DIESEL INITIATIVE
PROGRESS REPORT 2016-2017

LEAD PARTNERS
Canada, International Council on Clean Transportation (ICCT), Switzerland, UN Environment, United States

IMPLEMENTERS
International Council on Clean Transportation (ICCT), UN Environment

TOTAL BUDGET FROM THE COALITION SINCE THE START OF THE INITIATIVE: $7,999,346

NOTE
This document presents results from the Climate & Clean Air Coalition’s Diesel Initiative reported between July 2016 and June 2017. These results were recorded using the Demonstrating Impacts indicators, which have been approved by partners as the “common currency” to monitor and communicate impacts across the Coalition’s initiatives and workstreams.

Presented achievements are the result of collaborations between multiple stakeholders, including national governments and cities, international organisations, NGOs, research institutions and the private sector. Some are a direct result of activities funded or co-funded by the Coalition, while others are indirect achievements in which the Coalition’s actions played a catalysing role.

1 The latest version of the Demonstrating Impacts Framework is accessible to partners here where the online tool to report new results is also accessible and open throughout the year.
DEMONSTRATING IMPACTS SUMMARY

OUTPUTS

The initiative released a roadmap for the adoption of clean fuel and vehicle standards in Southern and Western Africa which supported the adoption of new standards in a number of countries. It also supported a report summarizing a one-week study tour and evaluation of the fleet of buses and MetroBus operated by the City of Johannesburg, South Africa and recommending ways forward. A Practical guide for evaluating freight transportation was also published in support to national green freight programs in Brazil, Mexico and Viet Nam. The initiative released the new Global Ports Hub Website to support its work on ports. The CCAC also funded the world’s first mapped global marine black carbon emissions inventory and published guidelines on black carbon measurement methods and emission factors from ships and on marine black carbon emissions inventory and technology performance database.

7 KNOWLEDGE RESOURCES AND TOOLS

The initiative supported regional consultation meetings on low sulfur fuels in ECOWAS countries and in East Africa, and at the national level in Zimbabwe; a conference on harmonisation of diesel standards in Africa. Workshops on the air emission inventories for the ports of Chittagong, Bangladesh, Mombasa, Kenya and Tema, Ghana; the launch of the Lima soot free urban bus fleet project. It also contributed to the international conference electric mobility and public transport in Chile and events at the African Refiners Association Week.

14 POLITICAL OUTREACH EVENTS

Three regional workshop on Green Freight were organised in Latin America, Asia and Europe, to support collaboration between governments, industry and civil society on expanding green freight programs across each region. Almost 200 participants attended the trainings. In addition a global training on measuring and controlling black carbon emissions from marine engines brought together 26 participants from Canada, Finland, Germany, Japan, Netherlands and the United States of America.

510 PERSON-DAYS OF TRAINING

Environment and Climate Change Canada provided in-kind support for the organisation of the 3rd Workshop on Marine Black Carbon Emissions: Measuring and Controlling Marine BC Emissions.

$3,000OF CO-FUNDING

OUTCOMES

100 USERS OF THE KNOWLEDGE RESOURCES

There are already 100 policy makers and practitioners using the knowledge resources on marine black carbon emissions.

5 INSTITUTIONS STRENGTHENED

Following the training on black carbon emissions from marine engines, research institutes from Canada, Japan, United States of America, the European Association of Internal Combustion Engine Manufacturers and VTT Finland produced raw data on marine black carbon emission factors and harmonized their research approaches and data reporting protocols, enabling new insights into how to measure and control marine black carbon emissions.
Nigeria, Togo, Benin and Côte d’Ivoire, Ghana, Mozambique and Malawi, working with the initiative, committed to low sulphur diesel fuel standards in 2017 what has already led to the adoption of new standards in Nigeria, Ghana and Mozambique (see below) while Malawi had already legislated such standards and was waiting for Malawi with whom they share their fuel import infrastructure. As part of the CCAC work on the Global Sulfur Strategy and Soot Free Buses, Brazil Environment Secretary and the State of Sao Paulo Environmental Authority committed to new phases of the control of air pollution by motor vehicles, including the adoption of new norms (including Euro 6/VI) which would require soot-free engines for all new diesel cars, trucks and buses in the country. The next step in the development of a proposed regulation by the national environmental council.

