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Re: Recommendation to accurately account for warming effects of methane

We write to recommend that you take several actions to ensure that the strong, near-term warming influence of methane emissions be accurately measured, reported, and addressed in the Administration's program to slow global warming. To assist with the development and implementation of urgently needed methane reductions – particularly in the oil and gas industry, the agricultural sector, landfills and coal mining – the most current and relevant information possible regarding the very important contributions of methane emissions to near- and long-term global climate change must be available to and used by policy-makers.

Accurate representation of methane's warming influence on the climate is important not only because methane's warming influence over the 21st century makes it the second most important anthropogenic greenhouse gas (with a current radiative forcing of 1 watt per square meter compared to 1.7 for CO_2),[1] but also – at least as importantly – because the climate system responds more quickly to methane with its short residence time in the atmosphere than to CO_2, where climate lags are quite long. This difference means that aggressive mitigation of methane emissions is essential if the near-term pace of climate change is to be slowed. Such a slowing is essential to increase the likelihood of avoiding climatic tipping points and to moderate the intensification of current climate impacts, including Arctic sea-ice loss (which has also been implicated in intensifying extreme weather anomalies), ice sheet melt, permafrost thawing, and declining seasonal snowpack.[2] Methane reductions are also feasible technologically today and can, in many cases, be achieved in a cost-neutral or even cost-positive way, and this opportunity for action must not be under-estimated.[3]

Specifically, we ask that that the Administration's methane mitigation effort include steps that will slow near-term climate change while also contributing to capping long-term warming. Because use of the 100-year Global Warming Potential (GWP) spreads out the strong near-term warming influence of methane over a period roughly ten times its atmospheric lifetime, the present reliance on GWP-100 in identifying optimal actions obscures the potential for cutting emissions of methane (and other short-lived warming agents) to slow the pace of climate change. To facilitate better development of emissions-reduction policies that will contribute to limiting both near- and long-term climate change, we recommend that the Administration and agencies adopt and require the use of both the 20-year and the 100-year GWPs for methane.

Due to the use of only the 100-year GWP and the use of outdated GWPs from early IPCC assessment reports, the warming influence of methane emissions over the next several decades has been underestimated by as much as a factor of four in many recent assessments, leading to neglect of important and practical opportunities for slowing near-term warming. As made clear in AR5, "there is no scientific argument for selecting 100 years [as the time horizon for GWP] compared with other choices."[4] Analyzing the relative warming influences of greenhouse gas emissions using the 100-year GWP instead of the 20-year GWP for methane obscures methane's strong warming influence over the next few decades and so the potential for reducing the rate of warming leading up to the hoped-for 2°C peak warming.[5]

While the 100-year GWP remains useful in developing policies that will achieve long-term climate stabilization (assuming tipping points are avoided), use of the 20-year GWP for methane is particularly important if the world intends to reduce the likelihood of reaching critical tipping points over the next several decades.[6] Choosing the appropriate GWP is also important to ensure that emission reductions actually accomplish commitments to slowing global warming. For instance, a recent study demonstrated that analyzing methane emissions using a 100-year GWP resulted in an inability to achieve shorter-term targets over coming decades.[7] In your future efforts, we recommend the Administration and agencies require both 20-year and 100-year GWP values be presented and used to estimate the warming influence (and consequent impacts) of methane emissions.

The Administration recently released its "Strategy to Cut Methane Emissions" under President Obama's Climate Action Plan.[8] The selection and implementation of the mitigation measures outlined in the Strategy are dependent on the estimates of the climate consequences of methane. EPA's greenhouse gas inventory converts methane emissions to CO_2 equivalents using a seriously outdated value.[9] Because of this shortcoming, the analysis of emissions and their effects in the Methane Strategy requires re-calculation using the best-available updated GWP values. Additionally, the Administration needs to update the methane GWP values used in the National Climate Assessment ("NCA"). While the most recent NCA is a comprehensive synthesis of the latest scientific knowledge regarding climate change, it uses the 100-year methane GWP of 21 taken from the IPCC's Second Assessment Report (AR2) that is no longer supported by the science.[10] Indeed, as reported in the 2013 Intergovernmental Panel on Climate Change's Fifth Assessment Report (AR5),[11] the 20-year GWP of methane is now estimated to be 86 and the 100-year GWP to be 34;[12] these values represent, respectively, 19% and 36% higher values than in AR4, and are even higher than the values from AR2. There is now simply no question that emissions of methane are much more important to control than has been earlier recognized.

