A Call to Action on Methane:

an international dialogue hosted by the GMI

3 June 2021, Live Event

Monica Shimamura:

Welcome everyone, welcome to a Call to Action on Methane: an international dialogue hosted by the Global Methane Initiative. Thank you for joining us today. I am Monica Shimamura, Director of the Secretariat of the Global Methane Initiative.

Before we get started, let's review a few housekeeping items. First tip, maximize your browser window to make sure that you can see all the controls. This is especially important if you want to use the closed caption feature. Your audio is controlled by the device you are using to join this event. For example, your cell phone, your smart phone, desktop computer, or tablet. If you are experiencing trouble with the sound or audio, turn up the volume on the device you're using. Make sure your device is not muted.

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Lastly, a recording of today's event will be made available on the Global Methane Initiative's website.

I'm very pleased now to introduce Helen Ryan. Helen is the Associate Assistant Deputy Minister of the Environmental Protection Branch at Environment and Climate Change Canada and Chair of the Global Methane Initiative's Steering Committee. Madam Chair, I'm turning this over to you now.

Helen Ryan:

Thanks very much. Good morning, good afternoon, and good evening. Bonjour, à tous et à toutes. My name is Helen Ryan. As you just heard, I am the Associate Assistant Deputy Minister of Environment Protection Branch at Environment and Climate Change Canada. I'd like to begin by acknowledging that the land on which I am speaking to you here in Gatineau, Quebec, Canada, is the traditional unceded territory of the Algonquin Anishnaabeg People.

As chair of the Global Methane Initiative's Steering Committee, I am delighted to welcome you to today's event, which we've named "A Call to Action on Methane: an international dialogue hosted by the GMI." I look forward to hearing from our speakers on their perspective and insight on the importance, the opportunities and challenges of methane mitigation.

Today's event is extremely timely as the world works to overcome a pandemic of global proportion. We are here to talk about solutions to another global crisis. Climate change represents an existential threat. The IPCC has been clear that we cannot hope to limit global temperature rise to 1.5 degrees Celsius without taking significant action on methane in the next few years. And as the window of opportunity to take meaningful action narrows so too does our ability to avoid the worst impacts of climate change.

Methane is both a potent greenhouse gas and a short-lived climate pollutant. According to the Global Carbon Project, methane is the second most important greenhouse gas contributing to climate change. It's responsible for about 23% of global warming produced by all greenhouse gases. It is also a precursor to harmful ground-level ozone and, as a result, has significant human health effects. And since methane only stays in the atmosphere for a decade or so, mitigating methane is one of the few ways we can slow the rate of warming in the near term.

However, taking action on methane is not just about mitigating climate change, it's also about economic opportunity, because methane is a valuable energy source. Rather than allowing methane to escape into the atmosphere it can be captured to yield both economic and environmental benefits. Repairing methane leaks in the oil and gas sector, for example, retains valuable natural gas that companies can then sell. Exciting technological developments in the methane capture and use show that methane can play an important role in the decarbonization of our economies.

We're also seeing the interesting development of new technologies and tools that can be used to find methane leaks at different scales; from satellite observation at the continental scale, easily deployable drones to monitor local operation sites.

Our Global Methane Initiative Partners recognize this potential. They recognize that there are existing solutions and opportunities to address methane, and they've been undertaking outstanding work to mitigate methane. Here a few examples of what the GMI has achieved since it was created in 2004:

- 70 countries have hosted activities where approximately 50,000 people received more than 225,000 hours of training on reducing methane emissions and capturing methane for productive uses.
- GMI has partnered with 45 countries and hundreds of private sector and multilateral partners to reduce methane emissions by more than 454 megatons of carbon dioxide equivalent.

While these are remarkable achievements, more can be done. I am pleased to announce that the GMI has recently adopted new terms of reference and has renewed its charter for another 10 years. Canada has been a proud member of the Global Methane Initiative since 2005 and co-chair since 2016. Canada will be continuing in its role as chair for another term.

I'd like to speak briefly about Canada’s approach to methane mitigation. Canada is also proud to be taking action on methane, putting into practice the very best available techniques and a robust regulatory regime. Canada is committed to reaching net zero emissions by 2050 by investing in clean technology and taking action through regulations and incentives. We are also committed to continuing to take a leadership role, including by sharing our solutions with the world to demonstrate how action to reduce methane emissions can spur innovation and clean job creation.

One exciting area of Canadian-led science is in the monitoring and measurement of methane sources. Working with clean technology innovators will allow us to detect large amounts of methane sources and measure the progress of our efforts. Canadian innovators are at the forefront in this area. We’re

providing ground-based solutions developed by members of the Methane Emissions Leadership Alliance, or space-based monitoring via GHGSat's satellite technologies.

Momentum has been growing since Canada committed in 2016 to reduce methane emissions from the oil and gas sector 40 to 45% below 2012 levels by 2025. Canada recognizes that reducing methane emissions from Canada's oil and gas operations is one of the lowest-cost actions to reduce greenhouse gases from the energy sector. Canadian provinces of Saskatchewan, Alberta, and British Columbia have all taken action to address methane from their respective oil and gas operations.

Canada is one of the first countries in the world to regulate methane emissions from the oil and gas sector at a national level. Our methane regulations are key to tackling climate change for Canada's largest industrial mission source. They provide the oil and gas industry with compliance options and opportunities for innovation.

In addition to methane regulations, our approach also includes complementary initiatives. For instance, the Emission Reduction Fund provides funding to reduce greenhouse gas emissions from the oil and gas sector with an emphasis on methane. As well, we are developing a clean fuel standard to reduce emissions from liquid fossil fuels, which can include incentives for reductions of certain methane emissions.

Canada is making strong progress towards its 2025 goal. And we believe enhancements in clean technology allow for a more ambitious 2030 methane reduction policy. That's why the Strengthened Climate Plan, introduced in December 2020, introduces a goal to achieve deeper methane reductions—a goal guided by the International Energy Agency's analysis that member countries should target a 60 to 75% emission reduction by the end of the decade. And, it's one of the reasons why Prime Minister Trudeau announced in April that Canada will enhance its Paris Agreement target, aiming to reduce GHG emissions by 40 to 45% by 2030.

As you know, oil and gas is not the only sector where we can mitigate methane emissions. Canada is also supporting, through Canada's Low Carbon Economy Fund, a number of climate projects that are diverting organic waste and expanding landfill gas collection systems. As part of our Strengthened Climate Plan, we will also be developing national regulations for landfill gas capture from large landfills.

Despite much progress made by several countries, including Canada, in addressing methane, we're here today because methane remains a global problem and emissions are continuing to rise in many parts of the world. And we understand that collaboration is absolutely key to progress. With the United States now reengaged on climate change, the global dynamics are changing and we must seize the opportunity to work together to achieve greater progress.

That's why I'm pleased that we're joined today by Acting Assistant Administrator of the U.S. Environmental Protection Agency, Joseph Goffman. Our two countries recognize that further emissions reductions are both feasible and essential to making rapid progress in fighting climate change. This April, our two countries issued a Roadmap for a Renewed U.S.-Canada Partnership, committing both of our countries to achieving ambitious method emissions reductions in the oil and gas sector and other sectors. We will work together to increase domestic requirements for methane reduction and to raise global ambition for methane mitigation.

As a global community, the shift towards a low carbon future is already underway. We've collectively improved our ability to measure methane emissions and quantify their impacts. We've developed cost-

effective mitigation solutions, and some countries have put measures in place to regulate or incentivize the implementation of these solutions. We will need to work hard as a global community to achieve methane reductions required to meet our collective Paris Agreement goals. Together, we can advance our economic and environmental goals even in the midst of a crisis.

Today you will hear from a variety of influential leaders with keynote addresses and an industry panel discussion with moderated Q' and A's. We've got a great program for you, so let me introduce our first speaker.

Our first speaker today will kick us off with a keynote address on Methane Mitigation Policy to Achieve Climate Goals. I am pleased to introduce Joseph Goffman, Acting Assistant Administrator of the Office of Air and Radiation at the U.S. Environmental Protection Agency.

Joseph has extensive experience in climate, air, an energy, having served previously in the OAR as an Associate Assistant Administrator for Climate and Senior Counsel. He has provided legal counsel and policy advice on a wide range of climate policy and Clean Air Act regulatory and implementation issues. Joseph has previously served as the Executive Director of the Environmental Energy Law Program at Harvard Law School. Joseph, I turn the floor over to you.

Joseph Goffman:

Good morning, good afternoon, and good evening. Thank you very much Helen for the introduction and for that great kickoff. It's a great honor and a great opportunity to be here today. And speaking on behalf of the U.S. Environmental Protection Agency and the Biden-Harris Administration, it is delightful to be able to share with you my perspective on one way that the global community can make a difference to address the climate change challenge. And that is by working together to reduce methane emissions globally.

The United States has re-entered the Paris Agreement with its goal of limiting the global temperature increase to 1.5 degrees Celsius above pre-industrial levels. To accomplish such an ambitious goal, the world must work together to reduce greenhouse gas emissions. Of course, we cannot focus just on carbon dioxide, we must also address other greenhouse gases and in particular, emissions of methane, a highly potent greenhouse gas. Global methane emissions have substantially risen over the past decade. And because methane is a powerful, immediate climate forcer, reducing methane emissions now can have immediate effects on the global climate.

