

APPROVED ENGAGEMENT STRATEGY FOR HEAVY-DUTY VEHICLES & ENGINES SECTOR

Objective

The objective of the Heavy-Duty Vehicles and Engines Engagement Strategy is the total elimination of black carbon emissions from diesel vehicles and engines by 2030 and 100% phaseout of fossil-based fuels from the heavy-duty industry as soon as possible. This strategy outlines what the CCAC will do in the next 8 years but is guided by an ambitious goal of the complete transition of the sector to 100% renewable energy sources.

While the end goal is complete defossilisation and many countries have already started the transition towards zero-emissions vehicles, many developing countries are expected to continue increasing the number of diesel engines in use, and lack necessary conditions to “leapfrog” all the way from high-emitting diesel engines to cleaner alternatives. This creates the need for an intermediate step in the transition to complete defossilisation, in which the CCAC can make significant contributions.

The Heavy-Duty Vehicles and Engines Hub will act as a centralized destination and knowledge-sharing platform as well as implementation support centre for CCAC partners to come together to design and develop strategies and actions that will help mitigate black carbon, CO₂ and methane emissions from heavy-duty vehicles and engines. The types of actions and activities that will take place can include fostering high-level political and industry commitments on both the manufacturing and demand side, raising awareness in relevant countries and regions, disseminating best practices and guidance documents, promoting regulations and standards and coordinating the implementation of actions and policies. National governments and regional groups will need to be engaged in order to ensure effective implementation of regulations, standards and policies, therefore the Heavy-Duty Vehicles and Engines Hub will work closely with the CCAC’s National Policy and Planning Hub.

Goals

CCAC activities in this sector will be structured around 4 goals on the following:

1. Cleaner Fuels and Vehicles
2. Non-Road Mobile Machinery and Stationary engines *(for electricity and heat production or emergency power generation)*
3. Marine and Inland Water Transport
4. Green Freight

Goal 1: Cleaner Fuels and Vehicles

- Long-term Goal: **By 2050**, zero tailpipe emissions and 100% elimination of fossil-based fuels for heavy-duty transport
- **By 2025**
 - 30% of new heavy-duty vehicles have zero tailpipe emissions (air pollutants and GHGs)
 - All countries adopt a part of 30% renewable fuel (renewable synthetic fuel or sustainable biofuel from waste) content as blend in the fossil fuel available on the market (drop-in fuel)
 - [other intermediate goal(s) in line with the Global Strategy to Introduce Low-Sulfur Fuels and Cleaner Diesel Vehicles TBC]
- **by 2030:**

- All countries adopt ultra-low sulfur diesel (10 ppm) and minimum Euro 6/VI emission standards by 2030
- Global soot-free vehicle standards for international trade (no dumping of dirty used vehicles)

Key Activities

Countries and Governments

Advocacy and raising high-level political ambition

- Secure commitments from governments to transition to soot-free transport and international trade of used vehicles; global high-level leadership to bring private sector and governments (national and cities) together to agree for example that by 2035 all buses should be zero emissions.
- Engage G20 Transport Task Group (TTG) to promote the transition to ultra-low sulfur diesel fuel and minimum Euro 6/VI emission standards in all G-20 countries
- Engage regional groups such as the ASEAN, SICA, ECOWAS, EAC, SADC to promote the transition to ultra-low sulfur diesel fuel and minimum Euro 6/VI emission standards in respective member countries, promoting a harmonized regional approach to regulation and policy
- Support analysis and awareness-raising in countries on how SLCP actions in the heavy-duty vehicles and engines sector support national development processes and benefits, potentially including specific work on helping to quantify the health benefits of transport measuresⁱ
- Communicate with countries how fuel emissions standards and fuel quality fits into the broader defossilisation picture
- Work with key exporting countries of used vehicles and support for strengthening inspection and standards for used vehicles in receiving countries
- Promote the potential of fuel alternatives such as biogas or fuels that demand specially designed vehicles but reducing emissions substantially compared to diesel (and even compared to HVO).

