

Transforming Transportation: Clean and Efficient Technologies for Buses

March 14th, 2018
Africa Clean Mobility Week 2018
Nairobi, Kenya

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**CLIMATE &
CLEAN AIR
COALITION**
TO REDUCE SHORT-LIVED
CLIMATE POLLUTANTS



United Nations
Environment Programme



THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION

Pollution killing more people than war and violence, says report

Pollution kills more people each year than wars, disasters and hunger, also causing huge economic damage, a study says. Almost half the total deaths occur in just two countries.



<http://www.dw.com/en/pollution-killing-more-people-than-war-and-violence-says-report/a-41044277>

Lancet Commission on Pollution and Health:

<http://www.thelancet.com/commissions/pollution-and-health>

Diesel Engines are a Key Target for improving human health

“The scientific evidence was compelling and the Working Group’s conclusion was unanimous: diesel engine exhaust causes lung cancer in humans.”

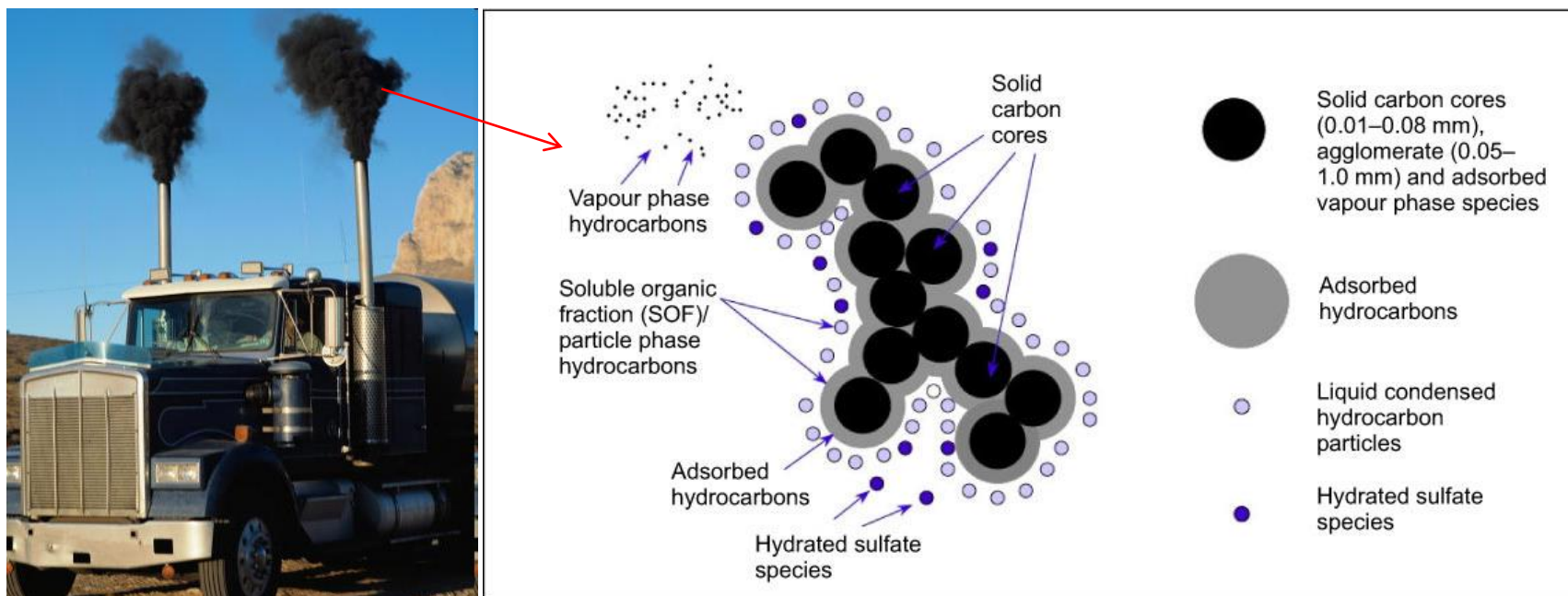
-Dr. Christopher Portier

International Agency for Research on Cancer

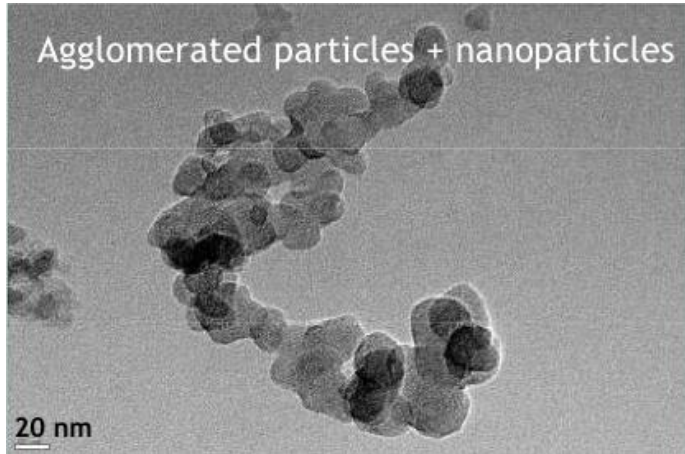


Diesel vehicles taipipe emissions that are regulated by Emission Standards

- CO, HC
- Nitrogen Oxides, NO and NO₂ = NO_x
- **Particulate Matter (PM)/Carbono Negro (BC)/Polycyclic Aromatic Hydrocarbons (PAH)**



Between 60% and 80% of uncontrolled diesel exhaust is black carbon



As a short-lived climate pollutant, BC can cause over 3,000 times as much warming as an equivalent amount of CO₂ over a brief 20-year period

What Technologies Deliver Soot-Free Performance?

ANY Euro VI or EPA 2010 (or newer) engine

OR

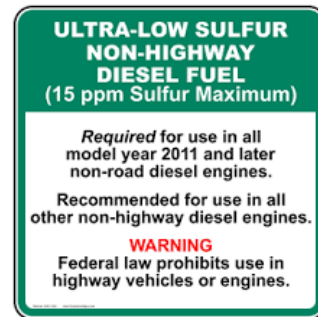
Filter-equipped diesel



+



+



Gas Engine (Euro VI)



Zero Emission
Electric Drive



electric drive

Soot-Free Buses 20 Targeted Megacities



Committed

Commitment Under Development

Not Committed

Updated SEP 2017

Even with high carbon intensity grids, BEBs have lower CO2 compared to diesel buses.

