

# Global Progress Toward Soot-Free Diesel Vehicles

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International Council on Clean Transportation*

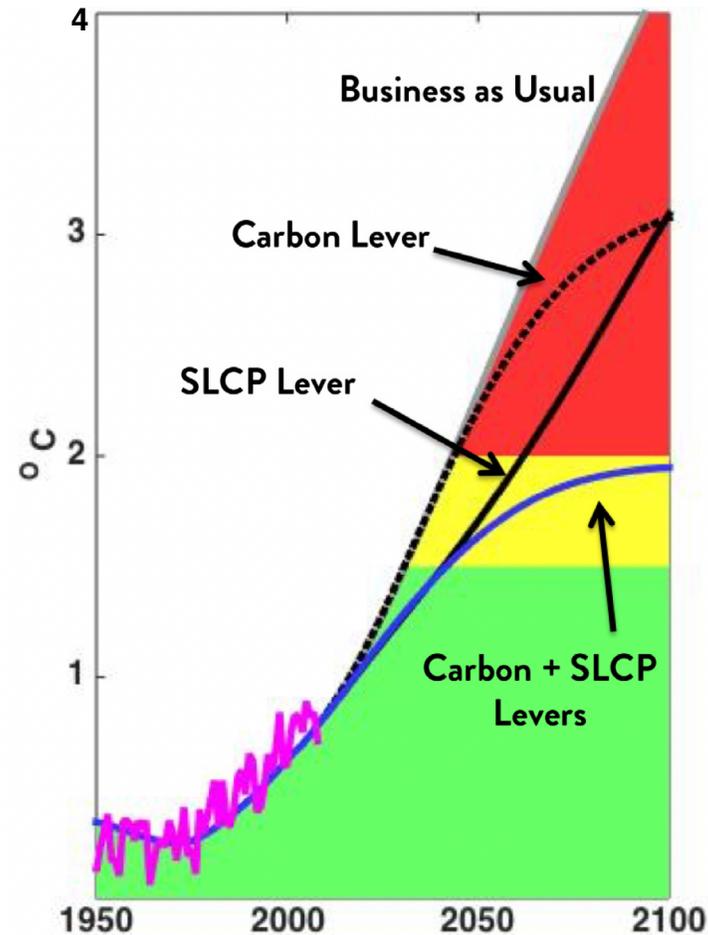
**Implementing Euro 4/IV and Developing a  
Roadmap to Euro 6/VI in Asia**

14 November 2018



# Immediate actions to reduce short-lived climate pollutant emissions are necessary to secure a sustainable future.

“We must act now, and we must act fast. Reduction of SLCPs will result in fast, near-term reductions in warming, while present-day reductions of CO<sub>2</sub> will result in long-term climate benefits. This two-lever approach—aggressively cutting both SLCPs and CO<sub>2</sub>—will slow warming in the coming decades when it is most crucial to avoid impacts from climate change as well as maintain a safe climate many decades from now.”



**SLCP**, short-lived climate pollutants:

- black carbon (BC)
- methane (CH<sub>4</sub>)
- tropospheric ozone
- hydrofluorocarbons (HFCs)

V. Ramanathan, M. L. Molina, and D. Zaelke (2017). Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change

# The CCAC Heavy-Duty Vehicles Initiative is working to reduce diesel black carbon emissions to achieve climate and health benefits.

- 2012** ○ CCAC launches the Heavy-Duty Vehicles (HDV) Initiative.
- 2016** ○ HDV Initiative releases a global strategy for low-sulfur fuels and cleaner diesel vehicles.
  - 36 countries endorse the strategy at the High Level Assembly of the CCAC in Marrakech.
- 2018** ○ **HDV Initiative releases the first of two annual assessments to monitor progress toward implementing the global strategy.**
- 2019** ○ HDV Initiative to release the second report on global progress toward soot-free vehicles.