The United States supports the Global Methane Initiative's call to action to reduce methane emissions from oil and gas production, from coal mining, from livestock waste, from landfills and from wastewater treatment plants. Methane emissions are an important contributor to climate change, and methane emissions can also exacerbate air quality problems and create industry safety hazards. There's good news though, and that is that there are already many cost-effective technologies to monitor, abate, and capture methane emissions for use as an energy source. Recovering and using methane can provide energy and economic benefits: a classic win-win. For example, coal mines can recover the methane that poses an explosion hazard to miners and sell it to natural gas pipeline operators. Oil and gas companies can save money and increase their efficiency by not wasting methane, the key constituent of their product. Farms can use methane from livestock waste to create source of energy, as well as valuable products such as soil fertilizer. And landfills can generate revenue from upgrading landfill gas for use as vehicle fuel.

Addressing the global methane emissions challenge, like addressing the challenge of climate change itself, requires taking global action. Reducing methane now will buy us time to put into place longer term strategies to address carbon dioxide. Reducing methane on a global scale can support the development of innovative technologies providing future generations a cleaner and safer environment while creating jobs and supporting economic development.

Meaningful global action on methane starts with meaningful action at the national level. Both at home, as well as with our international Partners, the United States will take methane-reducing actions to help combat climate change, recover an otherwise wasted resource and provide economic benefits. The U.S. will continue to demonstrate our leadership on climate change, including methane mitigation at home and abroad. Addressing methane presents a unique opportunity to strengthen our economy by, as President Biden says, building back better and ensuring a healthy and equitable environment.

The Biden-Harris administration is already taken significant steps on climate and methane. During his first days in office, President Biden issued a series of Executive Orders that gave federal agencies, including the Environmental Protection Agency, direction to use the best science to protect the environment and public health to ensure access to clean air, to reduce greenhouse gas emissions, and to bolster resilience to the impacts of climate change. For example, EPA has already begun moving forward to reinstate regulations designed to limit climate-warming methane emissions from the oil and gas sector. And the Administration is implementing a whole-of-government approach through actions by the Department of Energy, the Department of the Interior, the Department of Agriculture, and the Department of Transportation, all to find ways to address methane. EPA will continue to rely upon our world-renowned reporting mechanism, EPA's Greenhouse Gas Reporting Program, which enables us to track methane and other greenhouse gases down to the facility level. And, of course, we will continue to work with our partnership programs to support methane reducing activities from landfills, farms, and the oil and gas sector. We will do so by sharing learning and best practices with the growing network of partners and we will do so by recognizing companies that are going above and beyond requirements to reduce methane through new initiatives and innovative strategies and technologies. These programs and our industry partners have led to improvement in technologies and approaches to monitoring and controlling methane emissions that are cost-effective and protective of human health and the environment.

The United States is proud of our collaboration with our international partners and our leadership to advance methane mitigation on a global scale, especially through our efforts with the Global Methane Initiative. This public-private partnership has been active since 2004, focusing on reducing the barriers to methane mitigation around the world. Through the Global Methane Initiative, the U.S., and our 45 partner countries and hundreds of private sector partners have made great strides to advance our understanding of how to mitigate methane in key sectors. Since 2004, Global Methane Initiative partners have implemented more than 1,100 methane mitigation sectoral projects across the globe. These projects have reduced methane emissions by more than 450 million metric tons of carbon dioxide equivalent.

I'd like to share a few examples of successful actions that EPA, with the support of the State Department, has undertaken with our GMI partners to reduce global methane emissions.

- Let's start in the city of Gurugram, India. The city needed assistance in understanding its waste streams to plan appropriate treatment facilities. EPA led a waste characterization study that showed that the city needed to divert organic waste from landfills which was causing high

methane emissions. The EPA team developed a guide on how to design and implement a waste characterization study and trained an in-country team. EPA in fact, has been training and empowering cities across the world ever since in order to understand better, and therefore address, their waste streams.

- In China, in the coal sector, the world's largest emitter of coal mine methane, since 2004 EPA has provided technical assistance and built capacity in China to identify opportunities to reduce methane. EPA conducted 30 feasibility and pre-feasibility studies at coal mines in China, provided funding and technical expertise to the China Coalbed Methane Clearinghouse, an in-country resource for coalbed methane mitigation, and conducted many technical workshops and trainings on best practices. With this increase in technical capacity, China now has the largest number of coal mine methane capture and use projects in the world.
- In 2018, India set a goal to build 5,000 biogas plants by 2023. These are plants that capture the waste from anaerobic digesters used to process organic wastes, such as manure. To achieve this goal, India needed a systematic framework for tracking commissioned biogas projects and a process for evaluating projects. With EPA assistance, the government of India developed a framework for a national database of biogas project opportunities, and these were based on EPA's AgSTAR Livestock Anaerobic Digester Database. The government collected data in three States and we understand that they are interested in expanding it nationally. With the database and a checklist that EPA developed to evaluate the viability of potential projects, India is better equipped to standardize basic data collection across project sites, identify the most promising projects, track greenhouse gas emissions reductions, feedstocks and outputs, and link to national greenhouse gas inventory and mitigation goals.
- One of Mexico's objectives when it joined the Global Methane Initiative was to increase understanding of quantifying and reducing oil and gas methane emissions. Between 2006 and 2018, EPA worked closely with Mexico to develop a robust process for measuring and mitigating oil and gas methane emissions, including numerous technical trainings and measurement studies. Mexico and its national oil company, Pemex, have emerged as leaders on methane mitigation in the oil and gas sector and in 2017, Mexico issued regulations to control oil and gas methane emissions.
- Now, I would like to take this opportunity to congratulate Global Methane Initiative and all of its partner countries on its recent rechartering for another 10 years. This rechartering and renewal of our commitment to take action on methane could not come at a better time. EPA has been proud to support the work of GMI since its inception, serving as the host of the GMI Secretariat, serving in leadership roles, and providing technical expertise that is the foundation of GMI's work. We look forward to continuing our longstanding support for GMI, and to do so with our partners. In fact, I want to thank our international partners for all their actions to reduce methane and to support the Global Methane Initiative. And specifically, I do want to thank the Government of Canada for their leadership of GMI as the Co-Chair of the Steering Committee for the past several years. Thanks to your strong engagement and active leadership, GMI hosted a very successful Global Methane Forum event in Toronto and has made great progress in our collaborative efforts across multiple sectors.
- Several of GMI's strategic partners are also doing excellent work and important work to mitigate methane internationally. I feel I must cite several of them and examples of leadership they provided.
- The Climate and Clean Air Coalition has been successful in raising global awareness of methane as a short-lived climate pollutant, and has developed an international partnership to better track

methane emissions from the oil and gas sector, in addition to their work for the municipal solid waste sector, and in doing so, working with cities, among other efforts.

- The United Nations Economic Commission of Europe developed a first-of-its-kind best practices for managing methane from coal mines and oil and gas operations.
- The International Energy Agency has increased global understanding of the linkage between energy systems and methane emissions.
- The World Bank has developed and demonstrated an innovative auction financing mechanism to incentivize methane recovery from landfills that has reduced millions of metric tons of methane globally.

We applaud the successful efforts of all of our GMI partners to raise global awareness about methane emissions and mitigation opportunities, to track methane emissions sources more effectively, and to incentivize methane mitigation globally. We look forward to working with our partners to reduce methane through the GMI partnership over the next 10 years.

And yet much more work remains to be done. We must re-double our collective efforts. Temperatures and methane levels in the atmosphere continue to rise. The time to act is now, and we must collaborate to meet the global climate challenges. Together, we can raise awareness of methane 's important role in climate change and, most importantly, together we can take action to reduce methane emissions. Responding to this call to action is an important way to support our commitments under the Paris Agreement. It is also a pathway to ensuring a better future for our children and grandchildren. And with that I would like to thank the GMI and thank you all very much for our current and ongoing and hopefully fruitful partnership.

Helen Ryan:

Thank you, Joseph, for those well-thought-out remarks and I'm so pleased to see the U.S. back in stride and taking such a prominent role. Together we can make great progress.

Our next speaker is Mechthild Wörsdörfer, Director of Sustainability, Technology, and Outlooks at the International Energy Agency. Mechthild plans and coordinates the IEA work on energy sustainability including clean energy technology and climate change policy. Previously she held several senior management positions in the European Commission in the area of clean energy and was involved with the IEA for a number of years as the governing board representative for the European Union. We are very pleased that Mechthild has agreed to provide us with the IEA's perspective on the benefits and challenges of methane mitigation. Thank you once again.

Now I turn it over to Mechthild. We'll see if the technology works for us.

Mechthild Wörsdörfer:

Thank you very much for the opportunity to join this distinguished event and to share some thoughts from IEA on a crucial topic. The International Energy Agency very much welcomes the call for action on methane and my special thanks goes to the Global Methane Initiative, GMI, and this possibility to speak to you today.

Methane emissions do not always get the attention that they deserve in the discussion on climate change. But let there be no mistake, methane makes a major contribution to global warming and early action on methane emissions will be critical for avoiding the worst effects of climate change, alongside

action on carbon dioxide. There's never been a greater sense of urgency about this issue than there is today. At IEA, for many years we have been highlighting the importance of reducing methane emission alongside action on CO_2.

In the brief presentation today, I'd like to focus on a few recent outputs from our side. First, the latest update on the IEA Methane Tracker 2020, where we provide the best estimates, by country, for oil and gas methane emission in 2020. We also published a Regulatory Roadmap and Toolkit, which is a detailed how-to-go-guide for policymakers and regulators seeking to cut methane emissions. Last, but not least, we launched on the 18th of May, the IEA, the new Global Roadmap to Net Zero by 2050 and that requires a concerted global effort to bring down methane emission over the coming decade.