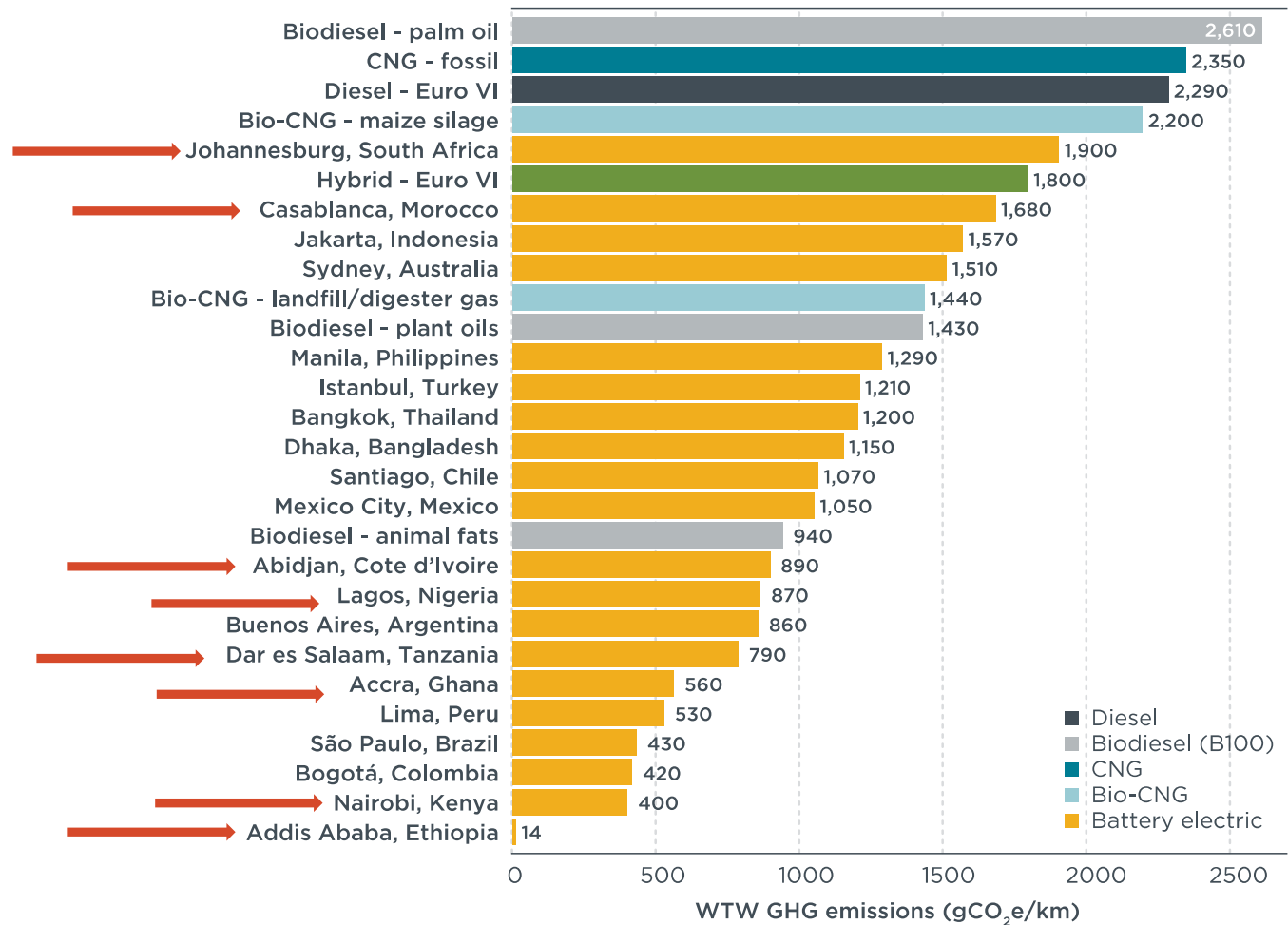
