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Soot-free urban bus fleets

EcoMobility Dialogues / Technical Papers

September 2015

By Ray Minjares

In brief:

Urban buses around the world account for 25 percent of black carbon emissions from all passenger and commercial goods transport vehicles in 2015. The Climate and Clean Air Coalition's (CCAC) Heavy-Duty Diesel Initiative (HDDI) aims to accelerate the transition of diesel urban bus fleets towards soot-free engine technologies. The core activity of this project is to directly inform, motivate, secure, and support the implementation of official commitments to shift toward soot-free engines.



The EcoMobility World Festival 2015

The EcoMobility World Festival 2015 will take place in the CBD of Sandton, Johannesburg – the vibrant heart of South Africa – in October. The Festival will offer a view of cities in the future, with active street life and social inclusivity, served by a sustainable transport system.

As part of the EcoMobility World Festival, the EcoMobility Dialogues aim to encourage local and international dialogue and informed conversations about the future of urban mobility and the need for innovation to meet the needs in developing cities.

The Technical Papers: Contributions to the EcoMobility Dialogues 2015

In the course of preparing the EcoMobility Dialogues 2015 in Johannesburg, South Africa, experts have been asked to prepare and present technical papers on topics that challenge urban mobility today.

Five such technical papers have been compiled:

- Transferring sustainable transport and EcoMobility solutions
- Transport and climate change
- Sustainable development synergies and co-benefits of low-carbon transport measures
- A call to action on green freight in cities
- Soot-free urban bus fleets

The findings and messages of this paper are part of informing local leaders for their debates and provide input to the "Johannesburg Declaration on Climate Smart Cities". They will be further shared within ICLEI's EcoMobility Alliance (www.ecomobility.org) and are made available to a wider audience.

We cordially thank the author of **Soot-Free Urban Bus Fleets** for his enormous work and input and for enriching technical and political debates around how we can generate more livable cities while contributing to a low carbon development.

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Soot-free urban bus fleets

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Executive Summary

The transportation sector is a significant source of short-lived climate pollutants that contribute to near-term climate change. Among these is black carbon, the second largest contributor to human induced climate change after carbon dioxide. The global transportation sector accounts for nearly 20 percent of black carbon emissions emitted annually, and diesel engines are responsible for more than 95 percent of these emissions. Urban buses are a particularly large source of black carbon emissions in the transport sector. These vehicles will account for 25 percent of black carbon emissions from all passenger and commercial goods transport vehicles in 2015.

Buses sold into developing country markets today face limited emission requirements and can emit 250 times or more black carbon than a gasoline passenger vehicle traveling the same distance. The Climate and Clean Air Coalition (CCAC), an intergovernmental partnership to reduce the climate and health impacts of short-lived climate pollutants, has established a Heavy-Duty Diesel Initiative (HDDI) that aims to accelerate the transition of diesel urban bus fleets towards soot-free engine technologies in cities around the world. As EcoMobility cities consider new investments in low-carbon public transport, the HDDI aims to support procurement of soot-free urban bus fleets as a critical component of any future low carbon transport strategy.

The core activity of this project is to directly inform, motivate, secure, and support the implementation of official commitments to shift toward soot-free urban bus fleets in large cities around the world. This will include support to define a public commitment to soot-free bus fleets, as well as implementation support to identify soot-free engine technologies and the fuels that enable them, procure new vehicles, identify financing, and overcome other implementation barriers. Additional activities will include: building a private sector partnership base in order to establish formal relationships with manufacturers of soot-free engines who can serve as a point of contact and technical resource to all cities, including those that have not made a commitment; developing a database of urban bus fleets in selected regions to report in greater detail on the size, emissions, and projected future impacts of urban buses; and pursuing cross-linkages with activities to mitigate emissions of short-lived climate pollutants.

Cities should pursue soot-free low carbon public transport by committing to soot-free urban bus fleets. Near-term steps can include identification of existing procurement requirements, data collection to assess fleet-wide refueling infrastructure and technical barriers, and public commitments to implement new procurement requirements and invest in cleaner fuels. By building the technical capacity, resources and experience necessary to enable a shift, cities can lead their countries in a nationwide shift towards clean, low carbon transport.

Acknowledgement

Funding for this work was provided by the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC). Thanks to Elisa Dumitrescu and to Gunjan Parik for their contributions to the development and implementation of the Soot-Free Urban Bus Fleets Project.



