

# Finland in the policy processes focusing on Black Carbon

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# Finland in the policy processes focusing on Black Carbon (BC)

- UNECE - CLRTAP
- Arctic Council SLCF work
- Climate and Clean Air Coalition (CCAC)
- Nordic collaboration
- International Maritime Organization (IMO)
- WHO health assessment
- Other processes
- Summary: key platforms and achievements

- "Black Smoke" in London (smog, coal use) – UK Clean Air Act 1956
- Black carbon and air quality 1970's
  - Transport
  - Residential combustion
  - Atmospheric composition and impacts
- Arctic haze 1980's
- 1st global emission estimates 1990's
- US Congressional hearings 2007, 2010, 2013.

AMBIO 2013, 42:840-851  
DOI 10.1007/s13280-013-0392-8



REVIEW

### The Black Carbon Story: Early History and New Perspectives

Tiea Novakov, Hal Rosen

- 2008 ♦ - AMAP reports #1 ja #2
- 2009 ♦
  - Arctic Council Tromsø declaration,
  - Arctic Council SLCF Task Force and AMAP SLCF expert group start
  - COP-15: US black carbon initiative
- 2010 ♦
  - UNECE ad-hoc black carbon expert group report and EB decision to include BC in the CLRTAP work
- 2011 ♦
  - AMAP report #3
  - Arctic Council SLCF Task Forcen report
  - Arctic Council Nuuk declaration
  - ACAP SLCF project steering group established
  - UNEP/WMO reports
- 2012 ♦
  - CCAC established (6 founding members, Finland joins in the summer of 2012)
  - CLRTAP revision of the Gothenburg protocol addresses black carbon
  - WHO:n report
  - US EPA black carbon report
- 2013 ♦
  - CCAC has 72 members (September 2013)
  - Arctic Council Kiruna declaration , Task Force for Action established

# Convention on Long Range Transboundary Air Pollution (CLRTAP)

- 2010 ad-hoc black carbon expert group
- The Gothenburg Protocol was amended in 2012 to include, ao., emission reduction commitments for fine particulate matter (PM2.5).
- The amended protocol addresses also black carbon as a component of PM2.5:
  - “Parties should, in implementing measures to achieve their national targets for particulate matter, give priority, to the extent they consider appropriate, to emission reduction measures which also significantly reduce black carbon...”
  - ...develop, maintain and report inventories and projections for emissions of black carbon as well as provide information to the general public.
- The CLRTAP is the first binding international agreement to include black carbon



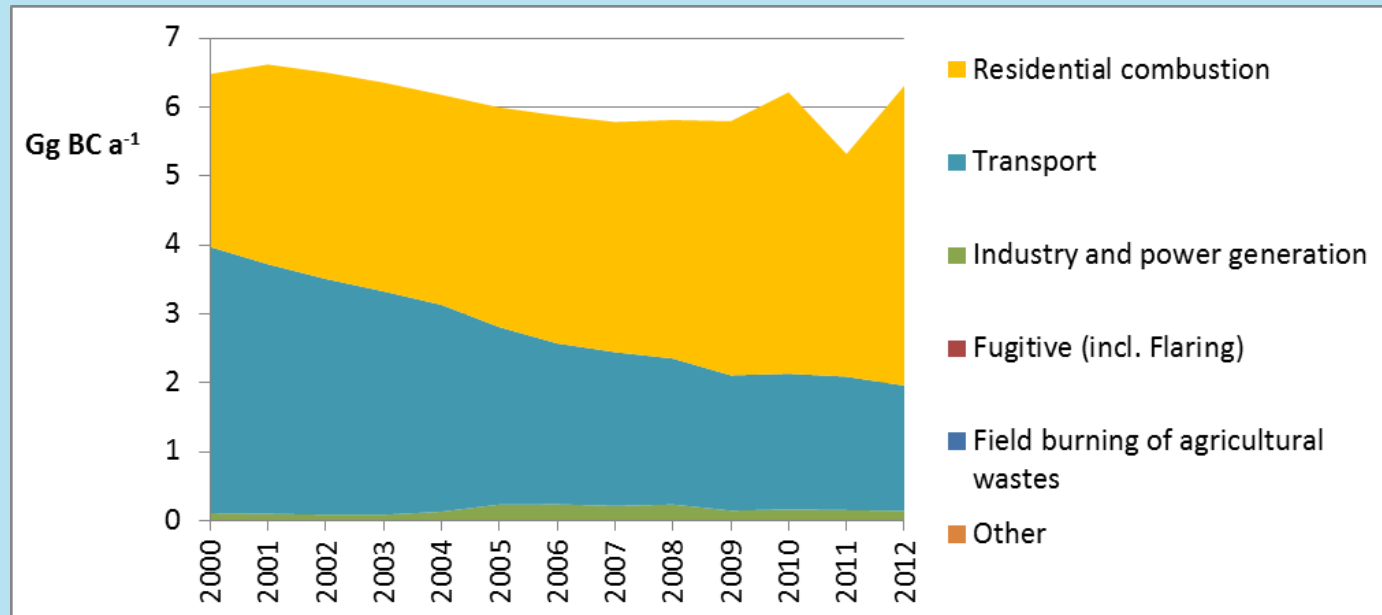
CLRTAP = Convention on Long-range Transboundary Air Pollution