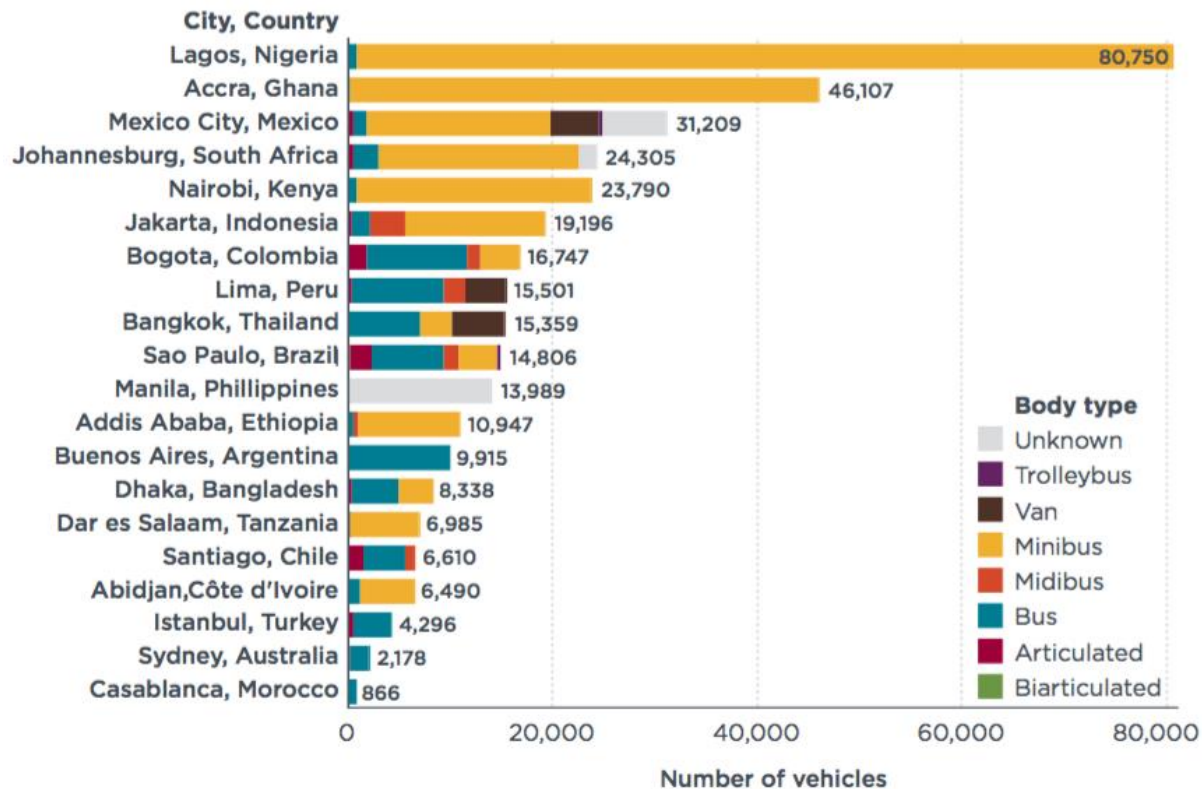


