

THE CLIMATE GROUP

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BLACK CARBON: AN OPPORTUNITY FOR LOW CARBON LEADERSHIP

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ABOUT

Earlier this year The Climate Group released a briefing paper underscoring the links between climate change and human health. In this follow up Insight Briefing we partner with BSR to zero in on one of the most critical climate-related threats to people's health: black carbon. While the pollutant is second only to carbon dioxide in heating our planet, opportunities remain for public-private leadership. In particular we focus on decarbonizing the transportation industry, which is the single most important actor in reducing the climate, health and economic impacts of black carbon – and driving a cleaner, more prosperous future for all.

FOREWORD

Outdoor air pollution is responsible for more than 3 million premature deaths a year. This is an alarming statistic and represents a serious public health crisis for both developed and developing countries. Many of the gases and particles in air pollution are also powerful climate forcers that add to short and medium term global warming.

The Climate and Clean Air Coalition (CCAC) is working to protect the climate and reduce dangerous air pollution by tackling four key short-lived climate pollutants (SLCPs): black carbon (soot), methane, hydrofluorocarbons (HFCs) and tropospheric ozone. Reducing these pollutants will provide multiple benefits for health, the climate, development, energy efficiency and the environment.

Business and the private sector can play a transformational role. The challenge requires a holistic approach based on the best science available to us today. It needs to involve communities, local and sub-national governments, countries, global financial institutions and development agencies, and it needs private sector support and innovation to help drive and implement change at all levels of society.

Global demand for a healthy environment that sustains a good quality of life is only increasing. So is the political will to act on these issues. There are numerous sectors where businesses can tap into this demand and deliver green and clean goods and services. Reducing these types of pollutants makes excellent business sense.

In transport, for example, the need for better engines and combustion technology to eliminate particulate matter and black carbon provides a triple win: it's good for business, through the creation of new markets and innovation; good for climate, because many measures to reduce climate pollutants like black carbon, methane or HFCs, also helps reduce carbon dioxide; and it's good for the health and quality of life of people.

The CCAC is working with partners, like BSR, to identify the most strategic opportunities for the public and private sector to achieve the results we all need. There are many places where each of us can make a difference and fast action now will yield quick results that deliver multiple benefits for people and the planet.

Helena Molin Valdes

Head of the Climate and Clean Air Coalition Secretariat, hosted by the United Nations Environment Program.

INTRODUCTION

While climate change is not yet widely seen as an immediate, serious threat for human health, it is already impacting people around the world – and subsequently costing public finances, communities and workforces.

Firstly, climate change aggravates diseases. The rise in global mean temperatures coupled with changes in the distribution of water increase vector- and water-borne diseases such as malaria and dengue; diseases which are a particular threat in regions like the Western Pacific.

And while climate change affects global food security which can result in new illnesses driven by hunger and malnutrition, the increasing intensity and frequency of extreme weather events like Typhoon Hagupit in the Philippines last year or Tropical Storm Erika that swamped Dominica in August 2015 will undoubtedly lead to more weather-related fatalities. More extreme weather will also bring with it an upsurge in communicable diseases as natural disasters overwhelm resources, infrastructure and disaster-preparedness systems. This is particularly the case in developing countries.

But these are just the direct health impacts of climate change. Many of the greenhouse gases that cause climate change are also culprits themselves. These gases create air pollution that drives premature deaths as well as severe health issues like cardiovascular and respiratory diseases and birth defects.

Black carbon, a major emission from the transport industry, is one such greenhouse gas. However, despite the importance of this issue, black carbon has largely been ignored in the major international climate discussions – although the public sector is beginning to increase the demand for solutions.

As a priority, governments and businesses alike must integrate health concerns into climate policies and low carbon business plans, and act urgently to reduce black carbon. In particular, there is a huge opportunity to transform the high-emitting transport sector by developing innovative low-emission transport solutions.

By acting now, the public and private sectors can work together to bring manifold benefits to the climate, human health and the global economy.

THE COSTS OF BLACK CARBON

Black carbon is a “short-lived climate pollutant”, otherwise known as greenhouse gases (GHGs) that don’t last long in the atmosphere but nonetheless wreak havoc on our climate. Among all of the GHGs that contribute to climate change, short-lived climate pollutants like black carbon pose the biggest threats to public health.

