

## **Status Report from the Task Force for Short-Lived Climate Forcers To the Senior Arctic Officials of the Arctic Council**

This is a status report on the work and recommendation development to date of the Task Force for Short-Lived Climate Forcers (SLCFs) under the Arctic Council.

The work of the Task Force is guided by the Arctic Council Tromsø Declaration from April 2009 and by the Operating Guidelines of the Task Force approved by the Senior Arctic Officials (SAOs) in November 2009.

The mandate of the Task Force is “to identify existing and new measures to reduce emissions of these [short-lived climate] forcers and recommend further immediate actions that can be taken and to report on progress at the next Ministerial meeting.”

### **1. Key Developments and Messages:**

Since the SAO meeting in Ilulissat, the Task Force has continued its technical work and the gathering of information from national representatives on emissions of black carbon. Work on the latter process is perhaps the most important contribution to date, leading to the first-ever compilation of nations’ black carbon emission inventory estimates, and therefore a more solid basis for mitigation options. Work should continue in order to ensure that estimates are comparable. Other key messages:

***The largest black carbon emission sources can be identified.*** The largest Arctic regional emission sources arise from ***transportation*** (primarily on-road and off-road diesel vehicles), ***residential heating, open burning*** (both intentional in the agriculture and forestry sectors, and wildfires – the latter often spread from intentionally set fires); and potentially ***gas flaring***. ***Marine shipping*** provides a small but potentially significant source due to the proximity of Arctic shipping routes to snow and ice. The identification of residential heating – previously not considered a significant target for mitigation – is a significant new development resulting from work generated by the Task Force.

***Overall, black carbon emissions from Arctic Council nations are projected to decrease in coming decades, primarily because of lower emissions from the transport sector, with stronger particulate matter (PM<sub>2.5</sub>) controls on diesel vehicles and equipment.*** These controls are primarily motivated by health and other air quality benefits, not by Arctic climate concerns. The projected decrease will however be highly dependent on the implementation effectiveness of current legislation, as well as how rapidly older vehicles not covered by the new legislation are retired or fitted with filters that control particles.

***Other sectors will not decrease, so there remains additional emission reduction potential.*** Outside the transport sector, analysis suggests black carbon emissions from the other sectors will remain constant or even increase. New measures by Council nations could therefore yield additional black carbon reductions, particularly from residential combustion, off-road vehicles and agricultural or forest burning.

***Size of emissions is not the entire story. Ongoing analysis is key to identifying the actual Arctic climate impact of each of these sources, and therefore key to refining Task Force recommendations.*** At this time, it is not possible to characterize an exact climate benefit (i.e., avoided temperature increase or avoided sea ice loss) for a given reduction measure. This is because the most effective control strategies might prove different, based on source location and seasonal weather patterns, especially since black carbon suspended over or deposited on snow and ice has a greater warming impact. Ongoing analysis by AMAP and others is therefore key to refine and identify the most effective mitigation options.

***Measures aimed at decreasing black carbon have positive health effects,*** especially for indigenous and other communities living in the region. The Task Force wishes to stress that many early measures can be considered “no regrets” because of these strong health co-benefits, in addition to their Arctic climate and environmental benefits; and also because they may make sense economically. Recommendations related to early mitigation measures should include a focus on “no regrets” actions wherever possible. A key consideration in future measures must be the impact on and benefits to the Permanent Participant members and Arctic communities. Many black carbon measures also decrease levels of other short-lived forcers such as ozone precursors and methane, and therefore bring health and climate benefits additional to those from black carbon reductions alone.

***The Task Force therefore believes that some voluntary early measures by Arctic Council nations are warranted.*** Other SLCF efforts, such as those within the Convention on Long Range Transboundary Air Pollution (CLRTAP) and UNEP and those related to the UN Framework Convention on Climate Change (UNFCCC), may also yield SLCF controls that benefit the Arctic. The Arctic nations can however continue to lead, not only by actively engaging and leading in other forums, but by demonstrating additional and voluntary measures because of the importance of slowing warming in the Arctic to their governments, as well as for the global climate system.

As requested in the Operating Guidelines, some initial recommendations are noted below for SAO consideration and discussion prior to finalization of the recommendations for the next SAO meeting.

## **2. Status Report**

### ***A) Taking into account the state of the science as the Task Force develops recommendations***

The AMAP 2009 report<sup>1</sup> stated that the Arctic continues to warm and that several indicators show further and extensive climate change in the Arctic at rates faster than previously anticipated. Regarding the role of short-lived climate forcers, AMAP reported that black carbon, tropospheric ozone and methane may have contributed to Arctic warming during the past century to a degree comparable to the impacts of carbon dioxide, “though there is still considerable uncertainty regarding their effects.”