Gothenburg Protocol = The 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone; 26 Parties. Entered into force on 17 May 2005. Sets national emissions ceilings for SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub> and NMVOCs as well as PM<sub>2.5</sub>



## Finnish BC in CLRTAP

- First country level emission estimates (with the FRES-IAM) operational since 2005,
- Finland voluntarily submitted an emission inventory of black carbon to the convention (CLRTAP guidelines) in February 2014



# Arctic Council SLCF work – Tromsø 2009

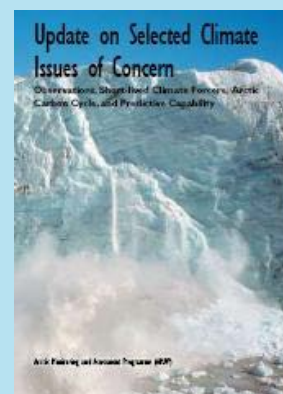
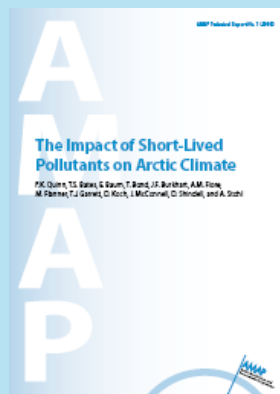
- Council initiated the work on black carbon (and other SLCFs) following workshops held by the Arctic Monitoring and Assessment Programme (AMAP) in 2008
- 2009 Tromsø ministerial declaration:
  - Implement **early actions** where possible on methane and other short-lived climate forcers
  - **Encouraged collaboration with other international fora**
- Two SLCF groups were established with **first focus on BC**:
  - **Arctic Council Task Force on SLCFs**
  - **AMAP SLCF Expert Group**



Arctic Council (est. 1996) high level intergovernmental forum to promote cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic Indigenous communities on common Arctic issues, in particular sustainable development and environmental protection in the Arctic.

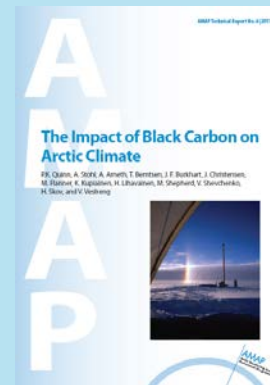
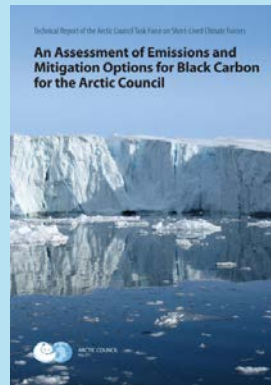
Work is organized in Working Groups and their supporting scientific and technical Expert Groups. AMAP (Arctic Monitoring and Assessment Programme) and ACAP (Arctic Contaminants Action Programme) are among them.

Member States are Canada, Denmark, Finland, Iceland, Norway, Russian Federation, Sweden, and the United States of America.



# Arctic Council SLCF work – Nuuk 2011

- 2011 SLCF groups reported to the ministers and recommended actions.
- Nuuk ministerial declaration:
  - requested the groups “to continue their work by focusing on **methane and tropospheric ozone, as well as further black carbon** work where necessary and provide a report to the next Ministerial meeting in 2013.”
  - Encouraged the Arctic states to **implement, as appropriate in their national circumstances, relevant recommendations for reducing emissions of black carbon**”
  - Established a **Short-Lived Climate Forcer Contaminants project steering group**, to manage circumpolar **demonstration projects**
    - Organised under the **ACAP working group**



