they are not completely isolated from each other. There are linkages and there are complementarities between them. And one can contribute to the other, one can enhance the information that is being collected in an MRV system around, say emissions could enhance what's being done in terms of the mitigation actions plant or vice versa.

I think you'll hear more in the next presentation about the relationship between national inventories, which will fall under MRV of emissions and project level MRV, which would fall under MRV of mitigation actions for instance.

This is just a quick slide on comparing MRV of emissions with MRV of mitigation actions to illustrate the distinction between the two. So, in the top chart, you can see that national inventory provides a comprehensive look at the country's emissions and it can show trends over time from year to year. But, the second chart helps you look at the impacts of a specific intervention, a project or a policy, rather than counting emissions from various sources. So, it is focused specifically on vis a vis baseline scenario: What does the implementation of a policy or a project or an action do to the emissions and what is the emission reduction component here?

Sorry, this is a repeat.

This slide here basically just looks at the relevance of reporting under the Paris agreement, where each type of MRV will support, or could support different reporting requirements under article 13 that deals with transparency. And this is one way to view the relationship between the rule book that now exists. And the Paris rule book has, of course, more detailed requirements as part of the ETF for each 1 of these MRV so to speak.

With that, I hand it back to Nick. Thank you.

## **Nick Elger:**

Thank you, Neelam. That was a really helpful presentation on the basics of MRV and really sets the stage for diving deeper into MRV, especially for the biogas sector, which are next speaker, Lisa Hanle, will dive into.

Lisa is an independent consultant with over 24 years of experience working on MRV issues at the project, corporate, national, and international levels. For over 10 years, she worked for the United Nations Framework Convention on Climate Change (UNFCCC) and most recently was the team lead for the enhanced transparency framework coordination unit, helping to transition from the current MRV system framework under the convention, to the ETF of the Paris climate agreement. Prior to that, she

supported capacity building efforts with the Greenhouse Gas Management Institute and spent nearly 10 years with the US EPA supporting the development of the greenhouse gas inventory and Greenhouse Gas Reporting program.

Lisa, I'll hand it over to you now.

### **Lisa Hanle:**

Thank you very much, Nick, and thanks to Neelam for such a great also introduction and overview of MRV. I think I could say that I agreed with everything she said, and I really like the idea of this story of transparency. That's something that I was hoping to get into a little bit—on the story of transparency and then how the MRV of biogas fits into this.

I think this issue is so important. Working on the national inventory, I understood and appreciated the benefits of project-level activities for getting better data to improve the national inventory. And then on the other side, while at the UNFCCC, we saw the international reporting process, and how important that was, but also how important it is to communicate to people about the importance of data.

Often in conversations on inventory and data, people's eyes kind of glaze over sometimes and it really is important. And I think it's great to see people here today, and this is what it's about—bringing in all of the stakeholders to really understand importance of the issue. So, I hope to talk a little bit about the importance of climate data, looking at the story of transparency, as Neelam referred to, highlighting what the biogas sector might look like under the enhanced transparency framework and how it can be operationalized. And then a little bit about making it happen, and concluding with some key messages.

I don't want to go over the slide now because Neelam did a really good job of talking about the importance of climate data. But I think it just emphasizes, given that both of us really saw the need to talk about this, that it really is and is an important topic, and it helps to not only report at an international level—that's the end point. What is important is being able to develop the systems in the country, at the sub national level, at the national level to generate this type of information because it helps inform domestic policy making as well.

One point that I would also emphasize, Neelam talked about this relationship between MRV of emissions and of support. Understanding this relationship is really important too because as you're tracking emissions and identifying support needs, you can make that link and ideally are making that link between action and support.

As we talk about the carbon markets, it was also mentioned, robust MRV is essential for understanding and quantifying these emissions reductions. And the biogas sector, we all know is critically important. It's about 20% of global missions across the sectors. It's potent. Methane is a potent greenhouse gas and so reducing it now has near term benefits, which is important. And, of course, it's an economic resource. Nick mentioned that. So, cutting emissions now, it's a resource that can be used.