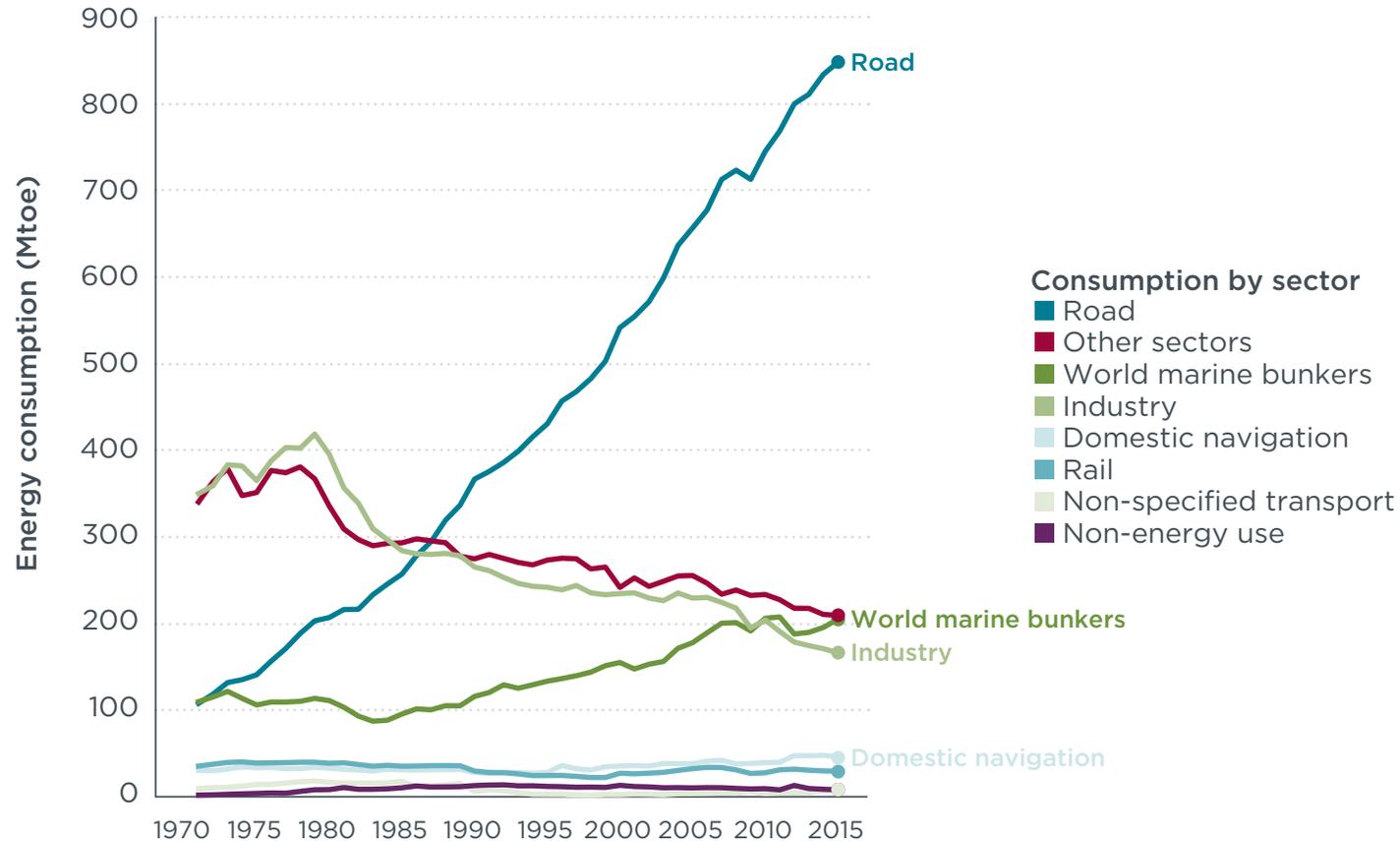
# Scope of analysis for this assessment

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- About 200 individual countries covering 99.8% of world population
- Diesel on-road vehicles divided into six vehicle types
  - Passenger cars, light commercial vehicles, three-wheeled vehicles
  - Buses and minibuses, medium-duty trucks, heavy-duty trucks
- Bottom-up fleet characterization
  - Sales, stock, vehicle activity, energy use, CO<sub>2</sub> and non-CO<sub>2</sub> pollutants
  - By model year, calendar year, vehicle type, country
- Policy impacts
  - New vehicle standards, used import restrictions, fuel sulfur standards
  - Focus on black carbon emissions and non-CO<sub>2</sub> temperature impacts

# Diesel fuel consumption in road transport has grown eightfold since 1970.

World diesel fuel consumption, 1970-2015 (Mtoe)

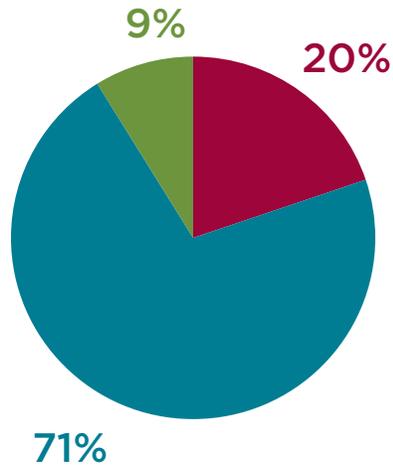


Includes gas/diesel oil and fuel oil. Mtoe, million tonnes of oil equivalent.  
Based on IEA data from the World Energy Balances Data Service © OECD/IEA 2017, [www.iea.org/statistics](http://www.iea.org/statistics).  
Licence: [www.iea.org/t&c](http://www.iea.org/t&c); as modified by ICCT.

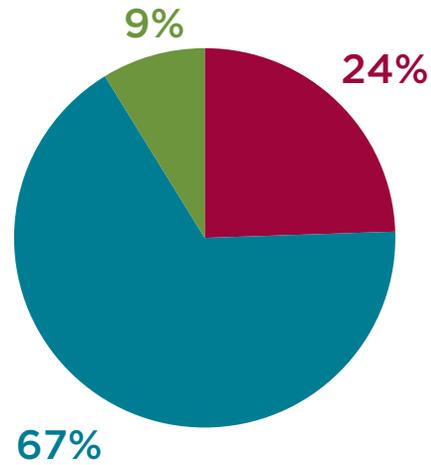
# One quarter of diesel vehicles worldwide are HDVs, but three quarters of on-road diesel consumption and BC emissions are from HDVs.