The Climate and Clean air Coalition brings together nations, institutions, organisations and companies to reduce short-lived climate pollutants with the aim to address near-term climate change and air pollution, and to improve public health, food security, and energy efficiency. More information is available at <http://www.ccacoalition.org>

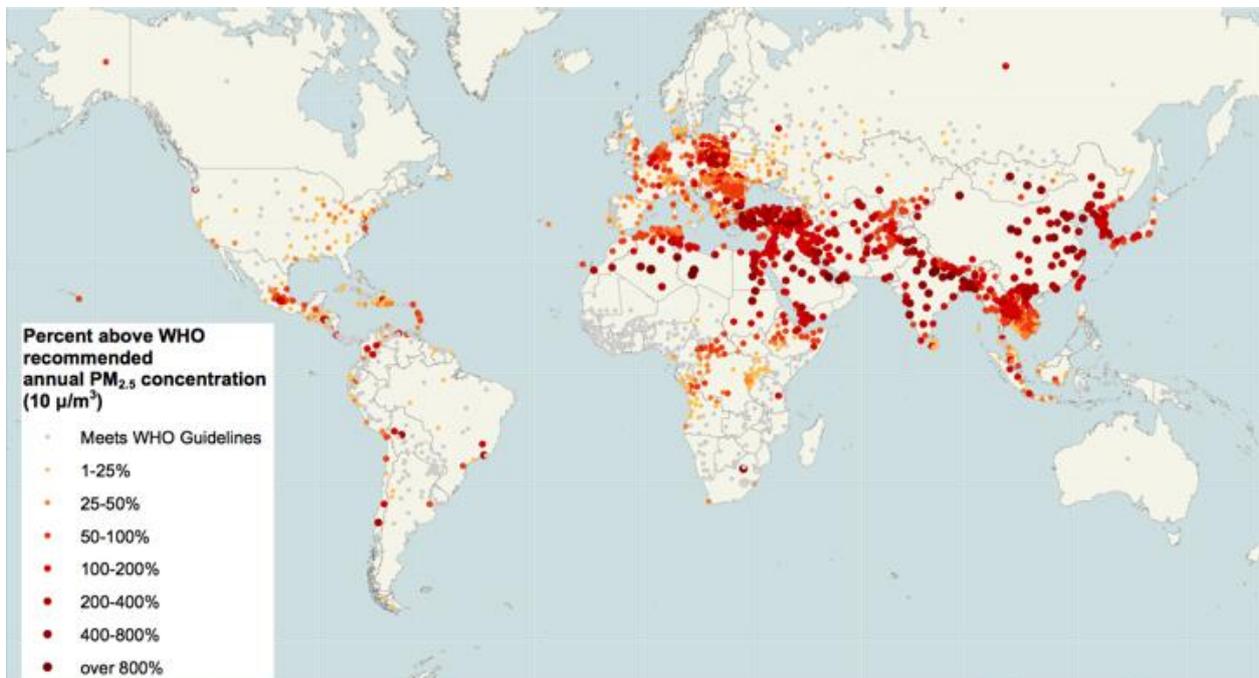


The International Council on Clean Transportation is an independent not-for-profit organization that provides unbiased technical research and policy analysis to environmental regulators working to reduce the health and environmental impacts of the global transportation fleet. Our mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation in order to benefit public health and mitigate climate change. More information is available online at <http://www.theicct.org>

The Vision: Soot-Free¹ Urban Bus Fleets

An estimated 3.7 million lives are lost annually to outdoor air pollution, according to the World Health Organization. And since 1998, average exposure to outdoor air pollution such as fine particulates has risen more than 2 percent each year. Among the major sources of outdoor air pollution are diesel engines, which in 2012 were classified by the International Agency for Research on Cancer (IARC) as a Class 1 carcinogen. There is no safe level of exposure to diesel exhaust. Actions to reduce exposure to diesel emissions worldwide are an effective strategy to reduce the global health burden of outdoor air pollution.

Figure 1: Exceedence of World Health Organization (WHO) guideline for annual average PM_{2.5} concentrations in cities worldwide in the year 2010.



