U.S. POLICY

DOMESTIC POLICIES TO REDUCE THE NEAR-TERM RISKS OF CLIMATE CHANGE

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Recent extreme weather events across the nation have sounded the alarm that climate change is happening here and now–it can no longer be dismissed as a long-term problem requiring only a long-term solution. Because of their relatively short atmospheric lifetimes (e.g., weeks to a few decades), cuts in methane, black carbon and hydrofluorocarbons (HFCs) will produce significant near-term climate benefits. This paper sets out a series of cost-effective steps that the Obama Administration can implement under existing authorities that would deliver substantial near-term reductions in the rate of climate change. These actions are a critical complement to ongoing efforts to limit carbon dioxide emissions and represent the only realistic option for keeping global temperature increases close to the 2 degree target adopted by the international community.

LIMITING CLIMATE CHANGE

Recent assessments by the United Nations Environment Program (UNEP), the World Meteorological Organization and others have focused on the need for a complementary two-prong approach to limit the risks from climate change.[1] Increases in extreme weather events are already imposing substantial costs on the United States and global economies. To limit the rate of climate change in the near-term, actions should be taken now to cut emissions of short-lived climate pollutants (black carbon, methane, and HFCs). In order to head off unacceptable long-term changes in climate, additional actions that will significantly reduce emissions of carbon dioxide remain critical.

Because of their short atmospheric lifetimes, methane, black carbon, and HFCs contribute to climate change over a period of weeks to a few decades. If emissions of

these substances are substantially cut, their atmospheric levels quickly come down and their contribution to climate change is diminished. In contrast, carbon dioxide remains in the atmosphere for long periods of time, affecting climate over a century to a thousand years.[2]

Recent estimates suggest that roughly 30-40 percent of warming experienced to date can be attributed to short-lived climate pollutants (SLCPs). One analysis suggests that a set of global actions to limit methane and black carbon could reduce projected increases in temperature by 0.5 degrees in 2050 while also avoiding 2.4 million premature deaths from exposure to air pollution.[3]

The Obama Administration has embraced the need for an international strategy to address SLCPs. In February 2012, Secretary Clinton hosted the announcement of a newly created international partnership, the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants. This partnership has expanded from six to twenty-five nations and now also has as members a number of environmental and business nongovernmental organizations and international organizations including the World Bank.[4]

In providing international leadership on this issue, it is critical that the United States also develops a comprehensive *domestic* program aimed at limiting emissions of these compounds. This paper provides a roadmap for the Administration to use existing authorities to undertake immediate actions to reduce domestic emissions of short-lived climate pollutants. It recommends:

1) Issuing an Executive Order to spur federal agencies to lead by example in reducing their emissions of these pollutants; and

2) Initiating a series of regulatory actions and programs to achieve near-term, low cost reductions in these pollutants.

As a first step under this initiative, the Administration could issue a new Executive Order, direct agencies to begin advancing the regulatory and program actions identified below, and establish an interagency Short-Lived Climate Pollutant Task Force to coordinate and monitor implementation of this effort and to identify additional actions going forward.

PROPOSED INITIATIVES

1. FEDERAL LEADERSHIP

One of the first major environmental actions by President Obama following his election in 2008 was to require the federal government to become a leader in promoting sustainable environmental practices. In October 2009, the President signed an Executive Order, *Federal Leadership in Environmental, Energy, and Economic Performance* (E.O. 13514), that called on all federal agencies to compile inventories of their greenhouse gas emissions and to set targets and develop plans for reducing those emissions through 2020.[5] HFCs and methane (but not black carbon) are explicitly included among the greenhouse gases covered under E.O. 13514. While actions under this Executive Order have spurred considerable efforts to reduce fuel use and improve energy efficiency, few agencies have specifically taken steps to reduce SLCPs.

As the nation's largest fleet operator, landowner, purchaser, and property manager, the federal government has the ability and responsibility to lead by example in limiting its emissions of SLCPs. The Administration could issue a new executive order with the explicit goal of mandating a number of specific steps requiring federal agencies to do more to leverage their resources to reduce SLCPs. Alternatively, under the existing E.O. 13514, the Federal Environmental Executive, who is charged with implementing the Executive Order, could provide guidance directing all agencies to place priority on identifying and taking actions aimed at reducing emissions of SLCPs. Under either approach, agencies could be encouraged to purchase products made without HFCs, to retrofit their dirtiest diesel engines to reduce black carbon emissions, and to take actions to facilitate capture of methane emissions from new and existing gas and oil wells and coal mines on federal lands. Specific goals for reducing SLCPs could be set and progress monitored over time. Agencies could be required to report on their progress in their annual Strategic Sustainability Performance Plans, and the Office of Management and Budget could review this progress by adding SLCPs as a new category on its annual agency scorecards.