## Global diesel vehicle sales, stock, energy consumption, and black carbon emissions in 2017

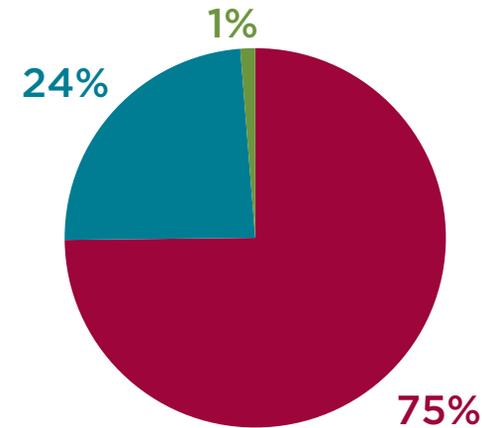
New diesel vehicle sales  
~24 million vehicles



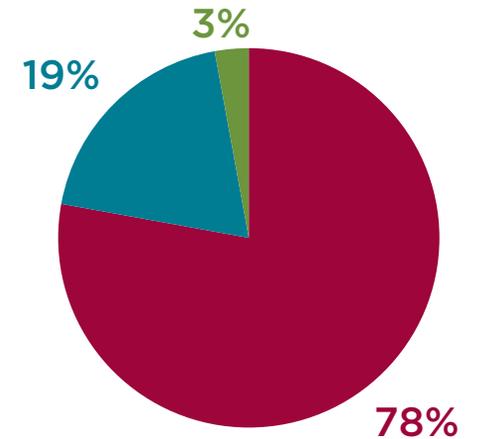
Diesel vehicle stock  
~350 million vehicles



Energy consumption  
~900 Mtoe



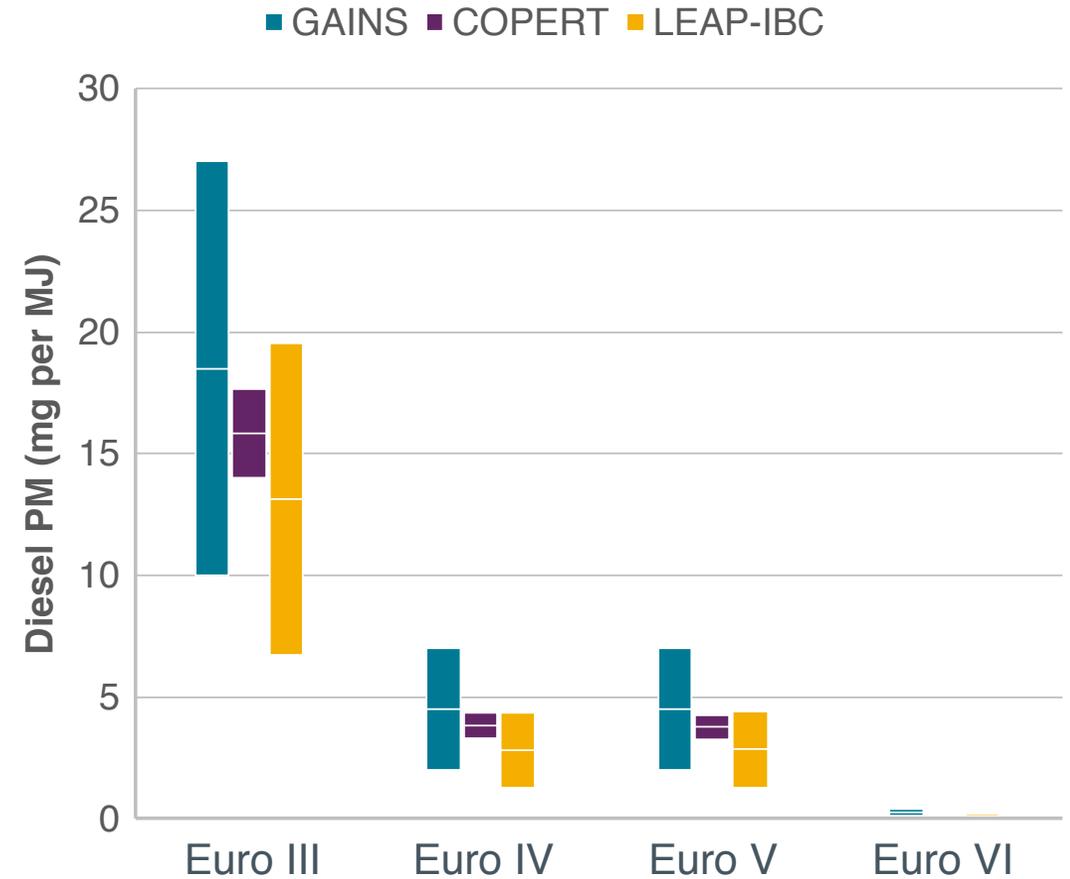
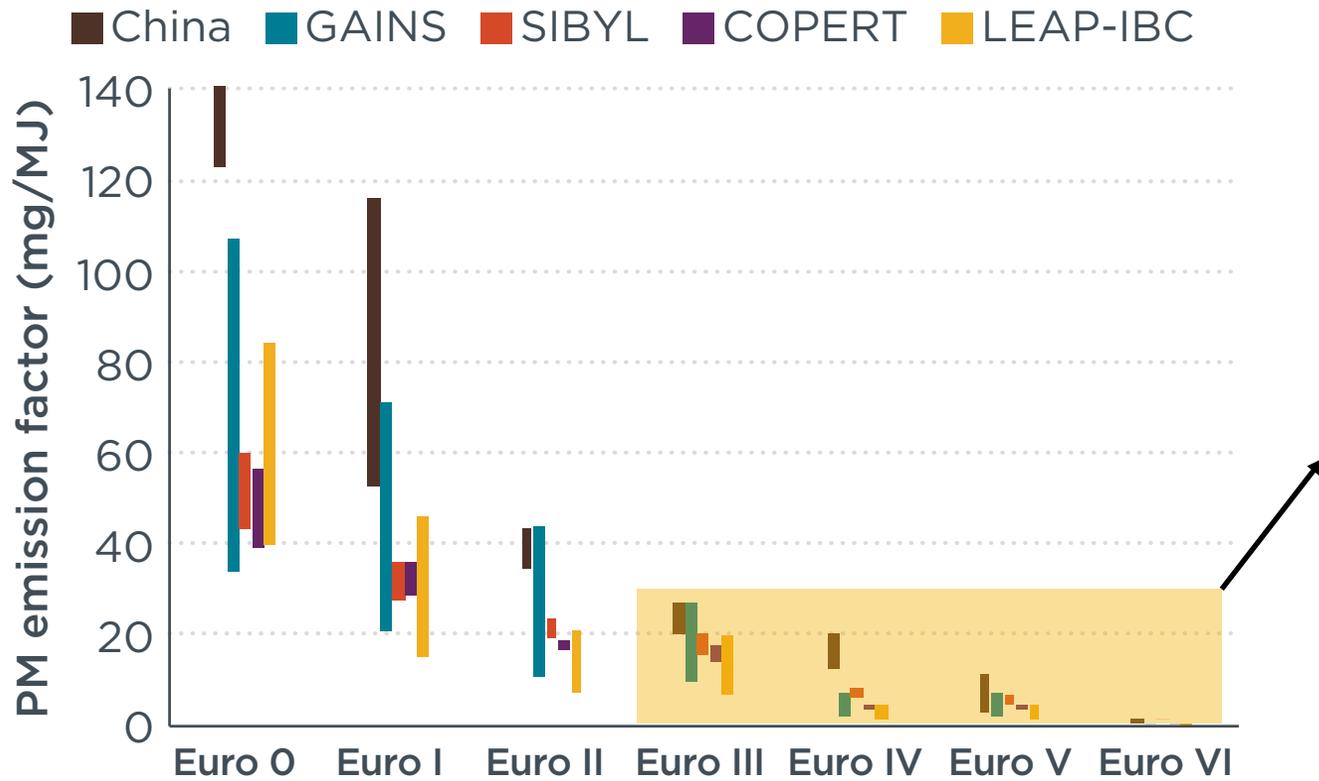
Exhaust BC emissions  
~864 kt