Soot is the collection of particles and gases, such as nitrogen oxides, sulfur oxides, volatile organic compounds, fine particulate matter, and other toxic components emitted from a diesel engine as a byproduct of incomplete combustion. Black carbon is an ultrafine carbonaceous particle found in diesel exhaust that causes it to be black in color. All diesel exhaust contains some amount of black carbon, which penetrates into the deepest regions of the lungs and facilitates the transport of toxic compounds into the bloodstream. As a component of fine particulate matter, black carbon exposure is associated with premature death from ischemic heart disease, lung cancer, and cerebrovascular disease, among other health outcomes.

¹ For the purposes of this project, a soot-free engine will be defined as any fuel and vehicle combination that meets emission levels for particulate matter set by Euro VI or US 2010. This can include compressed natural gas or electric-powered buses, alongside other fuel/engine types including conventional diesel engines. This project will remain technology neutral and performance-based in order to seek the maximum feasible cost-effective solutions to black carbon control in all regions.

As a short-lived climate pollutant, black carbon contributes to near-term climate impacts and is among the largest contributors to human induced climate change. Black carbon is strongly light-absorbing and radiates this energy as heat, which contributes to atmospheric warming. Black carbon also changes the reflectivity of ice and snow, increasing the amount of energy absorbed at the Earth's surface that increases surface heating and further melts these surfaces needed to maintain Earth's energy balance. Reduction of black carbon emissions has rapid benefits on the order of days to weeks owing to the short lifetime of this pollutant. These characteristics of black carbon make this pollutant a key target for rapidly mitigating the adverse impacts of climate change.

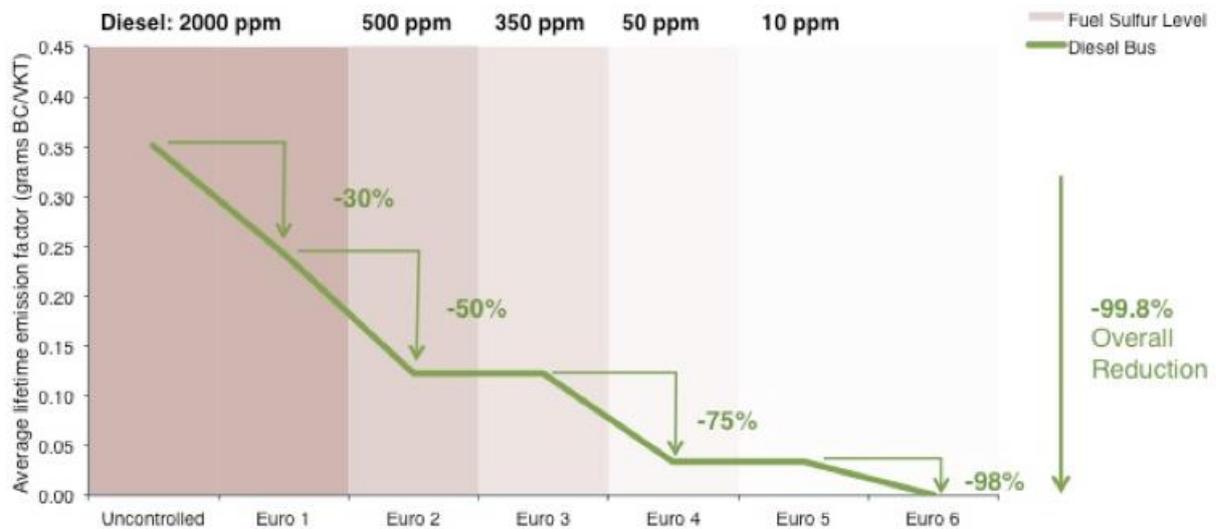
The transportation sector is a major source of black carbon and is responsible for approximately 20 percent of global black carbon. Diesel engines are the primary target for reducing transportation-related black carbon emissions since they account for more than 95 percent of black carbon in this sector. Diesel engines are used in movement of goods via commercial trucks and shipping, public transport via buses, and service equipment such as construction and agricultural tractors. Scrappage of older, high-emitting diesel engines and their replacement with new clean burning engines is an effective control strategy for mitigating the climate impacts of diesel black carbon. To achieve rapid and sustainable control of black carbon emissions, the Climate and Clean Air Coalition (CCAC) to reduce short-lived climate pollutants has established a Heavy-Duty Diesel Vehicle initiative in to reduce black carbon emissions from diesel engines.