The story of transparency, I think it was great. It all started sort of based in the UNFCCC, the framework convention in 1992. And there was a common, but differentiated responsibilities and respective capabilities. So, we had two kind of parallel systems in operation, one for developed countries of MRV and 1 for developing. Under the developed countries, the national communications were submitted every 4 years containing information on emissions, policies and actions adaptation, support starting, and actually this was enhanced, in the Kyoto protocol. I mean, right now there are developed countries' inventories, literally this week, are being reviewed under the final year of the second commitment period of the Kyoto protocol.

So, the MRV of emissions has been enhanced over time. In 2010, the Cancun agreements brought around for developed countries, these Biennial reports. So every 2 years, they were reporting on their inventory, reporting on the mitigation actions, and the support provided. Similarly, developing countries had a similar trajectory. National communications enhanced with this biennial update reports in 2010.

But the submissions have not been as frequent. They're subject to the availability of resources. They followed different reporting guidelines. So, there's kind of two separate systems that have evolved over time, but the Paris agreement will bring them together. Slowly. The first is the biennial transparency reports. These biennial reports that will be submitted under the Paris agreement, are due by 2024 with some discretion for LDCs (least developed countries) and SIDs (Small Island Developing States).

In summary, they bring a common framework together for both developed and developing countries for the reporting and the review process. There is an increased rigor for all, but the jump between current requirements and new requirements for developing countries is larger. And that's why Neelam had mentioned this flexibility.

There's some flexibility in the provisions for developing countries who needed in light of their capacities. So that's a way to try to bring these systems closer together.

So, biogas has been important all along, but it's even more important now as we have these more frequent inventories, these inventories will be subject to review. Countries having targets that they're trying to track towards—MRV is the way this is done. And this is why MRV is often thought of as the backbone of the Paris agreement. So, this slide also has information on the global stock take and the nationally determined contributions, but I'll get into that in the next slide.

So, what the enhance transparency framework has, it has what is sometimes referred to as the cycle of ambition. First, countries have to communicate their own nationally determined contributions. This is different than developed countries under the Kyoto protocol—I mentioned that there was a fixed target that was imposed. And in the case of the Paris agreement, all countries have identified nationally determined contributions (NDC) that they will make towards meeting the objectives of the Paris agreement.

Their first NDC was submitted in 2015 and then it is submitted every 5 years thereafter. So, there was one in 2020. Countries have been encouraged to increase ambition this year and submit one. And then the next one is due in 2025. And so, in these communications, countries will identify their self-determined target or targets and what kinds of indicators that they will use to track their means to achieving those targets. They will report information, for example, on baselines, information on, maybe which target is conditional on getting additional funding or additional technological or capacity building support. But this is all communicated every 5 years.

And so, when we think about biogas, for example, an example could be that a country in their NDC would say that they intend to reduce methane emissions from landfills by X percent by X year below a certain, a certain level. They may also communicate the technical support that they need to do this. Right now, today, countries have their targets. They should be implementing policies and measures to achieve those targets. They should be these MRV-ing their actions and tracking their progress towards the targets. So, this is all happening now.

By 2024, as I said, at the end of the year 2024, countries will submit their 1st biennial transparency report. And this has the full package of information on MRV, and information on the emissions, information on the progress towards their target, and information on the support. Developed countries

provide information on support provided and mobilized, and developing countries on what is needed and has been received.

And so, again, thinking about what does this mean for biogas? You can imagine that the national greenhouse gas inventory will have information on methane emissions from the solid waste disposal sites. There would be information from a country who has this in their target on the amount of methane emitted, recovered, perhaps technologies in place, and what is their progress towards their identified target. And the country may also talk about in terms of support needed and received, they might talk about additional funding that they need, additional technological support or capacity building that they need to help them achieve the target. All of this is part of the BTR (biennial transparency report), which will be reviewed by an international team.

