

# Addressing Air Pollutant and Climate Relevant Emissions in the Transport Sector

January 28, 2016

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**Presenter:**

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# AGENDA

- Overview of the LEDS Global Partnership & Transport Working Group
- Presentation by Clean Air Asia
- Questions and Answers
- Closing Remarks
- Survey

# LEDS GLOBAL PARTNERSHIP

*Advancing Climate-Resilient Low Emission Development Around the World*

## Mission

Harness the collective knowledge and resources of governments, donors and international organizations, and practitioners in scaling up and strengthening implementation of climate-resilient low emission development around the world.

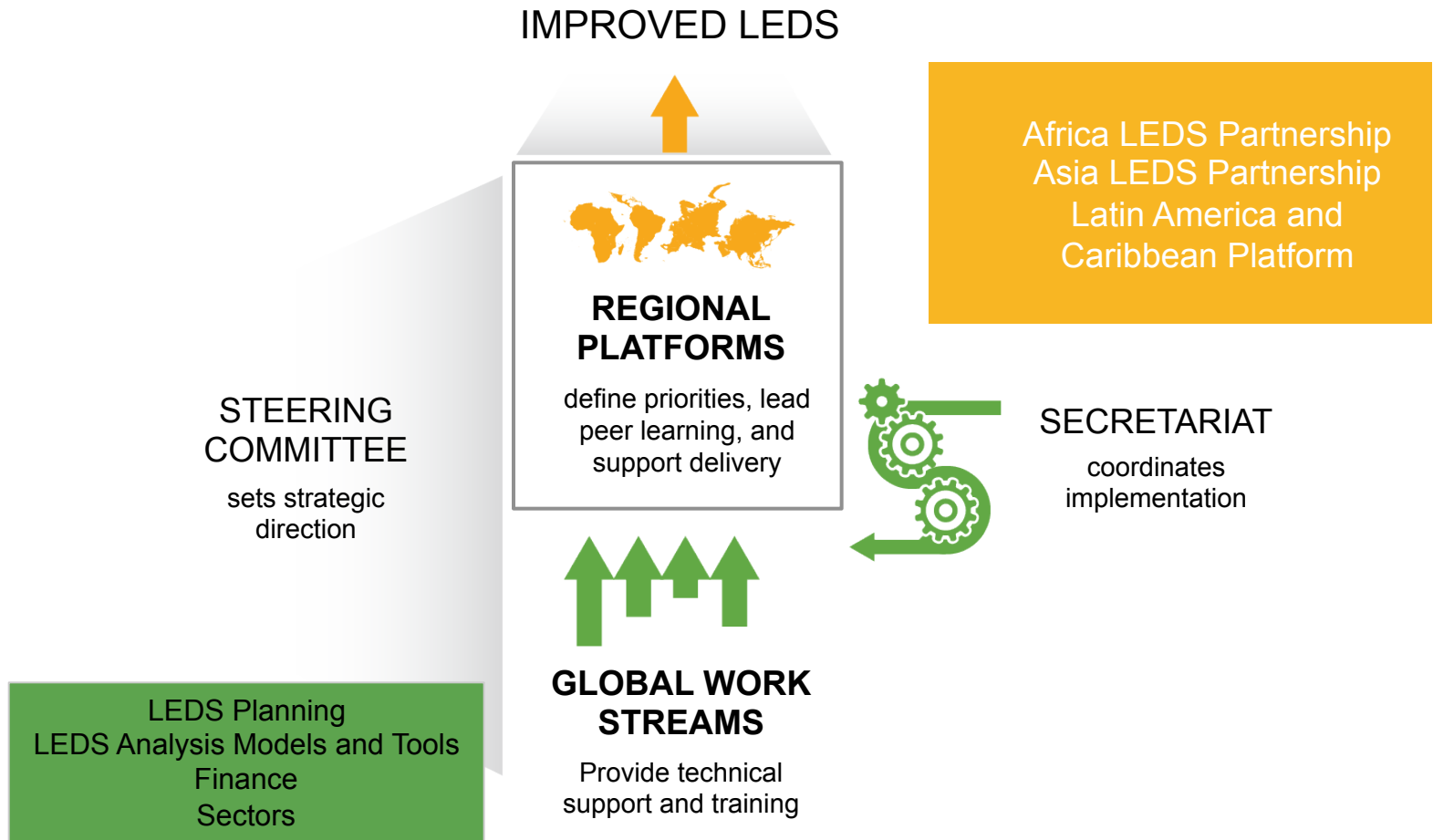
## Objectives

- **Strengthen quality, coordinated support, and leadership** of climate-resilient low emission development strategies by countries in all regions
- **Foster effective implementation** of LEDS
- **Spur development of new LEDS** by additional national and sub-national governments

Launched in 2011, the LEDS GP now catalyzes action and collaboration across more than 120 countries and international organizations.



# LEDS GP ORGANIZATIONAL STRUCTURE





# EXAMPLES OF LEDSGP SUPPORT

## Peer learning and knowledge sharing

- Global and regional workshops and trainings for more than 800 practitioners on LEDSGP planning, analysis, finance, and sectoral programs

## Technical collaboration

- Transportation and Development Impacts Assessment (DIA) toolkits and country assistance
- National LEDSGP Finance Strategies with Colombia, Peru, and Chile
- No cost expert assistance available on LEDSGP analysis, finance, and sector measures to all members
  - e.g. support to Mauritius on solar hot water program, Bhutan on transport options, Indonesia on budget allocation, Cambodia on green fund, and Cote D'Ivoire on bio-energy

## Understanding and analysis of LEDSGP benefits

- Application of DIA visual tool with Ghana, Kenya, and Montenegro
- Broader portfolio of shared LEDSGP communication resources under development



Learn more at:  
[www.LEDSGP.org](http://www.LEDSGP.org)



# LEDS Transport Working Group

## Leaders

- EMBARQ, the sustainable urban mobility initiative of WRI Ross Center for Sustainable Cities
- United States National Renewable Energy Laboratory (NREL)
- United Nations Environment Programme (UNEP)

## Global

- LEDS Transport Toolkit ([ledsgp.org/transport](http://ledsgp.org/transport))
- Webinars
- Global events and trainings

## Regional

- Workshops that serves the specific needs of that region
- Matchmakers for knowledge sharing

## Local

- Deep dive, in-country support for governments on specific transport issues and policies
  - Workshops with peer experts
  - Technical assistance
- Remote Expert Assistance on LEDS (REAL)



## TRANSPORT WORKING GROUP

Supporting sustainable transport systems of tomorrow

Countries facing significantly increasing demand for transport services over the coming decades have a unique opportunity to meet this demand and enable economic growth minimizing greenhouse gas (GHG) emissions. Sustainable transport systems are based on minimizing travel; shifting to more environmentally (as well as socially and economically) sustainable mobility; and improving transport technologies, fuels, and institutions. The Low Emission Development Strategies Global Partnership (LEDS GP) Transport Working Group provides technical assistance, tools, and training on strategies that support low-emission development in transport systems.