The Administration and federal agencies have multiple opportunities and obligations to adopt and communicate the most appropriate and accurate GWP values for methane through President Obama's methane strategy, CEQ's upcoming greenhouse gas guidance under the National Environmental Policy Act (NEPA), and EPA's greenhouse gas emissions inventory (see the appendix for specific suggestions).

As evidence continues to mount that serious climate change impacts are already upon us,[13] research indicates that mitigation of short-lived pollutants such as methane can play a significant role in slowing the rate of climate change, while producing many co-benefits for human health and food security.[14] To support the accurate evaluation of the benefits of methane mitigation, the Administration and agencies should develop a two-track strategy directed at limiting both long-term warming and the near-term rate of warming. Doing this requires using the GWP for methane (and other short-lived warming agents) that accurately reflects the latest science and provides decision-makers the best possible understanding of and options for addressing both near- and long-term climate change and disruption: specifically, a 20-year GWP of 86 and a 100-year GWP of 34.[15]

The challenge of limiting global warming to 1.5 to 2°C is much more difficult than is apparent using only GWP-100 in the analyses, and only development of both near- and long-term strategies has the potential for success that the Administration is striving for.

Signed,

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Specific Opportunities for the Administration to Greatly Improve Treatment of Methane

The Administration and federal agencies have multiple opportunities and obligations to adopt and communicate the most appropriate and accurate GWP values for methane through President Obama's methane strategy, CEQ's upcoming greenhouse gas guidance under the National Environmental Policy Act (NEPA), and EPA's greenhouse gas emissions inventory.

CEQ is currently responsible for drafting guidance for analyzing greenhouse gases under NEPA. This guidance will provide a blueprint for analysis of greenhouse gases from major projects. The use of the updated methane GWP estimates from the IPCC AR5 for both 20- and 100-year timescales will provide decision makers and the public a more accurate representation of the environmental consequences of a project. The NEPA regulations require that "information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA."[16] These requirements can be best met by using the updated GWP estimates and considering the effects of emissions on both the near-term pace of warming and the long-term cap.

EPA recently finalized several changes to the Greenhouse Gas Reporting Rule,[17] which included updating the GWP for methane. EPA declined to adopt the best-available estimate from the AR5, and instead adopted the lower value from AR4 due to concerns about international reporting. For domestic use, we recommend that EPA make available full emissions information for methane using both the 20-year and 100-year GWP from the AR5. Regardless of international reporting requirements, domestic laws require the use of the best-available science, which by definition includes use of the most current estimate of methane's GWP. There is no reason why EPA cannot use the current figures for domestic purposes while also complying with all international reporting requirements.

Another important focus for methane mitigation is the fugitive emissions from the oil and gas sector. Oil and gas drilling and hydraulic fracturing have significantly expanded in recent years. At the same time there is growing evidence that EPA's emission factors for methane leakage from these activities may, at least in some cases, substantially underestimate actual methane releases.[18] Use of updated methane GWP estimates would aid the prioritization of methane mitigation efforts in this sector as well as inform decision-makers and the public about the climate consequences of oil and gas projects.

We would add that the failure of analyses using only the Kyoto basket of greenhouse gases to include the strong warming influences of black carbon, precursors of tropospheric ozone, and the reduction in sulfate loading associated with reduced CO_2 emissions also creates a misleading representation of the potential for slowing global warming by cutting emissions of short-lived gases and aerosols, and we also recommend that the warming influence of these species also be properly and fully treated.

References

[1] IPCC, Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Summary for Policymakers at Figure SPM.5, page 12 (2013). The cited radiative forcing of 1 W/m^2 for methane includes feedbacks; the concentration-based estimate of methane's forcing is 0.48 W/m^2.

