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A call to action on methane management

Note by the secretariat

I. Methane and climate change

1. Methane is a potent greenhouse gas (GHG) with an instantaneous climate forcing effect 120 times that of carbon dioxide (CO_2). Global atmospheric concentrations of methane have grown nearly 150% from pre-industrial levels and are far above the range of the last 650,000 years. Global emissions from human activity are projected to increase another 20% by 2030. Reducing methane emissions offers significant climate change benefits, especially in the near term, as there is a large reduction potential and cost-effective mitigation technologies are readily available. Achieving a 50% reduction in methane emissions by 2050 and maintaining them through 2100 would reduce global temperature rises significantly.[1]

2. Unlike other GHGs, methane can be converted to usable energy. Capturing and using methane emitted from human activities offers opportunities to generate energy and reduce its climate impact. Technology for capturing and using methane is available in every sector. Countries are recognizing that increased concentrations of methane in the atmosphere are contributing to climate change such that it threatens their development.

3. In addition to mitigating global warming, reducing methane emissions can deliver a host of other energy, safety, and local air and water quality benefits. These benefits make methane emission reduction projects worth pursuing:

(a) Methane contributes to background tropospheric ozone levels both as an ozone precursor and by contributing to global warming, which raises daytime temperatures. Reducing global methane emissions can lower tropospheric ozone formation and reduce associated mortalities, particularly in equatorial regions. In addition, many of the technologies and practices that reduce methane emissions also reduce associated emissions of volatile organic compounds (VOCs), odours, and other local air pollutants;

[1] GMI webpage (https://www.globalmethane.org/about/methane.aspx). Footnote 5: Reilly et al. 2003. *Multi-Gas Contributors to Global Climate Change: Climate Impacts and Mitigation Costs of Non-CO_2 Gases*. Pew Center on Global Climate Change and Massachusetts Institute of Technology Joint Program on the Science and Policy of Global Change (available at http://web.mit.edu/globalchange/www/PewCtr_MIT_Rpt_Reilly.pdf)

(b) Leachate from landfills and manure and waste from agricultural facilities can infiltrate local waters and cause disease, eutrophication, and other environmental problems. Technologies that capture methane from these sources reduce contamination of local waters, with associated benefits to public health and ecosystem integrity;

(c) Producing energy from recovered methane can also help to avoid the use of higher CO_2 - and pollutant-intensive energy resources such as wood, coal, and oil. It also provides local sources of alternative energy that can serve as catalyst for investment and spur local economic development. In addition, capture and use of methane from coal mines delivers important co-benefits including improvement of mine safety and productivity, localized energy production, and improvement in local/regional air quality.

II. Emissions

4. About 60% of global methane emissions are a result of human activity. Approximately 54% of anthropogenic methane emissions come from five sources – the main sources of anthropogenic methane emissions are the oil and gas industries, agriculture, landfills, wastewater treatment, and emissions from coal mines:

(a) Natural gas and oil systems account for 24%;

(b) Landfills account for 11%;

(c) Coal mining accounts for 9%;

(d) Wastewater accounts for 7%;

(e) Agriculture (animal waste management), accounts for 3%.

5. Fossil fuel production, distribution and use are estimated to emit 110 million tonnes of methane annually, which accounts for 29% of anthropogenic methane emissions.

6. Methane is emitted to the atmosphere during gas production, processing, storage, transmission, distribution, and use. It is estimated that around 3% of total worldwide natural gas production is lost annually to venting, leakage, and flaring, resulting in substantial economic and environmental costs.

7. Coal mining related activities, such as extraction, crushing, distribution, and the like also lead to the release of a substantial amount of methane that is trapped in coal seams. Issues associated with methane from coal are addressed in the United Nations Economic Commission for Europe (ECE) document “Managing methane from abandoned coal mines” (ECE/ENERGY/133/Add.2).[2]

8. Methane emissions from different sources are second only to CO_2 emissions as a cause of global warming, even though it remains in the atmosphere for only about 12.4 years. The global warming potential (GWP) of a gas is estimated based on a theoretical emission of gas for selected time horizons. The relative potency of the gas as an agent of global warming is most often reported at the 100-year time horizon, however, estimates of GWP for the 20-year time horizon can be useful in understanding the impact of short-lived climate forcers in the atmosphere. The 100-year and the 20-year time horizons are chosen by convention to illustrate the relative impact that a gas will have upon its release to the atmosphere and act as the basis for policy development and monitoring the success of limiting these GHGs. However, as molecules of methane break down in the atmosphere, other GHGs are formed including CO_2, water vapor and tropospheric ozone which increase the heat retained in the atmosphere that results from a single emission of methane. To account for this indirect effect on global warming the GWP is increased, but depending on the application, different values may be used.[3]

[2] https://unece.org/sites/default/files/2020-12/ECE_ENERGY_133_Add.2_AMM.pdf.