The Working Group is building a LEDS transport community, supporting champions and innovators, creating networks of experts on low-emission transport, and exploring opportunities for collaboration at local and regional levels. A team of international transport experts from EMBARQ, the sustainable urban mobility initiative of WRI Ross Center for Sustainable Cities, the United States Department of Energy's National Renewable Energy Laboratory (NREL) and the United Nations Environment Programme (UNEP) are leading these activities.

## Avoid-Shift-Improve approach to sustainable transportation system development

The traditional approach to developing transportation systems has focused on expanding infrastructure—building new roads, rails, and vehicles to meet growing demand. This approach has led to proliferating sprawl, traffic congestion and associated economic impacts, costs to public health from reduced local air quality and increased accidents, and direct and indirect costs of global climate change impacts.

Sustainable transport system development is based on an Avoid-Shift-Improve (ASI) approach—which moves the focus to the policies and behaviors behind the demand for transport. LEDS prioritizes solutions that seek to "avoid" or reduce trips through the integration of land use and transport planning; that "shift" to more efficient and less carbon intensive modes such as public transport, walking and bicycling; and that "improve" the environmental efficiency from each kilometer traveled by enhancing vehicle and fuel technology. This approach addresses the long-term root of problems rather than marginally improving the status quo.



The Avoid-Shift-Improve (ASI) framework supports the holistic design of sustainable low-emission development strategies for transportation systems.

# Supporting countries with implementing new vehicle emission fuel quality standards

This webinar is part of a training brought to you by the LEDS Transport Working Group, in partnership with the United Nations Environment Program (UNEP) and Clean Air Asia. The series will include\*:

- Improving air quality and reducing climate impacts from the transport sector
- Roadmap for implementing new fuel economy standards: Case of Mexico
- Case study presentation: Introduction of Euro IV fuel
- Innovative financing solutions for low carbon transport projects to improve air quality

*\*Topics may be subject to change*

# Addressing Air Pollutant and Climate Relevant Emissions in the Transport Sector



Presenter:

**Alvin Mejia**

Transport Program Manager, Clean Air Asia

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# Outline

1. Drivers for increasing emissions from the transport sector
2. Impacts on emissions and relevant issues
3. Framework for addressing air pollutant and GHG emissions from the sector
4. Examples of key considerations : trade-offs

To promote better air quality and livable cities by translating knowledge to policies and actions that reduce air pollution and greenhouse gas emissions from transport, energy and other sectors.





# About Clean Air Asia

- Clean Air Asia Partnership is a UN recognized partnership of more than 250 organizations in 31 countries in Asia and worldwide and 8 Country Networks (China, India, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, and Vietnam), and is supervised by a Partnership Council.
- Clean Air Asia acts as the Secretariat of the Clean Air Asia Partnership and is a registered non-stock non-profit organization headquartered in Manila, and with offices in Beijing and Delhi.
- We were established as the premier air quality network for Asia by the Asian Development Bank, World Bank and USAID in 2001, and we operate since 2007 as an independent non-profit organization

## What we aim for

Reduced air pollution  
and greenhouse gas  
emissions



Improved health  
Energy savings  
Livable cities

## Outcomes

### Clean Air Asia as a trusted CHANGE MAKER

- Decision makers use reliable analysis, knowledge, data and effective tools to understand the problems and identify solutions
- Stakeholders at the city, national and regional level cooperate better through networks & partnerships
- Policies and programs are in place that are science-based, stakeholder inclusive, and effective

## Clean Air Asia Programs

Air Quality and  
Climate Change



Low Emissions  
Urban  
Development



Clean Fuels  
and Vehicles



Green  
Freight and  
Logistics



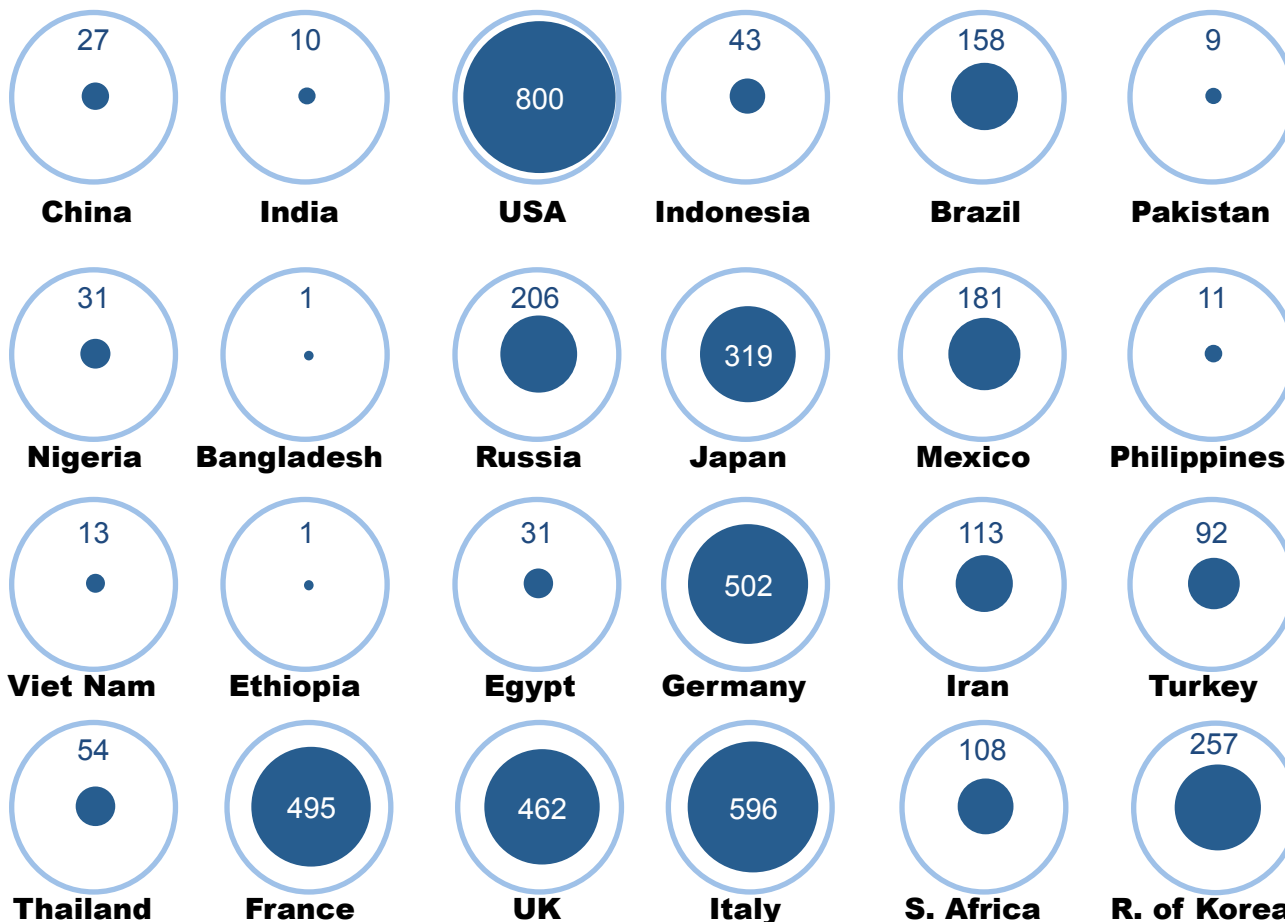
**Input from Clean Air Asia  
Partnership and other partners**