The first Green Freight Strategy in Africa supported by the CCAC has been launched under the Northern Corridor Transit and Transport Coordination Authority which links six countries (Kenya, Uganda, Rwanda, Burundi, South Sudan and Democratic Republic of Congo), it is the busiest corridor in East and Central Africa. The strategy aims at reducing in particulate matter (PM), black carbon and oxides of nitrogen (NOX) by at least 10% by 2021. In relation to the CCAC Soot Free Bus Initiative, The Government of the Philippines have proposed a Public Utility Vehicle Modernization Programme. The programme intends to modernize the fleet of jeepneys, the primary mode of public transport in Metro Manila.

Several countries involved in the initiative made progress on vehicles and fuel standards. Indonesia, Kenya and Ghana adopted Euro 4 emissions standards. Kenya also adopted Euro V for bus rapid transit vehicles. Ghana is the first West and Central African country to adopt low sulfur diesel fuel standards and match fuel quality with vehicle emissions standards. Mozambique also adopted such standards as well as Nigeria who also introduced a 150ppm standard for petrol fuels. Australia developed a new regulation to harmonise its national standards for road vehicles the Australian Design Rules (ADR)s with these of the World Forum for Harmonization of Vehicle Regulations.

Jakarta recently procured 60 CNG buses adding to the 1100 CNG-powered buses currently operating in the city and supplied by 15 CNG refuelling stations. However, diesel Euro III engines are also still being procured to satisfy surging demand in public transportation.
NARRATIVE REPORT

SUMMARY

MARINE/PORTS

- The Ports Hub is now online which features port profiles for the regional pilot ports projects with links to the baseline air emission inventories, international best practices/case studies, institutional framework for a sustainable clean port program and even links to the Global Online Port Emissions Inventory Tool (goPEIT) also developed by the Diesel Initiative.
- First air emissions inventories were done in Tema Port, Ghana, Chittagong, Bangladesh and Mombasa, Kenya.
- In the marine sector, the Diesel Initiative (1) collected, analyzed, and reported on ship technology testing data; supported ports in developing draft emissions inventories using goPEIT; (2) developed a global marine BC emissions inventory, which is the world’s first global, geospatially allocated marine BC emissions inventory; (3) prepared the Technology Performance Database Report and included it in the global marine BC inventory (4) held the third and final workshop on marine BC emissions, focused on measuring and controlling marine BC; and (5) developed a final paper (report) on the global marine BC inventory and technology findings.

WESTERN AND SOUTHERN AFRICA

- The Initiative organized regional workshops to support a regional harmonized low sulfur standards in West and Southern Africa. Workshops were also conducted for sub-regional groups in a) Mozambique, Malawi and Zimbabwe; b) Nigeria, Cote d’Ivoire, Ghana, Benin, Togo and Mali; c) South Africa, Lesotho, Swaziland, Namibia, Botswana. The Initiative also supported national workshops and technical assistance in Nigeria, Ghana, Mozambique, Zimbabwe, Ivory Coast and Botswana. In addition, two more countries - Benin and Togo were also supported. South Africa indicated a preference for support on refinery investment financing options instead of a national event.
- Implementers also participated in various outreach events aimed at advancing regional decisions on a roadmap for clean fuels and vehicle policies in Western and Southern Africa, leading to the crafting policy recommendations in the final white paper produced by the Initiative in 2017 “Developing a roadmap for the adoption of clean fuel and vehicle standards in Southern and Western Africa”

SOOT-FREE BUS FLEETS

- The Initiative has continued to engage with government/city authorities to support city commitments on soot-free bus fleets through workshops, bilateral engagements and technical support.
- In Santiago, UN Environment and Centro Mario Molina Chile developed a project concept for the promotion of Electric Mobility for a Green Climate Fund proposal for an electric bus fleet for the city of Santiago. The Soot Free Urban Bus Fleet Project for Santiago was launched at the International Conference for Electric Mobility, May 2017.
- In Lima, a soot-free buses launch in February 2017 with the Ministry of Energy concluded the need for including electric transport and improving fuel quality and vehicle technology of urban public transport,
along with the possibility of moving to 10 ppm sulphur fuels and beyond currently proposed Euro 4/IV standards to Euro VI for public transport buses. Peru’s current fuel quality standard is 50 ppm sulphur in diesel for 80% of the fuels market, and Euro 3/III vehicle emissions norm.