## Arctic Council SLCF work – Kiruna 2013

- 2013 SLCF groups reported to the ministers and recommended actions.
- 2013 Kiruna ministerial declaration:
  - Welcomed the Task Force report on SLCFs, and supported its recommendations including that **national black carbon emission inventories for the Arctic should continue to be developed and reported as a matter of priority**
  - Established a **Task Force for Action to Reduce Black Carbon and Methane** to develop arrangements to achieve enhanced black carbon and methane emissions reductions in the Arctic and report at the ministerial meeting in 2015



# Arctic Council SLCF work - Finland

- Finland is active in formulating the common position of the Arctic nations on SLCFs (TF for Action on BC and methane)
  - Co-leads the intersessional work on reporting about emissions and national actions
- Scientists working in all experts groups of the AMAP working group (in charge of the science behind the Arctic climate change and the role of SLCFs)
- FI is the current chair of the ACAP working group (in charge of the demonstration projects to reduce emissions of SLCFs)
- The latest Finnish Arctic Strategy (2013) calls for a national action plan and international co-operation

# UNEP assessment(s) set ground for establishment of the CCAC

- A series of assessments
  - UNEP/WMO assessment
    - Summary for decision makers
    - Technical report
  - UNEP synthesis report: Actions for Controlling SLCFs
    - Focus on regional mitigation opportunities
    - Includes cost assessments of mitigation measures
  - Shindell et al. 2012 article in Science (13 Jan 2012)
- UNEP will continue its ongoing scientific assessment efforts and host the secretariat of the **Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants**



A UNEP Synthesis Report



## RESEARCH ARTICLE

### Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security

Ben Shindell,<sup>1</sup> John C. Sirois,<sup>1</sup> Elizabeth Tighe,<sup>1</sup> Rita van Dingen,<sup>1</sup> ...

Transferring costs and black carbon (BC) controls to both degraded air quality and global warming. We combined 108 scenarios and scenarios to assess these pollution by using ...

ing revealed that for top 10 scenarios reduced ...

# Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC)

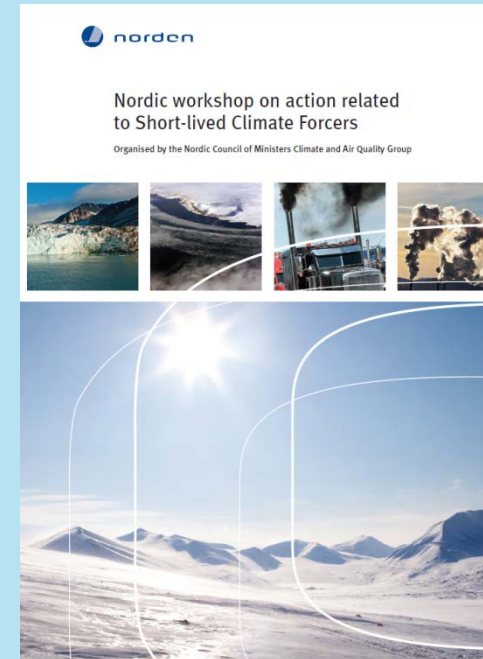
- A voluntary initiative, established in 2012
- Defines short-lived climate pollutants (SLCPs) to include **methane, black carbon, tropospheric ozone, and many hydrofluorocarbons (HFCs)**
- The Coalition's work will augment, not replace, global action to reduce CO<sub>2</sub>
- Seeks to reduce SLCPs by:
  - raising awareness of SLCP impacts and mitigation strategies;
  - enhancing and developing new national and regional actions,
  - promoting best practices and showcasing successful efforts,
  - improving scientific understanding

# Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC)

- Open to governments and other stakeholders who are committed to:
  - mitigating SLCPs in their own countries,
  - to the objectives of the framework, and
  - to helping others take similar actions.
- Partners may choose to take action in a variety of ways, recognizing that priorities vary among countries.
- Founding members: Bangladesh, Ghana, Canada, Mexico, Sweden, The United States
- Currently about 70 member states or –organisations, including the European Commission.
- Finland joined the coalition in the summer of 2012

# SLCF in the Nordic countries

- Joint ministerial statements emphasising the issue
- Nordic Council of Ministers work
  - Workshops
  - Project funding opportunities
- National actions in the Nordic countries
  - Emission inventories (CLRTAP)
  - Finland: emission inventory and IAM work as a basis for assessments of national policies and impacts
  - Norway: national action plan published in 2013
  - Sweden: active in international SLCF fora
  - Denmark: participates, has worked on emission inventories



# International Maritime Organization (IMO)

- In 2010 the United States, Norway and Sweden submitted a proposal to the International Maritime Organization's (IMO) Marine Environment Protection Committee (MEPC) to consider taking action **to reduce BC emissions from shipping that impact the Arctic.**
- The MEPC has mandated a Sub-Committee on Bulk Liquids and Gases to
  - define black carbon and
  - propose how it should be measured in international shipping as well as
  - investigate appropriate control measures to reduce black carbon emissions from international shipping.
- The sub-committee will report to the 65th session of the MEPC in 2014.