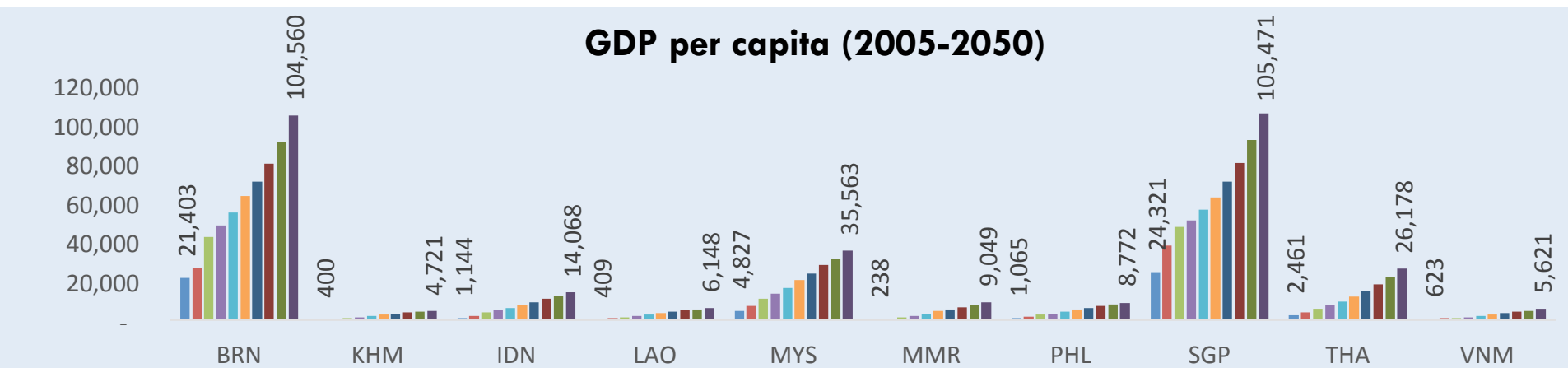
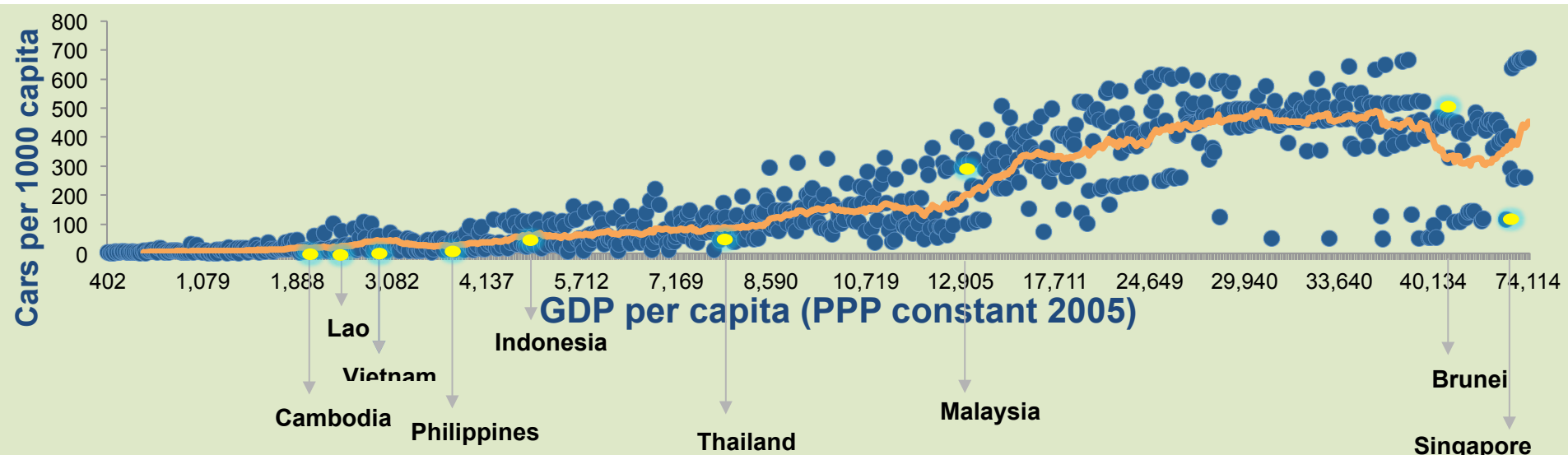
- Transportation → service provision, moving people and goods
- Transportation as a significant sector in energy consumption
- Significant global and local environmental impacts (e.g. GHGs and air pollutant emissions)
- Importance in overall economic efficiency