Emitted during fuel combustion, black carbon is estimated to be the second-most significant anthropogenic emission to contribute to climate change after carbon dioxide. It has a unique ability to both increase global and regional temperatures and reduce the cooling effect of large reflective surfaces like glaciers. Indeed, over a 100-year period, black carbon has the potential to trap 900 times more heat in the atmosphere than carbon dioxide.

The direct impact of black carbon on mortality and human health is also considerable. It is a component of PM_{2.5}¹, fine particles that, by entering and remaining inside the lung through pollution, can cause premature mortality², cardiovascular³ and respiratory diseases⁴ as well as birth defects⁵.

According to the World Health Organization, 3.7 million⁶ premature deaths resulted from outdoor air pollution in 2014, which is primarily from transport. Of this figure, 88% occurred in low- and middle-income countries which use older engines and dirtier fuels – and where vehicle use is also surging. China is particularly vulnerable, with an estimated 4,000 daily deaths that can be attributed to poor air quality⁷. Even the United States faces up to 4,300 additional premature deaths from air pollution if

1 <http://www.airnow.gov/index.cfm?action=aqibasics.particle>

2 <http://www.atmos-chem-phys.net/11/7253/2011/acp-11-7253-2011.pdf>

3 <https://www.mcgill.ca/newsroom/channels/news/black-carbon-linked-risk-cardiovascular-disease-238419>

4 http://erj.ersjournals.com/content/44/Suppl_58/2923

5 <http://aje.oxfordjournals.org/content/155/1/17.full>

6 <http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/>

7 <http://berkeleyearth.org/wp-content/uploads/2015/08/China-Air-Quality-Paper-July-2015.pdf>

8 Tagaris, E., K. J. Liao, A. J. DeLucia, L. Deck, P. Amar, and A. G. Russell, 2009: Potential impact of climate change on air pollution-related human health effects. *Environmental Science & Technology*, 43, 4979-4988, doi:10.1021/es803650w.

regulatory and demographic conditions remain constant.

The economic costs of the public health challenges stemming from black carbon are also significant. In Europe, the economic cost of deaths from air pollution is more than US\$1.4 trillion, which amounts to almost 2% of the global economy. For the entire OECD region, this figure is estimated to be US\$3.5 trillion⁹. Black carbon accounts for about half of these impacts.

CITIES AND TRANSPORTATION

The impacts of black carbon are most acute in major cities. This is especially the case in the developing world, where more than 90%¹⁰ of air pollution derives from transportation including passenger cars, public transit vehicles, or light- and heavy-duty vehicle trucks. This makes the transportation industry the single most important actor in reducing black carbon. As concern for human health from pollution continues to take center stage in cities around the globe, the transport sector must act in concert with the public sector to cut emissions.

But for the transport sector to act, investments are needed from both the public and the private sector. At the global level, governments must continue to uphold strong policy frameworks on transport emissions, including strict vehicle standards. At the local level, policies must respond to specific population needs and policymakers must seek collaboration with private companies that can act as service providers, technology innovators, or investors.

The private and public sectors can consider, for instance, partnerships to monitor and evaluate emissions reduction. The largest bus company in Russia's Murmansk region for example, has developed a reporting protocol to understand whether its upgraded fleet is meeting company goals of cutting emissions and costs, improving the health of passengers, and strengthening its market position.

Another example of such collaboration is in Dubai, where the French emissions-monitoring company NUMTECH mapped air quality across the entire city, taking transport and industry into account. The city of Dubai commissioned the modeling, which was carried out in partnership with Airparif, Enviro Solutions, and CTI-Chuden.

OPPORTUNITIES FOR PUBLIC-PRIVATE LEADERSHIP

Today there is already significant action to cut emissions from the transport sector underway at the local level. This activity falls into three broad categories that should be replicated elsewhere:

— TRANSPORT DEMAND MANAGEMENT

Various economic instruments like parking management and congestion pricing, together with regulatory instruments such as restrictions on traffic and vehicle ownership, can help cities create more efficient transport systems and encourage people to shift to public transit. Examples of this approach have been taken in places like Beijing¹¹, where parking management has also led to increased social equity¹², and London, where pollution was reduced after a congestion charge was introduced in 2003¹³.