Diesel exhaust from urban buses poses a significant health risk. In the Los Angeles Metropolitan Region, exposure to diesel exhaust can constitute up to 70 percent of the risk of exposure to air toxics. Urban residents are at risk of diesel exhaust exposure as a consequence of emissions entering the bus cabin and emissions entering the breathing zone at bus stops or along urban transit corridors. The health risks of exposure to diesel exhaust provide clear justification to focus on cleaner diesel bus fleets in urban areas.

Urban buses are large sources of diesel black carbon emissions. By 2015, urban buses will account for 25% of transportation-related black carbon emissions. These emissions will occur predominantly in rapidly developing and urbanizing cities that rely heavily on diesel engines in their urban bus fleets and have yet to require a transition to soot-free engines. Buses sold into developing country markets today face limited emission requirements and can emit 250 times or more black carbon than a gasoline passenger vehicle traveling the same distance. Since urban buses will travel up to 10 times more than the average passenger vehicle, their emissions will be that much greater. Demand for affordable mobility is growing in developing regions, and urban bus activity will grow nearly 50 percent from today's levels. This will translate to an estimated 26 thousand tons of black carbon in 2030, an increase of 15 percent over current levels. Buses run for 20 years or more, so poor emissions performance among new buses today can persist for decades.

City officials have significant power to reduce urban bus emissions: a survey of 57 cities by the C40 Climate Leadership Group finds that over 80 percent of cities own or operate a municipal bus fleet, 86 percent set or enforce bus fleet policies, 77 percent control the local budget for bus transport, and 86 percent set the vision for their bus fleet.

Figure 2: Stages of black carbon emissions control for urban bus fleets in Europe.



Each stage represents a stepwise reduction in emissions of black carbon, with Euro 6 representing a level of emissions control considered “Soot-Free.” Any fuel and engine combination, including diesel, natural gas, biodiesel and electricity, is able to meet Euro 6 levels. Source: COPERT Emissions Model

Diesel black carbon emissions can fall dramatically through changes in vehicle engines and fuels. Figure 2 shows the reductions in black carbon emissions that come from changes in bus engines and fuels designed to meet each phase of the European emissions control framework. A city with access to 50 ppm diesel fuel sulfur content can allow the operation of a Euro IV or V engine that will reduce black carbon emissions by 75 percent compared against a baseline Euro III vehicle commonly found on international markets today.

A city with access to 10 ppm diesel fuel sulfur content can leapfrog to Euro VI emission levels that offer an additional 98 percent reduction in diesel black carbon emissions from a Euro V or older engine. These soot free diesel engines utilize high-efficiency diesel particulate filters or other fuel/technology systems that provide up to a 99% reduction of black carbon emissions. Other soot-free engines include those that utilize compressed natural gas, electricity, biodiesel or others that comply with the European standard. Cities can rapidly eliminate diesel black carbon emissions by requiring engines that are the cleanest allowed by currently available fuels, and by shifting to soot-free engines designed to meet the most stringent standards for particulate matter. Scrappage, retrofit, and replacement of existing high-emitting diesel buses with cleaner engines that meet more stringent emission standards reflects the core technical strategy to reduce black carbon emissions in urban bus fleets.

Since fuel quality will determine the actions expected of cities, the following three categories of cities define the specific commitments we believe they can make (also see Figure 2).

A **Tier 1 city** will be a city with access over the next three years to fuels that will allow an immediate shift to soot-free engines. These fuels can include 10 or 15 ppm ultra-low sulfur diesel fuel, compressed natural gas, or other fuels. Our goal for all Tier 1 cities will be a commitment to purchase within the next three years only soot-free engines.

A **Tier 2 city** will be a city with access over the next three years to Euro IV fuel, such as low sulfur fuel containing 50ppm sulfur content. Our goal for all Tier 2 cities will be a commitment to purchase

within the next three years only engines that will achieve the lowest technically feasible black carbon emissions matched by Euro IV fuel. This can include Euro IV engines, Euro III engines retrofitted with DPF, Euro V engines, or others dictated by local conditions. Furthermore, our goal for Tier 2 cities will include an interim target date to shift to Tier 1 status (via cleaner fuels), and a final target date to shift new bus purchases to soot-free engines.