# Motorization Trends

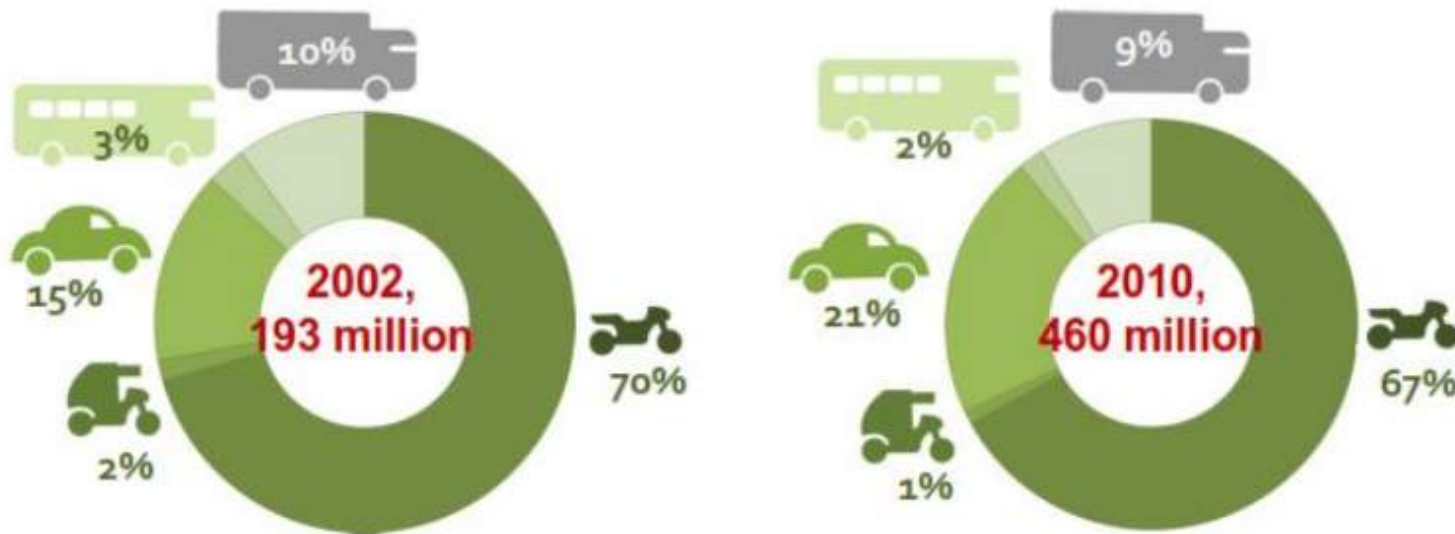


Source: Crist, Philippe. OECD Trends : Transport, a powerpoint presentation delivered at the Steering Committee meeting for the ITPS Long-Term action plan for Low Carbon Transport held in February 2012 in Bali Indonesia. Data is from World Bank, UN Statistics,