[3] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

9. The GWP for methane in the year of its release is 120, with an average of 86, including indirect effects, for the 20-year time horizon.[4] This value represents the average of its GWP from years 0 through 20. Similarly, for the 100-year time horizon, the average GWP, including indirect effects for years zero through 100 is 34. After 20 years, only about 20 percent of the initial mass of methane emission will remain in the atmosphere and by the time that the 100-year time horizon is reached, only 0.03 percent of the original mass of the methane emission will remain. The challenge for addressing methane emissions is that atmospheric volumes are continuously replaced, and global atmospheric concentrations of methane continue to rise, realities that argue for using the instantaneous GWP value of methane, 120, in climate change mitigation planning. Reducing methane emissions at their source is therefore an important and available opportunity to enhance and accelerate climate efforts.

III. Natural gas' role in the energy mix

10. Methane is a major constituent of natural gas and, when produced and transported under safe conditions, it is an important fuel source that is growing in importance in many regions. Natural gas, or methane, is considered by some ECE member States both as a transition fuel and a destination fuel depending on its suitability compared to other forms of energy.

11. Methane is expected by some member States to play an important role in the future in transport, power generation, space heating, and industry. It is delivered through an existing natural gas infrastructure that offers efficient and cost-effective storage and transmission capacity. This same infrastructure could serve as the backbone for a future hydrogen economy.

IV. Consequences of the diminishing role of fossil fuels

12. In many western countries the energy sector is undergoing extensive transitions. As the costs to install and commission renewable power facilities continue to decline, capital markets are showing a preference for investing in renewable energy rather than conventional energy companies. In response, many conventional energy companies are moving away from fossil fuels and in countries of the Organisation for Economic Co-operation and Development (OECD), an unprecedented number of coal-fired power plants and coal mines are closing. Adoption of policies requiring modernization of or withdrawal from fossil fuels, adoption of low-emission power production, renewables, and energy efficiency is a trend that likely will continue. Many of the coal mines and power plants operating at a loss in North America and the European Union (EU) likely will close as the cost of competing in power markets becomes untenable. The COVID-19 pandemic has exacerbated this trend as energy use and energy fuel commodity prices have dropped. Many coal mines in the United States have closed in response. In contrast, new coal mines and coal-fired power plants are being developed in the Asia Pacific region though there are growing objections.

13. As energy markets move away from fossil fuels, funding to sustain communities and invest in the future energy system will be needed during the transitions. Identification of the regions that will be hardest hit by closures of coal mines and coal fired power plants are being conducted at the national and regional level. Funding for the transitions may not be at levels needed to address the deterioration of associated industrial and urban ecosystems and to stave off unemployment. Transition programmes cannot focus only on coal mine closure and the direct consequences for coal mine employees, they must also address the needs of neighbouring communities that have a strong dependence on the facility. Although funds are committed for a just transition in many countries and regions, some regions are not prepared. Lost jobs and the reductions in the tax base are a double threat for community stability that

[4] This means that in year zero methane has a GWP of 120. Preventing one tonne of methane from entering the atmosphere is thus equivalent to preventing 120 tonnes of carbon dioxide from being released to the atmosphere.

may be undermined by lack of public investment supporting new job creation and funding social safeguards.

14. Methane emissions from disused oil and gas wells will continue if they are not properly plugged and abandoned. The situation for gassy coal mines is similar as once a mine is closed the emissions will continue even though coal is no longer being mined. It is necessary for governments to recognize the need to repurpose mined land and manage methane emissions from disused wells and coal mines.[5] Mined lands can offer many options for land repurposing if mine closure is planned and executed with a future use in mind. It is critical that early action is taken in order to preserve the value of natural resources and prepare the closing mine in a way that will provide opportunities for new businesses which can utilize the remaining assets and natural resources. Sustainable closure of the mine must employ business models that use the remaining natural resources such as the gas, water, and the surface land. Manmade artefacts of the mining activity such as buildings and the mine void may be used for many other purposes, such as natural gas storage, CO_2 sequestration, energy storage using water in pump and store schemes, waste storage, and for research in development projects that need shielding from electromagnetic energy or stable temperatures. Also, repurposed mine sites can be used for recovering critical elements and rare earth elements from mine waste. Such sites can be an important element in re-employing ex-miners.