And then every 5 years, there's a global stock take this isn't about what's happening in any one country but collectively, what is happening globally. Globally, are countries on track of meeting the objectives of the Paris agreement? And the countries may get together and talk about specifics—actually, it's all stakeholders, it's not just countries—to talk about specific areas in mitigation or adaptation and support. I mean, one can imagine that methane could be a big topic of conversation here because it is so critical. So another element of the MRV.

A word specifically on national greenhouse gas inventories, because the greenhouse gas inventory is really important for many reasons. All of the reasons why I said that data is important, but also in the ETF realm, it's important because it can help track progress towards targets. Developed countries are encouraged to have economy-wide targets and the inventory is a good way of tracking that. Developing countries are also encouraged to move towards these economy-wide targets. So, developing and improving an inventory is critical. A lot of it is based on a strong foundation and institutional arrangements and this actually is for every level of project that every level that Neelam was talking about, it's important to have a strong foundation of what are the procedures in place? Who's doing what and when? What are any legal frameworks that are in place? Countries will then estimate greenhouse gas emissions for every single category, or source, or sink in their country. So, they have to identify which methods they'll use. The intergovernmental panel on climate change (IPCC) provides national methods that can be used at different levels with Tier 1 being the most basic, where you can just use national activity data and some default emission factors, up to more refined and detailed tier 3 methods. These are typically methods that are like facility-level data even down to technology processes. So, the national inventory is a collection of all of these individual source and sink categories. The team will compile it, they'll check it, they'll quality assure it, revise it, and submit a national inventory.

It all seems very simple and linear, but it's not. The reality is that it's a lot of bottom-up and top-down and refining things over time, and it's about prioritizing what is most important and where's the greatest opportunity for improvement and for reductions. If you want to learn more about this, the 2006 IPCC guidelines are sort of the international Bible for all of this. And volume one is linked here talks about the process of national inventory development.

So, I just wanted to have a quick thought of it is not always linear. It is messy. And there's no one right way to do an inventory. Neelam mentioned it and it's true. It takes time you improve over time, there's incremental improvements. But I think that the enhanced transparency framework is going to be a driver. It's going to be a driver for improving data, and for getting support to do that, which is important as well, and one way you can see it happening is, there could be a discussion by the inventory team. Well, we know the waste sector is a large source of emissions in the country but we don't really have



good methods, but if we include it in our NDC, it will attract support. And so you can slowly improve it over time.

I have here the example of Tonga because I thought it was interesting. Their waste sector is like, point 3% of their national emissions, but their NDC has a target in it to improve the waste collection system because they see it as such an important indicator of getting data and for opportunities for having a target in the future. Data is the foundation for a lot of this. So, that may be something to look into.

I know we're running out of time. Just the making it happen again. It's this idea that nothing is perfect. You have some top-down estimates, which can be really good for providing indicators of what are the largest sources of your inventory. The bottom-up data is very important. I mean, we were so excited in the U. S. when we had the facility level program, because you get all of this data in, and you can get a better sense of mission factors and processes.

But you realize quickly that you can't just naturally include it in the inventory. There's a process that you have to do to see—is it relevant? Is it complete? Is it representative?

So, I put an hourglass here because it's like you have the top-down, you have the bottom-up, and you keep flipping it and eventually, everything improves over time. And the important activity is just to start. Why focus on MRV now? It's a significant source of emissions—Nick mentioned that. It makes economic sense. I think everyone working on this knows that if there are some real opportunities here. But accounting is important, you can only manage what you measure as Neelam said. The Paris agreement is now. Countries, stakeholders around the world should be looking at this and looking at it closely now, because they should be tracking towards targets. And I think, like 81% of countries have the waste sector in their NDC. And maybe the high 70-77 percent have it in the agriculture sector.

So it's important now. And the data—it's not just important for international progress and tracking, but also for your own domestic policy making and purposes. There are benefits all around.