# Case of Southeast Asia

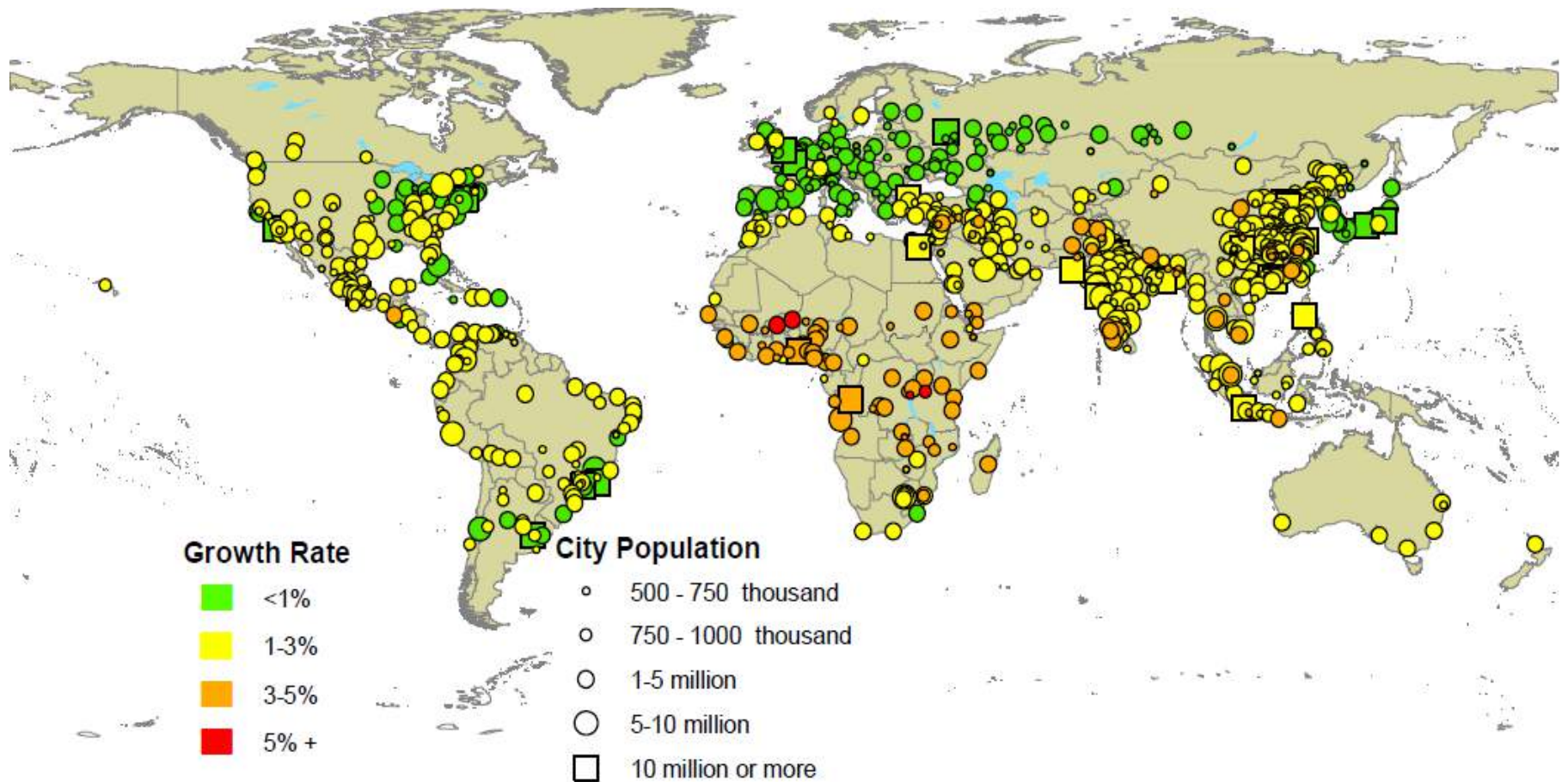


# Vehicles – Asia



- **Asia: 460.4 million vehicles (2010)**
  - ✓ at current annual average growth rates, number of vehicles in Asia will double in less than 7 years
- **Private passenger vehicles dominate (88%)**
  - ✓ two-wheelers (67%) & passenger cars (21%)
  - ✓ expected to double in next 5 to 7 years
- It will take ~10years for buses to double

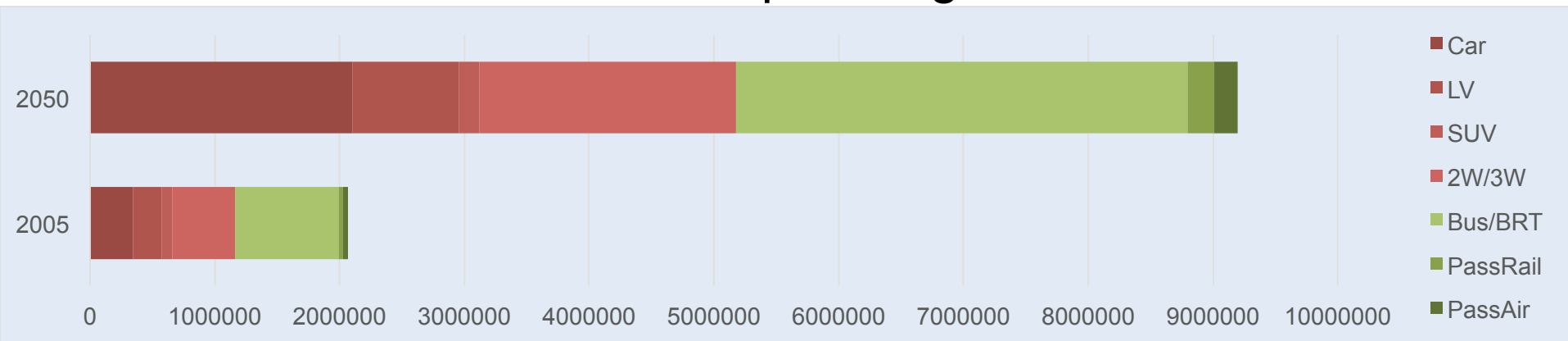
# Growth of Urban Agglomerations





# Continued Increase in Transport Activity

Private modes will dominate passenger travel



Freight transport will heavily be dominated by trucks



# Air Pollution and Transportation

- **3.7 million deaths attributable to ambient (outdoor) air pollution**
- **Around 88% of these deaths occur in low- and middle-income (LMI), representing 82% of the world population.**
- **Outdoor air pollution is carcinogenic to humans (Group 1). Sufficient evidence that exposure to outdoor air pollution causes lung cancer.**

## • Particulate pollution

Outcome	Associated transport-related pollutants
Mortality	Black smoke, ozone, PM <sub>2.5</sub>
Respiratory disease (non-allergic)	Black smoke, ozone, nitrogen dioxide, VOCs, CAPs, diesel exhaust
Respiratory disease (allergic)	Ozone, nitrogen dioxide, PM, VOCs, CAPs, diesel exhaust
Cardiovascular diseases	Black smoke, CAPs
Cancer	Nitrogen dioxide, diesel exhaust
Adverse reproductive outcomes	Diesel exhaust; also equivocal evidence for nitrogen dioxide, carbon monoxide, sulphur dioxide, total suspended particles