Targeted Technical and Policy Support (To be implemented in collaboration with the SLCP Planning, Policy and Implementation Hub)

- Support “committed” governments at the national and regional levels with the needed/requested policy support and/or technical assistance to adopt regulations, policies, standards, laws that target black carbon and CO₂ reductions in the sector which may include:
 - development of electrification roadmaps, policiesⁱⁱ and/or programs for the HDV sector, focusing on public transit, government fleets, and commercial vehicles (delivery trucks), ensuring this electricity is from renewable sources (and hence the need to green the grid in parallel) – as well as roadmaps for moving to higher vehicle emission standards for the HDV sector.
 - research/analysis products targeted at the national level

Strengthening the Case for Action and Capacity-Building

- Review progress and update/relaunch the Global Sulfur Strategy to build on successes and identify most effective intervention measures to achieve its objectives by 2030
- Provide guidance on technological options available for old and high emitting vehicles that still have significant lifespans

- Enhance the CCAC's role as a knowledge sharing platform that disseminates unbiased information
- Adopting the approaches and learning from experience in the heavy-duty vehicles sector, collaborate with partners to address black carbon emissions from medium-sized vehicles used for freight and public transport
- Promote best practices and encourage peer-to-peer exchanges in city experiences in the transition to soot-free urban buses in collaboration with other partnerships working on electric vehicles (for example ZEBRA)

Finance Sector

- Work with a partnership of development banks, investment banks, bilateral aid agencies and the private sector to finance the transition to soot-free buses in cities linked to subnational
- Develop tools and build capacity on financing models for smaller operators versus larger fleet owners, including identifying the main financing challenges that need to be overcome
- Share best practices with cities through the BreatheLife platform
- Engage with financial institutions to increase the awareness of the benefits of sustainable business models for clean fuels and vehicles
- Support the CCAC global finance partnership for soot-free urban bus fleets being established by the current CCAC Heavy-Duty Vehicles Initiative

Industry

- Engage with the multilateral and national oil and gas industry to discuss the upgrade of oil refineries to provide "cleaner" diesel in the short-term while emphasizing that the CCAC supports the transition beyond soot-free diesel towards lower carbon and zero carbon soot-free engines such as electric drive.
- Continue to promote industry engagement on soot-free urban bus fleets, for example through enhancement of the CCAC Soot-Free Buses Industry Partnership or other mechanisms

Key Partners

- ICCT, UNEP, ClimateWorks, FIA Foundation, CALAC+ Programme/Swisscontact, G20 Transport Task Group (TTG), Pisces Foundation, Partnership on Clean Fuels and Vehicles (PCFV), GFEI, ZEV, ITF, regional intergovernmental bodies, oil and gas industry

Goal 2: Non-Road Mobile Machineryⁱⁱⁱ And Stationary Engines

- Primary Goal: By 2050, zero tailpipe emissions, 100% elimination of fossil-based fuels- engines for non-road mobile machinery and stationary diesel engines
- **By 2030**, to significantly reduce black carbon and particulate matter emissions from non-road diesel engines through countries' adoption of standards for soot-free non-road mobile machinery and stationary diesel engines
- Medium Term Milestone by 2030: All countries adopt ultra-low sulfur diesel (10 ppm) and minimum EU Stage V emission standards by 2030

Key Activities

- Facilitate information exchange and collaboration, harmonized tools^{iv} and technologies, guidance and capacity-building
- Support assessments and studies for inventory analysis of the non-roads sector at the international level
- Provide high-level promotion of standards and regulations (e.g. supporting/promoting the Clean Construction Declaration and potentially replicating for other subsectors like mining, forestry, agriculture, harbor)
- Engage with original equipment manufacturers (supply side), machinery fleet operators (demand side) to catalyse action on technological advancement needed to electrify the non-road engines sector and reduce the exporting of machinery without diesel particulate filters
- Provide emissions inventories and support to ODA-eligible countries for developing strategies, policies, regulations or roadmaps, such as emission standards for machinery, etc.
- Support the development of voluntary public-private partnerships, like green freight programs, to leverage market forces and interests, to develop demand for “greener” non-road services from customers and users.