Investigation of appropriate control measures (abatement technologies) to reduce Black Carbon emissions from international shipping -  
Study Report

Prepared by



In co-operation with

Daniel A. Lack

Currently at University, Boulder, Colorado, USA

&

Jørgen Thuesen & Robert Elliot, ERRIA, DK



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SUB-COMMITTEE ON BULK LIQUIDS AND GASES  
16th session  
Agenda item 15

BLG 16/15/4  
25 November 2011  
Original: ENGLISH

ANY OTHER BUSINESS

Definition and measurement of Black Carbon in international shipping

Submitted by the Institute of Marine Engineering, Science and Technology (MarEST)

SUMMARY

*Executive summary:* This document proposes a definition of Black Carbon, identifies potential measurement methods, offers evaluation criteria to compare measurement techniques, and suggests an appropriate measurement method for international shipping, based on expert guidance and scientific review. The information provided contributes to the current discussions on Black Carbon by identifying the state of the art for its definition and measurement.

*Strategic direction:* 7.3  
*High-level action:* 7.3.2  
*Planned output:* 7.3.2.1  
*Action to be taken:* Paragraph 27  
*Related documents:* MEPC 62/4/10, MEPC 62/4/16 and MEPC 62/4/18

INTERNATIONAL MARITIME ORGANIZATION



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MARINE ENVIRONMENT PROTECTION COMMITTEE  
65th session  
Agenda item 4

MEPC 60/4/24  
15 January 2010  
Original: ENGLISH

PREVENTION OF AIR POLLUTION FROM SHIPS

Reduction of emissions of black carbon from shipping in the Arctic

Submitted by Norway, Sweden and the United States

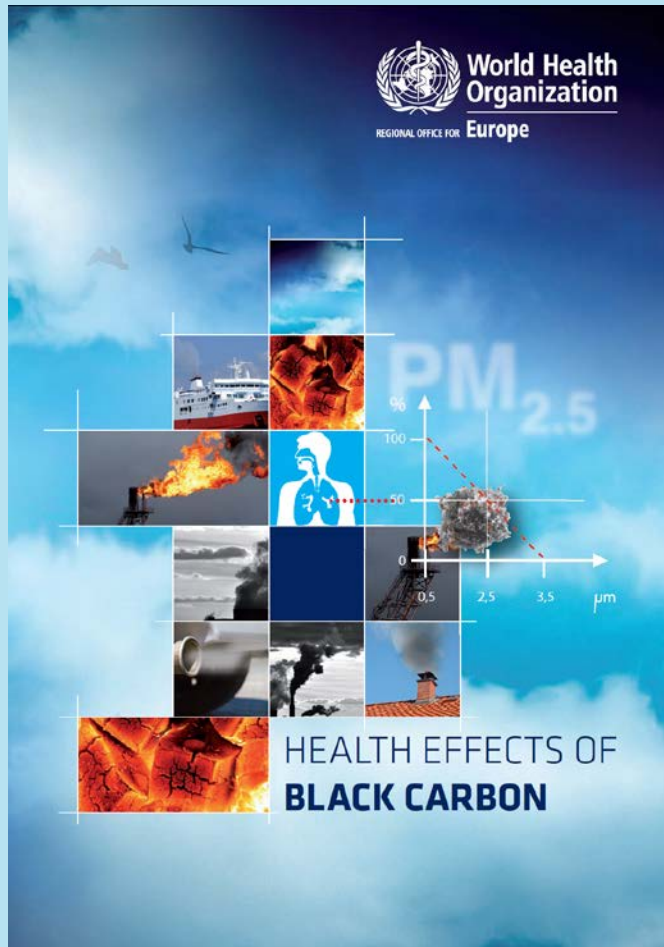
SUMMARY

*Executive summary:* This document discusses the impacts of black carbon (BC) emissions from shipping on the Arctic climate, the importance of that impact, and several approaches to reduce those emissions. This document also sets forth several potential initial proposals for action to reduce BC emissions from shipping that impact the Arctic that the Committee might consider.