Vehicle category ■ Heavy-duty vehicles ■ Light-duty vehicles ■ 2- & 3-wheelers

“Soot-free” Euro VI equivalent standards reduce tailpipe PM<sub>2.5</sub> emissions more than 99% compared with uncontrolled levels, and 90% compared with Euro V.

### Heavy-duty diesel vehicles



# Four policy scenarios facilitate the evaluation of emissions trends for diesel vehicles and the benefits of further action.

- **Baseline**

- Timeline of vehicle emissions and fuel quality standards that were in force in 2015.

- **Adopted**

- Final regulations adopted as of May 2018, including those with a future implementation date.

- **Global Sulfur Strategy**

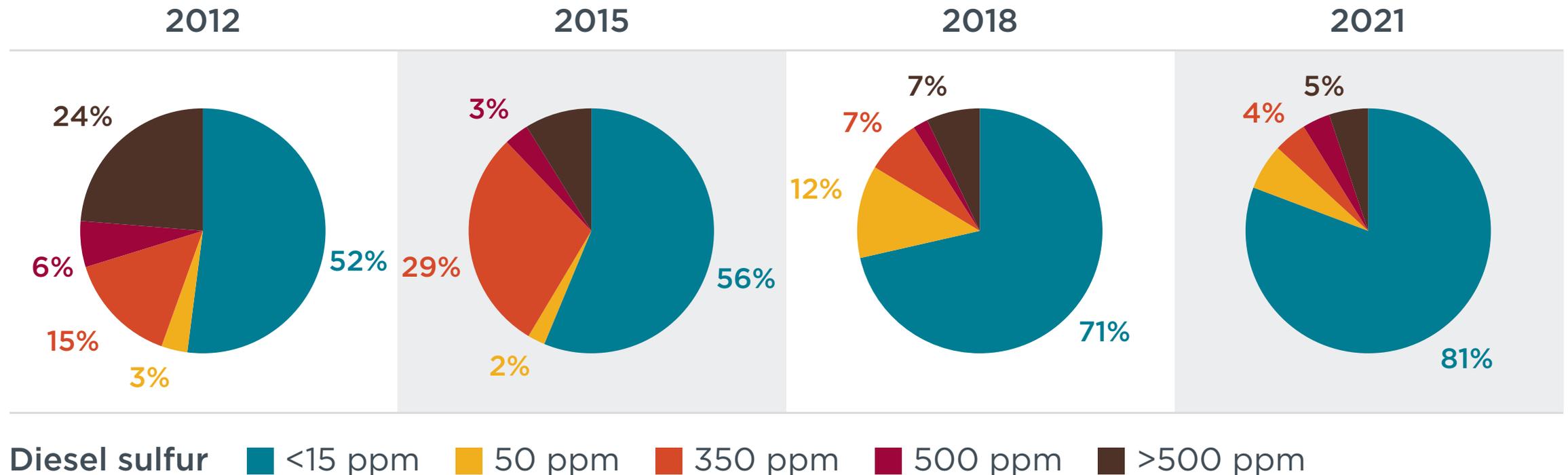
- Assumes all countries implement at least Euro 4/IV by 2025 and Euro 6/VI by 2030.

- **High Ambition**

- Assumes all countries implement at least Euro 4/IV by 2021 and Euro 6/VI by 2025.