Key Partners

- C40, ICCT, Swisscontact, US, European Union, Switzerland, Transport Task Group (TTG), U4E/UNEP

Goal 3: Marine and Inland Water Transport

- Advocate for the International Maritime Organization (IMO) to adopt a black carbon emission standard for all new ships **by [TBC: 2022]** and existing ships **by 2025**, as well a methane emission standard for new LNG-fueled ships **by 2030**.
- Diesel emissions policies for inland water transport developed in relevant countries (2030)

Key Activities

- Facilitate technical dialogue among IMO Member States to build consensus on technology and policy options to control black carbon in the international marine sector.
- Provide scientific, technical and political support in IMO negotiations on the reduction of SLCP emissions (control of black carbon and methane slip) from the marine sector
- Support international collaborations focused on measuring real-world black carbon and real-world methane emissions from ships to better understand the actual emissions from ships and to help guide policymaking to reduce those emissions
- Support countries to adopt emission standards for inland water transport used for passenger transport and freight

Key Partners

- Marine: IMO, ICCT, key IMO member countries (both CCAC partners and non-partners such as China)
- Testing partners: *Explicit^v* which flies drones and helicopters through the plumes of ships to measure emissions
- Inland water transport: UNEP, AIT, IMO, etc.

Goal 4: Green Freight

- To significantly reduce emissions of black carbon, particulate matter as well as other climate pollutants and greenhouse gases from the freight sector by advocating for
 - the alignment and enhancement of existing green freight efforts
 - development of new green freight programs globally
 - incorporation of black carbon and other pollutants reductions alongside greenhouse gas emissions into green freight programs

Key Activities

- Facilitate information exchange and collaboration, harmonized tools and technologies, guidance and capacity-building
- Provide high-level promotion of cleaner or zero-emissions technologies and strategies (including adoption of electric freight vehicles)
- Raise awareness for and support the reduction of emissions from medium-duty freight vehicles
- Provide emissions inventories and support for developing strategies, policies, regulations or roadmaps

Key Partners

- GIZ, regional green freight programs, private sector (including multinational shippers), UNCTAD, UNESCAP, Marrakech Partnership for Global Climate Action (MPGCA)
- Private sector partner with a fleet of medium-duty trucks

ANNEX 1 – CONTEXT, KEY ACHIEVEMENTS AND RATIONAL FOR CCAC INTERVENTION

Heavy-duty diesel engines are significant sources of black carbon, fine particles, air toxics, greenhouse gases and other harmful emissions. Uncontrolled diesel engines from on-road trucks and buses and marine vessels operating on inland waterways and throughout international waters emit large amounts of fine particles and black carbon. Heavy-duty vehicles account for 40% of energy and CO₂-related emissions from the on-road transport sector. These vehicles produced approximately 670,000 annual tons of black carbon emissions in 2017, equal to about 78 percent of all on-road diesel black carbon emissions.

Ambient air pollution is the leading environmental health risk factor globally, resulting in nearly 3.5 million premature deaths in 2017 from stroke, ischemic heart disease, chronic obstructive pulmonary disease, lung cancer, lower respiratory infections, and diabetes. ICCT in 2019 estimated that emissions from the transportation sector were responsible for 11.7% of global PM_{2.5} and ozone mortality in 2010 and 11.4% in 2015. Despite recent adoption of more stringent vehicle emission regulations in some major vehicle markets, the transportation sector remains a major contributor to the air pollution disease burden globally. This points to the need for reducing emissions from the transportation sector to be a central element of national and local management plans aimed at reducing ambient air pollution and its burden on public health.^{vi}

Black carbon, the second largest contributor to human-induced climate warming to date after carbon dioxide, can be reduced by 99 percent with a transition to soot-free technology. Soot-free diesel engines require a combination of ultra-low sulfur diesel fuels (between 10-15 parts per million sulfur), tailpipe emission controls (such as soot-free Euro VI or US 2010 standards), adequate compliance and enforcement practices, and inspection and maintenance practices. Other soot-free technologies include gas or electric drive engines.

The CCAC remains to be the only global initiative addressing BC emissions of heavy-duty vehicles in the pursuit of a defossilised transport sector. The CCAC's work on heavy-duty vehicles has resulted in significant achievements to date that include the International Maritime Organization (IMO) agreeing on appropriate methods to reduce black carbon from ships, and providing support to 61 countries and 28 major cities worldwide, 40 of which have implemented soot-free engine standards and ultra-low sulfur fuel standards. There has been significant progress in the implementation of the Global Strategy for Cleaner Fuels and Vehicles (a.k.a Global Sulfur Strategy) but in many developing countries Euro2/3 engines are still common proving that there is still much to be done to achieve the 2030 goals of the Strategy. The remaining challenges in the heavy-duty vehicle sector include access to sufficient financial support, increasing the awareness of black carbon impacts and providing support and guidance for transitions to soot-free transport sectors.