V. Standards for mine closure

15. Methane emissions occur throughout the coal mine life cycle. When gassy coal mines reach the end of their useful life, special preparations are required to prevent mine gas emissions and other hazards. Taking a responsible approach to coal mine closure requires that methane emissions be managed in a way that not only prevents hazards from developing after closure but also ensures that mined land repurposing and sustainable development can be carried out. The World Bank Group is engaged in assisting coal regions in transition which face difficult decisions related to governance, people and communities, and repurposing land and assets. It has created tools to assist in developing a rational approach to meeting the needs of the community, reducing environmental damage, and ensuring a useful future for mined lands as regions seek to create a new energy economy that is equitable for all. Among the tools that are being developed are mine closure standards which provide guidance related to preparations beginning early in the coal mine life cycle and continuing through to closure and post closure activities that must take place as countries face coal mine closure and mined land repurposing. Mine closure standards provide guidance on implementing measures which will prevent methane emissions and endangerment of nearby buildings and groundwater resources. Managing methane at closed and abandoned mines ensures community safety and reduces emissions that left unabated will persist for decades.

16. ECE is involved in development of the above-mentioned mine closure standards through engagement in the process by a dedicated task force of the Group of Experts on Coal Mine Methane. Further contribution of the Group of Experts in the dissemination of the standards is expected.

VI. Call for Action

17. As of today, there is neither a common technological approach to monitoring and recording methane emissions, nor a standard method for reporting them. Available information regarding methane emissions from extractive industries is relatively sporadic and often based on estimates. Therefore, the extent of the challenge and opportunity to manage such emissions remains largely undefined.

[5] Underground coal mines which were gassy when active, are likely to be gassy after mining ceases and emit gas for decades; however, gassy mines which are flooding or are likely to flood will emit gas until the workings are flooded and the gas no longer escapes from the coal. Over time the amount of methane can be significant.

18. Much can be done to reduce methane emissions, which will be essential if countries are to attain their objectives. Additionally, reducing methane emissions offers significant health benefits by improving local air quality especially in the near term. Effective management of methane including from abandoned coal mines is an imperative part of climate change mitigation strategies. Abandoned mine methane emissions typically are not accounted for in national GHG inventories.

19. Awareness of methane as a GHG is growing but methane emissions are burgeoning and near-term action is needed along with medium term planning and program development aimed at real, substantial, and verifiable emission reductions. Through the adoption of best practices to reduce methane emissions ECE has a powerful and impactful opportunity to create a thematic approach to tackling this enormous problem systematically. The suggestion is to build on ECE's convening power to unite partners for an immediate, medium-term effort to raise awareness and develop actionable steps toward methane reduction.

20. In this regard, ECE has worked with partners to develop a proposal for the United Nations General Assembly to declare an International Decade for Methane Management. This can be a thematic approach offering solutions which fit the needs and budgets of member States identifying the potential for opening new opportunities and forming powerful partnerships among the public and private sector.

VII. Actions to be taken by the Committee on Sustainable Energy

21. In light of the above, the Committee on Sustainable Energy is requested to:

(a) Endorse the contribution of the Group of Experts on Coal Mine Methane to the development and dissemination of the standards for mine closure discussed in section V of this document;

(b) Encourage member States to support a resolution at the United Nations General Assembly on declaring an International Decade for Methane Management. An indicative sample of a declaration is presented in the Annex to this document. Preparation of a draft resolution will require active engagement of one or more countries to take the lead in drafting a document for consideration by UN Member States.

Annex

Draft Proposed Declaration of the International Decade for Methane Management

1. The General Assembly,

(a) *Recalling* [any previous decisions related to methane];

(b) *Recalling* [any previous decisions related to climate change];

(c) *Recalling* [any previous decisions related to health, safety, and local air pollution];

(d) *Bearing in mind* [its own resolutions and those of subsidiary bodies like the United Nations Economic and Social Council (ECOSOC) – Coal Mine Methane (CMM), Abandoned Mine Methane (AMM), and Oil and Gas Monitoring, Reporting and Verification (MRV) documents];

(e) *Considering* that methane is a potent greenhouse gas with a substantially higher climate forcing effect than CO_2;

(f) *Considering* also that methane is a precursor to ozone and air pollution;

(g) *Considering* that methane emissions have a social cost, including damage to public health;

(h) *Considering* that methane emissions reduce the yield of agriculture and forest ecosystems;

(i) *Noting* that global atmospheric concentrations of methane have grown nearly 150% from pre-industrial levels and are far above the natural range of the last 650,000 years;