Figure 9. WTW greenhouse gas emissions of soot-free buses operating in low-speed urban driving conditions in 20 megacities, ranked by climate impact.

Fleet sizes in targeted cities



Dallmann, T. R., Du, L., & Minjares, R. (2017). *Low-Carbon Technology Pathways for Soot-Free Urban Bus Fleets in 20 Megacities* (No. Working Paper 2017-11). *International Council on Clean Transportation* (Vol. 356, pp. 493–494). Washington, DC. Retrieved from <http://www.theicct.org/publications/low-carbon-technology-pathways-soot-free-urban-bus-fleets-20-megacities>

Global Industry Partnership on Soot-Free Clean Bus Fleets



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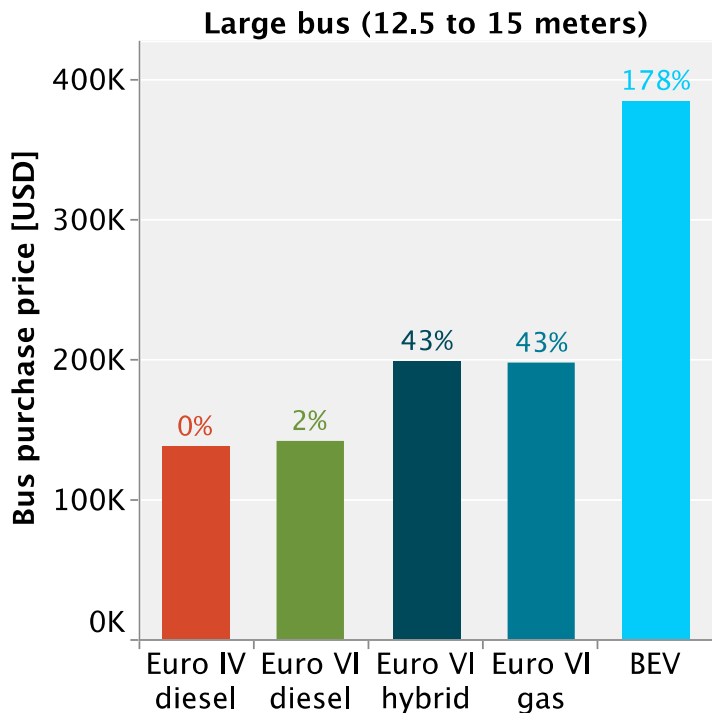
1. **We commit** to make soot-free engine technology available in all 20 targeted cities; where clean fuels are available today, this technology will be available no later than 2018; cities without clean fuels must first make these available.
2. **We commit** to provide to all 20 cities a list of soot-free bus and engine technology that is available to purchase in each city, including all relevant and publicly available product specifications.
3. **We commit** to provide to all 20 cities the name and point of contact we designate to advise and consult on product specifications, demonstration, and procurement.
4. **We commit** to publicly report the number of soot-free buses and engines we have sold in the most recent year.
5. **We commit** to update this information on an annual basis.

