

Global Trends in Sulphur Reduction



Ghana National Low Sulphur Workshop
Jane Akumu - UNEP

3.7 million deaths attributed to outdoor air pollution

58,000 in Americas

200,000 in Europe

236,000 deaths in Eastern Mediterranean

176,000 in Africa

2.6 million in South East Asia and Western Pacific



88% in low-middle income countries

455,000 in high-income countries



Over half of world's population lives in urban areas; **only 12% of cities** have air quality measures that meet **WHO standards**



Ground level ozone impacts food security by **reducing crop yields** by up to **50 million tons** each year



Financial cost of environmentally related **health risks** are in the range of **5%-10% of GDP**, with air pollution taking the highest toll

DISEASES DUE TO:

- O_3
- PM2.5 AIR POLLUTION



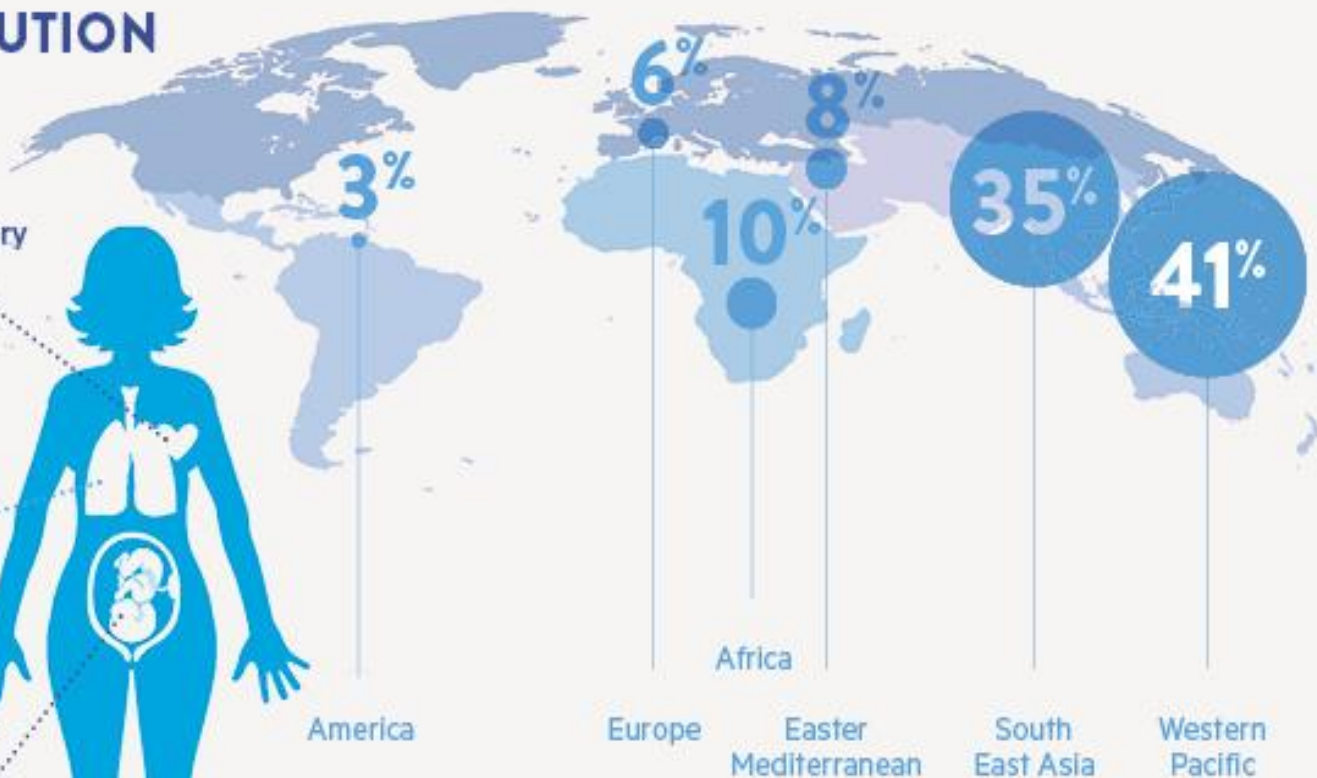
- Chronic obstructive pulmonary disease (COPD)
- Childhood pneumonia
- Ischaemic heart disease
- Stroke



- Asthma
- Breathing problems
airway inflammation
- Chronic respiratory illness
- Reduced lung function