The concentration of methane in the atmosphere is now around 2 1/2 greater than it was in pre-industrial times. This increase in methane concentrations is very worrying. Once released, methane doesn't stay around for long in the atmosphere, around 12 years, compared with centuries for CO_2. But it's a much more potent greenhouse gas. As you can see here, from the slide, the largest source of human caused methane emission is agriculture, responsible for around 1/4 of emissions, directly followed by the energy sector. It is important to reduce all sources of emissions arising from human activity. The recent global methane assessment by the Climate and Clean Air Coalition and UNEP shows that reducing human made methane emissions by 45% this decade could avoid nearly 0. 3 degrees of warming by 2035. This is a price well-worth pursuing. At the IEA, we focus in particular on oil and gas methane emissions because of the huge scope to reduce them cost effectively.

So how do we deal with methane in our new Roadmap to Net Zero by 2050? The first thing to emphasize is that methane is an integral part of this roadmap alongside actions on CO_2. Action on methane is not a choice; it's a necessity if we are to avoid severe impacts from climate change. Methane constitutes about 60% of emissions from the coal and natural gas supply chain and about 35% of emissions from the oil supply chain. In the new Net Zero by 2050 Scenario, total methane emissions from fossil fuel fall by around 75% between 2020 and 2030. There are different ways to convert methane to CO_2, but that's roughly equivalent to a 2.5 giga ton reduction in carbon dioxide emissions. To put it in another way, this is a reduction the same size as all energy-related emissions from the European Union today. Around 1/3 of this decline is a result of an overall reduction in fossil fuel consumption. But the larger share comes from a huge increase in the deployment of emission reduction, measures, and technologies, which leads to the elimination of all technically avoidable methane emissions by 2030. Our estimates suggest that there was a small downturn in global emission in 2020. A crucial task now for the oil and gas industry is to make sure that there is no rebound and that 2019 becomes the peak year for oil and gas methane emissions.

There's a large variation in performance across country and companies. What you're looking at here at the slide–the missions for each country, but also with the yellow dots, the myth and intensity of oil and gas production. That is our estimate of the amount leaked for every unit of production. And the striking thing from our data is that the difference in intensity varies by a factor of more than 100. The worst are more than 100 times worse than the best. There is a depressing message, but in some ways it's also an encouraging one. Depressing because it shows the needless waste and damage that we're doing today; encouraging because it underlies that for many countries, huge and rapid improvements in performance should be possible. Furthermore, addressing methane from oil and gas operations is not necessarily costly or technology challenging. The Methane Tracker indicates that about 70% of these emissions can be abated with existing technology and a good part of this can come at no net cost because the value of

the additional gas is less than the cost of the abatement measure. This can be done with a relatively simple measures, such as leak detection and repair programs.

New sources of data are also becoming available, especially from aerial and satellite observation. Our latest update incorporated satellite readings for the first time, and I think we're rather proud to be able to show on a map like that what we're getting out of the satellite data. Overall for 2020, this data accounted for some 5.5 million tons of methane emissions. This is less than 10% of the total volumes that we estimate are being emitted from oil and gas operations. For the moment, only the larger plumes or super emitters are visible from space. There are lots of other missions in these countries in addition to these that we include in the IEA Methane Tracker. These leaks might not last for long but while they emit they are very damaging. To put them in context, a flow rate of 20 tons per hour, which is the smallest dot that is shown here on the map, is equivalent to emissions from a 600 megabyte coal fired power plant. Existing satellite coverage has limitations. It does not provide reliable measurements over equatorial regions, northern areas, or offshore operation are not there. However, this is a very dynamic area and we see already improvements.

I would like to emphasize that the focus of the IEA is just not on defining problems but finding solutions. In particular, solutions that governments can implement. And that brings me to our How-To guide that governments and regulators can use to bring down methane emissions from oil and gas operations. We believe that industry must act to reduce these emissions, but also that there is a strong role for government policies to incentivize early action by companies, push for transparency and improvements in performance, and support innovation in getting results. However, over the last few years in our discussions with countries around the world, we heard a consistent theme. Countries would tell us that they understand the importance of acting to reduce methane emissions, but also that they lack some of the information and the tools that they need. In particular, they lack information on what other countries are doing, what their options are.

That's why we chose to put together the new IEA Regulatory Road Map. Over the last year we looked at all around the world for examples of how countries, states, and provinces have tackled this issue. We collected examples of regulations for more than 50 jurisdictions from the United States to Iraq and Nigeria, from Mexico to China. We are making all of this information freely available and accessible in our IEA policies database. And we used this information to build up our step-by-step guide for anyone trying to develop or to update regulations on methane. There's no single solution that will work for everyone, so we have not attempted to come up with one, but we discussed the advantages and disadvantages of different approaches using examples and case studies. These include prescriptive or command-and-control requirements, performance-based requirements, economic instruments, and information-based instruments. In doing so, we provide policymakers with the tools that they need to take action.

Let me conclude. A key finding from our analysis is that effective policy tools already exist and can be implemented now even without accurate baseline data on emissions. Better information can enable more efficient regulations, including performance- and market-based instruments. However, requirements such as leak detection and repair programs and equipment mandates can be implemented without such data and can be an effective and powerful first step. Over time, jurisdictions may improve or supplement these requirements as more robust measurements and reporting regimes are put in place. At the IEA, we look forward to the opportunity to continue work with a wide range of stakeholders, including, of course, the Global Methane Initiative to secure early and rapid reductions in these emissions. Thank you very much for your attention.

Helen Ryan:

Thank you once again to Mechthild for providing the International Energy Agency's perspective. Next, I'm really pleased to welcome Olga Algayerova, Executive Secretary of the United Nations Economic Commission for Europe. She has previously served as Permanent Representative of Slovakia to the International Organization in Vienna and State Secretariat in Slovakia's Ministry of Foreign Affairs. She brings a strong focus on building and nurturing partnerships among key stakeholders with the UNECE.

Olga, I give you the floor.

Olga Algayerova:

Thank you very much. Madam Chair. Ladies and gentlemen, good morning, good afternoon.

First of all, I would like to thank the Global Methane Initiative for inviting me to join this international dialogue on a Call for Action on Methane.

We have worked together for many years with GMI and GMI's partners on methane and related topics. Our collaboration has been most notable in coal mining. Since 2004, we have developed various best practice guidance documents regarding methane and we have conducted joint sessions and joint activities. More recently, we've developed an overview of best practices for methane management in the oil and gas sectors.

We appreciate that collaboration and we look forward to strengthening it in the future. I congratulate GMI on the renewal of its charter for 10 years. Methane is an urgent problem that requires "all of the above" solutions, with all of us, UNECE, GMI and a full slate of stakeholders, working together.

Unfortunately, because of the COVID-19 pandemic, we were obliged to delay the 2020 Global Methane Forum. Given positive developments on COVID, we anticipate holding the Forum in Geneva in 2022.

GMI's call for action is very well timed. Our Commission met in April. Our member countries recognize that early action at scale is needed on methane, CO_2, and hydrogen, and tasked our Committee on Sustainable Energy to develop needed normative instruments. The Commission also asked the Committee for a broad appraisal of subsidies and carbon pricing.

Furthermore, this September, the UN Secretary-General will convene a high-level dialogue on the energy-related goals on the 2030 Agenda, including an action plan for sustainable energy. Our Committee on Sustainable Energy will meet following that dialogue. For its 30th anniversary session, countries will be asked to deliver near-term results at scale, through what we call the Commitment Trifecta: 1st, to achieve superior performance in buildings; 2nd, address growing concentrations of methane in the atmosphere; and 3rd, modernize resource management.

Bold action on those three areas will deliver real near-term outcomes and achieve the 2030 Agenda for Sustainable Development and the Paris Climate Agreement. Longer-term actions outlined at the Committee will explore delivering carbon neutrality, ensuring a just transition, and preparing a hydrogen economy.

Finally, at COP26, we will try urgently to find ways to limit global warming while delivering quality of life sustainably. Last week's WMO report stated that average global temperatures will have risen 1.5

degrees Celsius above pre-industrial levels within five years. Our analysis showed that the world is on the pathway to a 4 to 6 degrees Celsius increase. Everything climate-related is happening faster and with greater consequences. I used to say we were at 10 past midnight on the climate doomsday clock. I'm afraid I may have been too optimistic.

We must act fast with real impact and at scale.

Which brings me to the Call for Action on Methane. UNECE endorses and supports that call without hesitation. I would also ask countries to support a declaration by the UN General Assembly of an International Decade for Methane Management in order to focus attention on a major area of concern, but also a major area of opportunity.

Reducing methane emissions offers significant climate benefits, especially near term, as there is potential for large reductions and cost-effective mitigation technologies are readily available. Managing methane delivers important improvements in air quality and safety. It can also enhance the uptake of sustainable hydrogen and support a just transition. Methane is a potent greenhouse gas with 120 times the climate forcing effect of CO_2. As methane is a short-lived climate pollutant, there are debates whether methane's global warming effect should consider a 100-year or 20-year timeframe. The issue is the CO_2 equivalence used for methane—does it have an 86 or 34 times greater warming effect than CO_2? In our view, what matters is the total portfolio of methane molecules in the atmosphere, not the atmospheric residence time of individual molecules. Global atmospheric concentrations of methane have grown 150% from pre-industrial levels. We should be using the 120 instantaneous figure in our considerations. Applying a “real” carbon price of $120.00 or higher for CO_2, you see immediately the economic implications of the choice of global warming potential.

And again, we must act fast. With real impact and at scale. Global emissions from human activity are projected to increase another 20% by 2030. Along with natural sources of methane, it begins to look like we may have passed a tipping point. It's imperative that we retreat from that precipice. Achieving a 50% reduction in methane emissions by 2050 would reduce global temperatures by 0.55 degrees Celsius.

Methane is also a precursor to ozone and air pollution. It's emitted from three main sectors: fossil fuels; waste, including solid waste and wastewater; and agriculture, including rice paddies, enteric fermentation, and manure. There is growing demand for natural gas, but that growth is at risk given that methane and CO_2 emissions. Proper emissions management would bring substantial near-term climate and economic benefits and would reinforce the sustainability credentials of natural gas.