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<sup>1</sup> AMAP (2009) Update on Selected Climate Issues of Concern.

Scientific uncertainty remains, and the Task Force has been collaborating with the AMAP Expert Group on Short-Lived Climate Forcers (see below) and informally with other research efforts to address these uncertainties, and to gain better insights about the potential Arctic climate benefits of controlling emissions of black carbon and other SLCFs. Key messages and recommendations of the Task Force nevertheless are being developed in accordance with its mandate, taking scientific uncertainty into account. This means the Task Force can identify strategies for further emission control, but it cannot currently state with confidence exactly what the Arctic climate benefits of such strategies will be.

***B) Collaborating with the AMAP Expert Group and other relevant groups***

The Task Force's collaboration with the AMAP Expert Group on Short-Lived Climate Forcers has resulted in the development of new climate modeling scenarios that are now being run and assessed. The purpose of these scenarios is to gain insights about how different black carbon emission sources from different sectors and regions impact the Arctic. Preliminary results were presented for the first time at the Task Force meeting, September 9-10, 2010 in Copenhagen. The Task Force will continue to seek the advice of the AMAP Expert Group as to how these new climate modeling scenarios, in addition to other available science, can inform the Task Force's recommendations.

The Task Force has been in contact with other relevant groups such as the CLRTAP Expert Group on Black Carbon, which is examining the feasibility of incorporating black carbon into the LRTAP Gothenburg Protocol.

***C) Producing a technical report to support recommendations***

In following up the Tromsø mandate and its Operating Guidelines, the Task Force is focusing its efforts on black carbon emissions. This does not however represent a pre-judgment by the Task Force that black carbon is necessarily more important than methane or other climate forcers in terms of Arctic impacts. Rather, this focus acknowledges that the impacts of black carbon are more of a frontier area of research, and that the Task Force therefore needs to conduct new technical analyses in order to inform its recommendations. As a result, the Task Force is drafting a technical report that quantifies or assesses:

- Current emissions
- Future emission trends out to 2020 or 2030
- Current and forthcoming policies, regulations, voluntary programs and technologies that have the effect of controlling black carbon emissions
- Additional emission control opportunities and, where possible, associated costs
- Implementation feasibility of additional emission control
- The role of emissions from regions outside of the Arctic Council countries

Nearly all countries have now provided reports, data and analyses on emissions, emission projections, current policies, an identification of additional mitigation opportunities, and

preliminary views on Task Force recommendations. This information is being compiled into the technical report as a foundation of the Task Force's recommendations.

### **3. Recommendations for Discussion**

Where possible, proven policies, programs and technologies are identified for each of the major black carbon emission sources, and these can be considered as the Task Force's preliminary menu of mitigation options for consideration. Not all measures may apply or be viable for all Arctic Council nations, due to varying national circumstances such as the country-specific emissions portfolio, existing air quality policies, and jurisdictional constraints. But all are considered potential measures because of the high likelihood of positive climate impacts in the Arctic region, as well as other environmental and health benefits.

#### **A. Transport/Diesel:**

On- and off-road diesel vehicles are a large source of black carbon emissions, and are already subject to regulation in all Arctic Council nations for emissions of other pollutants such as PM<sub>2.5</sub>. Most Arctic nations already have regulations for *new* diesel vehicles that are either in effect or will become active by 2020, and which require these vehicles to implement technologies that should reduce black carbon emissions by over 90%. Primary early measures would therefore involve either more retrofitting of older and "dirtier" vehicles, enhancing current controls on existing vehicles and equipment, or accelerating the timeline, or broadening the scope of regulations for new engines already agreed. Such measures – all of which have strong health co-benefits – could include:

- ◆ Retrofitting existing older and "dirtier" vehicles, equipment and stationary engines with particle traps through regulation or voluntary subsidy programs;
- ◆ Retirement or replacement of the dirtiest existing sources (especially those not easily fitted with filters) through regulation or financial incentives;
- ◆ Coordinated campaigns for better enforcement of new standards and to encourage better maintenance practices;
- ◆ Expansion of "green zones" that ban or require special fees of vehicles with high particle emissions, or include black carbon as a specific new target for these zones;
- ◆ Reducing idling, additional vehicle efficiency programs, and other measures that reduce diesel engine use.

#### **B. Residential Heating (wood stoves, boilers, fireplaces):**

Wood stoves and boilers have emerged as a leading target for black carbon emissions reductions, as they appear to comprise both a major source of emissions that reach the Arctic, and one of the few sources projected to remain essentially unchanged in 2030 without new and additional measures. Wood burning also produces emissions of methane and ozone precursors.

