

## **The curbing of black carbon emissions offers many benefits for the Arctic**

Black carbon, emitted from incomplete burning, may cause some 20-25% of the warming in the Arctic. Arctic Council and the Northern Dimension Environmental Partnership have recognized the need to address this pollutant that is also detrimental to human health and ecosystems. In the Arctic it darkens the snow and accelerates melting of ice and snow.

Because black carbon remains in the atmosphere only for days or weeks, emission reductions produce positive results fast. Both the general warming effects and the long-range transport to the Arctic would be reduced.

The ND Future Forum on Environment<sup>1</sup> explored both the policy actions and the practical measures that can be taken to curb emissions of black carbon.

Key actions include

- \* Initiating research and development, experiments and pilot cases that demonstrate the feasibility of further significant reduction of emissions in different sectors, activities and locations.
- \* Strengthening the policy base domestically, regionally and internationally. By providing coherent and consistent signals to a wide range of actors, changes of practices may be achieved and innovations emerge.
- \* Active dissemination of progress and lessons learned within Arctic countries, Countries and Organizations that are Observers in the Arctic Council and beyond.

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<sup>1</sup> The Forum, organized by the Northern Dimension Institute, took place on 19 November 2018 in Brussels, Belgium. It brought together top researchers and policy- and decision-makers to discuss how to curb black carbon emissions. For more information visit <http://www.northerndimension.info/news/news/822-cutting-black-carbon-emissions-is-an-acute-challenge-for-all-in-the-european-arctic>

## EXPLORING THE NORTHERN DIMENSION

### Black carbon emissions are a global problem with special significance for arctic regions

Temperatures in the Arctic are rising clearly faster than the global average temperatures. The main reason are increasing amount of greenhouse gases, but black carbon, emitted from incomplete burning, contributes to the warming. It may cause some 20-25% of the warming in the Arctic, both through warming of the atmosphere and by accelerating melting due to reduced reflection of sunrays reaching ice and snow.<sup>2</sup> Important sources of black carbon include transport, residential burning of coal and biomass, oil and gas flaring, and open burning of biomass from wildfires or the open burning of agricultural waste.

The health effects of black carbon emissions are significant. Black carbon is a component of the fine particles that have serious adverse health effects globally. The combined effects on the climate and health have motivated the Arctic Council and the Northern Dimension Environmental Partnership to pay special attention to ways of reducing emissions of black carbon. The actions to reduce emissions need to be replicated globally for the positive effects to take effect. Globally residential combustion and transport emissions dominate (see Figure below). In the Arctic region emissions from oil and gas production are also important.