Natural gas has an important role to play both as transitional fuel as the world decarbonizes, and possibly also as a destination fuel if its environmental footprint can be attenuated. The existing infrastructure of natural gas will also be important as a carrier of renewable gases. The role of natural gas will depend on its economics, its environmental performance, and on the social angle: what we call a just transition. It will also depend on politics. Often the natural gas industry touts its environmental performance vis-à-vis coal. For countries that use coal today, turning their backs on coal risks creating disadvantaged communities, as entire urban and industrial ecosystems developed around the primary fuel. That social risk represents a major obstacle for governments wanting to act. Enabling a just transition will enable stronger action.

There is a well-known phrase: “All roads lead to Rome.” We have been exploring possible pathways to sustainable energy for our member States and it's patently obvious that there is no one single such path. Each country has its own endowment of natural resources and its own cultural, legal, and regulatory

heritage. Each country will necessarily choose the pathway that best suits its needs. Our challenge as an international community is to get alignment of those interests with the objectives of the 2030 Agenda. We can start by using the common threads among the pathways to sustainability as a point of departure.

As I noted, UNECE has been working for years on best practices on methane management in the coal industry in collaboration with all relevant stakeholders. We began with best practice guidance on coal mine methane, which was extended and strengthened over the years. Recognizing that methane emissions continue long after a mine has been shut, we also recently published best practice guidance for abandoned coal mines. Furthermore, we have developed a review of best practices in the oil and gas sector. To broaden our perspective, we think that the work on normative instruments in the fossils sector needs to cover monitoring, reporting, and verification, as well as remediation for upstream oil and gas, downstream oil, downstream gas, and coal.

It is in light of this work that we are pushing for declaration of an International Decade for Methane Management. The objectives of such a declaration would be to raise awareness among governments and industry of challenges and opportunities, and to obtain stronger commitments to action. If we are successful with such a decade, the critical outcome would be declining atmospheric methane concentrations, or at least declining emissions of methane from human activities. We would seek to develop detailed best practice guidance for all sectors, not just energy. An example would be development of standards for coal mine closure including socioeconomic and environmental aspects—delivering on a just transition. Another outcome we would expect to see is enduring programs and structures to disseminate, demonstrate, and deploy relevant normative instruments with training, regulation, and outreach to enhance their uptake.

We would also propose that the International Decade for Methane Management take a much broader view of the challenge, for example through policies and standards for introducing renewable gases, including hydrogen, to reduce the carbon footprint of natural gas.

We have been in discussion for some time with our partners on the idea of a UN General Assembly declaration of an International Decade for Methane Management. This would be a vehicle for raising awareness and coordinating among the range of existing initiatives. It represents a push to get country commitments and real action.

Ladies and gentlemen, we are cooking our planet and can witness multipliers of the climate change threat in action. Addressing methane emissions is one of few actions that can have real impact at scale relatively quickly. I would ask countries to include stronger action on methane in their climate negotiations and in their commitments at the high-level dialogue on energy in September. The success of an International Decade for Methane Management will depend on strong country support. Hence my call for wide endorsement, support, and championing of the initiative.

We have no time to wait. We must act fast, with real impact and at scale. Thank you.

Helen Ryan:

Thank you, Olga, for the insightful and inspirational comments and thank you for highlighting the opportunities for global action through a potential International Decade of Methane Management and the work that your organization has already done to advance this.

For our next keynote address. I would like to introduce Fred Krupp, President of the Environmental Defense Fund, to speak to the importance of action on methane. Fred has guided the EDF for three decades, overseeing its growth from a small non-profit to one of the world's most influential environmental organizations with more than 750 employees and an annual budget of more than 200,000,000. Fred is a leading voice on climate change, energy, and corporate sustainability. He was named one of America's best leaders by U.S. News and World Report and received the 2015 William K. Reilly Environmental Leadership Award from the Center for Environmental Policy at American University. He and Miriam Horn co-authored the New York Times bestseller *Earth: The Sequel – The Race to Reinvent Energy and Stop Global Warming*.

We are very pleased that Fred has agreed to share with us some of his perspectives on the importance of action on methane.

Fred Krupp

Thank you.

If you take one thing away from my talk today, remember this: the single most impactful action we can take to slow global warming is to slash methane pollution now. So, let me explain why that is, some of the work underway, and also outline the steps we need to take to lower temperatures we would otherwise see, as well as the ferocity of future storms.

First, the importance of methane. The global methane assessment just out from the Climate and Clean Air Coalition in the UN Environment Programme concludes that lowering methane emissions is the key to preventing catastrophic climate change. Our next speaker, Drew Shindell, lead author of the report, will detail those conclusions. Inger Andersen, Executive Director of UNEP of course said, and I quote, “Cutting methane is the strongest lever we have to slow climate change over the next 25 years and complements necessary efforts to reduce carbon dioxide.”

Now, EDF scientists agree. And also see this as a tremendous opportunity. A paper published just last month led by Dr. Ilissa Ocko found that a rapid full scale effort to cut methane pollution from oil and gas, large scale agriculture, and other major human activities could slow the rate of warming by as much as 30%. Think about what that would mean compared to inaction. Less ferocious storms. Less heat waves. Less flooding. Less melting of ice in the tundra. There is simply no better opportunity to reduce radiative forcing and all manner of catastrophic impacts in our lifetime. Methane reductions are a key part of the net zero carbon scenario released by the International Energy Agency couple of weeks ago.

Props to the Global Methane Initiative—one of the first initiatives set up to address this challenge, starting more than a decade ago.

Around that time, EDF, the Environmental Defense Fund, organized a six year series of 16 studies involving 150 researchers documenting methane pollution across the oil and gas supply chain in the United States. A synthesis of those studies in 2018 found that pollution was 60% higher than the official EPA inventory at that time. Recently the U.S. National Oceanic and Atmospheric Administration, NOAA, reported that methane levels in the atmosphere are now the highest on record. To convert this problem into an opportunity, we need: 1) government action; 2) industry action; and 3) accountability for both.

Let's start with government action. In the U.S., our new President understands the impact of methane. On his very first day in Office, President Biden signed in order to restore an expand methane standards

for the oil and gas industry, which the prior administration had tried to revoke. The U.S. Senate recently voted to speed up the process of putting in place stronger rules by repealing the Trump rules. Our House of Representatives is expected to follow suit soon. Getting stronger rules is a top priority in the United States. One step we believe the administration can take next: re-engage with Canada and Mexico around our 2016 agreement to cut methane pollution in North America by 40 to 45% by 2025 and raise that bar to a 75% reduction by 2030. We're also encouraged by the U.S. administration's launch to the Net-Zero Producers Forum, and we would expect to see methane reduction as its first priority.

Meanwhile, the European Union announced a new methane strategy last fall, a big step. By the end of this year, we hope to see strong rules for leak detection and repair, and to reduce venting and flaring of methane in Europe. And Europe can do more. As the world's largest gas importer, importing 85% of its natural gas, Europe has the power to set standards requiring that the gas they use is produced cleanly, no matter where in the world it's produced. Methane pollution from that gas used in Europe is currently estimated to be 3 to 8 times higher in the supplier countries than the gas supply chain inside the EU. A methane performance standard for all gas sold in the EU would have a broad effect on gas suppliers worldwide, both an opportunity for the EU and a responsibility. We'd like to see the EU propose a standard by the end of the year.

China, Japan, and South Korea could all do the same—putting standards on imported gas. China is making progress on methane; in December, President Xi announced plans to peak CO_2 emissions before 2030 and explicitly included methane. In March, the 14th 5-Year plan called out stronger controls on methane and other non-carbon dioxide greenhouse gases, and two weeks ago, 7 Chinese oil and gas companies pledged to reduce methane intensity to below 0.25% of production by 2025, in line with pledges from other leading global producers.

Even Russia, the largest natural gas exporter is signaling concern. At the White House Summit in April, President Putin talked about methane and called for cooperation to reduce emissions.

Action by governments is certainly a big reason for growing concern by the oil and gas industry and its investors. Today, oil and gas producers are directly competing with cleaner renewable energy sources. Just last week, Exxon Mobil shareholders, concerned about the company's slow response to this challenge, voted out two of the company's directors. The same day, 61% of Chevron shareholders voted for a resolution to cut carbon emissions from its company's products. Environmental risk is now recognized as a business risk. Failure carries a high price. For example, last fall, the biggest gas utility in France cancelled a $7 billion deal to buy liquid natural gas produced in Texas over concern about methane and other pollution. One reason dissident Exxon shareholders succeeded last week is because major Wall Street investors joined with big retirement funds to support the move. It's an issue of financial returns, of course. But many of these investors are demanding accountability. A few weeks ago, JP Morgan Chase, the largest oil and gas lender in the world, announced a set of 2030 climate targets for oil and gas, electric power, and transportation. It entails a 75% reduction in methane emissions from oil and gas in its portfolio. A 90% cut in flaring.

We've also seen global oil and gas companies come out in support of stronger methane standards in both the EU and the U.S. That's encouraging. We've also seen them setting voluntary commitments. In 2018, thirteen companies in the Oil and Gas Climate Initiative pledged to reduce average emissions intensity from upstream operations to 0.25% with ambitions to achieve 0.2%.

We can't overlook the Oil and Gas Methane Partnership, another important initiative by the CCAC and UNEP, along with the European Commission and the Environmental Defense Fund. The Oil and Gas Methane Partnership includes 64 companies with assets on 5 continents, representing 30% of the world's oil and gas production. It creates a rigorous objective framework for methane accounting that makes it easier for public officials, investors, and the public to track and compare performance across companies. The goal is a 45% reduction in the industry's methane emissions by 2025 and a 60 to 75% reduction by 2030.