2. METHANE EMISSIONS FROM OIL AND GAS OPERATIONS

Methane emissions are 10 percent of the nation's total greenhouse gas releases. Given its short atmospheric lifetime compared to carbon dioxide, this percent underestimates methane's contribution to near-term climate change. The natural gas industry is the largest man-made source of methane emissions in the United States, accounting for over 30 percent of methane emissions in this country.[6] These emissions come from leaks or intentional routine releases of natural gas (which is mostly composed of methane) from throughout the production, transmission and distribution process.

In April 2012, the U.S. Environmental Protection Agency (EPA) finalized new source performance standards (NSPS) and hazardous air pollutant regulations for oil and gas production and gas processing, transmission and storage facilities.[7] While primarily aimed at reducing smog-forming and toxic air pollutants, the rules also have the indirect effect of reducing methane emissions in significant amounts. The rules include the requirement to use "green completions" at natural gas wells to limit emissions from hydraulic fracturing, a rapidly growing means of drilling and production. By capturing and beneficially using methane emissions, EPA estimates that these rules would result in a net cost-savings to industry. EPA estimates that when fully implemented, the rules would reduce methane emissions from these sources by about 15 percent or around 1 million short-tons–equivalent to a *net* reduction of 18 million metric tons of carbon dioxide.[8]

Given the widely varying estimates of methane emissions from these and other sources associated with the production, transmission and distribution of natural gas, there is a need for improved understanding and more accurate measurement of these emissions. Despite this uncertainty, voluntary efforts under EPA's Natural Gas STAR program demonstrate that there are substantial opportunities to achieve additional technologically-feasible and cost-effective reductions across the value chain.[9]

Under this proposed initiative, based on the improved information about emissions, EPA would be directed to evaluate the potential for additional cost-effective reductions from across the natural gas value chain at existing, as well as new, oil and gas facilities not covered by the recent new source standards. Because the dispersed nature of distributing natural gas to end users makes developing regulatory programs particularly difficult, expansion of EPA's Natural Gas Star program to include voluntary reduction targets by participating companies might be the most effective approach for this segment of the sector.

3. METHANE EMISSIONS FROM LANDFILLS

Solid waste landfills are the third largest source of methane emissions in the United States, emitting the equivalent of 108 million tons of CO_2, which amounts to 16 percent of methane emissions and almost 2 percent of our nation's total greenhouse gas emissions.[10] In March 1996, EPA issued final rules regulating the emission of smog-forming and hazardous air pollutants from the largest municipal solid waste landfills.[11] Under these standards, landfills are required to collect and combust their "landfill gas" (LFG) if they have a design capacity of more than 2.5 million tons and more than 2.5 million cubic meters of waste. Although methane was not regulated directly under the rules, EPA estimated that the rule would indirectly reduce emissions by 37 million metric tons of carbon dioxide equivalent–even though the rules affect fewer than 5 percent of all landfills. Since these rules were implemented, landfills as small as 1 million metric tons design capacity have successfully implemented LFG collection systems.

The most straightforward way to significantly reduce methane emissions from this sector would be to bring more landfills into the NSPS regulatory program by lowering the capacity threshold to reflect current technologies.[12] EPA's Landfill Methane Outreach Program estimates that an additional 540 sites represent potentially attractive opportunities for low-cost capture and beneficial use of methane emissions. These sites have a potential for methane reductions of 13 million metric tons of carbon equivalent.

EPA has been sued to update its rule–the 1996 rule has not been revisited for far longer than the eight-year review period called for under the Clean Air Act. As a result, EPA has agreed to a consent decree requiring a review of this rule and an Agency determination on whether to revise it by May 2013.

Under this initiative, the Administration would direct EPA to revise this rule (under section 111 of the Clean

Air Act) to regulate methane directly, to substantially increase the number of landfill sites and quantity of reductions captured at those sites that are subject to the regulations, and to work with states to facilitate effective implementation of these requirements.

4. METHANE EMISSIONS FROM COAL MINES

Active coal mining is the fourth largest methane source releasing 11 percent of U.S. methane emissions, with an additional one percent contributed by abandoned underground mines.[13] Depending on the nature of the mining operation, methane contained in coal seams and surrounding rocks can be emitted in several ways. For example, in active underground mines, ventilation to dilute the explosive methane in "coal gas" is vital for the safety of mining operations. Technologies to remove and capture the diluted methane before venting are available and in use in some mines, and the methane can in some cases be converted into useful energy. Similarly, technologies exist for other mine-related emissions, including surface mines, degasification before mining, and emissions from "gassy" abandoned mines. EPA's Coalbed Methane Outreach Program lists dozens of projects that have achieved substantial reductions in methane and other pollutants, and suggests substantial additional cost-effective reductions are possible. In June 2010, environmental groups have both petitioned EPA and filed a lawsuit to compel EPA to take action on mining emissions.[14] EPA has not yet responded to this petition.