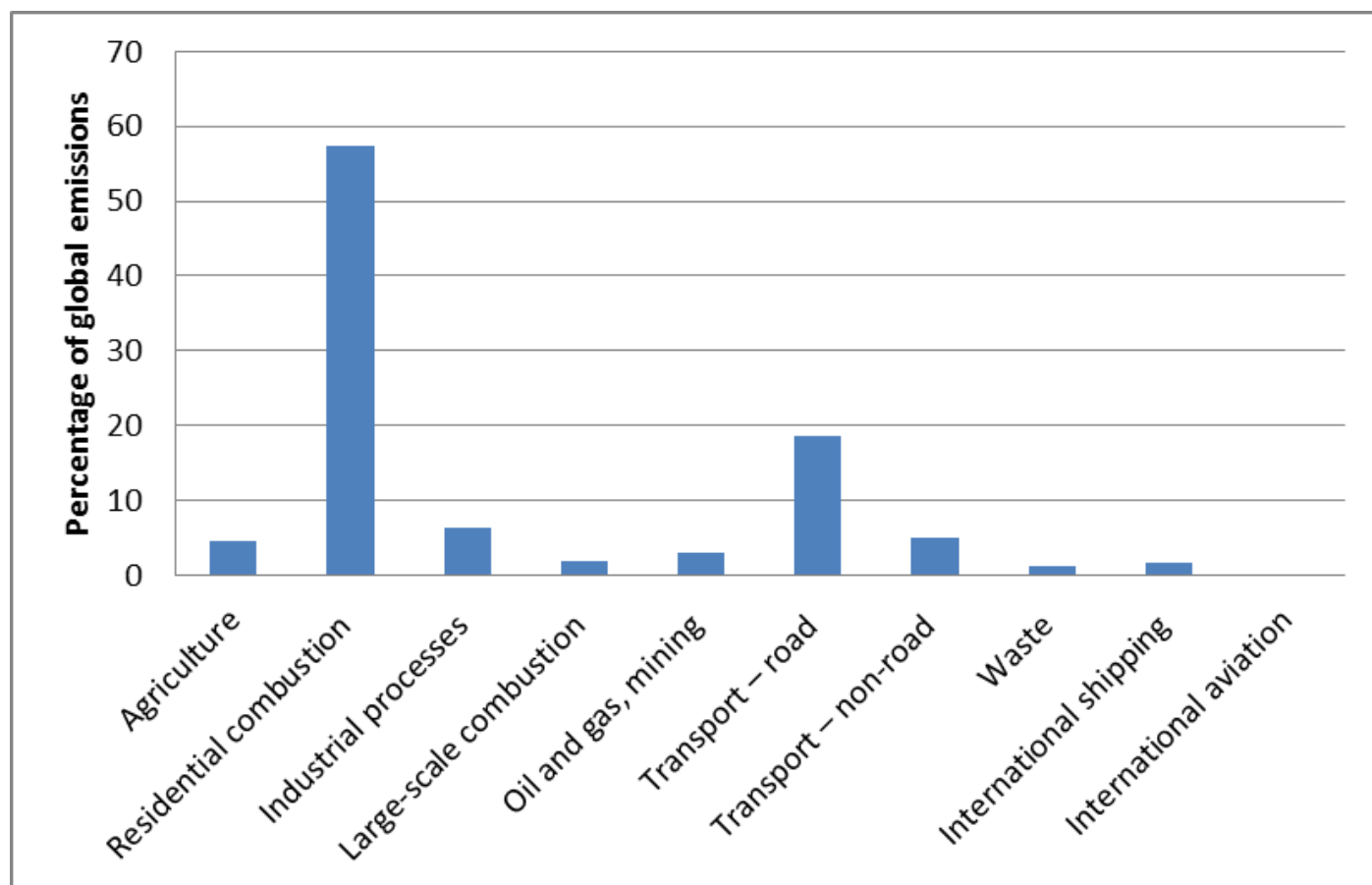


Figure: Percentage distribution of global emissions of black carbon according to sources, excluding forest fires. Data from Klimont, Z., Kupiainen, K., Heyes, C., Purohit, P., Cofala, J., Rafaj, P., Borken-Kleefeld, J., Schöpp, W., 2017. Global anthropogenic emissions of particulate matter including black carbon. Atmospheric Chemistry and Physics 17, 8681–8723. <https://doi.org/10.5194/acp-17-8681-2017>

<sup>2</sup> <https://www.amap.no/documents/doc/amap-assessment-2015-black-carbon-and-ozone-as-arctic-climate-forcers/1299>

# EXPLORING THE NORTHERN DIMENSION

## The dimensions of the problem

The ND Future Forum on Environment<sup>3</sup>, which gathered researchers, professionals and national and EU-level policy-makers, focused on different aspects of and approaches to reducing black carbon emissions.

**The levels and trends of the emissions as well as concentrations and their effects** need to be systematically addressed. The work under the Convention on the Long Range Transboundary Air Pollution of the UNECE has provided a base for the data collection. The Arctic Monitoring and Assessment Programme (AMAP) has made scientific assessments of the contribution of black carbon to the warming in the Arctic and explored other impacts.<sup>4</sup> Further progress can be made by improving the data on black carbon emissions as some sources and countries are still poorly covered. This is a key objective of the EU Action on Black Carbon. PAME<sup>5</sup> and IMO<sup>6</sup> have co-operated the International Council on Clean Transportation on work to specifically be able to monitor and reduce emissions from shipping.<sup>7</sup>

**The costs of inaction and the economic benefits of reducing emissions** are important to explore. The OECD has developed suitable methodology as part of its effort to model global air pollution costs and benefits.<sup>8</sup> By focusing attention on emissions that are of particular relevance for the Arctic, including the long range transport, new policy relevant knowledge can be gained.

**The development of coherent policies that reduce black carbon emissions** need to address the market failures that contribute to the growth of emissions. Because the emissions of black carbon are caused by a great diversity of activities, including flaring in oil production, domestic heating, transport and open biomass burning, a single policy cannot address the problem fully. As emissions are transported across borders and reach the Arctic from afar, there is a need for both domestic and international policies. The Expert Group on Black Carbon and Methane of the Arctic Council documents policy development. In principle one could strive for a Multilateral Environmental Agreement on black carbon, or concentrate on further developing soft law that supports international and regional co-operation and frameworks for addressing the problem.