New OGMP 2.0 standards announced last November set a new bar by requiring real measurements instead of engineering estimates. The loss will be the basis for the new EU methane standards and the framework for reporting under a European performance standard. Crucially, the Oil and Gas Methane Partnership 2.0 includes not only a company's own operations, but also the many joint ventures responsible for a substantial share of global oil and gas production.

All of these commitments are important, but for the most part, they're still just promises. It's a long way to get from good intentions to real results, and we can't afford to go slowly, which brings us to accountability. Now that they're finally talking the talk, we need to hold these institutions to their commitments, government and industry both. It's one of the most important things we need to do right now. People have learned to say the right things. Now, we need to make sure they do the right things.

I believe that accountability starts with data. We need robust, reliable, an organized accounting of emissions by company, by country, and on a global scale. Emissions data needs to be public, so all of us stakeholders, competitors, the public can see who is and who isn't getting the job done.

Which brings me to another effort I want to applaud today: the International Methane Emissions Observatory. Once again organized by UNEP and the European Commission. This observatory, called IMEO, will be the key to accountability and action on methane. IMEO will be an aggregator and validator for the vast stream of methane data already being generated by government, industry scientists, and civil society. It will make available trustworthy data. People can debate methane policies, but we shouldn't have to argue about methane facts. IMEO will collate emissions data collected through the OGMP, reporting aggregate company data and verifying progress on targets. IMEO will work with governments to develop policy-relevant science and sharpen understanding of the importance of methane to achieving the Paris Agreement targets. IMEO will improve the transparency and visibility and consistency of emissions data from all sources, including a growing number of methane detecting satellites.

Integrating satellite data is particularly important. In the past few years, we've seen new orbital sensors launched. First was Tropomi operated by the European Space Agency, and now we're seeing a whole new generation of satellites emerge with an expanding array of capabilities. One of these is MethaneSAT, which is being developed by my organization, the Environmental Defense Fund. MethaneSAT will be able to detect and quantify methane almost anywhere on Earth at concentrations as small as three parts per billion. Under construction right now in Colorado, MethaneSAT is scheduled to be ready for launch in October of next year. It's designed to both accelerate and motivate methane reductions. Accelerate, by giving operators and regulators new ability to locate and quantify total emissions with frequent high precision measurements worldwide. Motivate, by making the data public in near real time so that anybody can see how much methane is coming from where and who is responsible for it. And they can also see who is best at cleaning up. Because of its high sensitivity, MethaneSAT will measure the pollution that other satellites just can't see. Quantifying total pollution

from all sources, big and small, is key to assessing progress. Think of those gathering lines spanning vast terrain in the Permian. With a lot of little leaks, they will be visible to MethaneSAT. Together the data from satellites, aircraft, drones, and ground-based measurements have the potential to unlock a tremendous climate opportunity. Let me end with something I mentioned earlier. Imagine if we had actually managed to slow the rate of warming by 30%. That's huge all by itself.

But that paper by Dr. Ocko also says that by fully deploying known solutions to reduce this pollution from all the major sectors, we could cut methane from human sources in half by 2030. That would avoid a quarter of a degree Celsius, half a degree Fahrenheit of additional global mean warming by mid-century, and more than half a degree C or 1 degree Fahrenheit by 2100. That half degree would make a critical difference in a world we're trying to limit global warming. It could mean 10 million fewer people at risk from sea level rise, half as many people stressed for water, half as many plant and animal species losing crucial habitat. How close we get to realizing this potential is up to us.

This is the methane challenge today. This is the opportunity we have to make a tremendous difference right now in our lifetime. Many of you were visiting today are in a position to make a difference, and I urge you to help.

Thank you.

Helen Ryan:

Thank you to Fred for underscoring the urgency and importance of action to mitigate methane emissions. The challenge is real.

For our last keynote, I'm pleased to introduce Dr. Drew Shindell, Chair of the Scientific Advisory Panel of the Climate and Clean Air Coalition and Professor of Climate Sciences at Duke University.

His research group is particularly focused on quantifying the impacts on human health, agricultural yields, climate, and the economy of policies that might be put in place to mitigate climate change or improve air quality.

He's been an author of more than 275 peer reviewed publications. That's quite an impressive number. He's received awards from Scientific American, NASA, the National Science Foundation, and the EPA, and is an elected fellow of the American Geophysical Union and American Association for the Advancement of Science.

He most recently chaired the 2021 Global Methane Assessment and has kindly agreed to speak to us about it today.

Drew, the floor is yours.

Drew Shindell:

Thank you, Helen.

Thank you all for coming out to listen, not that you're necessarily out very far, but I did want to talk to you about the benefits and costs of methane mitigation, which is the subtitle of our Global Methane

Assessment. With everybody else, I thank all of the speakers who went before because they have done a great job of already covering many of the main conclusions.

But I do want to want to talk to you about a few of the things we found that are really relevant to the GMI's very laudable call to action on methane. If I could have the next slide please.

One of the things that we already heard about is how we have a lot of talk and a lot of work on methane, and yet we're still going in the wrong direction. And, as was alluded to the most recent data from last year showed that not only are we recording record levels of methane, but the rate at which methane grew last year was the fastest in the entire record. So we're going rapidly up when we need to be going rapidly down. Now this is in part due to increased use of fossil fuels, the surge in fracking, and switch from coal to gas. In part, due to biogenic fluxes from wetlands in the tropics and some of that may be driven by climate. These kind of issues are very interesting scientifically, but they don't affect our policy going forward. We know we can't—the only way to deal with biogenic emissions from, say, tropical wetlands or thawing permafrost increasing is to slow the rate of climate change and the way to do that is to target the anthropogenic ones.

So what we need, and the assessment, concludes, what you can see on a graph from the right, is really a U-turn. Instead of going up rapidly, we need methane to be going down rapidly. And, to be on the 1.5 degree path we need a cut of around 45% by the end of this decade. So that really goes to what we heard before from UNECE about a decade for international action on methane to reach this target. Next please.

We also have looked in the past at what we can get from controlling fossil fuels and just phasing out fossil fuels without a real targeted effort to control methane. And what you can see here is that when you get rid of fossil fuels, the sulfur comes along with the burning of coal, primarily, and so the net impact over—this was a phase out starting in 2020—the net impact over those subsequent 30 years is, on average, essentially zero. So we have no time to lose in starting to make dramatic efforts and really aggressive efforts to reduce CO_2 because it's so long lived. We have to start now in order to have a better planet by the end of the century. But at the same time, starting now doesn't buy us relief in the near term. We get virtually no relief from the increase in storms, the increase in heat waves, droughts etc.—all of these things that are happening now—we don't get any relief for those in the next 30 years. The next slide please.

In contrast, when we compare with what happens when we reduce methane, there I put the results from the global methane assessment over this graph from an earlier publication, and you can see that you really do bend the curve of warming in the near term. So, methane is a complement to reducing CO_2. Reducing CO_2 is vital for the long- term welfare of our planet, but reducing methane, I would argue, is also vital. And it's vital for the near term because that matters too. People are alive today and suffering from the consequences of climate change and waiting to do something about that until the latter half of the century will bring no real relief to all the people suffering the consequences already. The next slide, please.

So in the assessment we really tried to take a comprehensive view of all of the consequences for society that we were able to quantify by making the kind of reductions we need to get to 1.5. So we have present day emissions—that first bar on the left. In 2030, our current trajectory will take us higher. Right. We are still going up, despite all of the wonderful work being done. It is not sufficient as of yet to have changed the trajectory. So we documented how controls could be put in place targeting methane

in the agricultural sector—that's that first bar which brings us from above 400 million tons a year down to a bit below; the waste sector—you can take another big bite out of the emissions; the fossil fuel sector—gives us the biggest reduction through targeted controls; and then we have a category we call additional, and these are things that are not focused on methane, but also reduce methane as a byproduct of their primary goals. So examples would be shifting from fossil fuels to renewables, which is primarily a measure that one would take to deal with CO_2 emissions. But, of course, it's not sufficient to get rid of methane from things like abandoned oil wells and abandoned mines, but of course it reduces leaks from methane systems if you are using less natural gas as a fuel. Another example would be reductions in food waste, which is generally done for the sake of food security. Another would be healthy diets, which are done precisely as the name suggests, because they improve public health. All of these have the potential to reduce methane emissions, but we call the call those additional measures. When you put them all together, you can get methane down to that 40% reduction, which gets you nicely in the range across all of the 1.5 degree scenarios as assessed by the IPCC. And you get this avoided warming of around 3/10 of a degree by the 2040s. That's pretty profound. Again, especially if you keep in mind the previous chart which showed how little you could get by most of the other options we have on the table for the near term, remember that the phase out of fossil fuels would essentially get you 0 by this time period, although it's obviously critical for the longer term.

And then the nice thing about methane, as we've heard a little before is that you get a lot of additional benefits as well, so it's not just the avoided climate change, but it's also the reduction in ground level ozone. So we quantify the avoided deaths related to ozone, which exacerbates respiratory and cardiovascular diseases, around 1/4 of a million fewer deaths per year, by the end of this decade when these reductions are in-place. So, while the climate benefits of methane reductions are very rapid compared to reducing other greenhouse gases, the health effects are virtually instantaneous. That, in addition to the avoided death, there's around three quarter of a million avoided emergency room visits for asthma. There's around 25 million tons of crop loss avoided. That one's interesting in that it's a function of both the ozone exposure, which is not good for crops the same way it's not good for people, but it's also a function of climate change. And the latter the lost work hours is from the reduced heat waves and heat stress that exposes workers, especially in construction, agriculture, and mining. If I could have the next slide please.