Thank you for the opportunity to present and happy to answer questions later. Thanks.

## **Nick Elger:**

Thank you so much, Lisa. That was a phenomenal presentation. I learned a lot and, you know, hearing you and Neelam speak, it just reminds me that you both are truly rock stars in the world of MRV and we're really lucky to have you here today and I encourage everyone that's on the call today to please type in questions for speakers here, this is a really great opportunity to get some feedback for any questions or thoughts you have as you're pursuing this process for your work as well.

Lisa mentioned that MRV is really the backbone of the enhanced transparency framework and there's a number of resources that the Global Methane Initiative, and World Resources Institute, and other organizations have to help on. And I want to share just a few resources that are really important for the biogas sector on MRV: a recently developed MRV handbook for the biogas sector and an MRV resources center that the Global Methane Initiative has.

U.S. EPA, in support of the Global Methane Initiative, recently developed the MRV handbook for the biogas sector. It's a high-level resource that includes guiding principles for conducting emissions and mitigation MRV for the biogas sector. And it's a really useful guide for decision makers to understand best practices for incorporating project-level MRV into international frameworks and objectives. The scope of the report covers agriculture, municipal solid waste, and wastewater sector, and it really looks at project-level activities, such as anaerobic digesters or landfill projects and how to incorporate that

data into national inventories. It's based on existing protocols and guidance from EPA, California Air Resources Board, and knowledge from industry experts.

And in the guide, there's really a lot of best practices case study examples from countries that have developed and utilized frameworks of their own, and a lot of information and best practices for developing national inventories and enhancing mitigation targets and NDCs and including biogas into those practices. The MRV handbook can be found on the Global Methane Initiative (<https://globalmethane.org/mrv/biogas-sector>) website.

We recently developed and launched a resources center, which is a centralized location for all global methane initiative MRV resources. And there's information on the biogas sector, which I just covered as well as oil and gas and coal mines as well. And it includes a lot of the basic information on what MRV is and when to use frameworks, and why it matters? And, of course, pulling information from that report, we pulled out on to some of the web pages as well so you can more easily search through understanding kind of the benefits of biogas MRV, best practices, case study examples, and other tools and resources that can help you on your MRV journey as well, as links to other resources from WRI, UNFCCC, and UN development program.

And this is just an example of one of the tools that we wanted to highlight that can be helpful for this. The solid waste emissions estimation tool. It's an Excel-based tool for quantifying emissions from the waste sector. It can help with project level or source level, emissions of methane, black, carbon, particulate matter, and other pollution. And it's been used by over 50 cities around the world to help them develop emissions estimations for biogas projects in their cities—so really great tool. There's a number of other tools and resources on our website and encourage you to visit.

I also wanted to highlight that the Global Methane Initiative is partnering with the Climate and Clean Air Coalition to host an event in Washington DC focused on methane and reductions of short-lived climate pollutants. It's a premier global event bringing together international stakeholders to discuss climate and air quality opportunities, with a focus on methane.

There's going to be a number of sessions particular to the biogas sector on waste and agriculture to discuss the challenges and opportunities for advancing a circular economy. We encourage you all to join in person, but if you're unable to, there will also be live-streamed options as well.

And just bringing it all together today. Some of the key takeaways. GMI and our partners, including Lisa and Neelam, have a number of tools and resources that can really help enable decision makers to establish effective MRV systems and MRV systems for the biogas sector. GMI, we aim to be a network of creating a network of practitioners to help share best practices and lessons learned and encourage you to reach out to us with any questions. If you need any assistance, there's a vast network of experts that we are engaged with that can be of help to you all.

So, thank you very much and I saw some questions started to come in, so we have about 15 minutes left for question and answer.

I will try to direct these to each of the speakers as best I can. Let's see if I can scroll to the top of these. So, one of the questions that came in is: "Are you aware of any specific tools to estimate methane emissions from food loss and where and waste?"