A **Tier 3 city** will be a city that is not expected to have Tier 2 status within the next three years, such as cities with diesel fuel sulfur content greater than 50 ppm. Our goal for all Tier 3 cities will be a commitment within 3 years to set an interim target date to leapfrog to Tier 1 status (via cleaner fuels). Local conditions will be permitted to dictate additional milestones, targets and strategies that support progress towards Tier 1 status.

Table 1 shows a preliminary estimate of a single year of climate and health benefits in 2030 that can result from successful transitions toward soot-free bus fleets in 20 megacities.

Table 1: Preliminary estimate of benefits from a shift to soot-free urban bus fleets in 20 megacities in 2030

Category	BC reduction (Kt)	Climate benefit (MMT CO ₂ e)		Early deaths avoided
		GWP-20	GWP-100	
Total	2.09	6.56	1.73	3,700

NOTE: GWP-20 and GWP-100 are weighting factors used to convert black carbon into an equivalent amount of carbon dioxide. GWP-20 represents climate impacts over a 20-year period and better represents the magnitude of near-term climate impacts. GWP-100 represents climate impacts over a 100-year period and better represents long-term climate impacts. As a short-lived climate pollutant, the near-term climate impacts of black carbon are about 3.5 times greater than the long-term impacts.

Countries with limited experience implementing this strategy can struggle to secure cleaner fuels and vehicles. For this reason bus fleets provide a fertile starting point for making a shift. Buses are centrally fueled, operated and maintained by dedicated professionals. This allows targeted delivery of higher quality fuels, targeted financing to support new fuel and vehicle infrastructure, and targeted training to support vehicle operators and mechanics. Problems can be resolved quickly at a pilot stage with bus operators, and these lessons can be scaled up to expand cleaner fuel and vehicle deployment at the city and national scales.

New opportunities to deploy soot-free engines are emerging. Today nearly one-quarter of all cities with a population greater than 1 million have access to ultra-low-sulfur fuels (less than 15ppm diesel sulfur content) necessary to enable soot-free diesel engines with additional cities expected in Brazil, India, China, and Mexico over the next five years. Changes in production practices to meet expected national vehicle emission standards in both Mexico and China could increase the affordability of soot-free bus engines throughout the world, including the production of electric buses in China.

Meanwhile major bus procurements are on the horizon: Sao Paulo has a plan to turn over 15,000 buses from now to 2020; Santiago is starting a similar process with 6,000 buses; and Bogotá is turning over 1,800 buses by 2016 with more to follow. New investments in Bus Rapid Transit are underway in Addis Ababa, Buenos Aires, Daar es Salaam, Johannesburg, and many other cities. International development banks are engaging the CCAC Heavy-duty Diesel Initiative to understand

what level of demand exists for cleaner buses so as to plan a major financing initiative to support new purchases. In 2015, the World Bank with other CCAC partners released a report² of the Black Carbon Financing Study Group with specific recommendations to finance diesel black carbon reductions in the transportation sector. These opportunities reflect the possibility for a major transition to cleaner urban buses over the coming years.

The strategy: city-level commitments to procure soot-free urban buses

The International Council on Clean Transportation with the United Nations Environment Program, the C40 Cities Climate Leadership Group and the Centro Mario Molina-Chile are undertaking a 2-year project beginning in 2015 to secure commitments from city officials to procure soot-free urban buses with the aim of accelerating a shift toward soot-free urban bus fleets around the world. The strategy consists of the following elements: (1) inform, motivate, and secure a public commitment from city officials to shift to soot-free urban bus fleets (2) establish an industry partnership with engine manufacturers and suppliers of commercially available soot-free engines to serve as an ongoing technical resource to cities and point of contact for clean bus procurement; and (3) develop an urban bus fleet database in order to assess current and future market demand for clean buses and estimate total financial assistance needed for their deployment.