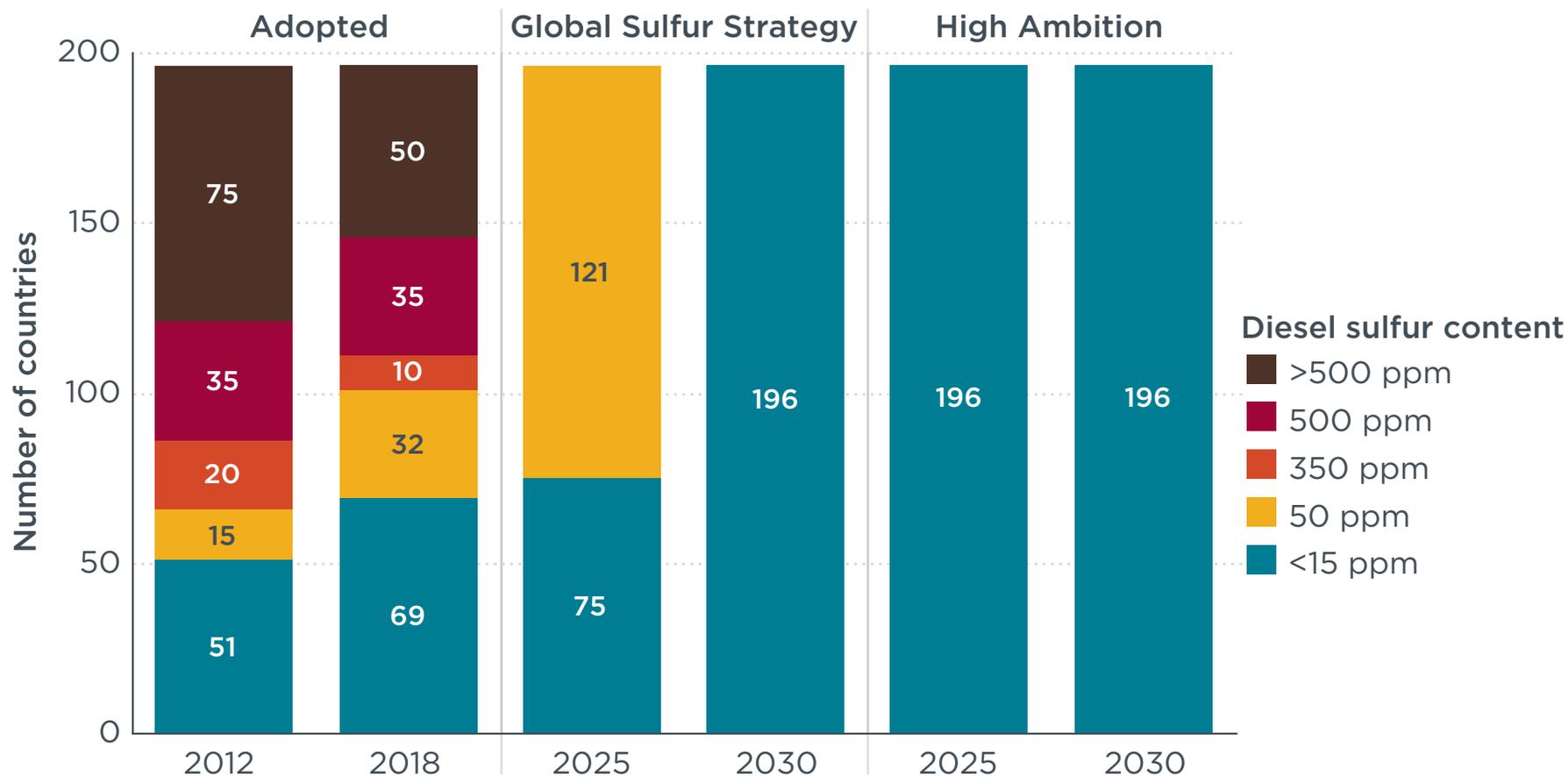
# Ultralow sulfur diesel (ULSD) is a requirement for soot-free vehicles. By 2021, more than 80% of the world's on-road diesel will be ULSD.

Share of global road diesel energy consumption by sulfur content with adopted policies



Since the CCAC initiated work on fuel desulfurization in 2012, a net 17 countries have switched to 10 ppm diesel, and another 17 to 50 ppm.

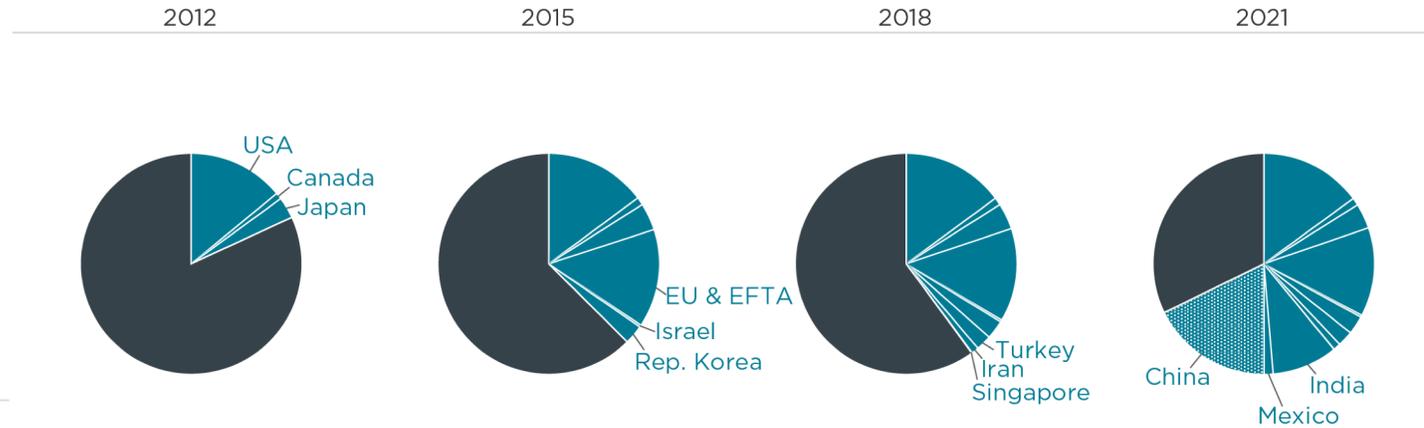
Number of countries by average road diesel sulfur content under Adopted policies, Global Sulfur Strategy, and High Ambition scenarios