So if you have all of these benefits, then we quantify, as well, all of the individual measures and what their potential is looking at analysis produced by groups like the IEA, that we've heard from, and the EPA. And we find that there's the greatest potential in the fossil fuel sector. But there's also a need for substantial, although smaller, reductions in the other two main sectors: waste and agriculture. So we have individual targets for the different sectors. If I could have the next slide, please.

One of the most positive or optimistic signs across all of this, I think, is that if we look at the same kind of chart that I showed before, instead of sorting by what sector the measures are put into place, we sort by how much they cost, we find that the majority of the measures are not very expensive. There's a large chunk that pay for themselves, the kind of thing we've heard about especially in the fossil fuel sector. There are also a lot that are low cost, and there's only a few that are fairly expensive. So the financial incentives are really encouraging for reducing methane. If I could have the next slide, please.

We go through some detail, and I'm really showing this just so that it's there in the assessment—I'm not going to go through all these—what the top the targeted measures that focused on methane are. These are all things that are already in use, and so we're just calling for best practices to be adopted around the world in those places where they're not. If I could have the next slide please.

And just to give you a little more information on what the additional measures are, these are not always things that are in use. But as I mentioned before, there are things like energy efficiency, demand management. There's also consumer behavior that changes the waste stream and changes waste separation; in particular, getting organics out of the waste stream and reducing waste itself, as well as adopting healthier diets.

Now the last thing I wanted to show to you, if I could have the next slide please, is that we've also built a web tool and you can find this online. The address is there, but you can search for it if you don't have time to write it down., What you can do is: this will allow you to look at the mitigation potential in any sector, to sort by cost, to sort by region of the World, to find what's available. In this example, it's fossil fuels available at low cost worldwide. It's about 37 million tons, and then it gives you the benefits. You can choose which benefits you want to look at, and you can put your cursor over the country you're interested in. Here I put it over India in the right, and I can see the number pops up. It gives me at the bottom the average cost for these fossil fuel measures is minus 851 dollars a ton, so they make you money rather than costing you and the total benefit to society is over $4,000 a ton, so it's to really make the argument and, to buttress the argument, provide national level data supporting how these measures pay for themselves, especially if you account for the environmental benefits but often, as in this example, even if you don't. If I could have the last slide, please.

To conclude, I wanted to just reiterate a couple things I already said. Methane mitigation is one of the most significant actions we can take this decade, so it's vitally important that we increase our ambition. I would wholeheartedly support the call to action from GMI as well as the UNECE's call for an international decade of effort to reduce methane. In part, I think we have a good chance of success because so many of the reductions can be made at low or negative costs, and I think it's very important that we reiterate and publicize that there are multiple benefits. It's not just that we make a dent in getting to the 1.5 degree pathway but also there are feedbacks, there are climate tipping points. There's a loss of Greenland and West Antarctic ice sheets. There's cumulative impacts like sea level rise. All of these things matter. They are affected by the rate of warming, and the next few decades and not just the long-term path. There's also the improved air quality in the millions of lives over many decades that can be saved. The improvement in food security by preventing crop losses due both to climate change and ozone. There's increasing carbon uptake by forests. I only showed how ozone affects crops, but it also affects the ability of agriculture to sequester carbon. And there’s job creation through these mitigation efforts, things like plugging leaks takes a lot of person effort on the ground.

Strong policies are needed to achieve the ambitious targets that we've outlined, so I'm looking forward to working with hopefully many of the people involved in this meeting today to put such strong policies into place. Thank you very much for listening. The report, the assessment, is online and I hope you will turn there for additional information.

Back to you. Out.

Helen Ryan:

Thank you, Drew, for providing an overview of this impressive report. This timely work provides us with compelling science-based arguments for urgent action on methane, and I'm really pleased that you highlighted the important health benefits that can come from these actions, and I know this work will help draw more attention to the linkages between methane, ozone, and health impacts.

I encourage all of our participants today to have a deeper look at the report and its findings, as it will most certainly be a key resource as we move forward.

We will now transition to our industry panel discussion and our Q's and A's, which will be moderated by Drew. So Drew, I'm going to turn it back to you for the moderated session.

Drew Shindell:

Wonderful. Thank you, Helen.

So I'm very much looking forward to the discussion and some Q&A, especially as we've had a series of keynote speakers, which I found very interesting, but I'm looking forward to this more interactive part, and I would like to begin by just introducing the panelists who will be participating.

We have Vicki Hollub, who is President and Chief Executive Officer of Occidental. And we have David Newman, President of the World Biogas Association.

So, some pretty obviously relevant and timely industry input and what we're going to do is we have a series of questions here which we're going to attempt to have the panelists weigh-in on, sometimes together, sometimes specifically directed to one or other, and we are hoping that we have managed to, all of us, work out the technical details for that.

So we're going to start, that the overall, our overarching idea, is to see from the industry point really how to follow up on everything that we've been hearing from these keynote presentations. There are these opportunities. GMI is producing data, IEA is producing data, EPA—all of these groups. What does it take for industry to adopt these kinds of recommendations and what are the considerations? So, to begin this, the first question is that we know that the opportunities for carbon dioxide reductions often dominate discussions on climate change. That makes a lot of sense in that CO_2 is the most powerful of all of the greenhouse gases in terms of its total impact to date. So reductions in CO_2 are indeed critical component but methane plays an extremely important role, as we've heard.

What the question then is: what would be the most effective way to raise the profile of methane abatement as an essential part of the climate change mitigation strategy amongst decision makers? So I'm going to ask Vicki to go first, and then we'll transition from there to David and get a response from each of you.

Vicki Hollub:

Thank you, Drew.

First, I'll say I'm happy to be here today. It's great to be a part of this conference and I think it's really, really important because this is the kind of thing that does help raise the awareness that methane is a very potent pollutant that we definitely need to focus on. And as a member of API, and we're actively involved in a voluntary partnership, and we're one of the first and founding members of that partnership to address methane emissions and, to us, it's time to now take advantage of all the amazing technologies that are being developed.

There was a time when we really couldn't tell in some cases where leaks were coming from. We now know that there are a lot of leak points within the operations of our methane and the handling of

methane. We are developing technologies that not only measure that better in terms of its presence, but also its volume. And now we can start to target first the worst parts and the most strategic parts that we need to eliminate or reduce. And we're doing that in ways that are advancing faster than in the past, but not as fast as we need them to.

For example, some of the things we're doing are building more like closed-loop systems, where we eliminate the leak points. So, we're starting to design our facilities in a way that we reduce the points at which methane can leak out of the facilities. Those that we can eliminate—the facilities we can eliminate—we do have vapor recovery and other things that will take that gas that would otherwise get into the atmosphere that we can then direct into the closed-loop system.

We're also trying to give ourselves flexibility around when a situation might occur where a third-party processing plant or something might go down to more quickly be able to divert the gas to an alternate facility or alternate system. So those are some of the things around operations. But we've recently put together a team that's focused on emissions technology and what they're trying to do is build what would be a next-decade facility and try to get that designed today and try to start implementing a better way of getting the gas molecule from the reservoir to actually where it's used. And part of that process is around the design of the equipment, but also how we drill and how we complete our wells and using green completions where we can capture the methane that would have otherwise been admitted at the way we used to do fracking and flow backs, we can now capture that and get that into the system right away so that we've illuminated that point.

And, what's really driving us right now in terms of our sense of urgency is exactly what Drew said. It's time to take action now and not delay.

So we were the first U.S. oil and gas company to commit to the World Bank that we would join their initiative to eliminate routine flaring by 2030. And part of some of what I've talked about with respect to facility redesign and capturing the emissions, where you can't redesign it, and then trying to ensure that you have flexibility and what to do with the gas when there is a disruption downstream, all of those things will play into enabling us to be able to achieve that zero routine flaring by 2030. Fortunately today, just as there are better technologies being developed to help target where the emission points are, there are better valves being constructed today that, and flanges that don't have the leak points and that are eliminating those as potential leak points.

So we are taking action. It's been something that we feel needs to be accelerated, so we support greater policies around how to measure and how to capture methane and how to reduce it over time. So we are aggressively working toward making our methane emissions much lower. We've committed to, as a member of OGCI, which is the Oil and Gas Climate Initiative, we've committed to achieve an upstream methane intensity target of 0.2% by 2025. And so that's going to be quite a reduction from our emission reductions and the other member companies of OGCI have committed to the same, so I think it's a matter of making that commitment, advancing the technologies, and being committed to making it happen as soon as you can.

Drew Shindell:

Thank you, that is great to hear of what Occidental is doing and how seriously you take this problem and I'm sure we'll have a little time to return to a couple of those things.

I want to turn it over to David to make some introductory remarks about the Biogas Association and if you want to chime in on the effective way to raise the profile as an essential part of the climate solution amongst decision makers. David.

David Newman:

Thank you, thank you very much and I'm talking to you from London and thank you very much indeed to our friends at the GMI for this invitation and in my various roles over the last 20 years I've had long interactions with GMI and very good to see you guys back. We need you.

I'm coming at this from a completely different angle to that of Vicki because, as our recent report—if you wish, I can show you some slides, otherwise I can use them later—but as a recent report, which we published as an Association, we showed that huge amounts of methane emissions are coming from uncontrolled dumping of biogenic wastes. We have your speakers already talked about the science, but we have estimated that roughly about 100 billion tons of biogenic wastes are dumped into the environment every year and we're only recovering some 2% of those. And most of those biogenic wastes—if I can see the slide myself, I will remind myself of the data—and you would think would be, food waste, but actually they're not. They're 80%—60%, 70% is sewage sludge—of which 80% is returned to the environment untreated. And huge amounts of livestock, manures, and slurry (some 33 billion tons); crop residues; and, of course, food waste.