- In January 2017, the Director of Transport for Johannesburg informed that a bid specification for new buses in the Reay Vaya fleet will require minimum Euro VI emission standards and received assistance from ICCT relating to change management. In Sao Paulo, the Initiative developed guidance on a long-term procurement strategy to inform a forthcoming update to concessions for SP TRANS operators, and has developed a model and produced an analysis that was presented to SP TRANS officials towards the end of June 2017. In Jakarta, the Initiative reached out TransJakarta in May 2017 to advise and support on fuel procurement, which is a key limitation to soot-free engines.
- The urban bus fleets database was finalized in June 2017 and is in the process of being posted to the CCAC Soot-Free Bus Fleets website.
- The Initiative reached out to auto and bus industry representatives to brief them on the project and also enlist their support in developing an industry partnership that would provide technical advice to cities interested in transitioning to cleaner fleet technologies.

GREEN FREIGHT

- Recent activities have been guided by the Green Freight Action Plan, which aims to create and align existing green freight programs worldwide and ensure black carbon emissions are incorporated into such programs. The online platform www.globalgreenfreight.org continues to cultivate an active online community and has become a primary resource in the freight sector. The initiative organized three regional workshops in Asia, Europe and Latin America this year with the goal of supporting the creation and harmonization of national green freight programs. Clean Air Asia coordinated the Asia workshop on August 29, 2016, the Smart Freight Centre (SFC) coordinated the European workshop in Brussels on April 6-7, 2017, and the ICCT organized the Latin America workshop in Buenos Aires on June 27-29, 2017. ICCT finalized the blueprint_guidance document on how to conduct freight assessments, which is being used for assessments in Brazil, Mexico and Vietnam. The project team is also in the process of finalizing a methodology to account for black carbon emissions in green freight programs.
- The first Green Freight Strategy in Africa has been launched under the Northern Corridor Transit and Transport Coordination Authority. The Strategy was prepared by the Northern Corridor Transit and Transport Coordination Authority (NCTTCA) and launched at the 42nd Meeting of the Executive Committee of the Northern Corridor in 16 January 2017.

HIGHLIGHTS

MARINE

In its 2-year implementation, the Initiative has completed the following: (1) Emissions inventory calculator; (2) Health impacts assessment tool; (3) Three Project Workshops; (4) Ship technology testing data study; and (5) Final paper on BC inventory and technology findings developed. In October 2016, International Maritime Organization (IMO) made
a historic decision to dramatically reduce the global sulfur limit of marine fuels by 85 percent in 2020. When the plan is implemented, the global cap in sulfur in marine fuels will drop from the current 3.5% to 0.5%.

PORTS

Tema Port completed the first air emissions inventory in Ghana, which indicated a total of 17 tons of black carbon per year were emitted from port operations with 14% of these emissions coming from land operations (cargo handling equipment). A key achievement of the Tema Port project is the ownership at the country level. The Ghana Ports and Harbours Authority (GPHA) is in the process of acquisition of air quality monitoring equipment as part of its air quality monitoring plan for 2017 and as part its commitment to reporting its environmental quality performance to the IMO as well as International Standards Organization (ISO 14001).

WESTERN AND SOUTHERN AFRICA

Ghana recommended low sulphur diesel fuels from March 2017 in 31 October-1 November 2016 national event. On 1 December 2016 Nigeria, Togo, Benin and Cote d’Ivoire joined Ghana to adopt low sulphur diesel fuel standards in 2017. The countries also committed to implement cleaner vehicle policies and work with the ECOWAS Commission towards sub-regional fuel and vehicle standards harmonization by 2020. The government of Nigeria agreed to import low sulphur diesel fuels (50 ppm) from 1 July 2017. However, the Nigerian refineries were granted waivers to upgrade their facilities to produce low sulphur fuels by 2020. This is a major achievement for the sub-region as Nigeria accounts for over half of the diesel market in the West Africa sub-region.