*Strategic direction:* 7.3  
*High-level action:* 7.3.1  
*Planned output:* 7.3.1.3  
*Action to be taken:* Paragraph 17  
*Related document:* MEPC 58/INF 21



# WHO – black carbon and health



## Review of evidence on health aspects of air pollution – REVIHAAP Project

Technical Report



This publication arises from the project REVIHAAP and has received funding from the European Union.



# Other activities

- Processes relevant to BC (examples)
  - Global Alliance for Clean Cookstoves
  - EU revision of the TSAP
  - UNFCCC
- A lot of action in the scientific community
  - Emission inventories
  - Climate impacts
  - Health impacts
  - IPCC AR:s
  - Bond et al. 2013 “Bounding the role of black carbon in the climate system”

JOURNAL OF GEOPHYSICAL RESEARCH: ATMOSPHERES, VOL. 118, 5390–5552, doi:10.1002/jgd.50171, 2013

## **Bounding the role of black carbon in the climate system: A scientific assessment**

T. C. Bond,<sup>1</sup> S. J. Doherty,<sup>2</sup> D. W. Fahey,<sup>3</sup> P. M. Forster,<sup>4</sup> T. Berntsen,<sup>5</sup> B. J. DeAngelo,<sup>6</sup> M. G. Flanner,<sup>7</sup> S. Ghan,<sup>8</sup> B. Kärcher,<sup>9</sup> D. Koch,<sup>10</sup> S. Kinne,<sup>11</sup> Y. Kondo,<sup>12</sup> P. K. Quinn,<sup>13</sup> M. C. Sarofim,<sup>14</sup> M. G. Schultz,<sup>14</sup> M. Schulz,<sup>15</sup> C. Venkataraman,<sup>16</sup> H. Zhang,<sup>17</sup> S. Zhang,<sup>18</sup> N. Bellouin,<sup>19</sup> S. K. Guttikunda,<sup>20</sup> P. K. Hopke,<sup>21</sup> M. Z. Jacobson,<sup>22</sup> J. W. Kaiser,<sup>23</sup> Z. Klimont,<sup>24</sup> U. Lohmann,<sup>25</sup> J. P. Schwarz,<sup>3</sup> D. Shindell,<sup>26</sup> T. Storelvmo,<sup>27</sup> S. G. Warren,<sup>28</sup> and C. S. Zender<sup>29</sup>

Received 26 March 2012; revised 6 December 2012; accepted 4 January 2013; published 6 June 2013.

[1] Black carbon aerosol plays a unique and important role in Earth's climate system. Black carbon is a type of carbonaceous material with a unique combination of physical properties. This assessment provides an evaluation of black-carbon climate forcing that is comprehensive in its inclusion of all known and relevant processes and that is quantitative in meridional best estimates and uncertainties of the main forcing terms: direct solar



# Key platforms and national achievements in the area of BC and SLCFs

- Arctic Council
- CCAC
- CLRTAP (and UN organizations)
- Nordic Council of Ministries
- National climate panel
  
- Policy assessments utilizing emissions (IAM) coupled with climate models (e.g. MACEB project)
- Emission inventory submitted to CLRTAP
- Atmospheric measurements of BC
  - Continuous timeseries from several background stations
  - Continuous measurements as part of the AQ monitoring network in Helsinki started in 2011
  - International collaboration (China, India, Arctic-Russia)



March 2012

**UNEP**

**Near-term Climate Protection and Clean Air Benefits: Actions for Controlling Short-lived Climate Forcers**

A UNEP Synthesis Report

**RESEARCH ARTICLE**

**Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security**

How Shindell,<sup>1</sup> Iqbal, C., Kuroki, T., Matthews, K., Edwards, R., Collins, W., Moore, R., ...

Topographic cover and black carbon (BC) contribute to both degraded air quality and global warming. The associated full-planet radiative forcing offsets some pollution by cooling technology and agriculture. We identified 12 measures targeting radiative and BC forcing that reduce regional global mean warming: 0.7°C by 2050. The average impact is 0.7°C by 2050, with a 1.5°C reduction in peak warming. The measures include: (1) 1.5°C reduction in peak warming by 2050, (2) 0.5°C reduction in peak warming by 2050, (3) 0.5°C reduction in peak warming by 2050, (4) 0.5°C reduction in peak warming by 2050, (5) 0.5°C reduction in peak warming by 2050, (6) 0.5°C reduction in peak warming by 2050, (7) 0.5°C reduction in peak warming by 2050, (8) 0.5°C reduction in peak warming by 2050, (9) 0.5°C reduction in peak warming by 2050, (10) 0.5°C reduction in peak warming by 2050, (11) 0.5°C reduction in peak warming by 2050, (12) 0.5°C reduction in peak warming by 2050.