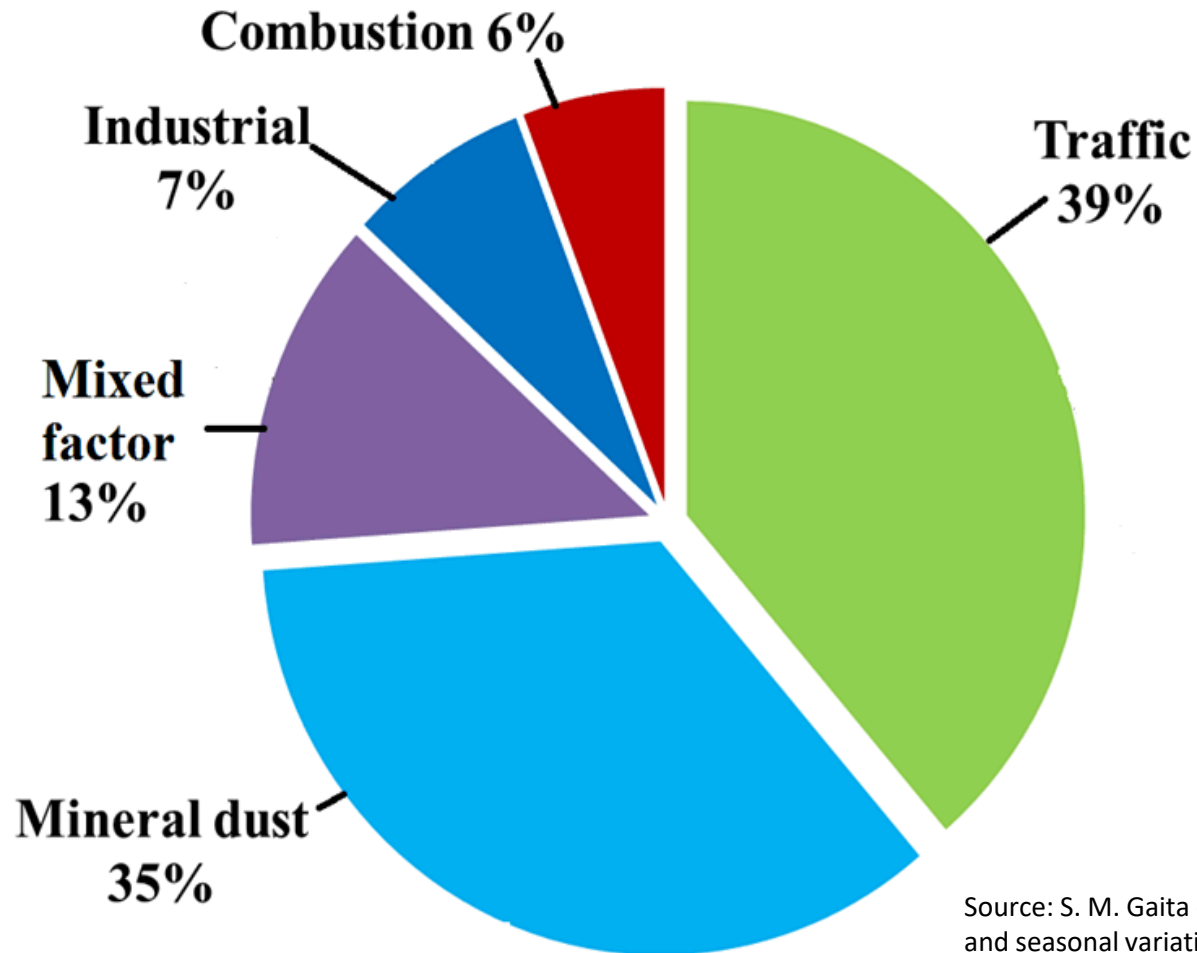


- Low birth weight



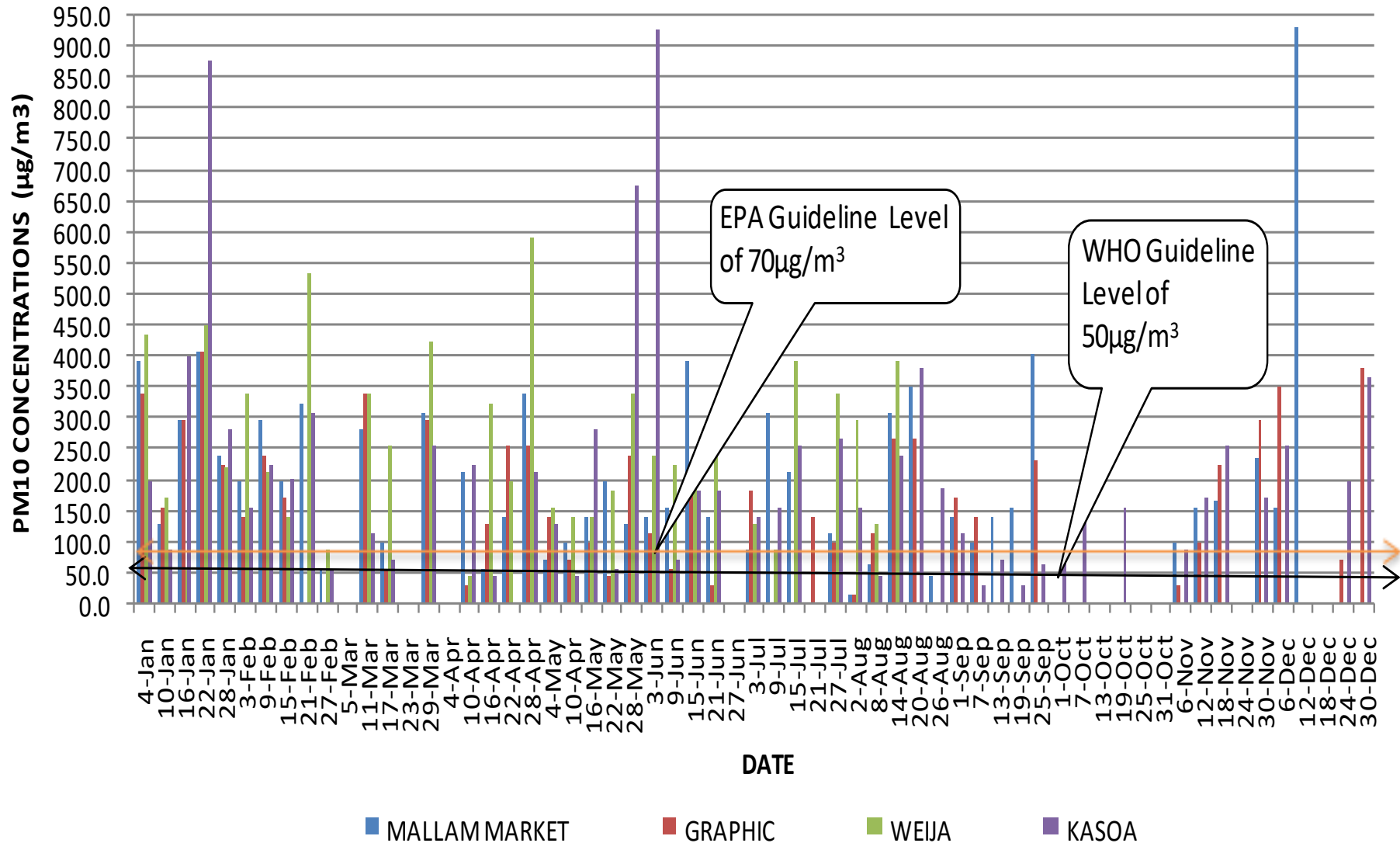
APPROXIMATE SHARE OF PREMATURE DEATH FROM **AIR POLLUTION** (YEAR 2012)

Main Sources of PM in Nairobi



OECD Dev Centre: Economic loss of Ambient PM pollution in 2013 estimated at 2.2 billion USD in Kenya and 5 billion USD in Ghana

**FIG1. PM10 CONCENTRATIONS ($\mu\text{g}/\text{m}^3$) RECORDED ALONG THE PROPOSED BRT ROUTE:
JAN - DEC 2014**



Paris drives old cars off its streets

Life | Fri Jul 1, 2016 8:33am

Paris banned old, exhaust-belching cars from its streets on Friday in a war on air pollution that environmentalists hope will also drive dirty vehicles from the centers of other European cities.

Air pollution, in large part caused by fine particulate fuel emissions, kills 48,000 people each year in France, some 400,000 in Europe and around 3.7 million worldwide, data published by France's public health agency this month showed.

Any car registered before Jan. 1, 1997, will be barred from the city's streets from Monday to Friday, from 8 a.m. to 8 p.m.

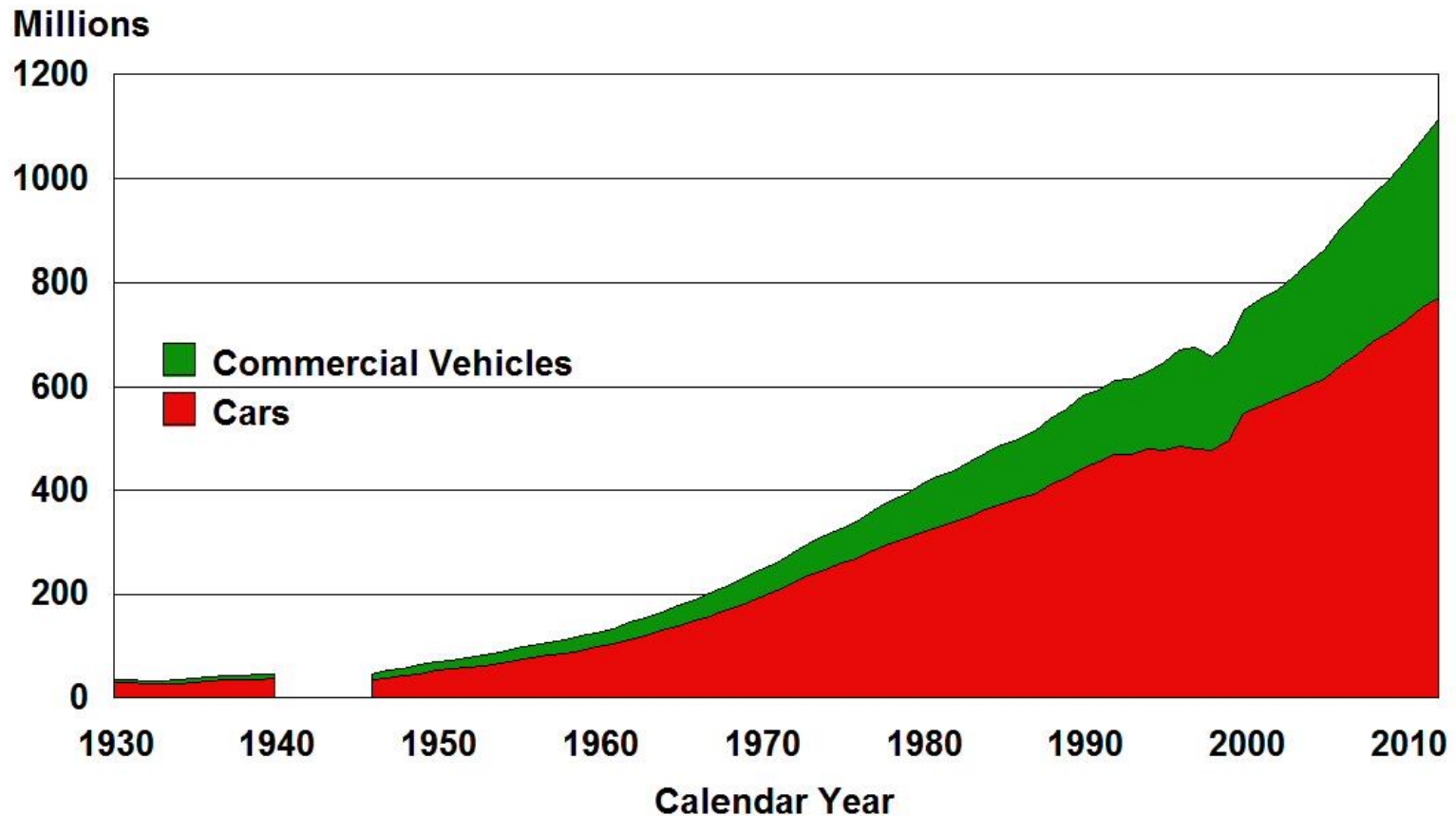
Some owners protested by parking their vehicles near the National Assembly and Champs Elysees avenue to denounce a ban they say will hurt poor people most and slash the resale value of their vehicles...