Now, all of these materials are, as I say, going from mainly urban centers (city centers) in an uncontrolled way into the environment. And simply putting biogas plants onto major sewage facilities is one way in which we can easily, cost effectively, and efficiently capture methane. As most of you are in North America, across North America, we are seeing huge uptake of biogas installations in some of the bigger dairy and livestock farming businesses where there are a lot of slurries that can be captured and can be used, the methane can be used in to generate either electricity or heating gas. And the uptake of these technologies across the globe is very, very rapid indeed. So, the message is getting out.

One thing that we note, however, is that when we look at the commitments which countries have put into their nationally determined contributions under the climate change agreements is that we have very, very few definite commitments on biowaste management and on the use of that biowaste into biogas production. So one thing that we can do at global level is to ensure that when the countries go to Glasgow at this climate change meeting, and we're trying to do this, is that they are aware of the great potential which capturing those biogenic wastes, producing biogas from them, can have to their climate abatement targets. We estimate, and you may all titter, but we estimate with the IEA that some 10% of global greenhouse gas emissions can be saved/reduced by using such technologies, by capturing biowaste and by putting it through biogas installations.

Drew Shindell:

Well, I, for one, am not tittering. I am very excited to hear stories like that and large potential is precisely why I think there's so much excitement about the possibility of stronger action on methane.

So I want to follow up with you David, and I'm very happy to hear about the rapid uptake at the larger farms and especially in probably the most advanced parts of the world. What, could you comment on the suitability and barriers to implementation of biogas projects for small-scale agriculture, and, in particular, it seems like as if there are small businesses who have solutions, who can implement these for farmers in developing countries, but it doesn't seem to be picking up quite as rapidly there.

Is there a way for governments, global organizations, and such to support small businesses on that?

David Newman:

Well, I think there is a misconception here.

Actually, small-scale biogas is growing very, very rapidly and small-scale biogas installations are in the millions. I think we counted last year, 32 million small-scale biogas installations across the globe and, of course, almost all in rapidly developing economies: India, China, Africa, Latin America. And we have done many webinars with development institutions and development organizations who are pushing these small-scale solutions.

One little bit of information which your audience might enjoy was at a COP meeting a couple of years ago. I was giving a talk and a delegation came up to me from the Sahel, from Chad, from Mali, from Burkina Faso, and these countries are planting the Great Green Wall, the Great Green African Wall. You may have read about it. It's a barrier of trees across the South of the Sahara, from the Atlantic Ocean through to the Red Sea. 6000 kilometers of trees and green areas are being planted—quite a phenomenal activity. And they said to me, they said Mr. Newman, you know, we love biogas because we get some energy from it. We can light our houses. But above all, we love it for the wet slurry that it gives which is helping us grow crops, helping us plant those trees, helping us green the soil.

I have to admit to you I was—we have a phrase in English, I was gobsmacked—because we think of these things in terms of energy. We think of these things in terms of methane abatement. But we actually don't think of these things sometimes with the side benefits: growing trees. Who'd have thought? And yet, for them that was the most important benefit of small-scale biogas.

Drew Shindell:

Thank you. That is indeed a very interesting story and an interesting application.

I think that is one of the challenges that we've heard about from some of the keynote speakers as well. How do you convey the benefits of having compost, as well as public health, as well as climate mitigation, etc.? So very interesting to see which of the different areas might focus on different impacts along this large stream of consequences from mitigation.

I want to come back to Vicki now and return to the oil and gas sector. And I have two questions for you, or two related questions.

One is to talk about, and you've already talked about this a little bit, what are the greatest challenges and gaps that need to be addressed and the oil and gas sector to meet the Paris Agreement?

The other is, if you're willing, I hope you don't mind, but yesterday there were stories in many of the major media outlets, including, for example, the New York Times ran a story about how some of the majors were doing great things in lowering their footprints, kind of like you had described. But in a couple examples, what some of the big companies had done was sell off some of their operations with the highest methane intensity to small operators, and therefore—I think the examples were BP and ConocoPhillips—had dropped their carbon footprints, but the national emissions hadn't actually dropped at all. If you're willing to comment on that too, is that something that we need to address? Is

that one of the great challenges? And, in general, what would you say are the greatest challenges for oil and gas?

Vicki Hollub:

I'll address the second one first because I do have some passion around that one and, that is, that it's critically important to pay attention to what's happening to the oil and gas industry in the United States.

Now, I know part of those, some of those transactions were in the United States, but I do believe that through peer pressure and through partnerships and through API's environmental partnership, I do believe there's a lot of commitment in the U.S. oil and gas companies to advance our technologies to further reduce methane in our own operations. I do believe there's been an awakening in our industry that's driving a lot of CEOs to be very committed to making this happen.

And as you, a lot of the European companies have gone to renewables and some have even said they'll reduce their oil and gas production and they'll go to renewable production. So, that helps their company. We all, as an industry, we must be conscious of the fact that if we are shifting production in the world to scenarios where the methane emission is not going to be reduced, that is not something that's going to help our planet and we've got to be very careful with that. I believe that, and I trust that President Biden and his administration will understand, that we have a much better chance of controlling emissions in the United States than we do in some areas around the world. Now I'll applaud some areas in the Middle East are doing a great job. But there's just some parts of the world that aren't at the level we are and that don't have the methane emission requirements and regulations that the EPA is putting back in place, which we strongly endorse. So, that has to happen. Simply shifting the production to someone else and not doing anything about it is not going to work.

And so that's the reason that we feel like we're perfectly positioned to be a leader in helping to reduce emissions over time. Because what we're doing is not as broadly appreciated as I would like for it to be because I think we're stepping out and we're trying to get ahead of this because we are leveraging our core expertise and, again, I'm not saying that what the European companies are doing is wrong, because we need more renewables. So, they're going to be putting capital into renewables. But what we're doing is, we're taking advantage of the large footprint that we have in the United States to leverage our CO_2 enhanced oil recovery experience and therefore get more out of the reservoirs that exist today, rather than needing to go develop new production in areas that are more sensitive in that are more difficult to manage the emissions.

And so what we believe is: it's best to recover more from reservoirs that are already developed and it's really important that you apply as much technology to those as you can. So we're not going to go and develop renewables for distribution; we are going to use renewables in our operations because they are a part of our plan to reduce emissions. And we installed what we believe was the first solar plant, 16 MW solar plant, in the State of Texas that primarily was built to run oil and gas wells and so that's what it's doing. We will build more solar but it's to lower our footprint within our own operations. The thing that we're doing beyond that is we're going to use some technologies like direct air capture and carbon capture on industrial sites to further lower our footprint.

And what I think is a is a big challenge for us to be able to communicate to people and help people understand is that the world is going to need oil and gas for decades to come. The transition is not going to be as short as some people believe. So within that transition there has to be companies that are

committed to doing more than just lowering our methane emissions. We have to do that. But we also need to help with the emissions from other industries. And so we've signed up a couple of agreements to take CO_2 emissions and capture them from a couple of ethanol plants and a cement plant in southern Colorado and an LNG facility that will be built in Texas, and so getting that anthropogenic CO_2, not letting it get into the atmosphere, is one way we're trying to address our carbon footprint. The second way is to build a direct air capture facility—the largest one that will exist in the world—in the Permian Basin. I think the other, the largest facility that exists today, is capturing about 4,000 tons a year. Our facility captures 1,000,000 tons per year and the gap that right now I'm seeing in our ability to meet the Paris Accord is that not enough Is being done to capture CO_2 before it gets into the atmosphere and not enough is being done to pull CO_2 out of the atmosphere. The models show that a significant amount of this must be done and so we're building the first large-scale commercial facility to do that, and we've got to have more of those built. It will take a lot of those to offset the emissions of the aviation industry. I've quoted a number about it. It takes about 1,000 direct air capture facilities to offset about half of the aviation industry's emissions.

So what we need to communicate and help people understand is that to meet the goals of the Paris Accord: direct air capture has to happen; carbon capture from industrial sites has to happen. So we need people to understand that the best way to make it commercial is to allow us to do what we do best and that's putting the CO_2 into existing reservoirs to increase the recovery from those reservoirs rather than having to develop in the future additional oil and gas production to meet the world's needs in sensitive places.

Drew Shindell:

Thank you, and I'm glad you brought up too that different parts of the world still have very different performance standards. We saw that chart from IEA. I've seen it repeatedly and every time I see it, it just astonishes me how there's a factor of 100 difference. Indeed, some places are doing much better than others.

So, thank you for being willing to address that issue of the corporate sell-offs to other operators. It's very interesting to hear the work on carbon capture and storage and, indeed, that is deployed in virtually every model that is able to produce a 1.5 degree scenario. Of course, the more the more you rely on that—the less or—the more you rely on that, the more you suffer if it doesn't work out as favorable as possible, so I'm glad you talked about a combination of different possibilities.

And that's actually a really nice transition to the next thing that I wanted to ask you, Vicki, which was really about what might be the kind of game-changing disruptive technologies or paradigm-shifting technologies, or things that would affect methane. And is it the ability to capture emissions that changes the whole footprint of the oil and gas sector? Is it something related to say, the observations that we saw other people highlight that the satellites can now see large emissions with? We were just hearing about MethaneSAT from EDF. If that will enable us to see very small ones, will that change the way industry works? Or, what would you expect is on the horizon for oil and gas?

Vicki Hollub:

I think that when we talk about disrupting and game changing, I think our direct air capture facility is one because a lot of people have said, "You can't build it. You can't build one that large and make it commercial." And, what I say to that is just watch us, because we will and we can, and we have to.

