3.7 million deaths attributed to outdoor air pollution

- 200,000 deaths in Europe
- 236,000 deaths in Eastern Mediterranean
- 176,000 deaths in Africa
- 2.6 million deaths in South East Asia and Western Pacific
- 58,000 deaths in Americas

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](https://www.who.int/)

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:

- O₃
- PM2.5 AIR POLLUTION

- Chronic obstructive pulmonary disease (COPD)
- Childhood pneumonia
- Ischaemic heart disease
- Stroke
- Asthma
- Breathing problems
- Chronic respiratory illness
- Reduced lung function
- Low birth weight

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

- America: 3%
- Africa: 6%
- Eastern Mediterranean: 8%
- South East Asia: 35%
- Western Pacific: 41%
Main Sources of PM in Nairobi

- **Traffic** 39%
- **Mineral dust** 35%
- **Mixed factor** 13%
- **Industrial** 7%
- **Combustion** 6%

Source: S. M. Gaita et al.: Source apportionment and seasonal variation of PM2.5 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 (µg/m³) RECORDED ALONG THE PROPOSED BRT ROUTE:
JAN - DEC 2014

WHO Guideline Level of 50µg/m³

EPA Guideline Level of 70µg/m³
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

Source: Mike Walsh
Motorization in Africa

Passenger cars per 1000 persons

- Ethiopia
- Sudan
- Burundi
- Malawi
- Uganda
- Tanzania
- Liberia
- Mauritania
- Madagascar
- Burkina Faso
- Mali
- Mozambique
- Cameroon
- Zambia
- Nigeria
- Kenya
- Togo
- Benin
- Ghana
- Senegal
- Angola
- Africa
- Egypt
- Zimbabwe
- Morocco
- Tunisia
- Algeria
- Botswana
- South Africa
- Mauritius
- Congo
- Libya
Lowering sulphur reduces vehicle emissions

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

Source: ICCT
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/pcfv/
24 countries have moved to 50 ppm and below
In Africa 8 countries
More countries have lowered sulphur levels
More cities at 50 ppm
Fuels & Vehicles: A Systems Approach

- Better combustion
- Cleaner fuel
- Tailpipe emission controls

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

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<tr>
<th>Year</th>
<th>Air Pollutants</th>
<th>GHGs</th>
<th>Air pollutants &amp; IMO Carbon Standard</th>
<th>HDV On-Board Diagnostic</th>
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<td>Air Pollutants</td>
<td>GHGs 2011-16</td>
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<td>2014</td>
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- Renewable Fuels (2 and 5% exemp.)
- Proposed Regulations
- Coal-Fired GHG Electricity
<table>
<thead>
<tr>
<th>Year</th>
<th>Light Duty</th>
<th>Heavy Duty</th>
<th>Year</th>
<th>Main Change in Properties</th>
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<tbody>
<tr>
<td>1980-90</td>
<td>Pre-Euro 1</td>
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<td>1976-80</td>
<td>Sulfur and lead gradually reduced</td>
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<td>1988</td>
<td>Euro 0</td>
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<td>1989</td>
<td>Benzene (5%) and octane start to be regulated</td>
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<tr>
<td>1992</td>
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<td></td>
<td>No Lead in gasoline</td>
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<td></td>
<td>Sulfur in gasoline 150 ppm, in diesel 350 ppm</td>
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<td></td>
<td>Aromatics, Octane, oxygen, olefins, benzene limits</td>
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<tr>
<td>2005</td>
<td>Euro 4</td>
<td>Euro IV</td>
<td>2005</td>
<td>Sulfur in gasoline and diesel 50 ppm (availability of 10 ppm</td>
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<td>must be ensured)</td>
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<td>Aromatics lowered</td>
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<td>2008</td>
<td>Euro V</td>
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<tr>
<td>2009</td>
<td>Euro 5</td>
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<td>2009</td>
<td>10 ppm gasoline and diesel</td>
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<tr>
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<tr>
<td>2014</td>
<td>Euro 6</td>
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</table>

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.

ICCT 2013: http://www.theicct.org/global-health-roadmap
Drop in blood lead level in Ghana after phasing out leaded gasoline in 2004

![Graph showing the drop in blood lead levels in Ghana after phasing out leaded gasoline in 2004. The graph compares lead in gasoline (g/l) and mean blood lead levels (ug/dl) over the years 2003 and 2006.]
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
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, impacting the environment and human health. 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.

www.unep.org/ccac
www.unep.org/transport

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