(j) *Noting* that anthropogenic methane is emitted from three main sectors: fossil fuels, including oil, gas and coal; waste, including solid waste and wastewater; and agriculture, including rice paddies, enteric fermentation and manure;

(k) *Noting* that there is growing demand for natural gas for energy, industry, and transport, but that that growth is at risk given methane and CO_2 emissions from natural gas value chains;

(l) [comparable comments for the other, non-energy sectors];

(m) *Recognizing* that global methane emissions from human activity are projected to increase another 20% by 2030;

(n) *Noting* that proper methane emissions management would bring substantial near-term climate and economic benefits and would reinforce the sustainability credentials of natural gas;

(o) *Noting* that achieving 50% reductions in methane emissions by 2050 would reduce the global temperature rise forecasts by 0.55°C[6];

(p) *Recognizing* that reducing methane emissions offers significant climate change benefits, especially in the near term, as there is a large reduction potential and cost-effective mitigation technologies are readily available;

(q) *Noting* that the United Nations has adopted certain best practice guidances on methane emissions from the coal, oil, and gas sectors but that the suite of guidances is incomplete;

[6] GMI webpage (https://www.globalmethane.org/about/methane.aspx). Footnote 5: Reilly et al. 2003. *Multi-Gas Contributors to Global Climate Change: Climate Impacts and Mitigation Costs of Non-CO_2 Gases*. Pew Center on Global Climate Change and Massachusetts Institute of Technology Joint Program on the Science and Policy of Global Change (available at http://web.mit.edu/globalchange/www/PewCtr_MIT_Rpt_Reilly.pdf)

(r) [Normative instruments in other sectors; spectrum of national and regional approaches];

(s) *Considering* the wide range of independent actors and initiatives working separately on issues of methane management including, among others, the Global Methane Initiative (GMI), the Climate and Clean Air Coalition (CCAC), the International Methane Emissions Observatory (IMEO), the World Bank, the Oil and Gas Climate Initiative (OGCI), the Environmental Defense Fund (EDF), international organizations, academia, private companies, and civil society;

(t) *Considering* that the international community as a whole has and continues to improve its capacity to confront this problem;

(u) *Recognizing* the necessity for the international community to demonstrate the strong political determination required to mobilize and use existing scientific and technical knowledge to mitigate methane emissions from the energy sector through proper monitoring and reporting, abatement and remediation, replacement of fossil fuels with alternatives, and removal of impediments to decarbonization (e.g., just transition);

(v) *Recognizing* the necessity for the international community to demonstrate the strong political determination required to mobilize and use existing scientific and technical knowledge to mitigate methane emissions from wastes through proper monitoring and reporting, abatement and remediation, and diminution of wastes;

(w) *Recognizing* the necessity for the international community to demonstrate the strong political determination required to mobilize and use existing scientific and technical knowledge to mitigate methane emissions from agriculture through proper monitoring and reporting, abatement and remediation, and [development of alternatives] ;

(x) *Recognizing* also the important responsibility of the United Nations system for promoting international cooperation on the spectrum of methane-related challenges in all related sectors to the United Nations Secretary-General.

2. Proclaims the International Decade for Methane Management, beginning on 1 January 2023.

3. Decides to designate the second Wednesday of November International Day for Methane Management, to be observed annually during the Decade by the international community in a manner befitting the objective and goals of the Decade.

4. Adopts the International Framework of Action for the International Decade for Methane Management contained in the annex to the present resolution.

5. Requests the UN Secretary-General to submit to the General Assembly at its [xx] session a progress report on implementation of the present resolution, including the organizational arrangements made for the Decade, and on the status of international protocols and conventions regarding methane and methane-related topics.

6. Also requests the UN Secretary-General to bring the present resolution to the attention of all Governments, intergovernmental organizations, appropriate non-governmental organizations in consultative status with ECOSOC and competent scientific institutions in the field of methane management.

7. Decides to include in the provisional agenda of its [xxth] session an item entitled "International Decade for Methane Management".

8. Calls on [xxxxx] to host the Secretariat of the International Decade for Methane Management and to coordinate, in accordance with the Organizational Arrangements set up in the Appendix to this Annex, the activities undertaken within its framework, in coordination with all involved actors and under the supervision of the General Assembly.

9. Calls on Member States, relevant intergovernmental organizations and industry associations, and private sector entities operating in the fields related to methane emissions, to contribute, financially and in kind, to the planning, development, and implementation of activities undertaken within the framework of the International Decade for Methane Management, and to support, financially and in kind, the work of the Decade’s Secretariat.