Paris Mayor Anne Hidalgo says the ban could be extended in 2020 to all combustion-engine cars more than nine years old.

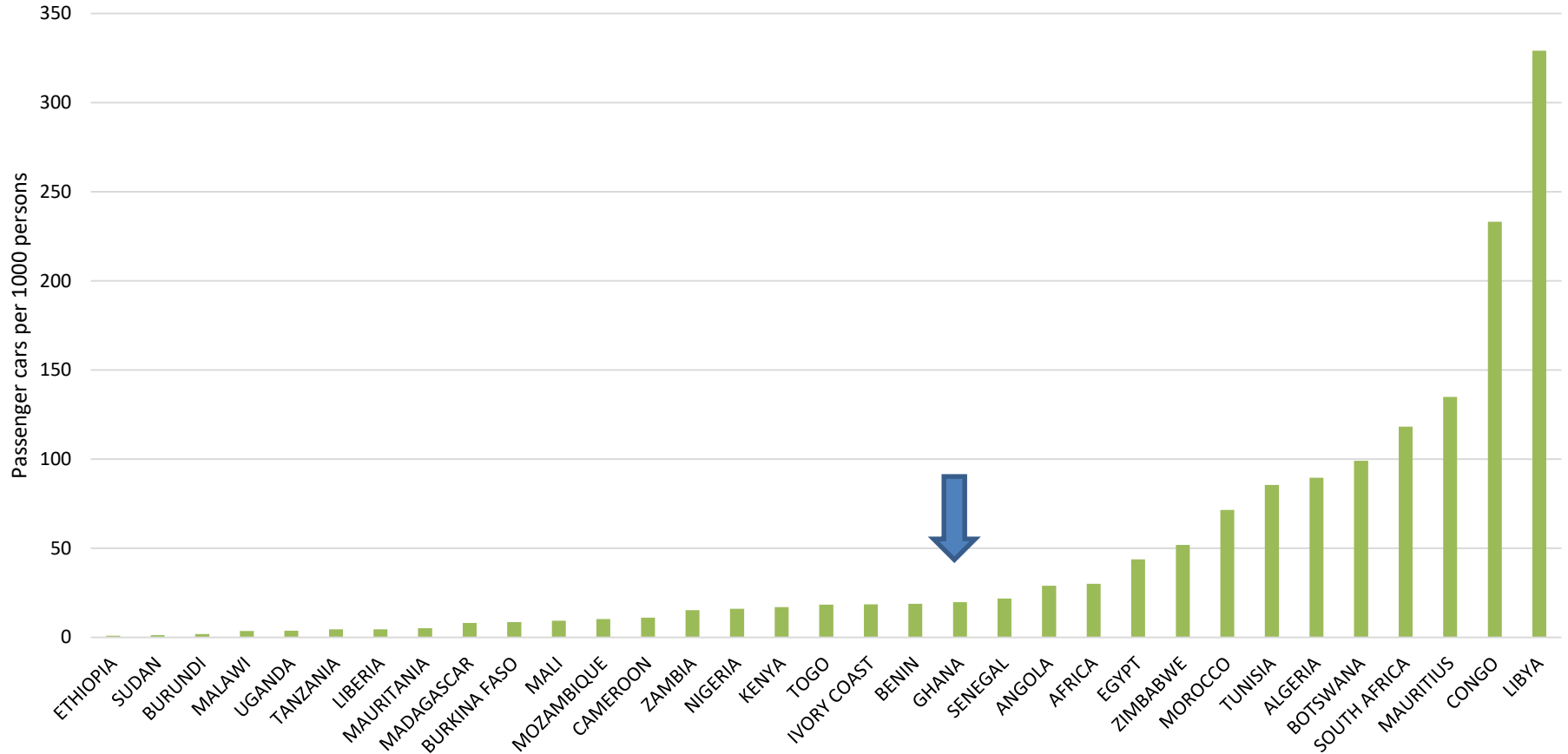
Norway is planning to ban petrol- and diesel-fueled cars from 2025 and several cities in Europe are testing various anti-pollution or anti-congestion measures based on tolls for city center access or temporary and selective car bans during surges in pollution levels.



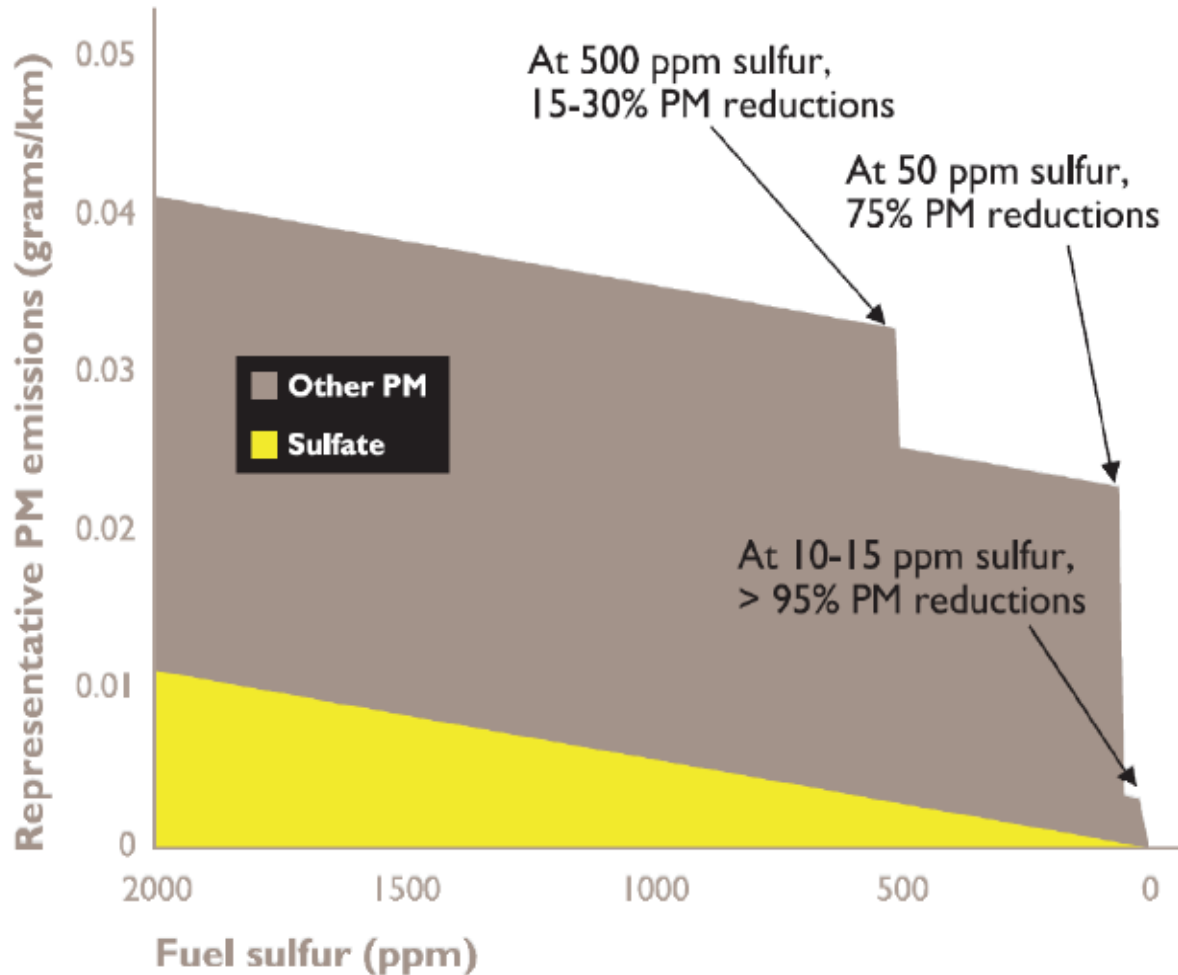
World Population of Cars, Trucks and Buses