Many homes have transitioned from oil to wood over the past decade, a trend expected to continue; and many that do use wood are located in the more near-Arctic regions. Although some countries do regulate particle emissions from these stoves, measures aimed at pollutants from home heating may not always capture black carbon emissions. While planned stove replacement

campaigns and particle emission controls may somewhat decrease black carbon emissions over time, without new measures emissions are projected to remain nearly the same in 2030. The following measures offer potential for reductions of black carbon emissions in this sector:

- ◆ Development of unified black carbon standards and inspections for stoves and boilers;
- ◆ Voluntary old stove/boiler change-out programs and incentives;
- ◆ Improved technology (boiler retrofit) and new pellet stoves and boilers;
- ◆ Operator education campaigns (best fuels and burning techniques).

### **C. Open Burning:**

Prescribed burns as well as wildfires appear to be a very significant source of black carbon in the Arctic, and may be one of the more cost-effective measures available to decrease black carbon, assuming implementation barriers can be overcome. Recent studies indicate that many – perhaps most – wildfires begin because of intentionally set fires that subsequently burn out of control. The summer 2010 fires in Russia demonstrate how warmer and drier conditions, such as those predicted by climate models, can have a tragic impact on mortality and property, as well as contribute to Arctic warming. Some Arctic Council nations already ban such burning; others control when and where burning may occur; and others rely solely on local regulation that can prove ineffective. In general, recommendations would entail Arctic Council nations moving more towards no-burn methods wherever possible; and highly controlled burning methods where no alternatives exist, to prevent wildfires from arising:

- ◆ Technical assistance (seminars, exchanges) and micro-financing assistance to foresters and farmers to aid in the transition to no-burn methods;
- ◆ Demonstration projects to show the efficacy of no-burn methods;
- ◆ Exchange of information and experience between no-burn and controlled-burn national and sub-national entities (for example the November 2010 St. Petersburg conference);
- ◆ More efficient and controlled burning techniques (central or consolidated locations, biochar).

### **D. Arctic Marine Shipping:**

Marine shipping in the region is a source small in size, yet potentially high in impact; and expected to increase significantly with projected decreases in summer sea ice. In addition to black carbon, shipping is a significant source of local ozone. The Arctic nations comprise 90% of current shipping activities in the region, and therefore have a unique ability to influence the development of future black carbon emissions from this sector by enacting early voluntary measures, or engaging in international regulatory regimes such as the IMO:

- ◆ Council-wide adoption of voluntary measures to decrease black carbon emissions, such as slower speeds in the Arctic;
- ◆ Sponsorship by all eight Arctic nations of the current IMO submission on black carbon by Norway, Sweden and the U.S.; development of new joint Arctic IMO proposals;
- ◆ Ongoing provision of new scientific developments to the IMO by the Task Force, AMAP and other Council working groups;

#### **E. Gas flaring:**

Flaring remains a large unknown, but potentially highly significant source of black carbon emissions in the High Arctic, especially as oil and gas activities expand. Accurately measuring black carbon emissions from flaring remains a challenge; therefore it is premature to propose abatement measures specifically targeting black carbon. More effective methods to quantify black carbon emissions from flaring are currently being developed through, for example, a Canadian research effort involving Carleton University and Natural Resources Canada – resources should be made available to support such efforts.

Oil and gas activities also constitute a very large Arctic source of methane emissions, and such studies could determine methane emissions and leakage in parallel to work on black carbon:

- ◆ Immediate work and funding for in-field measurements, scientific and technical analysis, in concert with the private sector, aimed at filling current information gaps;
- ◆ Providing information on best practices and regulatory options from the energy industry where there has been progress in reducing flaring (e.g., Canadian provinces such as Alberta).

#### **4. Other Potential Council Measures for SAO Discussion:**

Although the Operating Guidelines asked the Task Force to focus on black carbon and in-Arctic emissions, the Tromsø Declaration also names the other short-lived forcers methane and ozone, as well as extra-Arctic emissions. Some preliminary thoughts for SAO discussion:

- ◆ As SLCF discussions expand in other forums, the Arctic Council role can be one of leading and demonstrating voluntary measures, as well as bringing the Arctic perspective and developments to other forums such as UNEP and UNFCCC.
- ◆ Enhanced collaboration with other efforts, such as the CLRTAP Black Carbon Expert Group.
- ◆ Measures aimed at methane and ozone may prove very effective for reduction of near term warming in the Arctic. The decision to focus on black carbon is not meant to pre-judge the relative importance of measures aimed at the other short-lived forcers. Further exploration of possible methane and ozone measures projects should be considered.
- ◆ Methane especially may, in addition to climate benefits, bring strong aspects of health and development benefits through a number of new and existing initiatives. Because methane reductions outside of the Arctic provide Arctic climate benefits, the Arctic Council may also wish to consider or enhance participation in methane reduction activities in other international forums where methane is already addressed.