Mozambique, Malawi and Zimbabwe switched to low sulphur diesel fuels from June 2017. Mozambique has published its new standards. Benin has also drafted new standards for low sulphur fuels, vehicle emissions and air quality.

INDONESIA

ICCT through this project, as well as through its Soot-Free Urban Bus Fleets project, organized a public dialogue on fuel quality, emission standards, and clean urban buses in the second half of 2016 with local partner, KPBB. In March 2017, Indonesia adopted Euro 4/IV-equivalent vehicle standards nationwide for implementation in 2018 (for gasoline vehicles) and 2021 (for diesel vehicles). Nationally, Indonesia adopted Euro 4/IV-equivalent vehicle standards nationwide for implementation in 2018 (for gasoline vehicles) and 2021 (for diesel vehicles).

SOOT-FREE BUS FLEETS

Three public announcements were recently made in support of deployment of soot-free engines at the national level, which shape the deployment of these vehicles in the target cities. Brazil announced its intent to adopt a new regulation requiring Euro VI emission norms by 2019. Indonesia adopted a Euro VI emission standard. The Philippines announced a new public utility vehicle modernization scheme requiring minimum Euro IV emissions. Australia released for public comment a draft cost-benefit analysis of Euro VI emission and fuel quality norms for implementation by 2020. In Jakarta, compressed natural gas for urban bus fleets is commonly available and is benefitting from large scale investments from Pertamina. Ghana has recommended Euro IV bus importation from 2018 and soot free buses by 2030 and Nairobi has adopted Euro IV for new buses. Kenya has revised its vehicle standards (KS1515) to require
a minimum requirement of EURO IV for diesel vehicle imports – including city buses, which may also have a higher (Euro V) emissions standard. These standards are still awaiting adoption.

In 2016 Chile announced that EURO VI or USEPA 2010 technology would be mandatory for every new bus purchased and operating in the Transantiago public transport system as of January 2019. This makes Santiago the first city to commit to soot-free technology for PM2.5 and NOx emission reductions. The Transantiago fleet consists of 6,500 buses; 82% are currently Euro III standard (3,000 of which are equipped with diesel particulate filters) while the remaining 18% have Euro V technology. Currently, Santiago is the testing laboratory for the development of Latin American low-emission buses and manufacturers, including Mercedes Benz and Volvo, are responding with technology offers.

The Initiative also took several steps forward in its implementation of a soot-free bus industry partnership. Four major bus and engine manufacturers made a private commitment to make soot-free engines available in all 20 cities by 2018. These commitments by BYD, Cummins, Scania, and Volvo will be publicized in September 2017.

**GREEN FREIGHT**

The Initiative finalized the blueprint guidance document on how to conduct freight assessments, which is being used for assessments in Brazil, Mexico and Vietnam. The Brazil assessment will support the Brazil Confederation of Transport to create a pilot green freight project in Brazil. The Mexico assessment will support a harmonized and unified green freight program for North America. And finally, the Vietnam assessment will support the establishment of a green freight program starting with an online freight exchange platform connecting carriers with customers.

An important achievement in 2016-2017 is that the Northern Corridor has adopted first Green Freight Strategy in Africa launched under the Northern Corridor Transit and Transport Coordination Authority at the 42nd Meeting of the Executive Committee of the Northern Corridor on 16 January 2017. By 2021, the strategy aims to improve the fuel economy of road transportation by at least 5% in grams per ton-km, and to cut emissions of PM, black carbon s and NOX grams by at least 10% per ton-km. The Northern Corridor, which links six countries (Kenya, Uganda, Rwanda, Burundi, South Sudan and Democratic Republic of Congo), is the busiest corridor in East and Central Africa handling over 30 million tons of cargo through the Port of Mombasa and interstate trade per annum with an annual growth of cargo throughput of around 10%. In this corridor, road freight accounts for nearly 96% with the remaining 4% transported by railway mode, inland waterways and pipelines.