Motorization in Africa

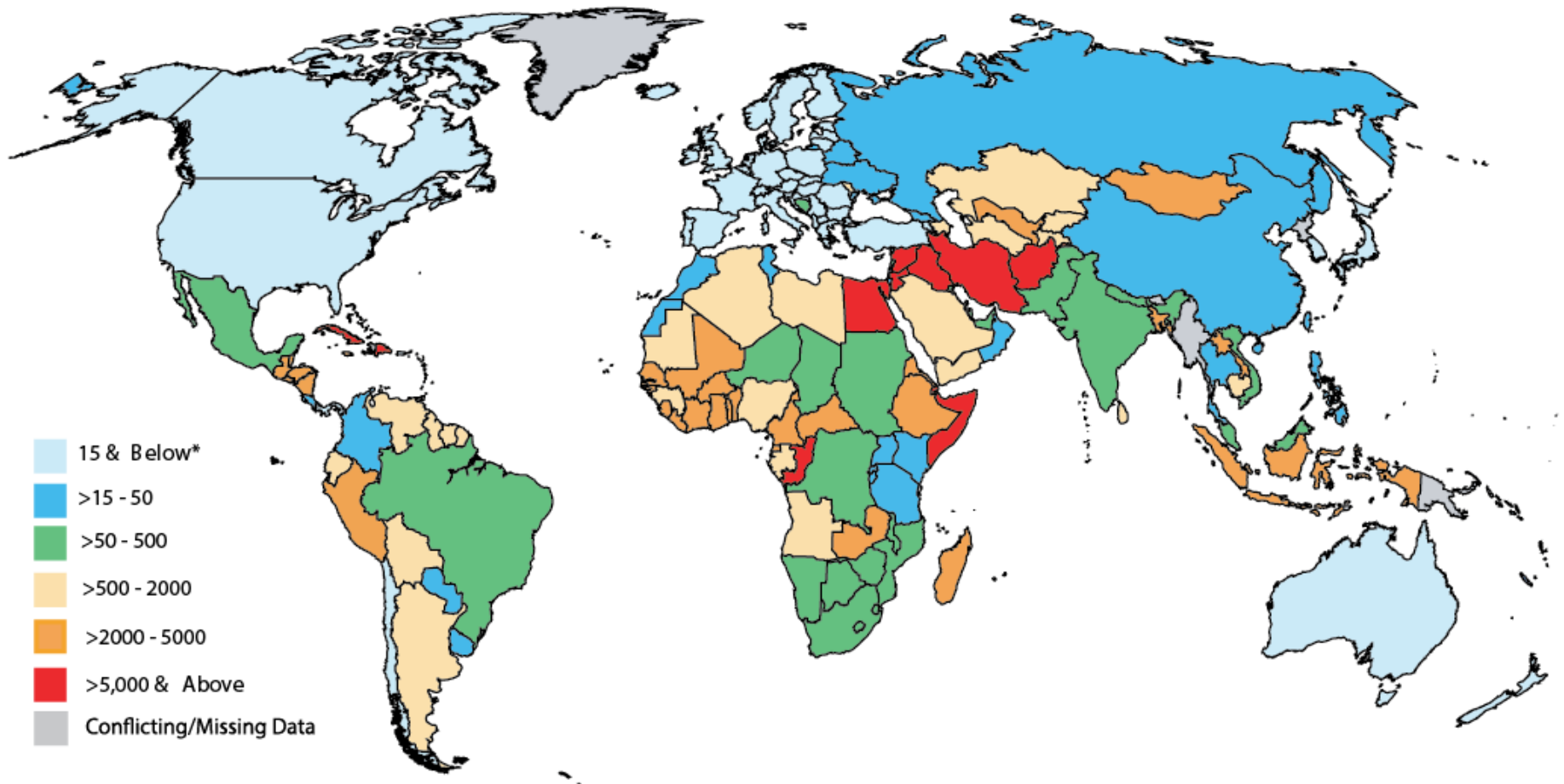


Lowering sulphur reduces vehicle emissions



Sulphur levels proportional to PM and SO₂ emissions in all cars - new and old cars

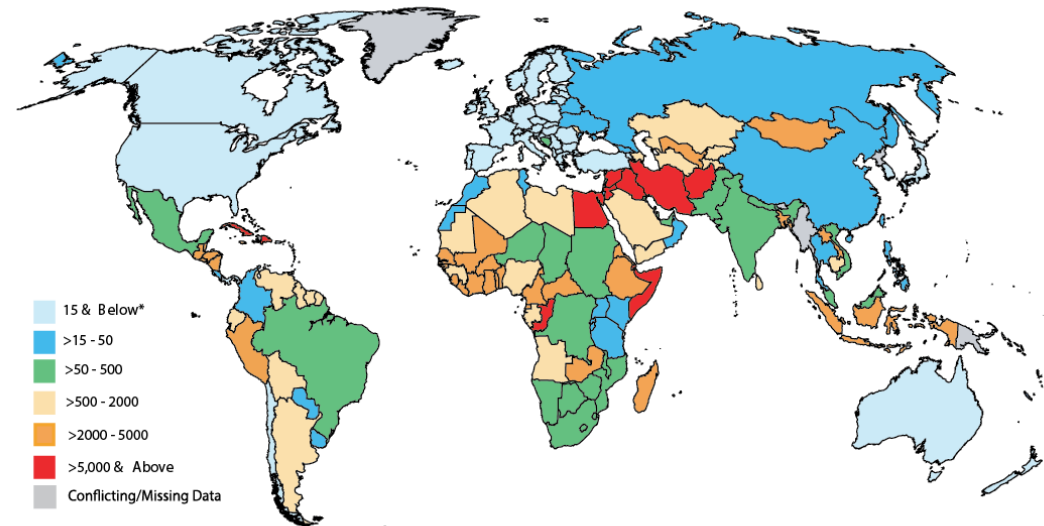
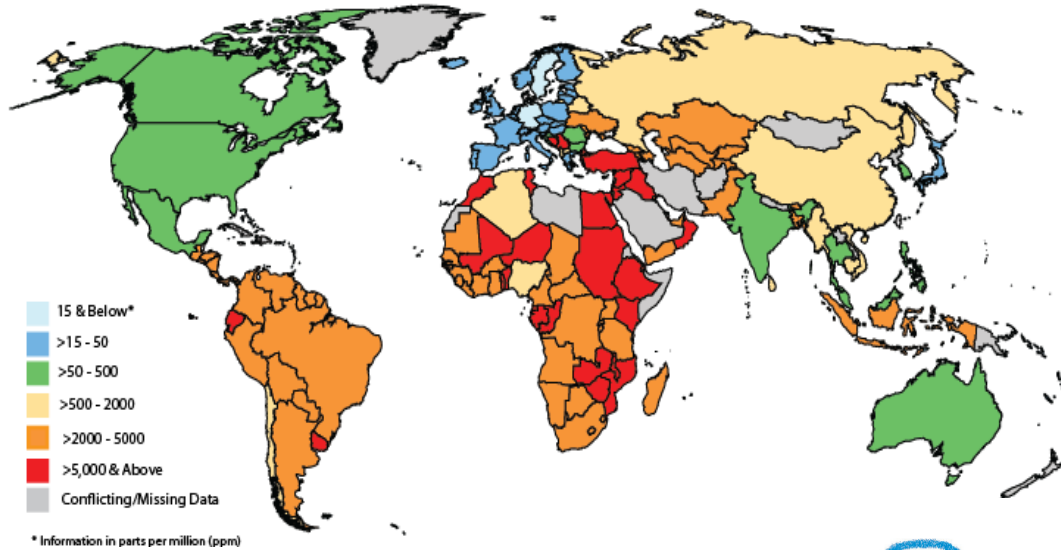
Diesel Fuel Sulphur Levels: Global Status June 2016