Under this initiative, EPA would list coal mining as a major source category of GHGs (methane) under section 111 of the Clean Air Act, set standards for limiting those emissions from new sources, and issue guidance to states requiring regulation of existing sources as well. EPA has the authority to limit the regulations to mines with characteristics that are most amenable to cost-effective controls. In the case of abandoned mines, where it is often difficult to establish ownership, the Agency could focus on encouraging voluntary compliance or provide incentive programs.

As a complement to EPA regulatory action, the Administration could advance efforts by the Bureau of Land Management to include requirements for capture, sale, or destruction of methane from new, existing and abandoned mines on Federal lands. BLM submitted an advanced notice of proposed rulemaking to OMB on the capture and sale or destruction of waste mine methane in May 2012, but the notice remains at OMB. This notice should be published to allow BLM to move forward in its efforts to address methane emissions from coal mines on publically leased lands.

5. METHANE FROM ANIMAL FEEDING OPERATIONS

Methane emissions from waste management at animal feeding operations (AFO) have grown in recent years to nearly 10 percent of total U.S. methane emissions, in part, due to increased use of centralized animal waste management systems.[15] Other air emissions from these operations include strong odors, hydrogen sulfide, ammonia, and organic compounds. Concerns over these emissions as well as potential for water runoff have led over 190 commercial livestock farms in the United States to install digesters to stabilize the solids and optimize production of methane, which can be sold, used to generate electricity, or burned on site. Over 90 percent of these installations generate electric or thermal energy from methane, which can significantly reduce the costs of the operation. However, this is only a small percentage of the total number of AFOs.[16] In 2009, environmental groups petitioned EPA to regulate AFO emissions under the Clean Air Act.

Under this initiative, EPA would develop regulations for the largest AFOs and USDA would support voluntary incentive programs for smaller sources not covered by regulations. Regulatory authority exists under section 111 of the Clean Air Act for both new and existing operations. Under this section, EPA has the flexibility to define the source category regulated in a manner that would target only the larger concentrated AFOs where cost-effective technologies are available. These largest facilities are a small fraction of all AFOs, but contribute a much larger proportion of total emissions.

6. HFCS

Section 612, the significant new alternatives program, was included in the 1990 Amendments to the Clean Air Act to ensure the health and safety of alternatives being developed and used to replace chlorofluorocarbons (CFCs) and other ozone-depleting substances. HFC-134a was an important alternative to CFCs (particularly CFC-12) with no direct adverse impact on the ozone layer. Its use allowed for a quick and relatively inexpensive transition away from CFCs. The one downside to HFC-

134a was that it has a very high global warming potential (GWP) of 1400–a substantial improvement over the GWP of CFC-12 (with a GWP of 11,000). However, as the use of HFC-134a grows worldwide, it has become an increasingly significant contributor to climate change.

With the development of more environmentally benign alternatives, EPA is now in a position where it could delist HFC-134a from the list of acceptable alternatives under its significant new alternatives program.[17] This would have the effect of prohibiting the use of this compound in those specific applications where more environmentally acceptable alternatives have been developed. In February 2011, EPA accepted a petition to remove HFC-134a from its list of acceptable alternatives for use as the refrigerant in new air conditioners for light-duty vehicles. However, it did not establish a timetable for taking action and did not address the use of HFC-134a in other applications that could also be removed from the list of acceptable alternatives.

HFCs currently represent less than 2 percent of the nation's GHG emissions[18] but are expected to double by 2020.[19] HFC-134a from auto air conditioning is by far the largest use of HFC emissions.

This initiative would require that EPA move forward immediately to propose and finalize a rule removing HFC-134a from the list of acceptable alternatives for use in new car air conditioners. In deciding on a timetable for transitioning away from HFC-134a, EPA should seek comments on the safe use of alternatives, and fully consider the ramp-up of production and availability of substitute compounds. EPA should also consider whether it would be useful to ban the sale of the alternative refrigerants except to licensed technicians in order to ensure proper servicing and avoid problems of refrigerant contamination. It should also evaluate the costs and benefits from requiring mandatory recycling and other refrigerant management practices under sections 608 and 609 of the Clean Air Act.