[2] Drew Shindell et al., Simultaneously Mitigating Near-term Climate Change and Improving Human Health and Food Security, *Science* 335, 183 (2012); J. J. West et al., Scenarios of methane emission reductions to 2030: abatement costs and co-benefits to ozone air quality and human mortality, *Climatic Change* 114, 441 (2012).

[3] *Id.*; USEPA, Global Mitigation of Non-CO_2 Greenhouse Gases (2006). Because methane is emitted by a limited number of major sources, mitigation measures will be straightforward to target and implement.

[4] IPCC, Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at 711 (2013).

[5] *See* R. W. Howarth, A bridge to nowhere: methane emissions and the greenhouse gas footprint of natural gas, *Energy Science and Engineering*, pre-publication (May 19, 2014).

[6] See, e.g., James Hansen et al., Target atmospheric CO_2: Where should humanity aim? *Open Atmospheric Science Journal* 2, 217 (2008); K. Anderson & A. Bows, Beyond 'dangerous climate change': emission scenarios for a new world, *Philosophical Transactions of the Royal Society A* 369, 20 (2010).

[7] M. R. Edwards & J. E. Trancik, Climate impacts of energy technologies depend on emissions timing, *Nature Climate Change* 4, 347 (2014).

[8] Climate Action Plan: Strategy to Reduce Methane Emissions (2014), *available at* http://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.

[9] USEPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2012 at 1-8 (2014). The methane GWP values reported in the main text of the inventory are derived from the Second Assessment Report, although general emissions estimates based on AR4 and AR5 GWPs are available in Annex 6.1 to the inventory.

[10] USGCRP, US National Climate Assessment: Climate Change Impacts in the United States 269 (2014). R. W. Howarth and other scientists also submitted a background paper on GWP values during the peer review process for the NCA (Methane Emissions from Natural Gas Systems: Background Paper Prepared for the National Climate Assessment (Feb. 2012) *available at*: http://www.eeb.cornell.edu/howarth/publications/Howarth_et_al_2012_National_Climate_Assessment.pdf). At the time of passage of the Global Change Research Act, the legislative record indicates that Congress anticipated that research plans under the GCRA: "will enhance our understanding of the Earth system on a global scale, improve our capability to predict natural or human induced changes and, most importantly, provide the best scientific information on which we can develop necessary and responsible policy decisions." (136 Cong. Rec. H12996-01, H13001 (October 26, 1990)).

[11] G. Myhre et al., *Anthropogenic and Natural Radiative Forcing*, in Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change IPCC Table 8.7 at 714 (Cambridge Univ. Press 2013).

[12] It should be noted that these values (34 and 86) are the estimates for biogenic methane and fossil methane with CO_2 reported elsewhere. Fossil methane is associated with higher global warming potentials of 36 over 100 years and 87 over 20 years.

[13] *See* IPCC Working Group II, Climate Change 2014: Impacts, Adaptation, and Vulnerability (2014); USGCRP, US National Climate Assessment: Climate Change Impacts in the United States (2014).

[14] *See* D. Shindell et al. (2012), *supra* note 2.

[15] Please refer to *supra* note 1 regarding appropriate GWP values for fossil as opposed to biogenic methane.

[16] 40 C.F.R. § 1500.1(b).

[17] USEPA, *2013 Revisions to the Greenhouse Gas Reporting Rule and Final Confidentiality Determinations for New or Substantially Revised Data Elements; Final Rule*, 78 Fed. Reg. 71904 (Nov. 29, 2013).

[18] *See, e.g.*, D. R. Caulton et al., Toward a better understanding and quantification of methane emissions from shale gas development, *Proc. Natl. Acad. Sci.* DOI 10.1073/pnas.1316546111 (2014); S. M. Miller et al., Anthropogenic emissions of methane in the United States, *Proc. Natl. Acad. Sci.* 100, 20018 (2013); G. Pétron et al., Hydrocarbon emissions characterization in the Colorado Front Range: A pilot study, *J. Geophys. Res.* 117, D04304 (2012); R. W. Howarth et al., Methane and the greenhouse-gas footprint of natural gas from shale formations, *Climatic Change* DOI 10.1007/s10584-011-0061-5 (2011).