<http://www.ccacoalition.org/en/news/bus-manufacturers-commit-bring-cleaner-'soot-free'-buses-20-megacities>

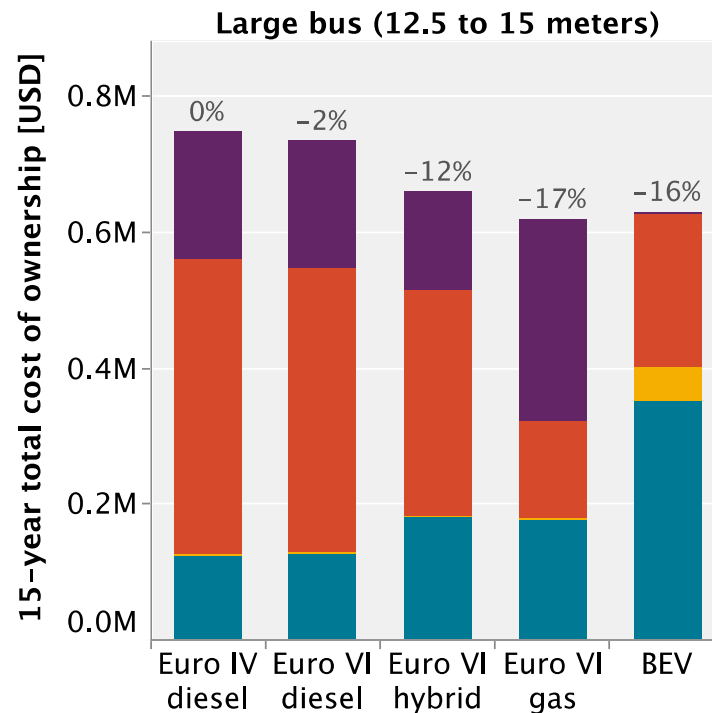


Total Cost of Ownership Changes the Financing Perspective – e.g. Bangkok, Thailand

a) Purchase Price



b) Total Cost of Ownership



Technology

- Euro IV diesel
- Euro VI diesel
- Euro VI hybrid
- Euro VI gas
- BEV

Cost component

- Maintenance
- Operating
- Net Inf Acquisition
- Net Bus Acquisition

Governmental and Commercial Sources of Bus Finance

Source	Examples	Financial products	Roles
Multilateral development banks	World Bank; Inter-American-, African-, and Asian Development Banks	Concessional loans, grants, guarantees, results-based financing	Bus and infrastructure acquisition and operations
Climate finance (including for NDCs)	Clean Technology Fund, Green Climate Fund, Global Environment Facility	Concessional loans, grants, guarantees, equity	Incremental cost of low carbon investments
National development banks	China Development Bank, Bancóldex (Colombia), Development Bank of the Philippines	Loans to buyers; credit lines to manufacturers	Intermediary for co-financing, blending of governmental and commercial sources
Export-import banks	OECD list of official export credits agencies; Berne Union association	Loans, guarantees, and insurance to exporters	Supports exporters
Commercial banks	List of 10 largest banks	Loans, lease financing, insurance	Largest volume of financing
Manufacturer leasing	Scania , Proterra	Lease financing for bus, infrastructure, or battery;	Partial or full coverage of purchase cost
Specialized leasing companies	Connect through manufacturers		

Actions to Expand Investment in Soot-Free Bus Technology

LOCAL

- Adopt minimum 'soot-free' emission requirements for public procurement of vehicles
- Request soot-free technology options in public bids
- Favor least total cost of ownership when comparing competitive bids

FINANCE INSTITUTIONS

- Favor minimum 'soot-free' emissions in finance projects
- Favor least total cost of ownership in bus procurement
- Issue guidelines for access to 'soot-free' project finance

NATIONAL

- Euro VI emissions and 10ppm S fuel quality standards
- HD fuel consumption and CO2 emission standards
- Low-carbon fuel and infrastructure development

Further Resources

PUBLICATION

Financing the transition to soot-free urban bus fleets in 20 megacities

<http://www.theicct.org/publications/financing-transition-soot-free-urban-bus-fleets-20-megacities>

PUBLICATION

Low-carbon technology pathways for soot-free urban bus fleets in 20 megacities

<http://www.theicct.org/publications/low-carbon-technology-pathways-soot-free-urban-bus-fleets-20-megacities>

INDUSTRY PARTNERSHIP

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Thank you!