EPA could also move forward to consider the availability of more environmentally acceptable alternatives for other significant uses where HFC-134a currently is approved (e.g., aerosols, flexible foams, and other refrigerant uses) and determine whether or not any of these uses should also be removed from the approved list of alternatives because safe alternatives for them are now available.

7. BLACK CARBON EMISSIONS FROM DIESEL ENGINES

Black carbon, which is emitted by incomplete combustion of most combustibles, is one of the most potent, but short-lived contributors to climate change.[20] Through air pollution programs and improved combustion efficiency, the United States has done a good job of reducing black carbon emissions from most major source categories. EPA has issued rules that specify strict limits that will significantly reduce black carbon and other particles from *new* diesel vehicles. However, because properly maintained diesels are very long lasting, it will be decades before most of the older, higher polluting vehicles will be replaced with clean ones. Moreover, lower-than-normal sales of new diesels in recent years suggest that existing diesels will be around and emitting black carbon for longer than expected. Cumulative reductions as large as 120 million tons of CO_2-equivalent are possible over the next 20 years by retrofitting about half of the U.S. heavy-duty fleet with advanced particle controls.[21] While costs can be significant, EPA estimated that the health benefits of particle-reducing retrofits alone exceed these costs. Accordingly, programs that would mandate or provide incentives for such retrofits would be cost-beneficial. Yet federal grants for diesel retrofit programs have decreased significantly.

Under this initiative, EPA would develop recommended options for regulatory and expanded incentive-based program to retrofit or accelerate the replacement of existing diesels.[22] Such programs could include a review of retrofit feasibility when engines are periodically rebuilt, or public private partnerships with diesel engine and vehicle manufacturers.

8. BLACK CARBON REDUCTIONS FROM SEASONAL MANAGEMENT OF AGRICULTURAL AND FOREST FIRES IN NORTHERN STATES

Black carbon emissions tend to produce the greatest impact on climate in an area not too distant from the region of emissions, and on regions that are covered by snow and ice.[23] Absorption of sunlight by black carbon and associated pollutants after they are deposited can continue to warm underlying snow and accelerate springtime melting. This exposes darker land and ocean surfaces sooner, which further increases warming in the arctic and near arctic areas.

One major source of black carbon transport to the Arctic in the springtime comes from planned burning for agriculture and forestry, particularly in northern latitudes. Analyses done for the Department of Agriculture suggest emissions from fires in several Northern U.S. states can reach portions of the Arctic, especially Greenland.[24] Shifting such fires to later (or much earlier) times of the year could reduce their impact on Arctic melting as well as reducing warming in snow covered regions below the Arctic. While the U.S. contribution of black carbon emissions to the Arctic may be smaller than that of Eurasian countries, demonstration projects and programs in the United States and Canada would help to promote ongoing efforts to work with Russia and China on the issue.

Under this initiative, the Administration would direct the Department of Agriculture to work with one or more northern tier states with significant prescribed fire activity to demonstrate the feasibility of shifting springtime fires to seasons likely to have lower impacts on Arctic regions.

ENDNOTES

1 See for example, United Nations Environment Programme, World Meteorological Organization, *Integrated assessment of black carbon and tropospheric ozone summary for decision makers* (Nairobi, Kenya: United Nations Environment Programme, 2011; United Nations Environment Programme, *Near-term climate protection and clean air benefits actions for controlling short-lived climate forcers: a UNEP synthesis report* (Nairobi, Kenya: United Nations Environment Programme, 2011); United Nations Environment Programme, *HFCs: a critical link in protecting climate and the ozone layer* (Nairobi, Kenya: United Nations Environment Programme, 2011); United States Environmental Protection Agency, *Report to Congress on black carbon* (Research Triangle Park, NC: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, 2011).

2 Solomon, Susan et al., *Irreversible climate change due to carbon dioxide emissions* (Washington, DC: Proceedings of the National Academy of Sciences, 2009).

3 Drew Shindell et al., "Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security," *Science* 335, no. 6065 (2012): 183-189.

4 For information on the coalition, see, "Climate and Clean Air Coalition," United Nations Environment Programme, last accessed January 18, 2013, http://www.unep.org/ccac.

5 For information on the EO 13514, see, U.S. National Archives and Records Administration, "Executive Order 13514–Federal Leadership in Environmental, Energy, and Economic Performance," *Federal Register* 74, no. 52117 (October 2009), http://www.gpo.gov/fdsys/pkg/FR-2009-10-08/html/E9-24518.htm.

6 U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2010* (Washington, DC: U.S. Environmental Protection Agency, 2012), http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Main-Text.pdf.