A new area where the CCAC can play an important role is reducing black carbon emissions from the non-road machines sector. Diesel engines used to power non-road equipment and vehicles, such as agricultural tractors and construction equipment, are a significant source of air pollutant emissions and CO₂. Several regions around the world, led by the United States and the European Union, have implemented increasingly stringent performance-based emission standards for non-road diesel engines. These engines now incorporate improved emission control technologies and produce less than 10% of the pollutants emitted by their predecessors. For countries where standards lag behind international best practices or where no standards are in place, there is a significant opportunity to reduce emissions of harmful air pollutants from non-road engines through further regulatory action.

SAP Key Messages on Black Carbon (2020)

- Under current policy scenarios, global anthropogenic emissions of black carbon are expected to decrease slightly (~3%) over the next decade.
- To be consistent with 1.5C scenarios, by 2030 global black carbon emissions should be reduced by **35% (10% - 66%)** compared to 2010 levels.
- Maximum technically feasible mitigation could achieve a **70% reduction** compared to 2010 levels by 2030. This exceeds the mitigation range implicated by the 1.5°C scenarios.
- Black carbon is a key component of PM2.5 which causes cardiovascular and respiratory disease, and cancers
- According to WHO, exposure to PM2.5 was responsible for an estimated 4.2 million premature deaths per year in 2016.

CCAC Key Achievements in the Sector from 2013 - 2021

Cleaner Fuels and Vehicles:

- 2016: Launch of the Global Strategy to Introduce Low Sulfur Fuels and Cleaner Diesel Vehicles (Global Sulfur Strategy). The target is to reach 50 ppm sulfur in fuels by 2025 globally, and most countries go to ultra-low (10 ppm) sulfur in fuels by 2030.
- 2016: At the 8th CCAC High Level Assembly, 38 country partners endorsed the strategy and committed to action to reduce black carbon emissions through cleaner diesel fuels and vehicles
- 2017: Eight nation Arctic Council set targets to limit black carbon (or soot) emissions between 25 and 33 percent below 2013 levels by 2025 in a bid to slow Arctic warming.
- 2019: 40 countries have implemented soot free heavy-duty engine standards and ultra-low-sulfur diesel standards and four more (Brazil, China, Colombia, and Mexico) plan to implement them before 2025.
- 2020: To date, the CCAC Heavy-Duty Vehicles Initiative has supported a total of 61 countries and is engaging with 28 major cities worldwide.

Marine and Ports:

- 2018: Baseline air emissions inventories produced for six major ports (Chittagong, Bangladesh; Jakarta, Indonesia; Mombasa, Kenya; Tema, Ghana; and Valparaiso, Chile), paving the way for clean ports strategies.
- 2019: International Maritime Organization (IMO) agreed on appropriate ways to reduce black carbon from ships
- 2020: Emissions Inventory for Inland Water Transport in Bangkok, Thailand produced

Green Freight:

- 2015: Established the Global Green Freight Action Plan
- 2016: Background paper on advancing green freight programs in Bangladesh
- 2017: Guidance documents on developing green freight programs in Vietnam
- 2017: Green freight assessment for Mexico
- 2017: Northern Corridor green freight strategy
- 2017: Freight assessment blueprint to support national green freight programs
- 2018: Green freight assessment for China

- 2018: Green freight assessment for the Philippines

Rationale for CCAC Intervention

Component 1: CLEANER FUELS AND VEHICLES

Cleaner fuels and vehicles are key components of the intermediate step between high-emitting diesel engines and clean zero-emissions alternatives. Countries that lack the capacity to make this direct transition from dirty to clean vehicles will still need options to reduce emissions from new and used vehicles.

The CCAC's Global Sulphur Strategy clearly shows that a worldwide transition to low sulfur diesel (50 ppm or below) for all countries by 2025 is feasible, while ultra-low sulfur diesel (10 ppm) can be phased in progressively and can represent nearly all of global diesel supply by 2030. With respect to heavy-duty vehicles, emissions can be reduced through securing commitments from governments and industry for cleaner demand-side procurement and higher vehicle emissions standards, supporting retrofits and promoting proper scrapping of high-emitting used vehicles.

The CCAC can continue raising high-level awareness of the impacts that black carbon from the transport sector have on climate and development, and it will be important to focus this on countries and regions where heavy-duty vehicles are not a top priority. National and regional action can be addressed through coordination with the National Policy and Planning Hub, where policy support and technical assistance can be provided. The Oil and Gas Hub can be consulted with regards to advancing the availability of cleaner diesel fuels through upgraded oil refineries.