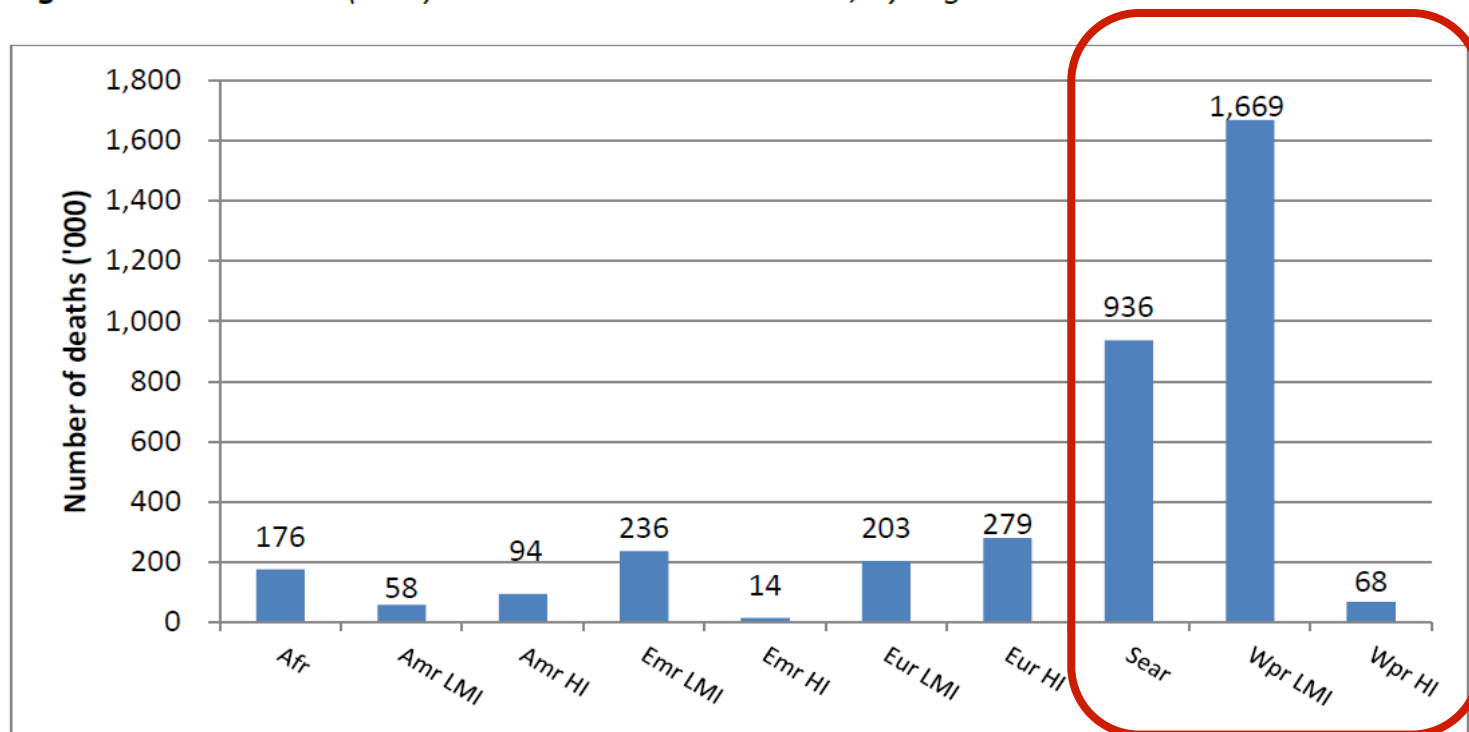
or air  
humans

Source: GIZ BMZ,WHO. 2011., Global Burden of Disease and WHO IARC



# Burden – Air Pollution

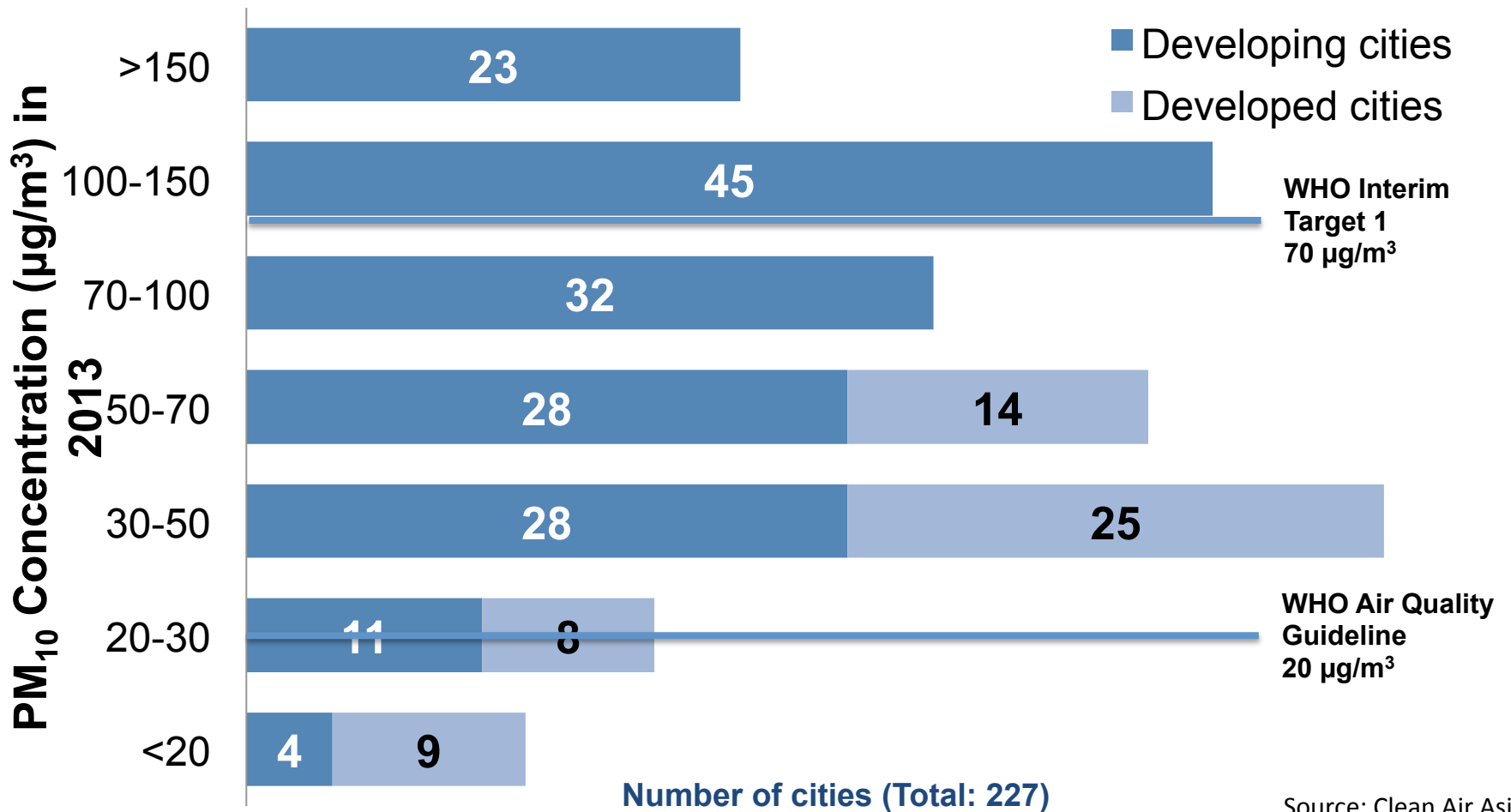
Figure 1. Total deaths ('000) attributable to AAP in 2012, by region



AAP: Ambient air pollution; Amr: America, Afr: Africa; Emr: Eastern Mediterranean, Sear: South-East Asia, Wpr: Western Pacific; LMI: Low- and middle-income; HI: High-income.