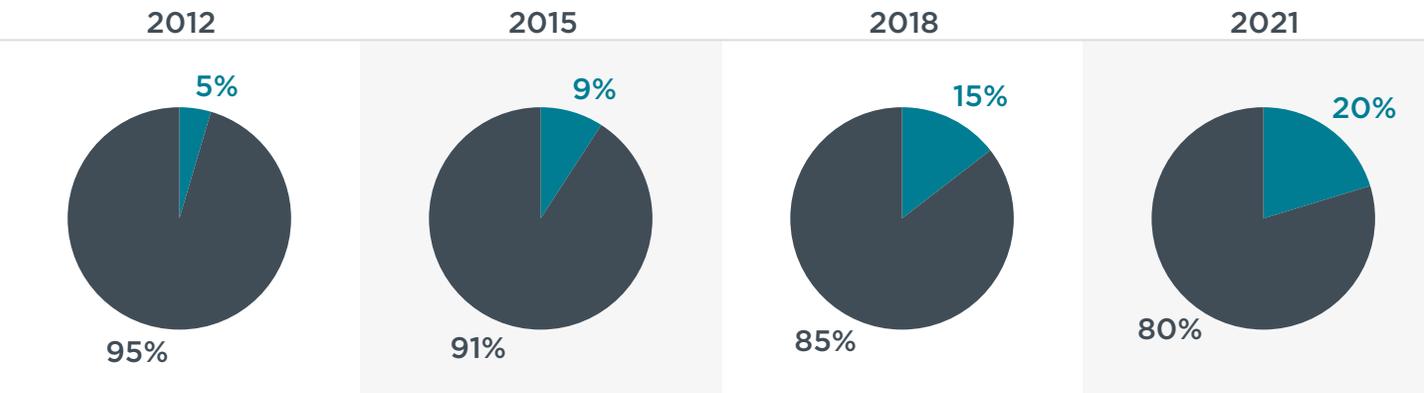
# Two thirds of new heavy-duty vehicles worldwide will be soot-free in 2021.