Appendix

International Framework of Action for the International Decade for Methane Management

I. Objective and Goals

1. The objective of the International Decade for Methane Management is to reduce global atmospheric concentrations of methane by 50% by 2050 through concerted international action on anthropogenic sources of methane emissions.

2. The goals of the Decade are:

(a) Tightened Commitments/Convention;

(b) Awareness of challenges and solutions;

(c) Reduced atmospheric methane concentrations;

(d) Detailed best practice guidance and case studies for all sectors;

(e) Enduring Programmes and Structures;

(f) Standards for coal mine closure and land repurposing aimed at reducing emissions and maintaining community safety, including socioeconomic/environmental aspects;

(g) Dissemination, demonstration, deployment, training, monitoring, reporting, regulation, and outreach;

(h) [other].

II. Policy Measures to be Taken at National Level

3. Governments are called upon to:

(a) Commit to significant actions on methane management;

(b) Add significant methane emission reductions to their Nationally Determined Contributions (NDCs);

(c) Conduct webinars and training programmes at local level on methane;

(d) Develop case studies of concrete actions;

(e) Sponsor research;

(f) Conduct dissemination and deployment activities in all sectors;

(g) [other].

III. Actions to be Taken by the United Nations System and Partner Organizations

4. Actions to be undertaken during the course of the decade:

(a) UN Member States add significant methane emission reductions to their Nationally Determined Contributions (NDCs);

(b) Develop best practices, standards, protocols or a convention on methane, mine closures, decarbonization, [other sector activities];

(c) Methane assessment and interactive tool (from the Climate and Clean Air Coalition (CCAC);

(d) Bi-Annual Global Methane Forum;

(e) International Methane Emissions Observatory (IMEO) reports;

(f) Methane management meetings coordinated with global climate meetings;

(g) United Nations Conference on Methane Management;

(h) European Union conference on methane;

(i) Scientific meetings in coordination with the World Meteorological Organization (WMO), CCAC, and groups such as the Environmental Defense Fund (EDF);

(j) Energy, Agriculture, and Landfill Methane Conferences and Fora;

(k) Methane meetings with the World Economic Forum, European Union and UN conferences on methane, and methane meetings coordinated with global climate meetings;

(l) Case studies of concrete actions and sponsored research;

(m) Workshops/Seminars covering all emitting sectors (energy, agriculture, waste);

(n) Dissemination/deployment activities in other sectors;

(o) [other].

IV. Organizational Arrangements During the Decade

A. Special high-level council

5. The Secretary-General is requested to establish, with due regard to equitable geographical representation, a special high-level council, consisting of a limited number of internationally prominent persons, which would provide him with general advice with respect to the Decade, take appropriate action to promote public awareness and mobilize support from the public and private sectors.

B. Scientific/technical committee on the International Decade for Methane Management

6. The Secretary-General is requested to establish, with due regard to equitable geographical representation and covering the range of methane issues, a scientific and technical committee on the International Decade for Methane Management, consisting of scientific and technical experts selected in consultation with their Governments on the basis of their personal capacities and qualifications, including experts from the organs. organizations and bodies of the United Nations system.

7. The role of the Committee shall be to develop overall programmes to be taken into account in bilateral and multilateral cooperation for the Decade, paying attention to priorities and gaps in technical knowledge identified at the national level, in particular by national committees, as well as to assess and evaluate the activities carried out over the course of the Decade and to make recommendations on the overall programmes in an annual report to the Secretary-General.

C. Secretariat

8. The Secretary-General is requested to establish a small Secretariat, to be funded through extrabudgetary resources, as follows:

(a) The Secretariat shall be established at [xxx] with its members drawn, as appropriate. from the international community of experts in the field and other relevant experts seconded, inter alia, from competent United Nations organizations, governments, international organizations, non-governmental organizations, civil society, and academia;

(b) The Secretariat shall be responsible for the day-to-day coordination of Decade activities and shall provide substantive and secretarial support to the special high-level council and the scientific and technical committee, as well as for other related activities.

V. Financial arrangements

9. It is recommended that extrabudgetary resources be provided for implementation of the activities of the Decade and, therefore, that voluntary contributions from Governments, international organizations and other sources, including the private sector, be strongly encouraged; to this end, a trust fund shall be established by the Secretary-General who will be entrusted with its administration.

VI. Review

10. The Economic and Social Council during its second regular session of 2028, will carry out a mid-term review of the implementation of the International Framework of Action for the International Decade for Methane Management.