Electric vehicles are the single most important technology for defossilising the HDV transport sector. A growing number of cities and national government in developed countries are announcing bans for new conventional vehicles in the next 5 to 15 years. Large vehicle manufacturing groups are also announcing their goals to move away from the combustion engine towards zero emission technologies in similar time frames, either battery electric or fuel cell. At the same time, battery technology prices continue to drop year after year, closing the price gap with conventional technologies. Low- and middle-income countries (LMICs) should start planning and implementing a transition to electrification in parallel. Starting with the easiest of HDV segments to electrify (transit buses) and expanding to commercial vehicles and long-haul freight. The transition still faces significant barriers due to higher capital costs, lack of funding to absorb the risk if this pricier option. In addition, there is a low-awareness barrier among regulators, operators, financing institutions and even manufacturers that don't see LMICs are potential markets for electrification. The role of the CCAC supporting the planning and implementation phase during these early stages of vehicle electrification would ensure that LMICs are not flooded with cheap vehicle technologies no longer accepted in the developed world.

A key element of the CCAC approach in the sector has been an ongoing collaboration with global and regional organizations that are also supporting a move to ultra-clean fuels and vehicles. The Global Strategy recommends actions at the sub-regional, national and local levels to reach a global target of ultra-low sulfur fuels necessary to support Euro VI or equivalent emission standards by 2030. This is an important intermediary step for countries that lack necessary conditions to leapfrog to zero emissions alternatives. The Global Strategy's markets-based approach scales up national-level actions in support of regional harmonization to ensure many more cities benefit from the targeted actions of the Hub that play a key role in the transition to a zero-emissions transport sector.

The Global Strategy organizes countries into four major market categories: (I) fuel importers, (II) fuel refiners, (III) vehicle standards and (VI) cities. The Global Strategy is based on the development and implementation of policies and the leveraging of finance for clean technology that will catalyze massive black carbon and PM_{2.5} emission reductions from the diesel sector. In practice this means providing support to national, regional and/or sub-regional efforts to adopt policies on low sulfur fuels, working with decision-makers to improve import standards for fuels, providing funding and technical expertise for specialized national working groups that foster cooperation on fuel quality and vehicle emission standards, and ensuring linkages with other related policies (particularly fiscal). As of 2021, the Global Strategy remains largely valid; however there is a need to evaluate and identify sections that need updating and to consider “relaunching” the strategy.

The Hub approach is centered on generating political will while simultaneously providing and building practical capacity in national and regional markets for standards that will institutionalize the import of cleaner fuels, the upgrading of refineries through leveraged financing, and access to the cleanest new vehicle technology. In practice, this means continued implementation of the Global Strategy in countries and cities in Latin America, Africa, East Europe, the Middle East and Asia, expanding the existing soot-free clean bus industry partnership and establishing a global finance partnership for soot-free urban bus fleets.

Combining support for cleaner fuels and heavy-duty vehicle standards at the national level with local-level support for soot-free buses is a model that has worked well - yielding results in Chile (Santiago), Accra (Ghana), Brazil (Sao Paulo), and Mexico (Mexico City) with similar potential in Colombia (Bogotá), Argentina (Buenos Aires) and South Africa (Johannesburg) on the horizon, validating that cities remain to be the key players for soot-free and electric vehicle technology adoption, and catalyzers for nationwide actions in these countries.

There is a huge need for strategic approach on defossilisation of heavy-duty vehicles in developing regions where we see several different players pushing in different directions including natural gas, biofuels, electrofuels, blue hydrogen, green hydrogen, and electric batteries. But in parallel, CCAC should also consider playing a role in the discussion of the upgrade of oil refineries to produce cleaner diesel, with the risk of any investment in the oil industry could be a stranded asset in a few years more. It would be important to provide regional roadmaps with guidance on real clean alternatives for HDV in the short, medium, and long term, while simultaneously considering how transport demand will change in developing regions as GDP increases (for example in Sub-Saharan Africa).