Car manufacturers must offer input too, as these policies will affect their business models due to possible restrictions on vehicle ownership and requirements for new product types that have lower emissions.

Another opportunity for the private sector lies in the fact public transit systems are likely to adopt innovative proposals from providers. Consider, for instance, that the total bus stock in 2010 was approximately 16 million units – a figure that is expected to rise to around 18 million units by 2020 and 20 million units by 2030. Currently about 17% of all buses are purchased for China, which is developing new transport and clean air policies¹⁴.

9 http://www.keepeek.com/Digital-Asset-Management/oeed/environment/the-cost-of-air-pollution/summary/english_9789264210448-sum-en#page1

10 http://www.unep.org/urban_environment/issues/urban_air.asp

11 http://www.tdm-beijing.org/index.php?option=com_flexicontent&view=items&cid=35%3Acase-studies-and-examples&id=318%3Aparking-management&Itemid=3&lang=en

12 http://www.lta.gov.sg/taacademy/doc/J09Nov-p07Lu_TransportInChina.pdf

13 <https://tfl.gov.uk/modes/driving/congestion-charge>

— TECHNOLOGIES AND STANDARDS

National and city governments are starting to introduce stricter emission standards for all kinds of vehicles, especially for those with diesel engines. Efficient technologies such as “green” tires, diesel-particulate filters, and hybrids and electric vehicles can also mitigate vehicle emissions. Jakarta is investigating refinery upgrades¹⁵ in order to improve fuel quality as well as vehicle-emissions standards, which includes partnering with companies such as Sinopec, Saudi Aramco, and JX Nippon Oil and Energy. California, which has enforced black carbon regulations and diesel engine emissions since the late 1960s, has been able to reduce black carbon by 90%¹⁶ over the past 45 years. At the national level, the United States recently adopted emissions standards for heavy-duty diesel road vehicles¹⁷, in a bid to reduce emissions and tackle energy dependency.

— TRANSIT-ORIENTED DEVELOPMENT AND PUBLIC TRANSPORT

A particularly relevant trend in the era of megacities is transit-oriented development that integrates urban and transport planning in order to manage land resources more efficiently. Cities are attracted to public-private partnership because private-sector management of these systems can reduce costs. In these partnerships, the city or local authority defines the outcomes, and the private contractor is responsible for achieving them within a defined budget.

But the most successful approaches will combine all of these actions. For instance, Mexico City¹⁸ has reduced private vehicle use by expanding sustainable transport options such as bus rapid transit¹⁹ and public bike-sharing, as well as prioritizing pedestrians and cyclists in its new mobility law²⁰. The city also launched a real-time monitoring²¹ program to track black carbon concentrations in five parts of the city. City officials mandated the removal of lead from the city’s gasoline supply, retrofitted existing automobiles with catalytic converters and created legislation to require vehicle manufacturers to put catalytic converters into cars from the outset. These projects relied on a partnership with the private sector.

This kind of public-private collaboration is also happening at scale. For instance, the Climate and Clean Air Coalition’s Heavy Duty Diesel Vehicle Initiative²² brings together multiple stakeholders to catalyze major reductions in black carbon through the adoption of clean fuel and vehicle regulations and supporting policies, with a focus on diesel engines in all economic sectors. To date, it has provided support to programs in Bangladesh, Chile, Colombia, Ethiopia, Ghana, Jordan, Kenya, Mexico, Paraguay, Peru, Sweden and Uruguay.

It is clear that addressing black carbon can generate positive outcomes beyond just reducing the impact of climate change.

With short-lived climate pollutants causing major health problems as well as urban smog and pollution, governments and businesses must act now to reduce black carbon and avoid future health costs to public finances, citizens, customers, workforces and families, creating a healthier and more prosperous low carbon economy for all.

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14 <http://www.theicct.org/sites/default/files/publications/ICCT%20Roadmap%20Energy%20Report.pdf>

15 <http://www.reuters.com/article/2014/12/10/indonesia-pertamina-idUSL3NOTU1K020141210>

16 <http://www.arb.ca.gov/newsrel/newsrelease.php?id=444>

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