* Information in parts per million (ppm)

For additional details and comments per country, visit www.unep.org/transport/pcf/

Global Low Sulphur Diesel Progress: 2005 and 2016



* Information in parts per million (ppm)

For additional details and comments per country, visit www.unep.org/transpo/rt/pcf/v/

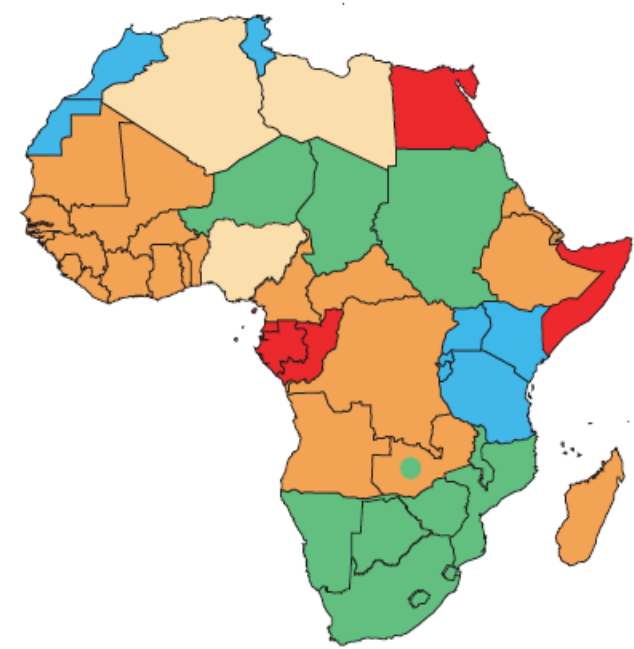
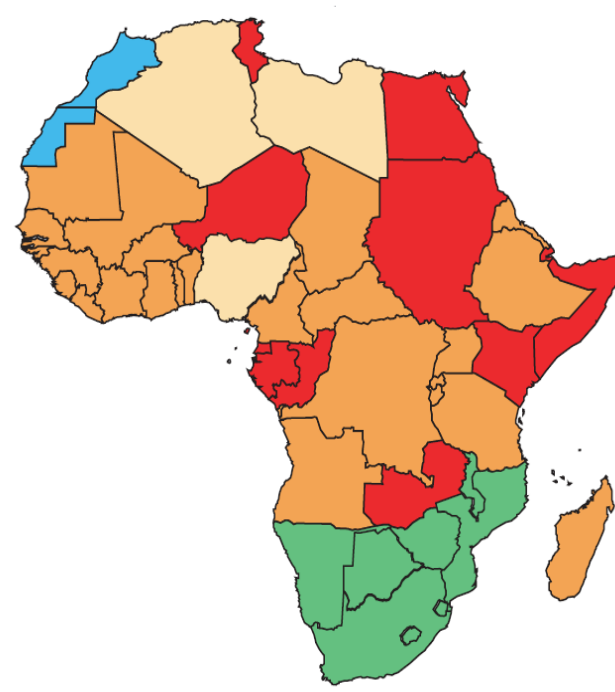
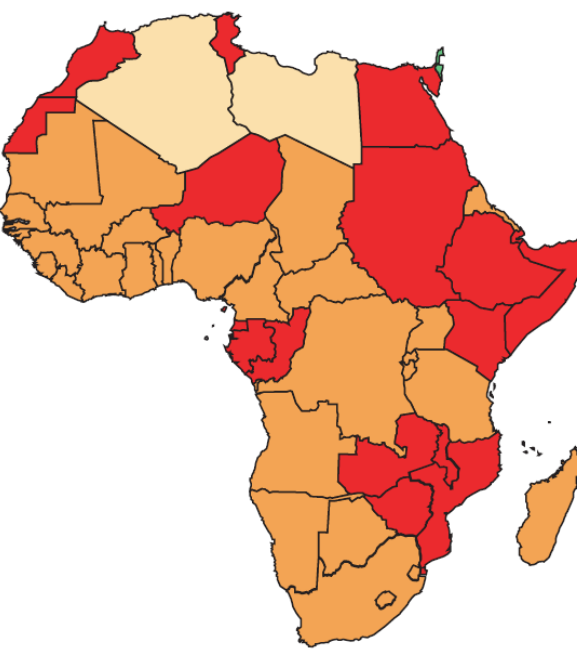
- 24 countries have moved to 50 ppm and below
- In Africa 8 countries
- More countries have lowered sulphur levels
- More cities at 50 ppm