BUILDS OFF:

- *CCAC’s Global Sulfur Strategy and Heavy-Duty Vehicles Initiative*
- *2016 Marrakech Communique endorsement of Strategy*

LIST OF INTERESTED PARTNERS:

- *C40*
- *Centro Mario Molina Chile*
- *ICCT - Technical support for EV & soot-free policy roadmap development, soot-free & EV regulatory development, industry partnership development, capacity building and knowledge sharing*
- *Swisscontact*
- *Switzerland*

- UNEP
- UTP

Component 2: NON-ROAD MOBILE MACHINERY

The non-road engines sector is a source significant black carbon and carbon dioxide emissions, especially in key sectors in developing regions like mining, forestry, and construction, but their emissions are not well considered in emission inventories, or often underestimated. There are fewer models and numbers of hybrid and zero-emission non-road machinery available on the market compared to light-duty vehicles. Many developing countries do not regulate these engines in spite of the availability of technology to reduce black carbon emissions (DPFs).

The CCAC can play an important role in catalyzing transformative action in the sector by helping provide a baseline and understanding of the scope of the problem, engaging with national governments and the industry by providing best practices, capacity-building, peer-to-peer learning, emissions inventories and defossilisation strategies. Learning from the approach and experience of the CCAC Heavy-Duty Vehicles Initiative from 2013 to present, the CCAC can support countries to increase the ambition on SLCP emissions reduction in the non-road engines sector. This can be done by undertaking research and analysis, creating inventories of emissions from the different non-road engines subsectors, developing a global strategy or roadmap similar to the Global Sulfur Strategy to guide the transition to defossilisation, promoting regulations and standards for the non-road engines, engaging with key players including governments and industry, and providing guidance on access to finance and technologies.

BUILDS OFF:

- Clean Construction Declaration C40 is fostering this declaration which includes commitments regarding zero emissions construction machinery and several cities have already expressed their interest.
- SDC's CALAC+ project implemented by Swisscontact which supports the development of intelligent policies for emissions reduction from non-road urban machinery (construction and industry sectors) in Chile, Colombia, Mexico and Peru.
- Green freight program models and partnerships which have demonstrated significant emissions reductions from HDDVs in the freight sector.

LIST OF INTERESTED PARTNERS AND WHAT THEY CAN OFFER:

- C40
- Centro Mario Molina Chile
- ICCT
- Swisscontact

Component 3: MARINE AND INLAND WATER TRANSPORT

Total greenhouse gas (GHG) emissions from maritime shipping rose about 10% from 2012 to 2018, according to the IMO final report of the Fourth IMO Greenhouse Gas Study^{vii}. Most striking were the increases in short-lived climate pollutants, also known as climate super pollutants, including a 12% increase in black carbon emissions and a 150% increase in methane emissions. Ships emit black carbon when they burn fossil fuels such as heavy fuel oil (HFO). Black carbon accounts for 21% of CO₂-equivalent emissions from ships, making

it the second most important driver of shipping's climate impacts after carbon dioxide. Currently, there are no national or international regulations that directly limit black carbon emissions from ships.

To reduce black carbon, IMO agreed that ships can use cleaner fuels such as distillate fuels, which reduce black carbon by 33% compared to HFO, or liquefied natural gas (LNG), which emits nearly zero black carbon.

Methane represents a small but rapidly growing share of GHG emissions from shipping. The 150% growth in methane emissions from 2012 to 2018 was largely due to a surge in the number of ships fueled by liquefied natural gas (LNG), many of which have engines that allow unburned methane to escape into the atmosphere. The study highlights the need to include methane in future phases of the IMO's Energy Efficiency Design Index (EEDI) regulations. Currently, only CO₂ emissions are limited under the EEDI.^{viii}

Another area of proposed intervention is the inland water transport sector. Switching boat engines to Euro 6 with 10 ppm sulfur fuel could reduce 98% of PM_{2.5} emission from the current situation. Using 10 ppm sulfur fuel with the existing engines would only reduce PM_{2.5} emissions by 5% from the current situation. Thus, the best policy recommendation for PM_{2.5} emission reduction from boats are promoting the use of 10 ppm sulfur and switching to Euro 6 engines. Use of electric motors will bring tail-pipe emissions to zero and can significantly reduce air pollution along the river and canals. Inland water public transport is one of the major transport means in many important cities and countries but the emissions from this sector has not been studied enough, nor included as a separated emission source in the previous inventories. Boats using 15-20 years old engines emit large amount of black smoke while departing and embarking from piers and contribute to the air pollution problem in many cities.