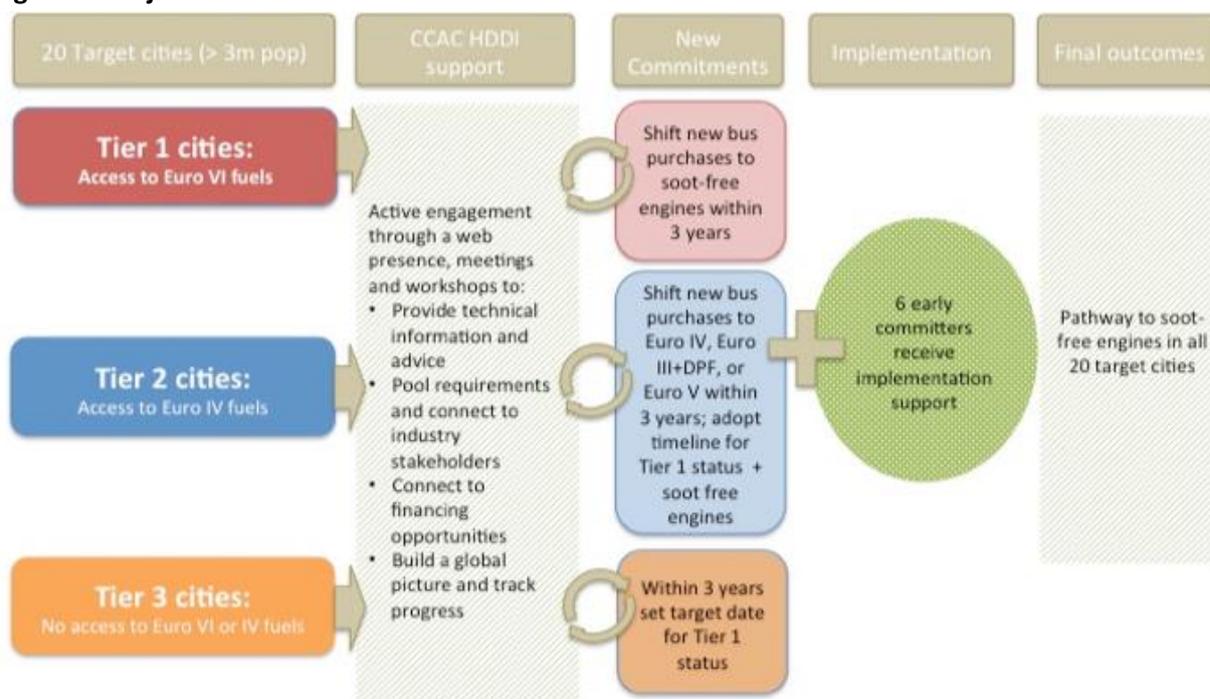
Project partners have a wide range of experience working on diesel black carbon control in developing regions. The International Council on Clean Transportation and the United Nations Environment Program are co-leads of the heavy-duty diesel initiative. These groups have decades of experience providing technical assistance to regulatory officials in support of more stringent vehicle emission and fuel quality standards. These groups will be supported by the C40 Cities Climate Leadership Group, the Centro Mario Molina Chile (CMMCh,) in Latin American cities, and partner organizations in other regions.

C40 is a network of the world's megacities committed to addressing climate change. C40 currently has 70 member cities around the world, where 93% of member cities are taking action on transport. CMMCh is an international research center with both regulatory and technical experience in advancing cleaner vehicle technologies in the Latin America region. CMMCh has been called upon for its technical support to cities in Latin America, while C40 has unique access to key decision makers in major megacities.

This project will undertake activities that encourage shifts to soot-free engines in cities with a population of 3 million or larger. This reflects at least 115 cities globally, who will be called upon in regional public meetings, online and other coordinated outreach with member nations of the CCAC to shift all new bus purchases to engines that achieve the lowest technically feasible black carbon emissions matched by current fuel quality, and to make a public commitment to shift all new bus purchases to soot-free engines by a target date selected by the city.

² http://www.ccacoalition.org/docs/pdf/1514315_Black_Carbon_Report_WEB.pdf

Figure 3: Project framework for soot-free urban bus fleets



Public commitments are central to our theory of change. They establish public policy towards cleaner transportation; they signal to vehicle manufacturers and bus operators the commitment to make investments to satisfy growing demand, and they are a powerful tool in coordinating multiple actors in support of a clean bus shift. The commitment itself can take many forms depending on the local situation. Commitments that are “official” include a written and/or public statement by a high level official such as a local mayor, a cabinet member, or a transit official; revisions to bus concession requirements; or changes in municipal or national laws such as emission standards for new bus engines. These public actions, while not a guarantee that a shift to cleaner buses will occur, provide the signal needed by bus operators, manufacturers, and fuel suppliers to make plans and investments that will in most cases lead to a clean bus shift. Through previously existing work, project partners have already initiated preliminary discussions with targeted cities.