Progress in Lowering Sulphur in Diesel in Africa

2002

February 2009

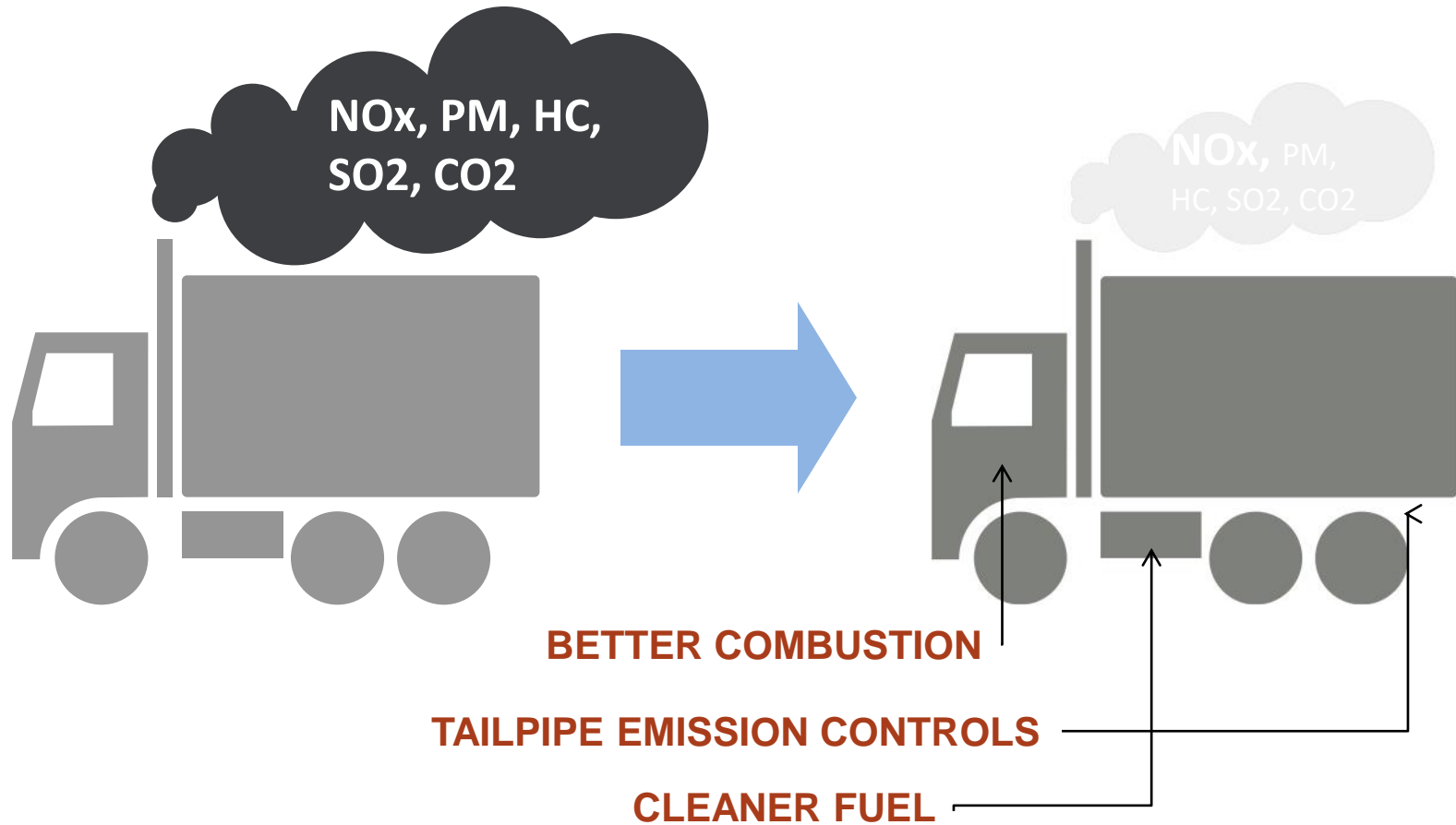
2016



- 15 & Below*
- >15 - 50
- > 50 - 500
- > 500 - 2000
- > 2000 - 5000
- > 5,000 & Above

* Information in parts per million (ppm)

Fuels & Vehicles: A Systems Approach

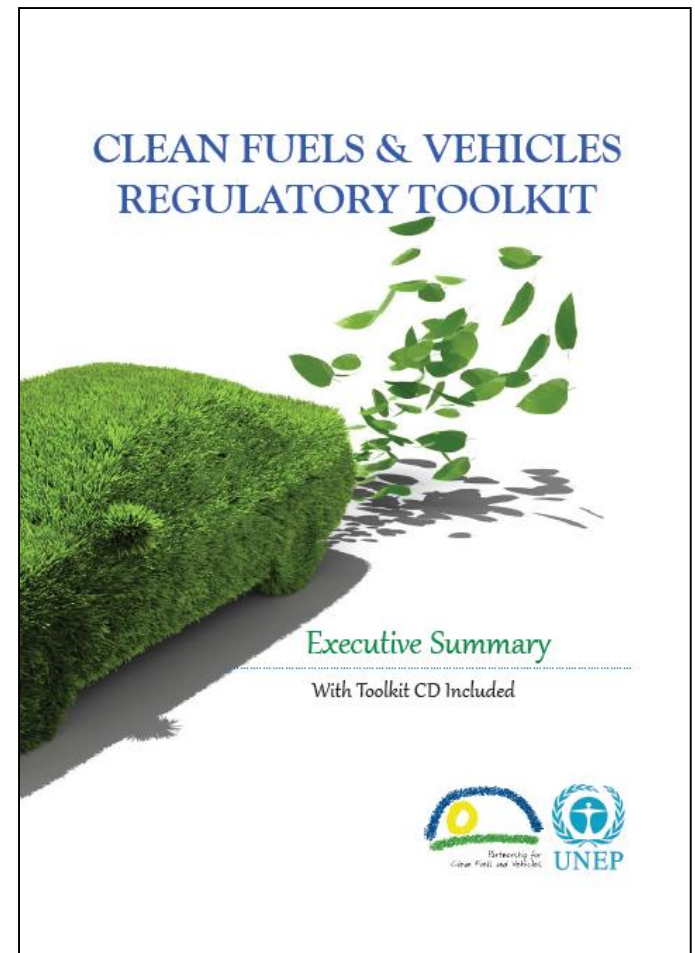


Fuel quality: Low sulphur in fuels

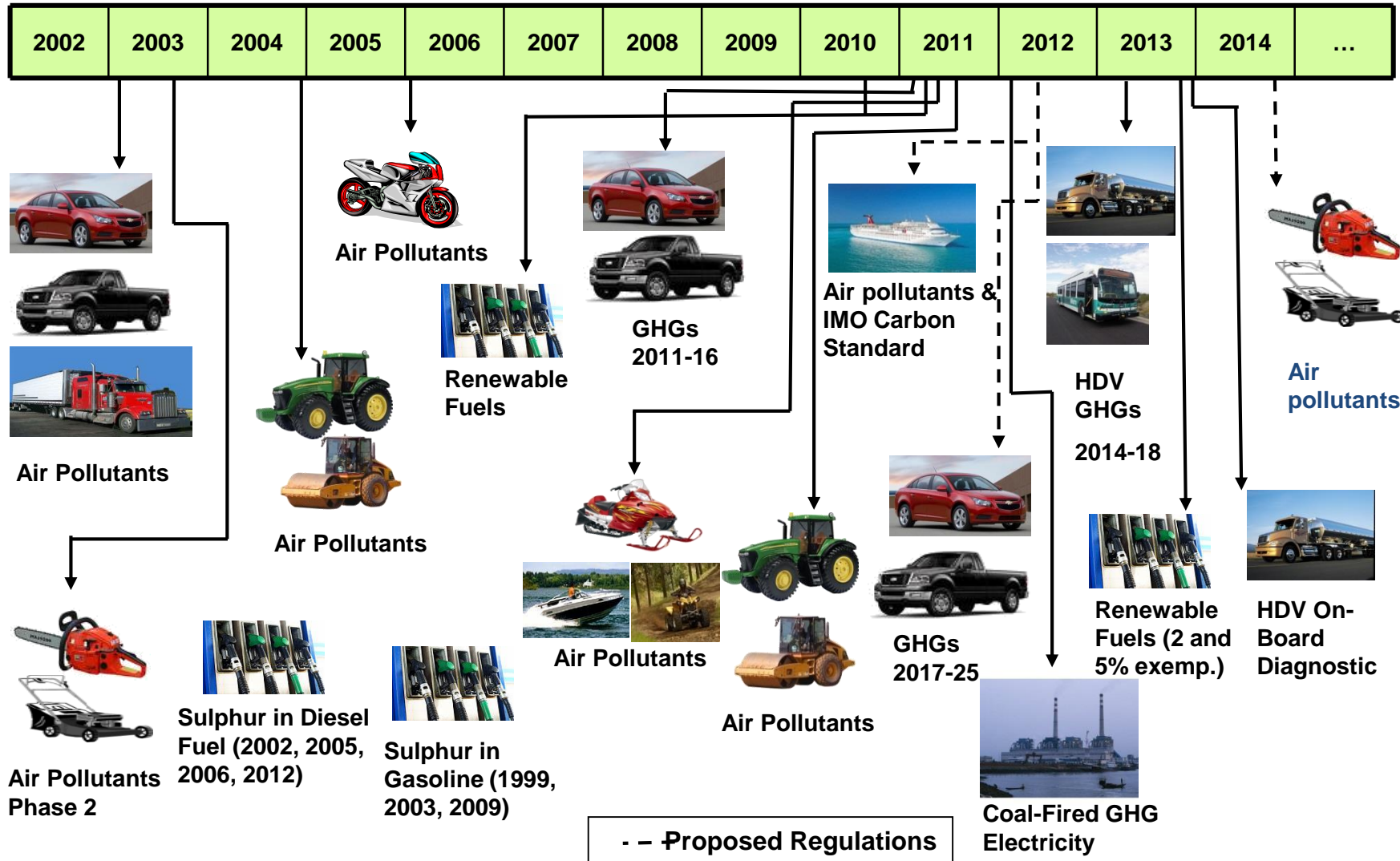
Vehicle emission standards: Euro 4/IV and above