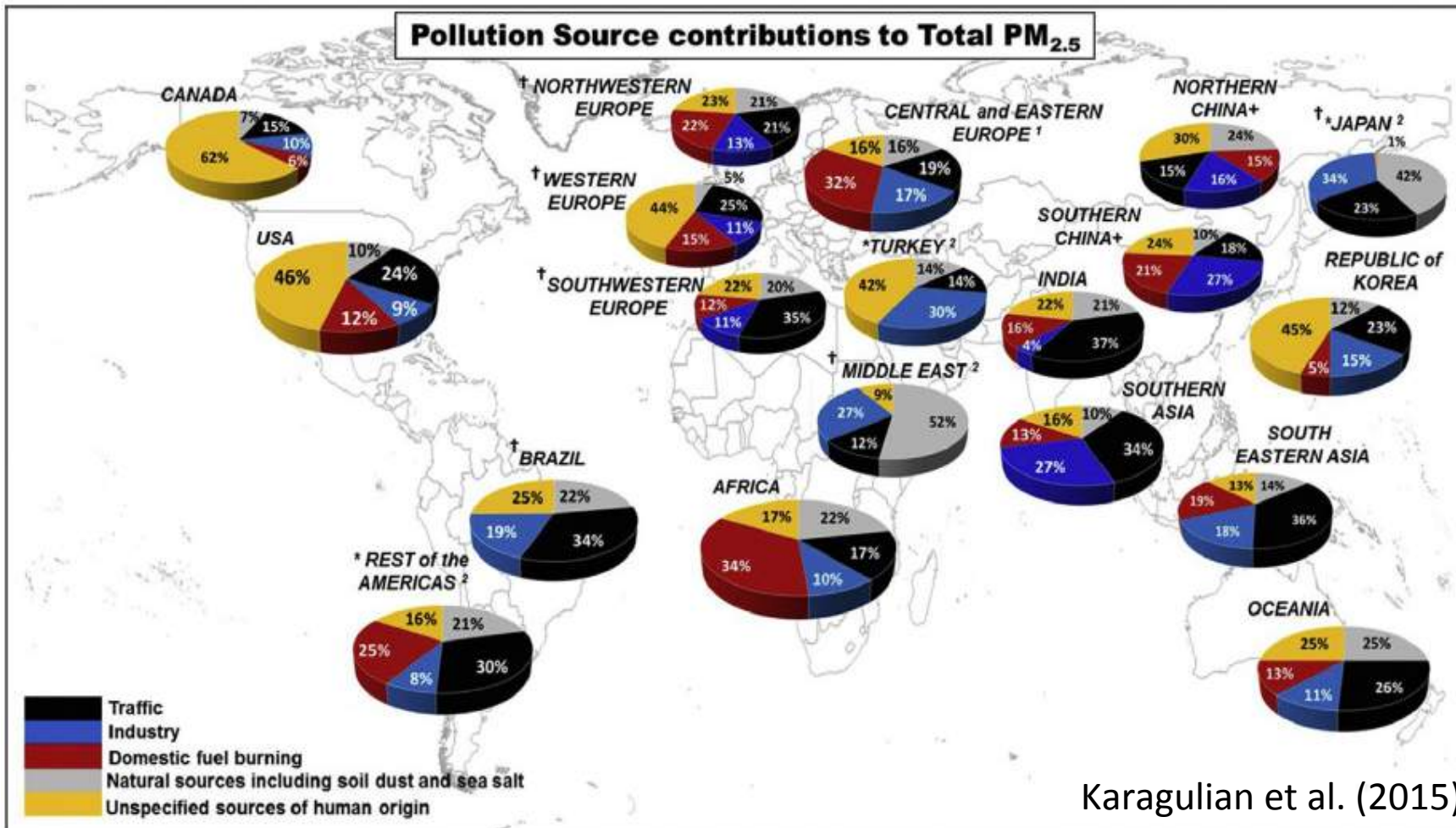
WHO 2014

# Air Quality Snapshot



Source: Clean Air Asia, 2015

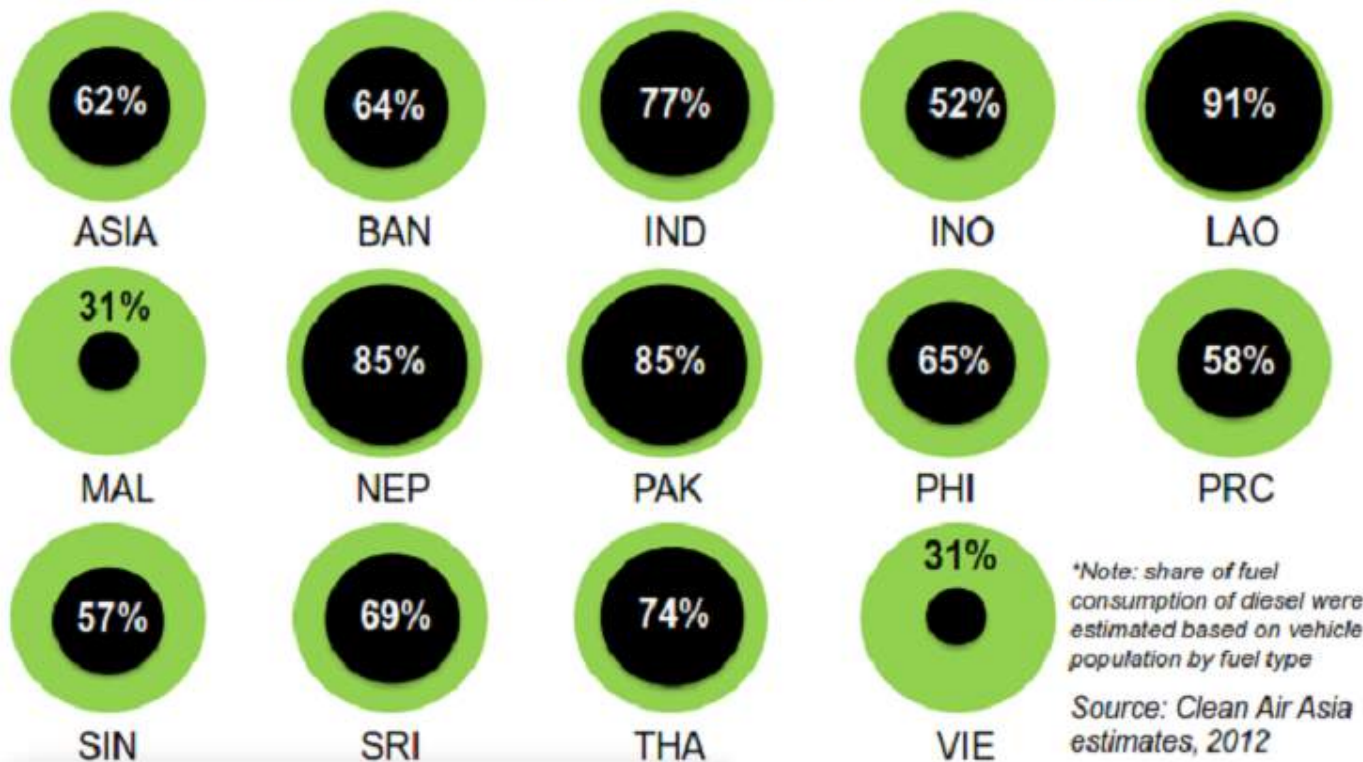
# PM2.5 Snapshot



Karagulian et al. (2015)