7 See: U.S. National Archives and Records Administration, "Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews," *Federal Register* 77, no. 49489 (August 2012), http://www.gpo.gov/fdsys/pkg/FR-2012-08-16/html/2012-16806.htm. The rule requires operators using hydraulic fracturing (fracking) on new or modified natural gas wells to capture the largest amounts of natural gas that is often emitted into the air during the fracking process. While the rules don't regulate greenhouse gases directly, they will result in substantially reduced methane emissions from fracking, and therefore reduce the climate impacts of this rapidly expanding source of natural gas.

8 U.S. Environmental Protection Agency, *Regulatory Impacts Analysis: Final New Source Performance Standards and Amendments to the National Emissions Standards for Hazardous Air Pollutants for the Oil and Natural Gas Industry* (Washington, DC: U.S. Environmental Protection Agency, 2012), http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OAR-2010-0505-4544. Methane's 100-year global warming potential (GWP) is generally accepted to be 25 times that of carbon dioxide. EPA used a more conservative estimate of about 20 to calculate the net reductions.

9 Information on EPA's Natural Gas STAR Program, see, "Natural Gas STAR Program," U.S. Environmental Protection Agency, last modified September 27, 2012, http://www.epa.gov/gasstar.

10 U.S. Environmental Protection Agency, *Inventory of US GHG Emissions and Sinks: 1990-2010.*

11 U.S. National Archives and Records Administration, "Standards of Performance for New Stationary Sources and Guidelines for Control of Existing Sources: Municipal Solid Waste Landfills," *Federal Register* 60, no. 9918 (March 1996), http://www.epa.gov/ttn/atw/landfill/fr12mr96.pdf.

12 Alternatively, EPA could move to directly regulate methane emissions from municipal solid waste landfills. Under this approach, it would add methane as a regulated pollutant for the existing source category–municipal solid waste landfills. It would then move to set technology-based emission standards specifically for methane. This approach would need to be

closely coordinated with current and future emission standards for limiting ozone precursors and hazardous air pollutants to achieve likely co-benefits and to avoid potential conflicts.

13 U.S. Environmental Protection Agency, *Inventory of US GHG Emissions and Sinks: 1990-2010.*

14 In June 2010, a coalition of five environmental groups jointly petitioned EPA to list coal mines as a source of harmful air pollution set standards for the best system of emission reductions.

15 U.S. Environmental Protection Agency, *Inventory of US GHG Emissions and Sinks: 1990-2010.*

16 EPA estimates over 20,000 of the largest AFOs (CAFOs). While reliable data are not available, estimates of the total number of AFOs are a factor of 10 or more higher. U.S. Environmental Protection Agency, *U.S. Anaerobic Digester Status: A 2011 Snapshot* (Washington, DC: U.S. Environmental Protection Agency, 2012), http://www.epa.gov/agstar/documents/2011_digester_update.pdf.

17 EPA could proceed down an alternative regulatory path where it would make an endangerment finding that HFCs presented a risk to public health and the environment. Under this approach EPA could move to set emission standards for major sectors using HFCs. Where acceptable substitutes exist, the standards could effectively prohibit the continued use of HFCs in these sectors. Alternatively, EPA could explore the potential to set up an overall cap for HFCs and phase-down their use over time similar to the way CFCs and HCFCs were regulated.

18 U.S. Environmental Protection Agency, "Industrial Processes," in *Inventory of US GHG Emissions and Sinks: 1990-2010.*

19 U.S. Environmental Protection Agency, *Benefits of Phasing Down HFCs under the Montreal Protocol* (Washington, DC: U.S. Environmental Protection Agency, 2011), http://www.epa.gov/ozone/downloads/HFCBenefits.pdf.

20 Center for Climate and Energy Solutions, *What is Black Carbon?* (Arlington, VA: Center for Climate and Energy Solutions, 2010), http://www.c2es.org/publications/black-carbon-climate-change. A detailed assessment of the impacts of black carbon on climate was recently published. See Bond, Tami et al., "Bounding the role of black carbon in the climate system: A scientific assessment," *Journal of Geophysical Research: Atmospheres*. Published online before print January 15, 2013. doi: 10.1002/jgrd.50171.

21 U.S. Environmental Protection Agency, *Report to Congress on Black Carbon.*

22 Continued funding for EPA's Clean Diesel Campaign under the Diesel Emissions Reduction Act is critical to support state and local efforts to retrofit existing engines.

23 Bond et al., *Bounding the role of black carbon in the climate system: A scientific assessment.*

24 U.S. Environmental Protection Agency. *Report to Congress on Black Carbon.*