Thank you for that question. I touched on that a little bit at the end. A few of the tools on the global methane initiative website are the SWEET tool, which I mentioned, the solid waste emissions estimation tool. There's also an anaerobic digester screening tool, which can help give you an estimate for how

much biogas could be produced from different waste streams, if it were to be utilized in an anaerobic digester and how much emissions could be reduced as well from that waste. I know there's over 38 tools and resources on that website and if you have specific questions on food loss and waste, please reach out to me, email provided above or to the global methane initiative website. There's a way to submit some questions through there and we can help direct some of your questions

And I can open it up to Neelam and Lisa if they have any other recommendations on tools to estimate methane emissions from food loss and waste.

### **Neelam Singh:**

So, I am not able to share in response to the question but, if you could, you can just search for food loss and waste protocol, you'll come across, guidance for companies on food loss and waste emissions. There's also a food loss and waste accounting and reporting standard both by WRI. And I'm not sure whether the protocol is specifically for companies or for organizations. I don't know whether that helps, but it's not a tool and it's not an Excel tool, but it's more guidance that at least I'm aware of.

### **Nick Elger:**

Thanks Neelam. Another question just came in— “Biogas from manure and other sources is an excellent source of base power energy. What funding programs are available to farmers to get funding to build digesters?”

And I'm not sure where this question came from as far as what country. In the United States, there's a number of incentives that are available for digesters, mostly offered through the US Department of Agriculture. But there are also, in some of the new climate laws that were just passed, tax incentives for building digesters. A lot of times there are state incentives as well.

Internationally, I'm not quite sure. I think it's a lot of times country dependent on incentives.

Yes, the question, on the Inflation Reduction Act. Yes, there are a number of resources available as far as funding for projects in the US that are available from the inflation reduction act. So, I encourage you to read that and I'm sure partners in the US will share information. The American Biogas Council is a great resource as well to stay up to date on some of the latest incentives that are available for projects in the US.

Sarah, I only see a few questions, if you're able to help out, answering or reading some of the questions, I'm not sure if I'm seeing them all.

### **Sarah Chadwick:**

I believe you read the last one. We did have a suggestion if you wanted to talk any more about what the Global Methane Forum would cover that might be helpful to this audience.

### **Nick Elger:**

I'm sorry can you say that again, Sarah?

### **Sarah Chadwick:**

Sure, just here internally, we were thinking it might be helpful to talk more about what the Global Methane Forum will cover. It might be interesting and relevant to this audience.

## **Nick Elger:**

Yeah, there's a number of topics at the Global Methane Forum related to biogas and in the agriculture and waste sector. I'm helping to organize a session, the Global Methane Initiative, is helping to organize a session on the role of biogas in a circular economy. We have speakers from around the world, including Denmark, Argentina, and the United States and other countries to share experiences on policies and approaches to advancing biogas for a circular economy. There's a number of waste sessions talking about innovations in this sector on small scale use of biogas, small community-scale use of biogas. So, there's a number of technical sessions that will focus on a lot of the really important information on biogas systems.

And, oh, I see. Another question has come in. "Where and how can we get access to the tools that estimate the emissions in Nigeria? We are currently trying to install a 2 megawatt anaerobic digester and are planning to have organic manure electricity. Is there a plan to access some funding?"

Certainly, we have, I mentioned a few of the tools, the anaerobic digester screening tool can help you with estimating energy and emissions reductions from anaerobic digesters. And I'd be happy to follow up with you to share some of those tools and resources. As far as access to funding for Nigeria, the Global Methane Initiative and US EPA are not offering at this time any financing for funding for projects internationally. Some of the programs that I mentioned earlier were for the United States and available from some of the new climate laws that were passed in the US

Another question that just came in on "What concentration of methane is the weakest that can be recovered for useful energy?"