## Share of global heavy-duty diesel vehicle sales and stock equipped with diesel particulate filters (DPFs)

### % of new heavy-duty diesel vehicle sales



### % of heavy-duty diesel vehicle stock

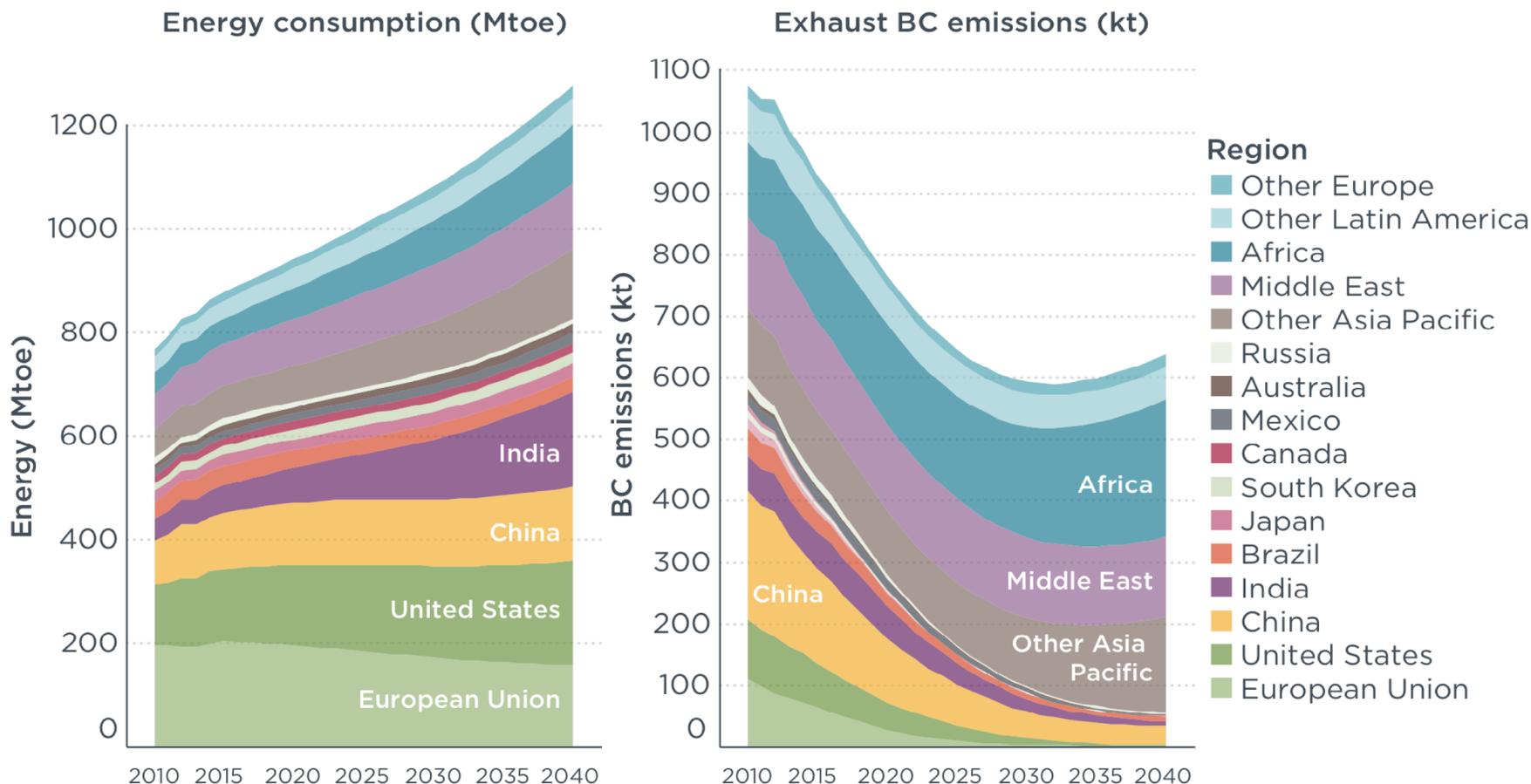


Technology ■ DPF ■ No DPF

In 2021...

- two thirds of new HD diesel vehicles worldwide will be “soot-free”
- one fifth of existing HD diesel vehicles worldwide will be “soot-free”

# The balance of diesel BC emissions is shifting from regions with soot-free standards to regions without such standards.



**Figure 14. Global energy consumption and exhaust BC emissions of diesel road transport with adopted policies, 2010-2040.** Mtoe, million tonnes of oil equivalent; kt, thousand tonnes.

# Members of the CCAC Scientific Advisory Panel have proposed targets to reduce SLCP impacts and BC emissions.

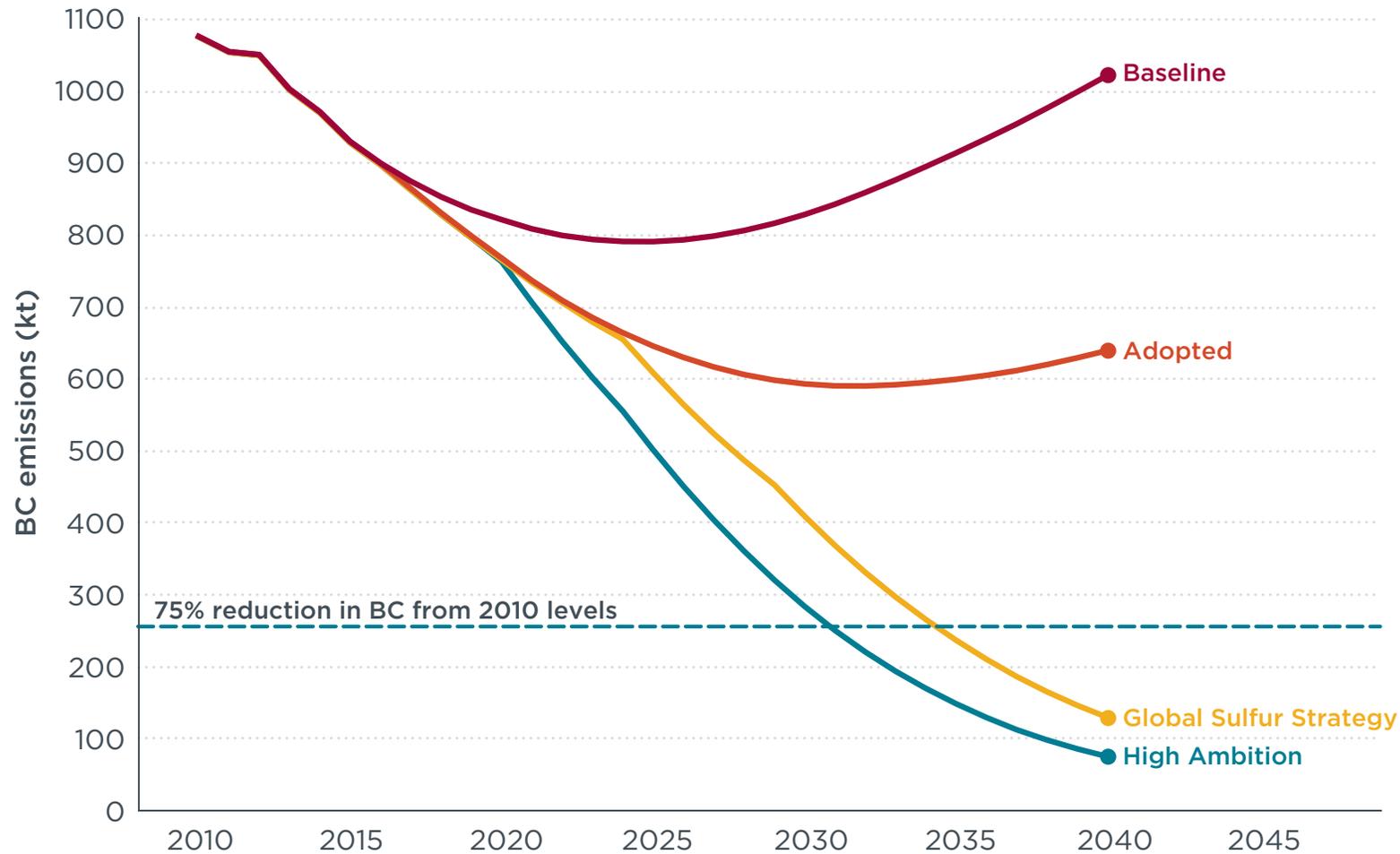
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## Proposed targets:

