

# Transforming Transportation: Clean and Efficient Technologies for Buses

March 14<sup>th</sup>, 2018

Africa Clean Mobility Week 2018

Nairobi, Kenya



**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.”

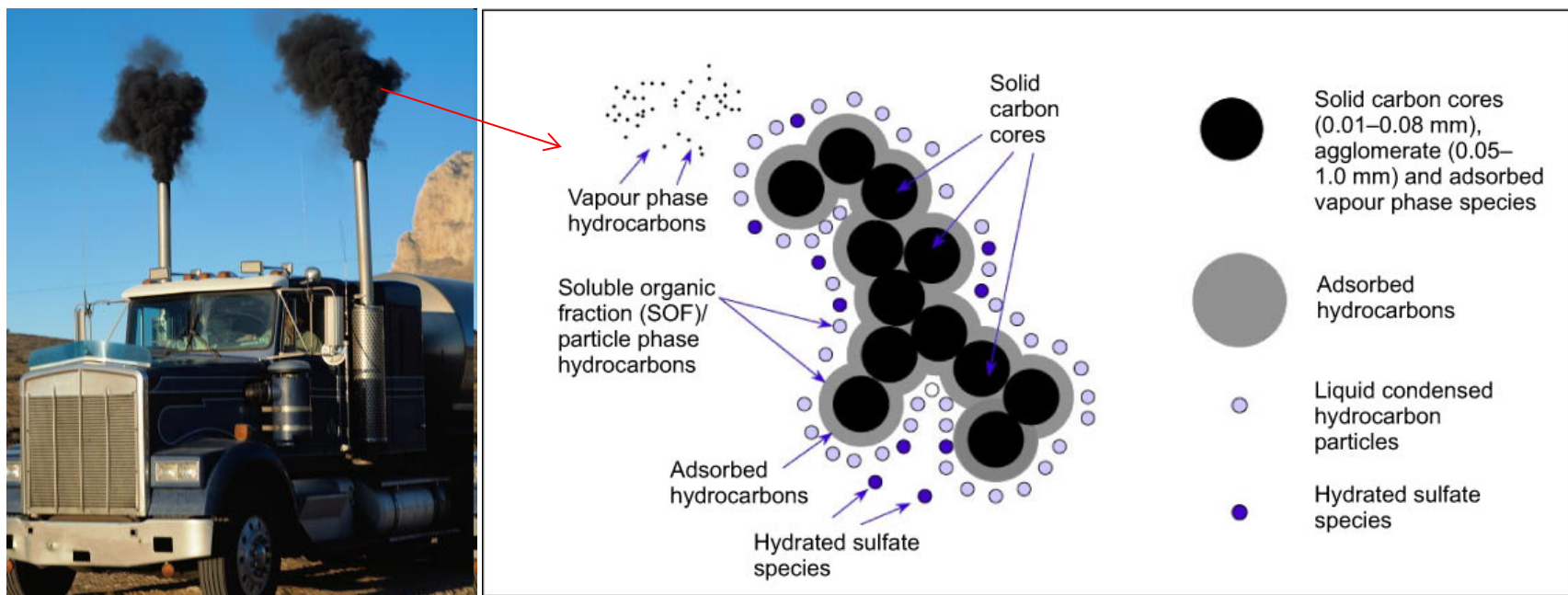
-Dr. Christopher Portier

International Agency for Research on Cancer



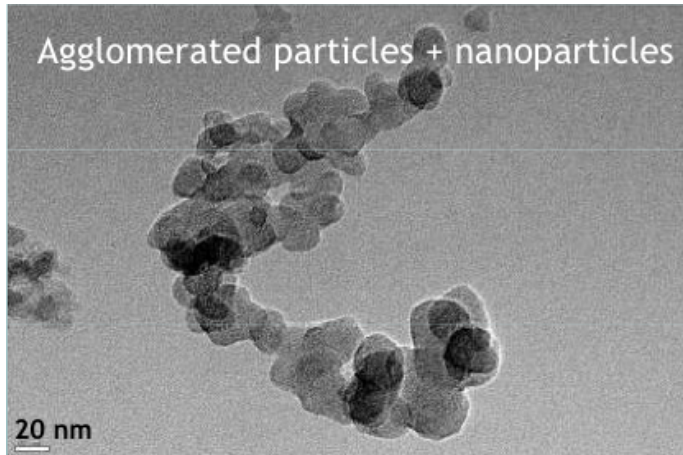
# Diesel vehicles taipipe emissions that are regulated by Emission Standards