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<sup>3</sup> <http://www.northerndimension.info/news/news/822-cutting-black-carbon-emissions-is-an-acute-challenge-for-all-in-the-european-arctic>

<sup>4</sup> <https://www.amap.no/documents/doc/amap-assessment-2015-black-carbon-and-ozone-as-arctic-climate-forcers/1299>

<sup>5</sup> <https://www.pame.is/index.php/projects/arctic-marine-shipping>

<sup>6</sup> IMO 2015. Investigation of appropriate control measures (abatement technologies) to reduce Black Carbon emissions from international shipping.

<http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/IMO-Publications.aspx>

<sup>7</sup> <https://www.theicct.org/publications/prevalence-heavy-fuel-oil-and-black-carbon-arctic-shipping-2015-2025> and <https://www.hfofreearctic.org/en/2018/01/24/infographic-can-reduce-black-carbon-emissions-international-shipping/>

<sup>8</sup> <http://www.oecd.org/environment/indicators-modelling-outlooks/the-economic-consequences-of-outdoor-air-pollution-9789264257474-en.htm>

# EXPLORING THE NORTHERN DIMENSION

The availability of alternatives that reduce emissions is necessary for policies to become accepted as legitimate. Non-polluting alternatives can be adopted rapidly after a sufficient number of wide spread pilot cases have demonstrated the feasibility of the transformation. The pilots need to fulfill the following conditions

- **technical feasibility.** Single tests will not provide sufficient evidence for large scale adoption. Therefore it is essential that tests and pilots are properly documented and disseminated.
- **economic feasibility.** A switch to a new technology or practice typically requires investments in the technology and in human resources and learning. The costs of the transformation need to be covered either by finding efficiency gains that offset the costs, by seeing them as an application of a polluter-pays principle or by finding subsidies that overcome the additional costs associated with, for example, a fuel switch.
- **scalability.** The technical and economic feasibility need to be combined to deliver scalability, i.e. the replication and adoption of new low emitting solutions on a sufficient scale. For changes to affect the overall emission reaching the Arctic major transformations need to occur. However, local health benefits can be achieved at a community or municipality level from changes in practice that are not reflected in the overall emission levels.

The Arctic Contaminant Action Programme (ACAP) implements pilots and other activities that demonstrate the feasibility of reducing emissions of black carbon.<sup>9</sup>

## Concrete and coherent policies are needed

To support action that significantly reduces emissions and impacts of black carbon there is a need for strong sector based policies that reduce emissions at the source. Such policies can be based on, for example

- standards that curb emissions from, for example, mobile and stationary diesel engines. For example, the Euro standards and the comparable US 2010 standards<sup>10</sup> have provided a base for replication also in other countries. Standards can also be developed for, for example, stoves and heaters that use solid fuel.
- emission limit regulations for, for example, power production and other major point source polluters. By regulating the operations through setting emission limits both fuel switch and end-of-pipe cleaning has been achieved in several countries. International shipping is an example of a sector where actions are needed at the international level (IMO).
- rules that change activities to become less polluting. Examples include the prohibition of routine flaring in oil and gas production and the prohibition of large scale open biomass burning on fields after harvest.
- economic incentives to change activities. By providing support for the switch to cleaner fuels or locally non-polluting energy sources such as heat pumps, solar heating or electricity, significant reductions can be achieved.
- promotion of alternative fuels to coal and heavy oil in heat and energy production is a primary action for reducing black carbon and CO<sub>2</sub> emissions. Investments for upgrading old production facilities and

<sup>9</sup> <https://arctic-council.org/index.php/en/acap-home/black-carbon-case-studies>

<sup>10</sup> [https://ec.europa.eu/growth/sectors/automotive/environment-protection/emissions\\_en](https://ec.europa.eu/growth/sectors/automotive/environment-protection/emissions_en)

# EXPLORING THE NORTHERN DIMENSION

replacement construction of new ones may be supported by Northern Dimension Environmental Partnership (NDEP) grants.<sup>11</sup>

- information campaigns to change practices that lower emissions. For example information on how to store wood fuel and burn it in such a way that optimal burning can be ensured helps to reduce emissions from domestic heating.
- support for research, development and innovation. The reduction of black carbon emission is not only a question of costly end-of-pipe pollution removal. Opportunities exist to reduce emissions while simultaneously gaining benefits from cleaner burning and efficient use of the resources in, for example oil production. New practices that remove the need for the burning of agricultural waste or that improve the combatting of wild fires can also benefit from innovations in agricultural practice and fire management and control.

## Further information

Presentations and summary of the Northern Dimension Future Forum on Health are available at <http://www.northerndimension.info/news/news/822-cutting-black-carbon-emissions-is-an-acute-challenge-for-all-in-the-european-arctic>

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<sup>11</sup> <https://ndep.org/about/overview/what-we-do/>