Additional political support at the national and local levels will be provided through the CCAC and partners. In the process of securing commitments the project partners will work with cities to define the minimum level of commitment that can lead to transformational change. Such commitments will be a key indicator of success of this project.

The following provides a more detailed description of the activities that will be undertaken over the course of this project to assist cities in establishing and implement soot-free bus commitments.

Secure and implement clean bus commitments in target cities

The first component of this project will undertake a series of activities designed at motivating, informing, securing, and implementing commitments from cities. Project partners will establish an internet presence for this project to provide direct technical resources to target cities and to establish a widely accessible information resource that can support a call to action to all cities. This internet presence will be designed in close consultation with the CCAC Secretariat and will target both high level city officials as well as bus operators and fleet managers. It will contain all technical

information produced in the course of this project, as well as templates for bus procurement that will be available to city officials to use when considering how to structure a commitment to cleaner buses based on the quality of fuel they currently have available.

To motivate discussion among target cities at the regional level, project partners will organize a series of three regional meetings with key stakeholders to further introduce the goals of this project, provide technical information about benefits of cleaner bus fleets and procurement opportunities, and invite representatives to participate in a commitment process with project partners. These meetings will occur in sub-Saharan Africa, Latin America, and Asia, with the EcoMobility Conference in Johannesburg representing the regional meeting for sub-Saharan Africa. Project partners will regularly call attention to commitments made to-date and will use these opportunities to invite new commitments.

Finally, project partners will maintain a strong, ongoing technical dialogue with cities to support motivated officials. The aim of this engagement will be to identify local barriers, remove such barriers, and subsequently design and adopt a public commitment to cleaner buses. Implementation support can include bus procurement, financing, and other forms of technical support.

Establish an industry partnership with clean bus manufacturers and suppliers

The second component of this project will undertake a series of activities designed to identify and partner with manufacturers of clean buses and their suppliers who can serve as a technical resource to committed cities seeking information on cost, performance, and availability of soot-free urban buses.

Project partners will identify manufacturers of buses and associations of bus manufacturers, key points of contact, and other basic information, then invite representatives of these groups to a meeting in Washington, DC in 2016 to introduce the goals of this project, the need for an industry group of clean bus manufacturers and suppliers, and to establish next steps towards industry participation in this project.

Motivated manufacturers and suppliers who currently participate in or plan to enter the market for soot-free urban buses will then be invited to join as official project partners. By joining, manufacturers or relevant industry associations agree to provide a list of vehicles they sell or plan to sell that meet emission targets for Tier 1 and Tier 2 cities, and agree to provide a point of contact for further information about their product. Industry partners will be encouraged to exchange data with project partners, including the current supply of buses available to cities, their cost, their performance, their availability by region, and future projections of supply that can then be communicated to city officials via the project website, public meetings, or in-person meetings. With this in mind, cities will have available to them a marketplace of vendors where they can identify the products best suited to their local market.

Build a global picture of the urban bus fleet

The third component of this project will undertake a series of activities designed to collect, analyze and communicate new information about the activity and emissions of the global fleet of urban buses.

Project partners will conduct a baseline survey of cities. This will aim to gather relevant information that may include bus fleet size, emissions level, and current fuel quality. Cities will be asked to identify common barriers to soot-free engines, highlight needs, and identify possible solutions. Cities that have adopted soot-free engines, including those in the C40 network such as London, Tokyo, Los Angeles, and Berlin, will be included as mentor cities in the survey component around good practices. Sources of information will include publicly available resources, points of contact in target cities and C40 cities, and knowledgeable experts.

Project partners will use this information to develop an urban bus fleet database informed by the quantitative data gathered from the previous activity. This will consolidate publicly available information, data gathered from industry partners, as well as new information developed through this project. This database will serve as an information resource on the current size of the global urban bus fleet, emission levels, fuel availability and consumption, and other relevant criteria.

Based on this information, project partners will conduct an assessment of financing demand for soot-free engines based on expected fleet turnover, incremental cost, and demand in target cities. These results will be reported to the chairs of the BC Finance Study Group of the Financing of SLCP Mitigation Initiative within the CCAC.