1. Reduce global SLCP emissions from all sectors by enough to avoid 0.5°C of warming over the next 25 years.
2. Reduce global anthropogenic BC emissions to approximately 75% below 2010 levels by around 2030.

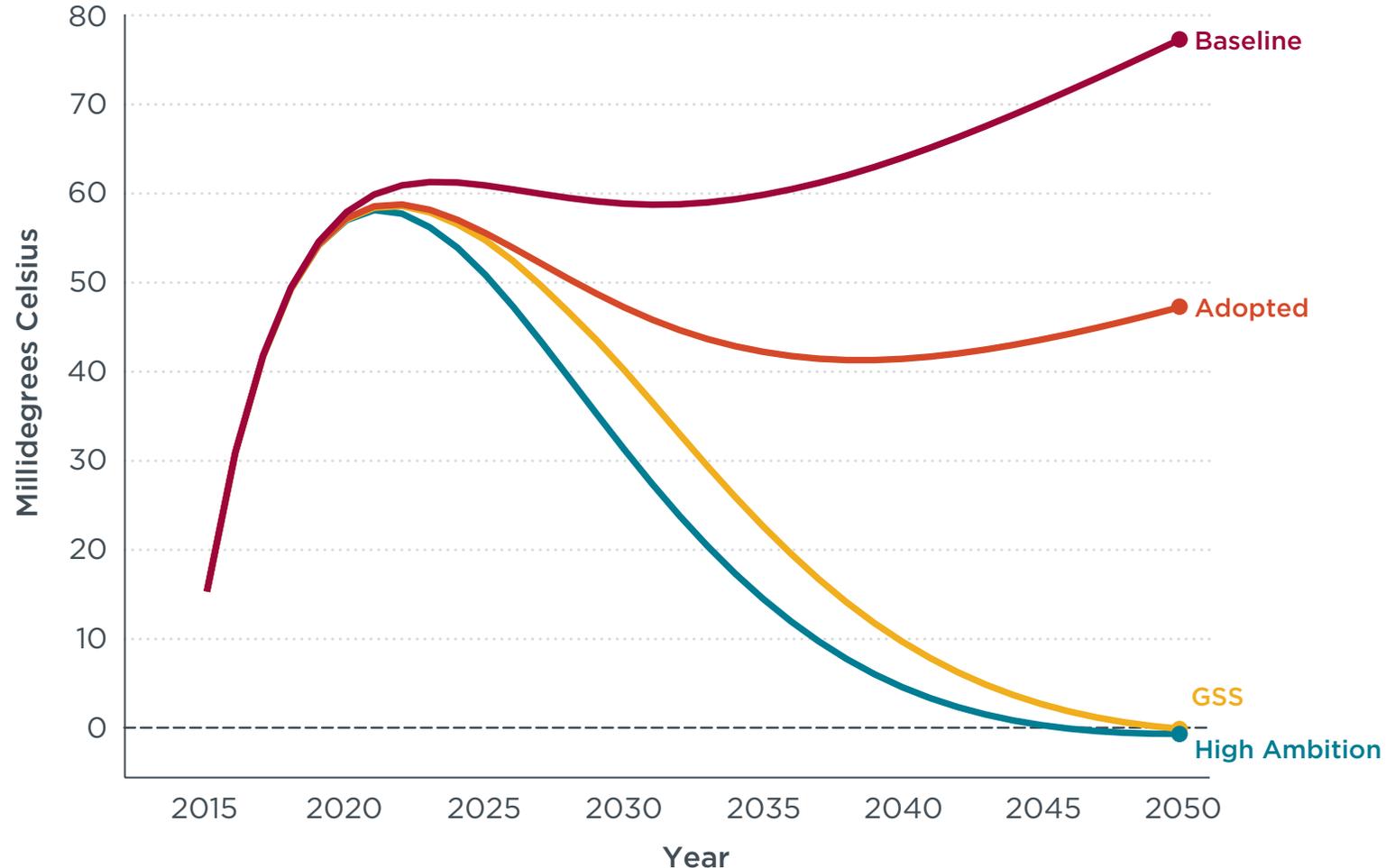
# High Ambition scenario could reduce BC from diesel road transport to 75% below 2010 levels in the 2030 timeframe.

Global BC from diesel road transport, 2010–2040 (kt, thousand tonnes)



# Soot-free standards could avoid warming in 2050 equivalent to 15.4% of the 0.5°C SLCP reduction identified in the 2011 UNEP-WMO study.

Temperature pathways of 2015–2050 non-CO<sub>2</sub> emissions from global diesel road transport



# Introducing soot-free vehicles throughout Asia by 2025 is key to meeting the global target for BC reduction.

Cumulative BC mitigation potential of diesel road transport from 2018 through 2040 achievable with high ambition scenario, compared with policies adopted as of May 2018