Fuels & vehicles: a systems approach

- Systems approach links fuel quality to vehicles emission standards for max emission reduction benefits
- Fuels and vehicles not matching thus potential emissions reductions not achieved
- Continued support to countries to develop long term roadmaps to reduce vehicle emissions
- Support for I & M programs



Canadian Vehicles and Fuel Quality Regulations



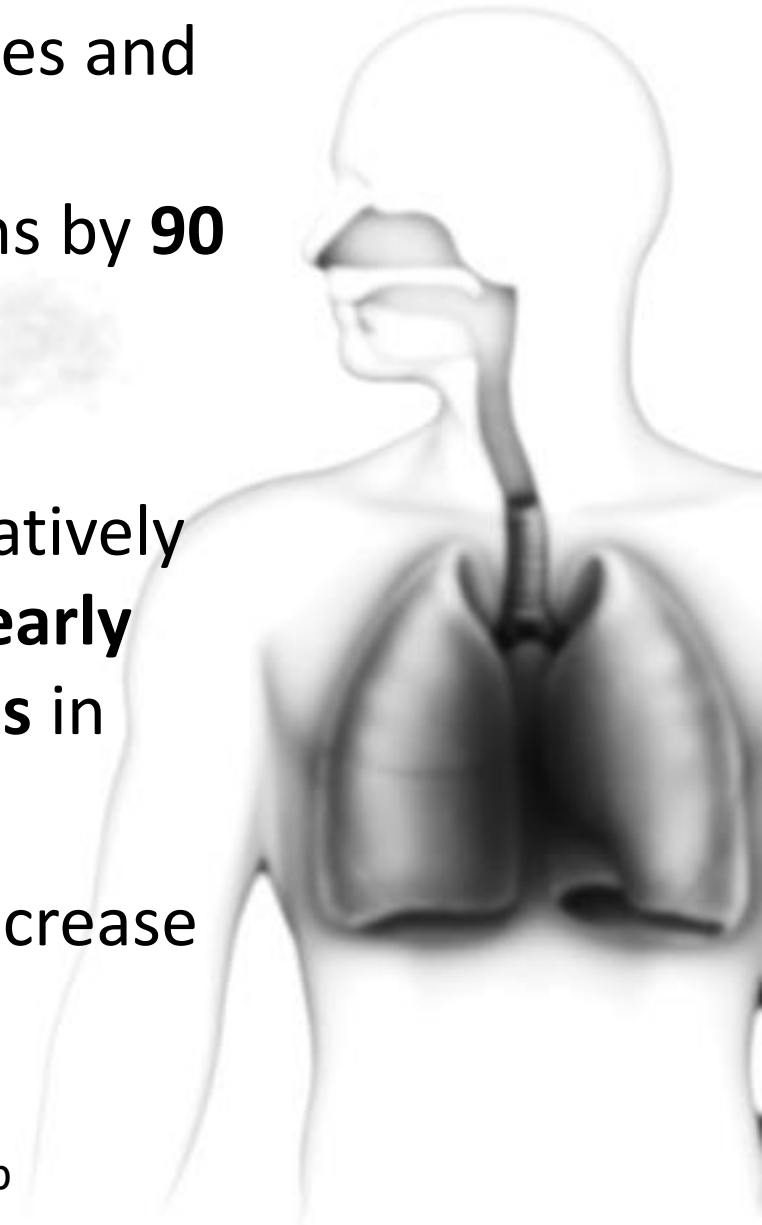
Summary of Euro Stages and Fuel Quality Standards in Europe - Timelines⁶⁷

Vehicle Emissions Standards			Fuel Quality	
Year	Light Duty	Heavy Duty	Year	Main Change in Properties
1980-90	Pre-Euro 1		1976-80	Sulfur and lead gradually reduced
1988		Euro 0	1989	Benzene (5%) and octane start to be regulated
1992		Euro I		
1993	Euro 1		1994	Further Sulfur reduction
1995		Euro II	1996	
1996	Euro 2			
2000	Euro 3	Euro III	2000	Directive 98/70/EC No Lead in gasoline Sulfur in gasoline 150 ppm, in diesel 350 ppm Aromatics, Octane, oxygen, olefins, benzene limits
2005	Euro 4	Euro IV	2005	Sulfur in gasoline and diesel 50 ppm (availability of 10 ppm must be ensured) Aromatics lowered
2008		Euro V		
2009	Euro 5		2009	10 ppm gasoline and diesel
2011			2011	E10 introduced
2013		Euro VI		
2014	Euro 6			

Source: Derived from IFQC

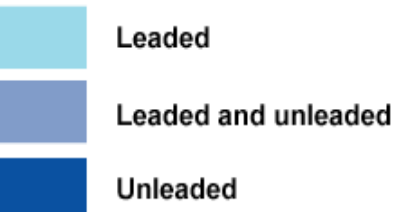
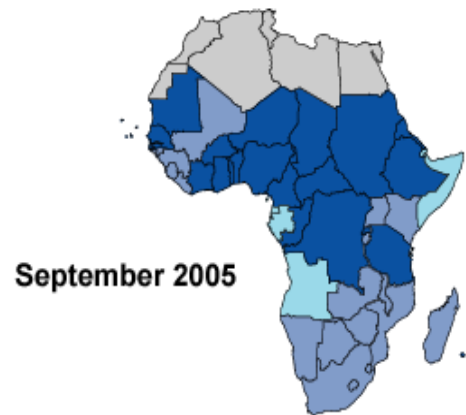
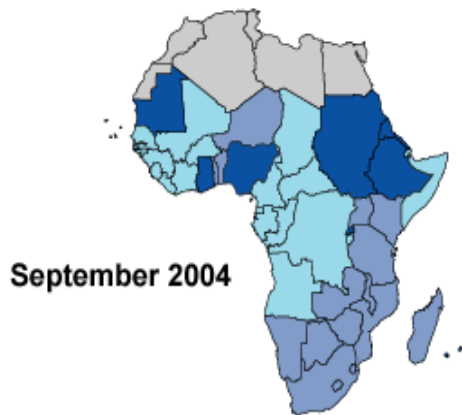
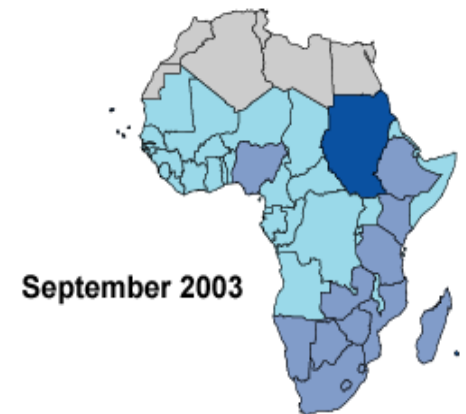
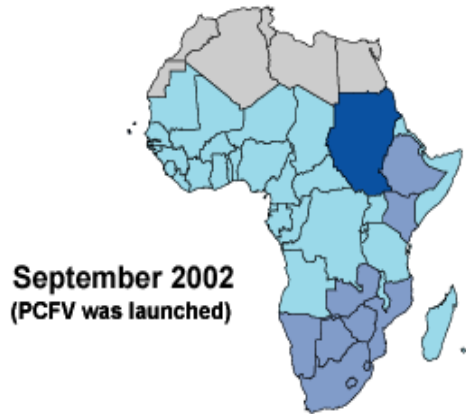
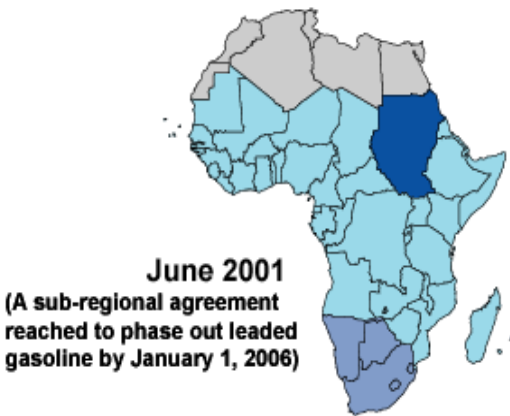
A global transition to Euro 6/VI vehicles and 10 ppm fuels by 2030 would:

- reduce global vehicle PM emissions by **90 percent** and **total adverse health outcomes by 75 percent** (from 2000 levels)
- save 25 million years of life cumulatively (4.4 million in Africa) and **reduce early deaths by more than 210,000 lives** in cities
- *despite* a projected 150 percent increase in vehicle activity.

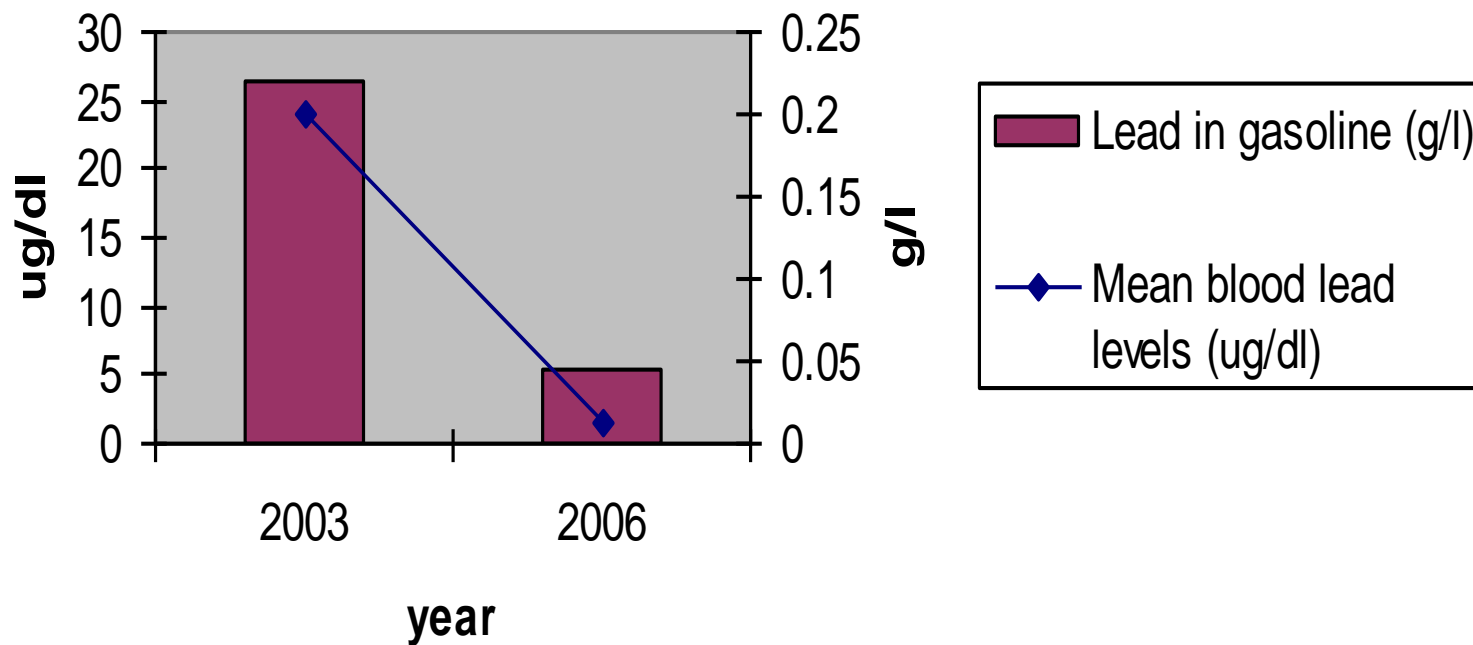




Progress of leaded petrol phase out in sub-Saharan Africa



Drop in blood lead level in Ghana after phasing out leaded gasoline in 2004



Support to West Africa/ECOWAS

- West Africa consists of 15 countries: No country has low sulphur fuels
- Nigeria has Euro 2 vehicle emission standards
- Collaborating with the Economic Community of West African States (ECOWAS)
- Regional workshop held in May 2015 that come up with a recommended low sulphur strategy for the sub-region including air quality monitoring
- Sub-regional for Nigeria and neighboring countries in June 2016
- Sub-regional Ministerial follow up meeting planned 1 December 2016





Diesel



Oil & Gas



Waste



Bricks



HFCs



Cookstoves



Agriculture



SNAP



Finance



Assessments



Urban Health



Diesel

Heavy Duty Diesel Initiative

“...substantial reductions of fine particulate matter and black carbon emissions from heavy duty diesel vehicles...through adoption of clean fuel and vehicle regulations and supporting policies.”

- Low sulfur fuels and HDV standards to match fuels worldwide
- Marine vessels (coast, in-land and Arctic)
- Clean Ports
- Green Freight
- Cities: Soot-Free Urban Buses



Soot free Buses

- A 2008 study of the Metrobús BRT corridor in Mexico City shows that between 2005 and 2015, the Metrobús will reduce on average 144 tons of total hydrocarbons, 690 tons of oxides of nitrogen, 2.8 tons of fine particulate matter, and 1.3 tons of sulfur dioxide annually
- These emissions reductions avoid an average of 6100 work loss days, 660 restricted activity days, 12 new cases of chronic bronchitis, and 3 deaths annually, all resulting in US\$3 million in health benefits each year
- Travel time saved during peak hours is over 2 million hours per year, with an economic value of US\$1.3 million



Technology options: Overview



Diesel



LPG and CNG



Hybrid



Battery



Trolley



Capacitor



Fuel cell

Next steps to sustainable transport

**Vehicle emission standards (Euro 4)
with matching fuel quality**



Clean soot free buses esp for BRT (Euro IV and above)

Fuel economy vehicles (fiscal policies and consumer awareness)



NMT policies and infrastructure



UNEP's TRANSPORT WORK

Transport affects everyone, every day. The Transport sector is a major contributor to air pollution and climate emissions, impact set to increase with an expected tripling of the global car fleet. UNEP's work is aimed at decoupling increased mobility from increased emissions. UNEP is a partner in several leading global transport programs in areas such as fuel economy, small particulate pollution and infrastructure development, implemented through public-private partnerships.

<p>Partnership for Clean Fuels & Vehicles (PCFV)</p> <p>Improving urban air quality through cleaner fuels and vehicles</p> <p>Read More >></p>	<p>Global Fuel Economy Initiative (GFEI)</p> <p>Promoting vehicle fuel efficiency in developing and transitional countries</p> <p>Read More >></p>	<p>Share The Road (STR)</p> <p>Promoting Investment in walking and cycling infrastructure</p> <p>Read More >></p>	<p>Africa Sustainable Transport Forum (ASTF)</p> <p>Developing Africa's first sustainable transport action plan</p> <p>Read More >></p>	<p>Global Clean Ports Project</p> <p>Reducing air pollution from ports in developing and transitional countries</p> <p>Read More >></p>
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