Next Steps for EcoMobility in Cities

The following provides recommended actions for city-level officials motivated to pursue soot-free bus fleets in their cities.

Identify existing procurement requirements for emissions performance of new buses entering the municipal fleet

Local ordinances, procurement procedures, and other performance standards define the emissions permitted from urban buses operating in the municipal fleet. City officials should identify the relevant rules and regulations that apply to the vehicles in the municipal fleet and determine whether these require soot-free emissions levels. City officials should also identify the next available opportunity to modify these requirements.

Seek technical guidance and support from the CCAC and its partners to formulate a commitment to soot-free urban bus fleets

Technical support is available on an ongoing basis to city officials to understand how locally available fuel quality defines what level of emissions performance is technically achievable within the urban bus fleet. Examples of procurement standards that require soot-free emissions performance can also

be available to city officials to explore how to make necessary modifications to existing procurement requirements.

Make a public commitment to procure soot-free urban buses

City officials should amend local rules and regulations to require the lowest achievable black carbon emissions. The lowest achievable emissions will be defined by current fuel quality available to the fleet, including not only diesel fuels but other fuels as well. An amendment to performance standards in line with lowest technically achievable black carbon emissions, along with a public announced target date to introduce soot-free buses into the municipal fleet, is a commitment to procure soot-free urban buses.

Demonstrate a commitment to soot-free urban buses

Cities that make a public commitment to soot-free urban buses can demonstrate this commitment by writing a letter to the CCAC Heavy-Duty Diesel Initiative identifying the local rule or regulation that requires the introduction of soot-free urban buses into the municipal fleet. Formal recognition of this commitment by the CCAC can unlock implementation support from the CCAC, industry manufacturers and fuel suppliers who can enable an accelerated transition to soot-free urban buses.

Collaborate on data sharing to build a picture of clean bus demand

The CCAC and project partner will appeal to cities for support in building the baseline survey of bus fleets worldwide. This will be the first time that detailed information on bus fleets at the local level will be gathered and analyze in order to help cities harness their demand for cleaner technology. City-level collaboration is key, and the information and analysis from this work will help cities to build a coalition to harness their purchasing power when it comes to advanced bus buses. In addition, city plans and preferences will send a powerful message to manufacturers both at the regional and global levels.

Summary

Urban buses are a key low carbon transport strategy, and yet the low carbon benefits of public transport can be offset in part by the diesel black carbon emissions they produce. Black carbon is an ultrafine carbonaceous particle that is produced as a component of diesel exhaust or “soot”. One gram of black carbon produces near-term climate impacts equal to approximately 3200 grams of carbon dioxide. As a component of diesel exhaust, which has been identified by the World Health Organization as a cause of lung cancer, black carbon transports toxic chemicals deep into the lungs and contributes to chronic health impacts including ischemic heart disease, lung cancer, and stroke.

The transportation sector contributes nearly 20 percent of all global black carbon emissions, and diesel engines constitute more than 95 percent of black carbon in the transport sector. Buses sold into developing country markets today face limited emission requirements and can emit 250 times or more black carbon than a gasoline passenger vehicle traveling the same distance. Future investments in diesel-powered urban bus fleets should consider how to transition to soot-free low carbon urban transport systems.

The Climate and Clean Air Coalition (CCAC), an intergovernmental partnership to reduce the climate and health impacts of short-lived climate pollutants, has established a Heavy-Duty Diesel Initiative (HDDI) that aims to accelerate the transition of diesel urban bus fleets towards soot-free engine technologies in cities around the world. EcoMobility cities should consider how they can leverage the knowledge and resources available from the CCAC and its member countries to reduce diesel bus emissions.

The core action we need from EcoMobility cities around the world is to establish a commitment to shift toward soot-free low carbon urban bus fleets. These commitments send a public signal that motivates local officials and private industry into action. To implement such commitments, it is necessary to identify soot-free engine technologies such as diesel engines equipped with particulate filters, natural gas engines, and electric drive engines that can be supported with local technical capacity and resources. Procurement practices for public and private fleets must change, and standards for procurement must reflect a commitment to soot-free engines. Financing is necessary to support the additional costs of bringing in new, cleaner fuels and engines.

By implementing their commitments, cities can build the technical capacity, resources and experience that can lead their countries in a nationwide shift towards clean, low carbon transport.