**Integrated Assessment of Black Carbon and Tropospheric Ozone**

Summary for Decision Makers



**The Impact of Black Carbon on Arctic Climate**

PK Quinn, A. Stohl, A. Arnech, T. Bentsen, M. Flanner, K. Kuplainen, H. Lihavainen, M. H. Skov, and V. Vestreng

AMAP Technical Report No. 4 (2011)

**An Assessment of Emissions and Mitigation Options for Black Carbon for the Arctic Council**

Technical Report of the Arctic Council Task Force on Short-Lived Climate Forcers

**WHAT IS BLACK CARBON?**

Black carbon particles, the major constituent of soot, absorb solar radiation and thus in the air heat the atmosphere. In addition, when deposited on snow and ice they darken the surfaces and accelerate melting. It has lately been estimated that black carbon is the second most important pollutant, after carbon dioxide, forcing the climate change.

Black carbon emissions are mostly caused by human activities, such as heating and transportation, when fossil fuels, biofuels and biomass are burnt incompletely.

Because of the short life-time, reductions of black carbon emissions could slow down the warming relatively quickly. Aerosols containing black carbon as well as methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are commonly identified as short-lived climate forcers (SLCF). Aerosols remain in the atmosphere only from several days to few weeks.



**MACEB**

The mitigation of climate change caused by global warming is the most important environmental challenge for the moment.

To find solutions to mitigate Arctic warming, the MACEB project integrates black carbon emissions from different sources and areas with black carbon concentrations in surface air and above over Arctic areas and further with corresponding radiative forcing.

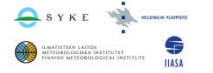
The method used in this project combines information from global (GAINS) and national (Finland, FRES) emission models, global (ECHAM5-HM2) atmospheric model, and actual measurements of black carbon concentrations in surface air and snow.

**PROJECT OBJECTIVES**

- To demonstrate the approach to mitigate warming of Arctic climate by black carbon (BC) emissions reduction at mid latitudes, especially in Europe.
- To assess the impact of the current air quality and climate relevant legislation in the northern hemisphere on BC emissions, their transport to the Arctic, and eventually on Arctic warming.
- To transfer action procedures and experiences to assess and mitigate BC emissions from most important source sectors, e.g. small-scale wood burning.

**PARTNERS:** Finnish Meteorological Institute (FMI), coordinator; University of Helsinki (UHEL), Finnish Environment Institute (SYKE), International Institute for Applied Systems Analysis (IIASA)

**FUNDING:** EU LIFE+



**MACEB**

Mitigation of Arctic warming by controlling European black carbon emissions

[www.maceb.fi](http://www.maceb.fi)



Reports:  
[www.unep.org/ccac](http://www.unep.org/ccac)



**norden**

**Nordic workshop on action related to Short-lived Climate Forcers**

Organised by the Nordic Council of Ministers Climate and Air Quality Group

**Bounding the role of black carbon in the climate system: a scientific assessment**

T. C. Bond,<sup>1</sup> S. J. Doherty,<sup>2</sup> D. W. Fahey,<sup>3</sup> P. M. Forster,<sup>4</sup> T. Bentsen,<sup>5</sup> M. G. Flanner,<sup>6</sup> S. Ghan,<sup>6</sup> B. Kirchner,<sup>7</sup> D. Koch,<sup>10</sup> S. Kinne,<sup>11</sup> Y. Kondo,<sup>8</sup> M. C. Sarofim,<sup>6</sup> M. G. Schultz,<sup>14</sup> M. Schulz,<sup>15</sup> C. Venkataram,<sup>16</sup> H. Z. S. Zhang,<sup>18</sup> N. Bellouin,<sup>19</sup> S. K. Guttikunda,<sup>20</sup> P. K. Hopke,<sup>21</sup> M. Z. Jac J. W. Kaiser,<sup>22</sup> Z. Klimont,<sup>24</sup> U. Lohmann,<sup>25</sup> J. P. Schwarz,<sup>2</sup> D. Shindell,<sup>2</sup> S. G. Warren,<sup>26</sup> and C. S. Zender<sup>20</sup>

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# Thank you!

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