- CO, HC
- Nitrogen Oxides, NO and NO<sub>2</sub> = NO<sub>x</sub>
- **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 CO<sub>2</sub> over a brief 20-year period

# What Technologies Deliver Soot-Free Performance?

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ANY Euro VI or EPA 2010 (or newer) engine

OR

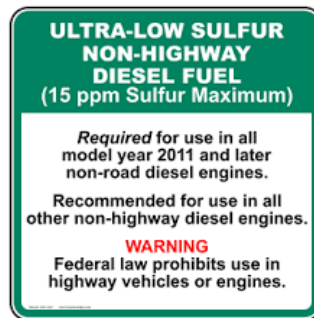
Filter-equipped diesel



+



+



Gas Engine (Euro VI)



Zero Emission  
Electric Drive



electric drive

# Soot-Free Buses 20 Targeted Megacities



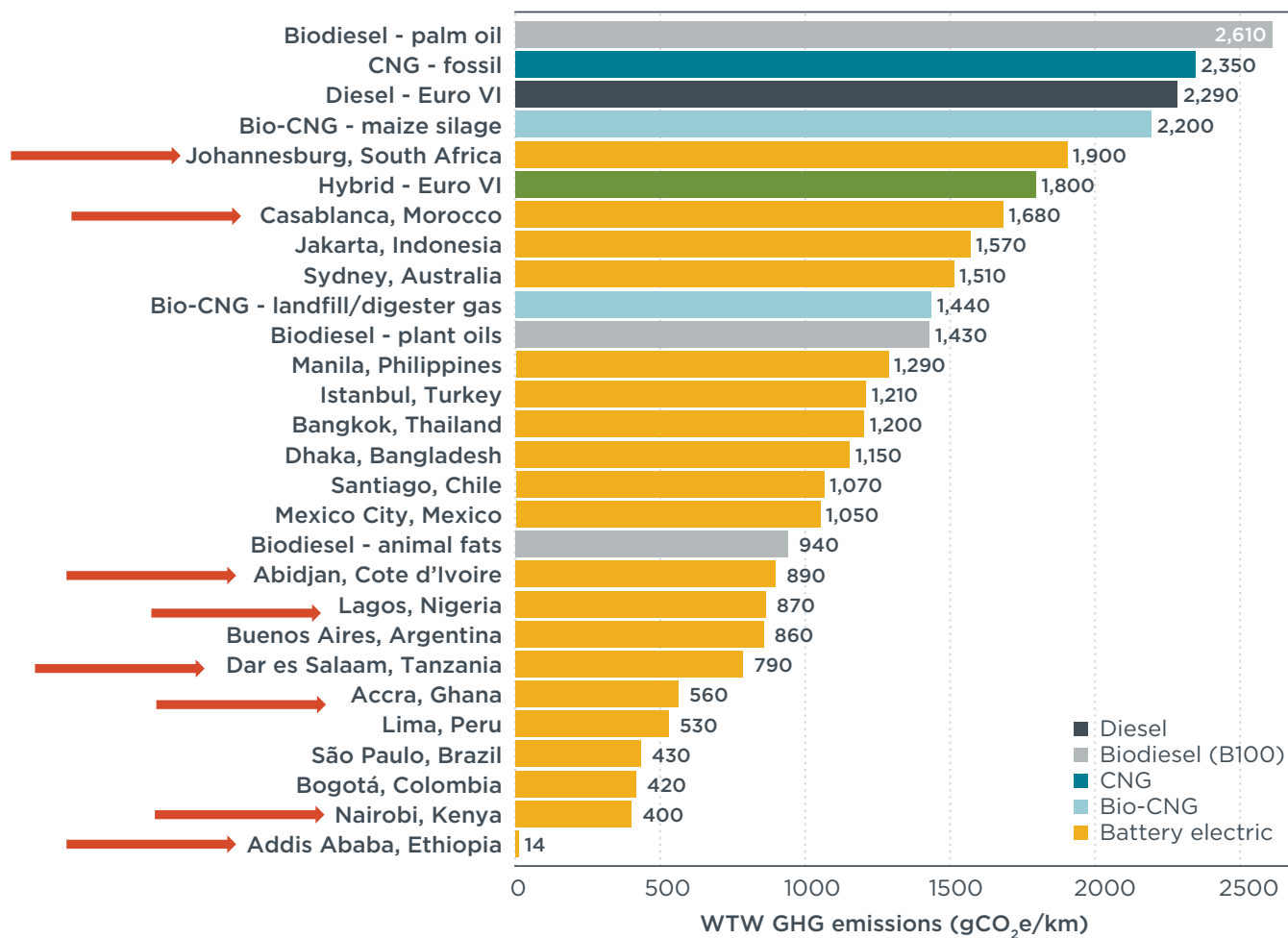
Committed

Commitment Under Development

Not Committed

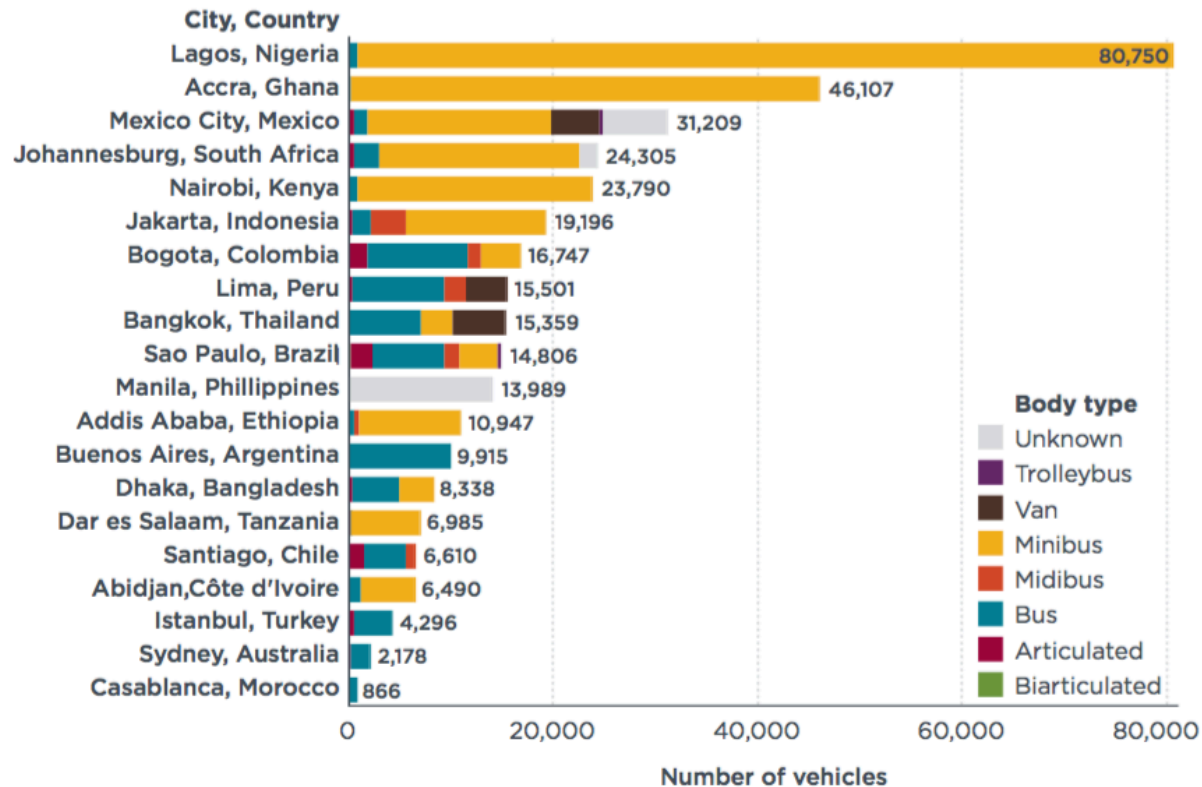
Updated SEP 2017

# 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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# Global Industry Partnership on Soot-Free Clean Bus Fleets