**CHALLENGES**

**GENERAL**

- Finding the right partners at national level for ports work was a considerable challenge
- Need for funding and financing
- Bringing solutions to scale in a swift manner
Change management - With more technology choices, decisions get more complex (e.g. buses for urban transport CNG, Diesel, Battery Electric...)

WESTERN AND SOUTHERN AFRICA

- The Initiative tried to build a cost and benefit analysis for a couple of countries, Nigeria and Botswana, but ran into serious data gaps limiting the analysis to an estimation of emission reduction benefits. Nevertheless, these results are helpful in illustrating the opportunity for reducing air pollution through clean vehicle and fuels policies.

INDONESIA

- Despite the recent adoption of a Euro 4/IV emission standard for all light- and heavy-duty vehicles, 50-ppm fuel is not available anywhere in the country at the moment, and Indonesia does not currently have a clear pathway to supply lower sulfur fuels in the country. The current diesel fuel quality standard indicates that 2500 ppm sulfur diesel is allowed starting in 2017, and that 50 ppm sulfur fuel will only be mandated starting in 2025, four years later than the Euro IV emission standard implementation date. In addition, state-owned local refineries have indicated that they will not be ready to produce Euro-4 compliant fuels (50 ppm) at the emission standard implementation dates for both gasoline and diesel, which means the country may need to rely on imports to implement the emission standard.

SOOT-FREE BUS FLEETS

- In Jakarta, the Director of Operations of TransJakarta informed the Initiative that 60 CNG buses have been procured, but 300 diesel Euro III engines have also been procured to satisfy surging demand. The Initiative has written and submitted an op-ed to the Jakarta Post on the importance of soot-free bus engines.
- The Initiative responded to a series of technical inquiries made by TransMilenio. After some extended dialogue, TransMilenio has decided to hire an independent consultant to advise on technology specifications for future procurement. At the request of ITDP and World Bank, the Initiative responded to a supplemental request for technical guidance as part of an independent inquiry into technology procurement for a BRT system planned for Dakar, Senegal. CNG and hybrid were disregarded due to cost. Despite the strong technical case for availability of imported low-sulfur fuels, a decision was taken to procure Euro III bus engines.
- An additional challenge experienced is related to the fact that not all data on bus fleets is in the public domain. Implementers approached all sources of data, both public and private, and requested permissions to post publicly. Confirming permissions remains the last task, but the urban bus fleet database is effectively completed. Any restrictions on sharing of data publicly may result in aggregation of data in some cities.

GREEN FREIGHT

- Due to the high demand for engagement from many countries, it has been challenging to find adequate resources to thoroughly meet all regional demands, especially in Africa.
LESSONS LEARNED

GLOBAL STRATEGY

On 1 December 2016 Nigeria, Togo, Benin and Cote d’Ivoire joined Ghana to adopt low sulphur diesel fuel standards in 2017. The countries also committed to implement cleaner vehicle policies and work with the ECOWAS Commission towards sub-regional fuel and vehicle standards harmonization by 2020.

These commitments were made at a sub-regional high-level ministerial meeting on low sulphur fuels hosted by ECOWAS. The importance of a strategic regional partner cannot be underestimated in transitioning groups of countries to cleaner fuels and vehicles in a harmonized way. In addition, ECOWAS provides a forum for continued discussions on fuel and vehicle standards, and as a platform for ensuring national implementation well beyond the lifetime of the projects in the region.

The role of strategic importing markets and refining countries such as Nigeria, Cote d’Ivoire and Ghana is also key in establishing pathways for cleaner fuels. The leadership of key fuel hubs is a focal point of the Global Strategy’s approach to global desulfurization and a transition to low and ultra-low sulfur in fuels and matching vehicle emission standards by 2030.

MARINE AND PORTS

The Initiative has learned that one static BC emission factor cannot produce an accurate marine BC emissions inventory. Research from the University of California-Riverside (UCR), commissioned by ICCT, found that BC emission factors are influenced by fuel characteristics, engine type, engine load, and exhaust gas after treatment technology. Based on this research, we developed new BC EFs that vary as a function of engine stroke type (2-stroke or 4-stroke), fuel type (residual or distillate fuel), and engine load. We developed these BC emission factors from data from participants in ICCT’s 3rd workshop on marine BC emissions, which was funded by CCAC. These BC emission factors were used to develop the world’s first global, geospatially allocated marine BC emissions inventory.