That's a good question. Typically, when biogas is produced, it's roughly anywhere from 50 to 70%, methane and a lot of times for beneficial use, whether it's for electricity or for vehicle fuel. It is cleaned up to a higher degree of methane. So, a lot of the CO<sub>2</sub> and water. And other constituents are taken out of the gas just so that engines can burn it cleanly. And it improves the energy content of the gas. So, a lot of times there are clean up technologies available to make that gas viable for use.

Okay, another question. "Thanks for the presentation, what do you know so far from African agricultural contacts? Biogas as a manure management is not common."

I'm happy to turn it over to anybody else that has had any contacts on that, or I can keep trying to answer some of these questions.

## **Lisa Hanle:**

I don't have a specific answer, but I have an answer where you could look maybe. For this question, I'm not sure the degree of penetration of these technologies in Africa. But where that information could be found would be in the biennial update reports that developing countries are submitting. So you can go to the UNFCCC website and they're in the national report. Sorry, you can find these biennial update reports and there's a section in there on the policies and measures and nationally appropriate mitigation actions. So there could be some discussion there for the African context.

## **Nick Elger:**

That's a great suggestion. I think that would be a great first place to look. Okay, another question what technologies are available to concentrate weak methane to that level. I don't have them off hand right here, but there are a number of available, number of technologies available, and EPA has a number of

web pages with information on some of those technologies that I can help refer you to. So, I'll follow up with you even on that with more information on gas clean-up technologies.

Okay, another question came in—"How are the programs dealing with CO<sub>2</sub> emissions in order to capture or reuse other chemicals as fertilizer? Is there a program called blue biogas as happened with the blue hydrogen?"

If I understand your question, it's focused on not just the methane component of biogas, but also the CO<sub>2</sub>, and what's being done to capture that as a viable resource? And that's a really good question. And I know there are a number of examples around the world of that technology being used to capture CO<sub>2</sub> for beneficial use. In India, I know there are a few anaerobic digesters that separate that CO<sub>2</sub> and use it for industrial purposes. And it really depends on where there's value in the market in local and national context. We don't have much experience with that in the US. Just because there's not as much market availability for that, but I know in other countries, CO<sub>2</sub> production is a really valuable incentive and an option for use of biogas maybe.

**Lisa Hanle:**

If I could just add on this. I think an interesting question, an important one for MRV, is the tracking. So you have what's happening inside your facility, but often with this question of CO<sub>2</sub> capture, the question is, well, where does that capture go, and is it ultimately stored? Is it ultimately emitted? What is the fate of that? So, I think as you're thinking about establishing programs is also important to look at where the CO<sub>2</sub> is going.

**Nick Elger:**

Really good question. Okay. "When I look at the NDCs for most African countries biogas is a target as a mitigation aspect. It's great to see." I know that Lisa mentioned biogas from waste and agriculture beginning to be a prominent aspect of countries's NDCs and I don't know Lisa, if you have any context or Neelam for African countries and biogas.

**Lisa Hanle:**

I'm just thinking about that comment in relation actually, to the next question, which I just lost—how can you propose to developing countries to promote biogas technology? I think there are there are a lot of references to agriculture and waste sector and biogas in the NDCs but I think a lot of times for all sectors, what is actually in the NDC can be a little bit vague or not clear and not fully transparent. So, one of the things is also to try to really understand what are these actions, mitigation actions, that are proposed, and that can help generate support and you can identify clear areas where more support is needed. So, yeah, thanks.

**Nick Elger:**

Thanks, Lisa. And we are at the hour and I just want to wrap things up and thank our speakers for today. It was really wonderful to hear your perspectives on MRV and especially MRV in biogas sector. And just to remind you all that this information will be available on the global methane initiative website in a few days, and we will let, you know, when that is available. And I encourage you all, for those that are on, in the side there's a quick feedback form that we would really appreciate your feedback to understand how you enjoyed today's webinar and any additional information that we can share in future webinars. So, please, if you have a moment to answer those questions, we'd really appreciate it.

And, so thank you so much for those that were in attendance today and we'll look forward to seeing you again on a future webinar. Thank you. Thank you. Bye.