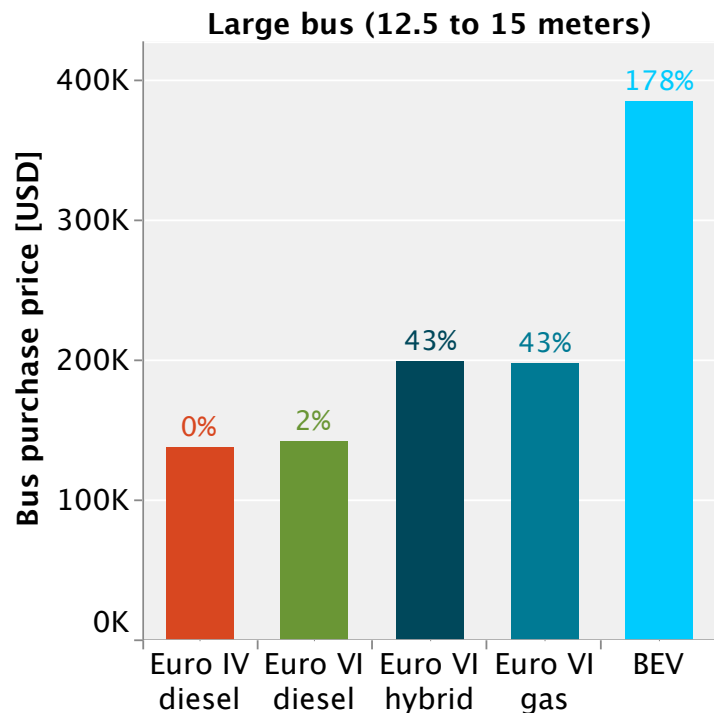
1. **We commit** to make soot-free engine technology available in all 20 targeted cities; where clean fuels are available today, this technology will be available no later than 2018; cities without clean fuels must first make these available.
2. **We commit** to provide to all 20 cities a list of soot-free 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>

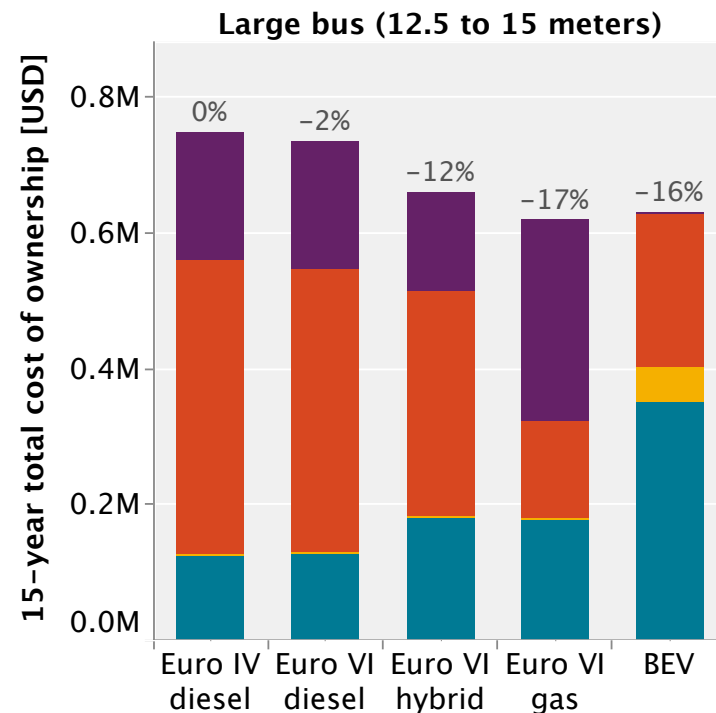


# Total Cost of Ownership Changes the Financing Perspective – e.g. Bangkok, Thailand

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
<b>Multilateral development banks</b>	World Bank; Inter-American-, African-, and Asian Development Banks	Concessional loans, grants, guarantees, <a href="#">results-based</a> financing	Bus and infrastructure acquisition and operations
<b>Climate finance (including for NDCs)</b>	Clean Technology Fund, Green Climate Fund, Global Environment Facility	Concessional loans, grants, guarantees, equity	Incremental cost of low carbon investments
<b>National development banks</b>	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
<b>Export-import banks</b>	<a href="#">OECD list</a> of official export credits agencies; <a href="#">Berne Union</a> association	Loans, guarantees, and insurance to exporters	Supports exporters
<b>Commercial banks</b>	List of <a href="#">10 largest banks</a>	Loans, lease financing, insurance	Largest volume of financing
<b>Manufacturer leasing</b>	<a href="#">Scania</a> , <a href="#">Proterra</a>	Lease financing for bus, infrastructure, or battery;	Partial or full coverage of purchase cost
<b>Specialized leasing companies</b>	Connect through manufacturers		

# Actions to Expand Investment in Soot-Free Bus Technology

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## 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

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## 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>

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

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## INDUSTRY PARTNERSHIP

### **Global Industry Partnership on Soot-Free Clean Bus Fleets**

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



Thank you!