BUILDS OFF:

- *HDVI work on marine and ports*
- *Inland water transport inventory in Thailand: <https://www.ccacoalition.org/en/resources/emissions-inventory-inland-water-transport-bangkok-thailand>*
- *MS Excel emission calculation template for inland water transport which can be used to assess the emission of inland water transport for other cities: <https://www.ccacoalition.org/en/resources/emissions-calculation-template-inland-water-transport>*

LIST OF INTERESTED PARTNERS AND WHAT THEY CAN OFFER

- *ICCT*
- *UNEP – for inland water transport*
- *AIT, Thailand, Maldives*

Component 3: GREEN FREIGHT

The freight sector is the most rapidly growing source of transportation emissions, expected to exceed transport GHG emissions in the coming decade(s). Globalization, e-commerce and export oriented economic development are driving massive growth in freight demand across the globe, in all sectors and in all modes. Heavy duty diesel engines are the workhorses of this sector due to their power output, durability and manageable costs. However, these qualities also ensure that diesel trucks, engines and other equipment can run for decades and/or millions of miles. This means older, dirtier vehicles can remain in use long after newer cleaner vehicles are brought to market. Because in many countries and regions, trucking is dominated by single operators and small "mom & pop" operations with limited capital and access to

advanced technologies, this “legacy equipment” tends to be used extensively. Numerous cost-effective technologies and strategies have been proven to reduce fuel use (and associated GHGs) and emissions but are often overlooked or unavailable.

Green Freight programs are typically voluntary market-based partnerships where freight shippers and carriers collaborate to adopt more efficient technologies and practices, report performance and drive the demand for more sustainable freight services. Often administered by public authorities, these programs support national climate goals, economic development and environmental protection. Led by SmartWay in the U.S. and Canada, dozens of similar programs have been implemented in Latin America, Asia and Europe. While many of these programs have similar features and capabilities, most are not aligned in a way that allows for common sharing of data across regional freight operations and global supply chains, thus limiting maximum impact. The exception is SmartWay in N. America which Canada has fully adopted, and Mexico is piloting. The CCAC has played an important role in setting the stage for more global alignment of these efforts by providing best practices, capacity-building, guidance, and peer-to-peer learning. Learning from the approach and experience of the CCAC Heavy-Duty Vehicles Initiative from 2013 to present, the CCAC can support development and expansion of these programs in the freight sector by the end of the decade. This can be done by using resources developed in the first phase of this initiative to further engage with key stakeholders including governments and industry and providing additional training and capacity building.

One area of focus is light freight (medium trucks). Demand for light freight is on a sharp increase globally, a trend that was accelerated by the covid-19 pandemic. Generally, medium-duty trucks make more last-mile deliveries to homes and businesses within city limits and these trip characteristics make light freight operations more polluting compared to long-haul freight.

BUILDS OFF:

- *2014 CCAC Global Green Freight Action Plan*
- *US/North America Smartway Program*

LIST OF INTERESTED PARTNERS AND WHAT THEY CAN OFFER

- *US EPA*
- *NRCan*
- *Smart Freight Centre*
- *Clean Air Asia*
- *ICCT*
- *World Bank*
- *UNEP*

ⁱ CALAC+ programme is developing tools for this

ⁱⁱ Examples of such policies are electrification mandates for public transit buses, procurement policies favoring electric powertrains, government led programs on electrification of commercial fleets.

ⁱⁱⁱ Non-road mobile machines in this document include those which are used in a wide range of sectors and applications, including construction, mining, agriculture, marine and forestry.

^{iv} CALAC+ Programme has developed tools for machinery which may be of interest to other partners: 1) CALMAC: Machinery Emissions Calculator for construction sites; 2) HEMAQ: Machinery fleet emissions calculator, health benefits (this tool has HEBASH included), cost-benefit analysis, emission fleet growth projection over time and different policy scenarios simulations

^v <https://www.explicit.dk/>

^{vi} ICCT 2019 “A global snapshot of the air pollution-related health impacts of transportation sector emissions in 2010 and 2015,” <https://www.ccacoalition.org/en/resources/global-snapshot-air-pollution-related-health-impacts-transportation-sector-emissions-2010>.

^{vii} [https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Fourth IMO GHG Study 2020 - Full report and annexes.pdf](https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/Fourth%20IMO%20GHG%20Study%202020%20-%20Full%20report%20and%20annexes.pdf)

^{viii} <https://theicct.org/news/fourth-imo-ghg-study-finalreport-pr-20200804>