The Initiative also learned that BC emissions can be measured reasonably well with four measurement methods: photo-acoustic spectroscopy (PAS), thermal optical analysis (TOA), laser induced incandescence (LII), and light absorption filter smoke number (FSN) methods.

Finally, modern Tier II engines emit much lower BC emissions than the older engines and that scrubbers can reduce BC emissions on the order of 30%.

In implementing port assessments of black carbon and other pollutants, one of the key lessons learned was the importance of process and product ownership at the country level. The Tema port project facilitated budgetary allocation by Ghana Ports and Harbor Authority (GPHA) for an air quality monitoring program at the Port of Tema. GPHA will build on the institutional arrangement developed under this project for activity data collection, emissions factors, and the emissions inventory reporting protocol to facilitate integrating the implementation of the emissions reduction strategy and action plan (ER-SAP) in its environmental quality monitoring of Tema Port.
In East Africa, the East African Northern Corridor Transit and Transport Coordination Authority (NCTTCA) led the development and adoption of the first green freight strategy in Africa. Building on this established cooperation, the NCTTCA was selected to conduct the Mombasa port baseline air emissions inventory as the primary organization developing policies for cost-effective and sustainable transport along the Northern Corridor. The role of national and regional champion organizations is instrumental in developing and implementing successful and sustainable initiatives in the transport sector.

**GREEN FREIGHT**

There is immense demand from countries on strategies to reduce freight emissions, and the combination of robust technical assessments together with stakeholder engagement (e.g., workshops) proved to be an effective way to support green freight programs.

There is a high level of scepticism about the true effectiveness of technologies because carriers often do not trust the efficiency claims from technology providers. Therefore, technology verification to verify the real-world efficiency of different technologies is an essential part of a green freight program.

The Initiative also learned that it takes a lot of resources to get a green freight program off the ground, and standardized tools and methodologies have an important role in supporting governments.

Lack of robust data is also a problem, and the development of strong freight assessments is a vital step to better understand the local freight market, and evaluate which technology and operational strategies better apply in a national context.

**OPPORTUNITIES**

**ASIA**

There is opportunity for the Initiative, in particular on diesel quality and clean urban transport, to work in Asian cities that are have the worst air pollution since these local governments seem committed to act and address the issues.

**SOOT-FREE BUSES**

There is an excellent opportunity to support interest in e-buses and CNG buses in developing country cities as an alternative to diesel buses. In addition, funding for this work can be leveraged from new and emerging funds.

**MARINE AND PORTS**

- There is now an opportunity to scale up the ports emissions inventory and reduction strategy development work to a global scale in developing countries.
Now that there is consensus on measurement methods for BC from ships, the IMO is set to discuss mitigation measures. There is an opportunity to reduce BC emissions in sensitive regions such as the Arctic, but also a possibility of extending BC control beyond.

The baseline emissions inventory for the Port of Mombasa indicated that most of the emissions are from the ships calling at the Port of Mombasa with 138 tons of black carbon estimated to being emitted per year by shipping vessels in port. Mitigation measures should mostly focus on ships emissions to reverse the trend. One of the critical interventions would be for the country to ratify MARPOL Annex VI regulations for the Prevention of Air Pollution from Ships.

**GREEN FREIGHT**

In most countries, road freight is responsible for a large share of freight emissions. Trucks represent a very small share of the fleet but a sizable share of fuel consumption and emissions, thus being an effective target for emissions control. There are two effective ways to catalyze emission reductions from trucks:

- Target the new truck fleet: advanced technologies are first introduced in the new fleet, but there are very few large carriers that purchase new equipment. Working directly with such large carriers will enable the collection of real-world data and the evaluation of which technologies and strategies best apply for their operations.

- Target the legacy truck fleet: the vast majority of the truck fleet is relatively old and take a long time to naturally leave the fleet. The implementation of well-designed fleet renewal schemes could target the scrappage of the oldest and dirtiest technologies, enabling owner operators to purchase newer and cleaner equipment.