The second thing is, I think that we are trying to also develop an emission-free, electrical power generation technology. We have a pilot plant that's running, and it's operating, well, now and we'll be building that in scale as we go. And that is, what it does is, it takes a hydrocarbon gases, burns them with oxygen, and creates a pure stream of CO_2 off of that, but a lower cost of electricity, so that the CO_2 is essentially captured in the process. So that's a, I think, a game changing technology because anywhere there are hydrocarbons (hydrocarbon gas) we can take that and generate electricity with it. That's no emission. So that's, I think, potentially disruptive and game changing.

But then I think that what I'd mentioned earlier is, I believe, with greater focus on it and attention, I have been so impressed over the last two or three years by what our employees have been able to do in the oil and gas industry in our chemicals business. So I do believe there still, yet to happen, that next decade of technology that we need to apply to our oil and gas business. We still have the same pumping units out in West TX that we had 60 years ago. So there is the opportunity to look at this differently and to just—when you when you set a goal and you say we're going to eliminate by this much. Then that starts to drive innovative thinking and ingenuity and I think that's happening within our company. I think that's happening within and other companies and I think we just have to collaborate more to ensure we advance that faster.

But I think the game changing technology that's going to lower methane emissions is to get out of this mode of thinking that what worked 50 and 60 years ago, and is still in place today, is going to be OK for tomorrow. It's not and it has to change.

Drew Shindell:

I wholeheartedly agree with that. We have to … we have to change the way we've been operating, and of course we're really concentrating on methane today. In the long term, I think there is no solution to getting us substantial reductions in fossil fuel use to meet our CO_2 targets as well.

And that's why, for example, in the methane assessment we talk about the transition as part of the additional measures complementing the near-term focus on targeted measures. I want to go to this kind of broader view and step back a little bit from any particular sector, and as both of you are in the industry side of things, of course.

We've had a lot of, to my mind, very encouraging presentations and the keynotes about how much is being done: how countries are committed, how international organizations like UNECE and IEA are committed to action. And yet, our emissions are still going up rather than down.

So the question, and I'll direct this first to you, David. You talked as well about how there's lots of uptake. The technology is being picked up by millions of farmers and large-scale operators in advanced countries. Is this going to be enough without some broader global convention or treaty or the kind of thing that the UNECE representative was talking about? Do we need a worldwide price on greenhouse gases? Do we need a convention or a treaty like we have for the ozone layer and for mercury? Or, can we continue—kind of in our different countries, in different sectors, and financing—everything kind of bottom up?

What do you think David?

David Newman:

Listen, I've been doing environmental activism dream for the last 30 years. OK, so it's sort of refreshing to be on a on a panel with Vicki from Occidental because in the days when I was working for Greenpeace we were trying to shut her down.

So, but the truth of the matter is that there, I think all of your speakers have said, that there is no time to lose. And we have gone too slowly. We have been accepting the resistance and the pushback, which there have been. And I'm sorry, Vicki, from you and your colleagues throughout the United States, but also throughout the rest of the world to stop the transition into other cleaner energy sources and also insert into energy reduction, energy prevention.

The cleanest energy is the stuff you don't use, and things like insulation of buildings. You know, I wrote a book a year ago about all this, and one of the things I saw in this was that the biggest building company in the United Kingdom spent millions lobbying against the new installation regulations so that it wouldn't cost him a few dollars on the bottom line because they would have to put more insulation in the buildings that they built.

So, industry has been pushing back. And, whatever great initiatives we hear, it's not enough. Now I have long been an advocate of a global carbon tax. It's obvious that we're still a long, long way away from that, but we have a European carbon tax now, and it's €50 a ton, $60.00 a ton, today. We have a UK carbon tax now – it's £50 a ton. It's about $75 a ton, today. We have carbon taxes implemented across, I think, roughly 25% of global emission jurisdictions. So, we are seeing progress. But everywhere you go, in every meeting you go to—I work for example a lot on plastics and plastic pollution—every meeting you go to you will see the major plastic producers and a lot of them are sitting down there in Texas, where Vicki is now, saying that: we're doing this voluntary initiative; we've put half a million dollars into this initiative; we've been supporting Indonesia on this initiative. And all these initiatives have taught me in 30 years of environmental action that they are always buying time so that the existing business model is not disrupted.

They, we, need major disruption to the existing business models. Get over it. The time of fossil fuels has finished. Now, they're not going to go away tomorrow. But we have to be doing everything—from yesterday, from the moment we get off of this webinar—to ensure that they go away as quickly as possible. And voluntary agreements are not going to do that. And all the wonderful things that Vicki's company is doing there are not going to do that because they are a drop in the ocean. Because they are, that's just, they are beacons if you like, to which we can look to and say, "hey, well done," but they're not changing the paradigm. And the paradigm needs to change.

I've written about this many times. Only through financial mechanisms will we get those changes because the world teaches us and the world economy teaches us that those who have got money don't want to let anybody else have it. And to get the money into the right places, it means taking away from somebody. We're still putting incentives into the into the global fossil fuel industry at a far higher rate than we are putting into renewable energy. Are we completely crazy? But we're still doing it. So in order to change the paradigm of the way in which we spend our money, we need global accords. We need tough government governance. We need strong governance and I'm not seeing enough of that today.

Drew Shindell:

Thank you, David.

I think that actually rings as a very compelling argument that is not really restricted to just this panel discussion on industry, but really is something that I'm glad you brought up because of the whole way that GMI has been operating since its formation is a voluntary partnership which as you said, I like your words, it's been a "beacon," but clearly the emissions are still going up.

I want to give you a chance to weigh in here too, Vicki. Do you think a global, more rigorous regime is going to be required?

David Newman:

Vicki, excuse me. Before you reply. I do not wish to be rude, but I have to leave in two minutes, so if I cut off that is not being rude, it's because I have a European Commission meeting that I have to go to now. So, thank you.

Drew Shindell:

Then if we don't see you again, thank you David for your participation. Over to you, Vicki.

David Newman:

Thank you.

Vicki Hollub:

And David, before you go, I just want to say we may be a little drop, but we're going to create a bigger wave than you might think because we're working that hard and …

David Newman:

I appreciate that.

Vicki Hollub:

The other thing I'd say is it's not just it's not about fossil fuels only. I can't tell you how many times that I walk into some of these department stores and home building places and restaurants where when there are two open doors. When the first one opens you almost get knocked down by the cold air coming out. We have to have everybody focused on this.

And you're not going to kill fossil fuels next year. Not in 5 years. Not in 10 years. Not in 20, or not in 30. So we have to have everybody on-board with us, helping us to move toward doing the right things.

And I can tell you that too many people are waiting on, and companies within our industry, waiting on there to be a price on carbon or carbon tax. They're waiting on that and they keep saying that when it happens then they'll do things.

We're doing things ahead of that because in the United States there is an incentive, just like there had been for solar and wind, there's an incentive to do some carbon capture and sequestration or use, and that's what's propelled us to be able to do what we're doing. We still have to focus on generating value

for our shareholders, but we figured out a way to do that while also capturing CO_2 from the air and from these industrial sites.

So there are mechanisms in place today for companies to do things. They just have to want to do it and they have to be innovative enough to figure out how to make it also deliver value for the shareholders. That's what we're doing, I don't think that. I think that the talk around carbon pricing in the U.S. and worldwide, that's just giving—to David's point—that's just giving companies an excuse not to do anything today, and we cannot give them that excuse because that is not going to happen anytime soon. I don't know if it's going to happen anytime soon in the U.S., but I know there's not going to be global policy that sets in place that around the world. So, it's a difficult thing to do.

But companies should be taking advantage of the things that help them today to do the things they ought to do to lower their carbon footprint.

David Newman:

Here I have to leave you both, and thank you again for the invitation. Sam has the slides by the way, which I didn't present. Please feel free to circulate them to the audience.

Vicki Hollub:

Thank you, David.

David Newman:

Thank you, thank you very much.

Drew Shindell:

Wonderful. We'll say so long to David and I think we are about finished with the time for our panel, which was getting very lively there toward the end. I appreciate the discussion and the candor. Indeed, it is hard to imagine a carbon price similar to what we have now in Europe. I will note that those prices are—that David just talked about in Europe—are far higher than what we called "low" for low-cost abatement measures. If you had such prices you'd start to get nearly everything that I think the different research communities, including the EPA, have addressed as methane mitigation potentials, that is, would be at negative cost if you had a price on carbon, such as what's available in—what is the current price in the European Union. So that is an interesting way to go, but clearly a mixture.

I want to thank Vicki for her willingness to participate in this and for the interesting insight into what the industry's point of view is and all the efforts being undertaken to reduce methane. So thank you very much.

I am going to turn the floor back over to Helen, and appreciate everybody for participation and hope you all enjoyed the panel. Thanks again. Over to you, Helen.

Helen Ryan:

Thank you, Drew. Thank you, Vicki, and thank you, David, for sharing your insights and for such a dynamic question-and-answer period. I think that's what we need: to have really robust conversation and lively exchanges.

And thank you to our audience for submitting your questions for our panelists ahead of the event. It was very helpful for us.

In closing, I would like to thank each of our speakers for taking part in today's event and making it such a success. Your insights and perspective as experts are extremely valuable as we move forward to accelerate our action on methane.

The message is very clear. Deep reductions in methane emissions over the coming decade will be essential from both the climate change and an air quality perspective. We know the major methane sources and we have the technology required to mitigate them. Solutions exist. There are pathways for immediate implementation that will achieve significant emissions reductions, often at low or zero-net cost. I think the conclusion is clear. Addressing methane is a win-win-win for climate, air quality, and for the economy.

With this, I want to thank you all for participating in today's event. Thank you.