# Shares of Diesel in Road Transport

Estimated share of diesel in road transport fuel consumption (2010)

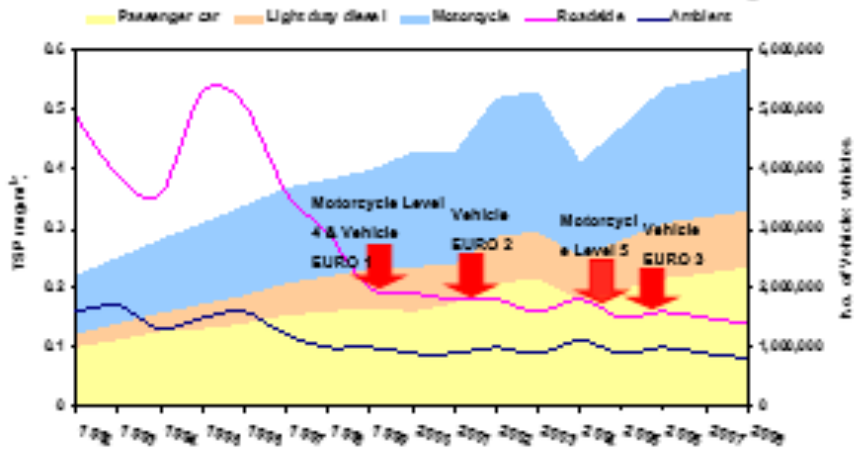


## IARC: DIESEL ENGINE EXHAUST CARCINOGENIC

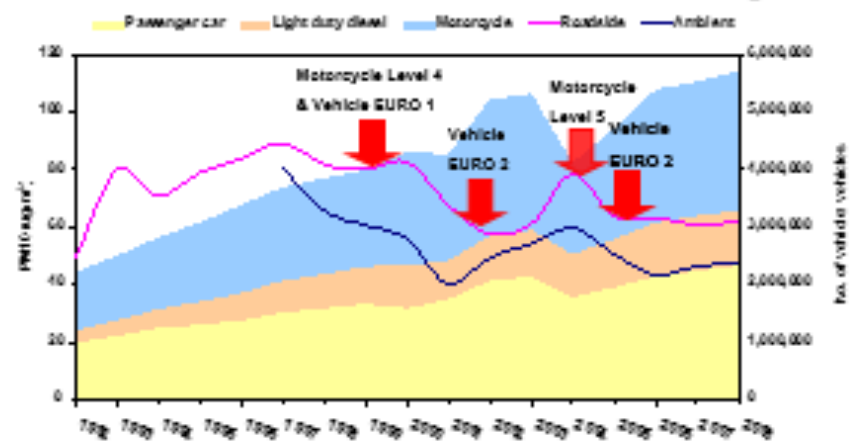
**Lyon, France, June 12, 2012** – After a week-long meeting of international experts, the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), today classified diesel engine exhaust as **carcinogenic to humans (Group 1)**, based on sufficient evidence that exposure is associated with an increased risk for lung cancer.

# Impacts of Vehicle Emission Standards

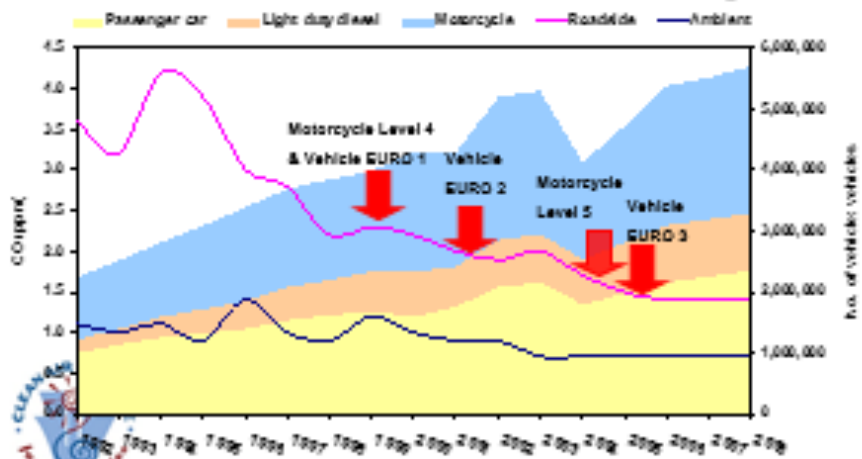
Annual Variation of Ambient TSP Concentration in Bangkok



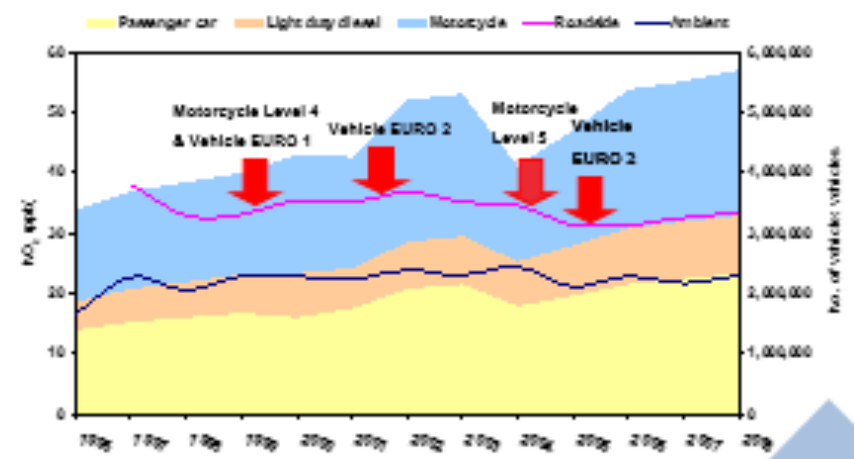
Annual Variation of Ambient PM10 Concentration in Bangkok



Annual Variation of Ambient CO Concentration in Bangkok



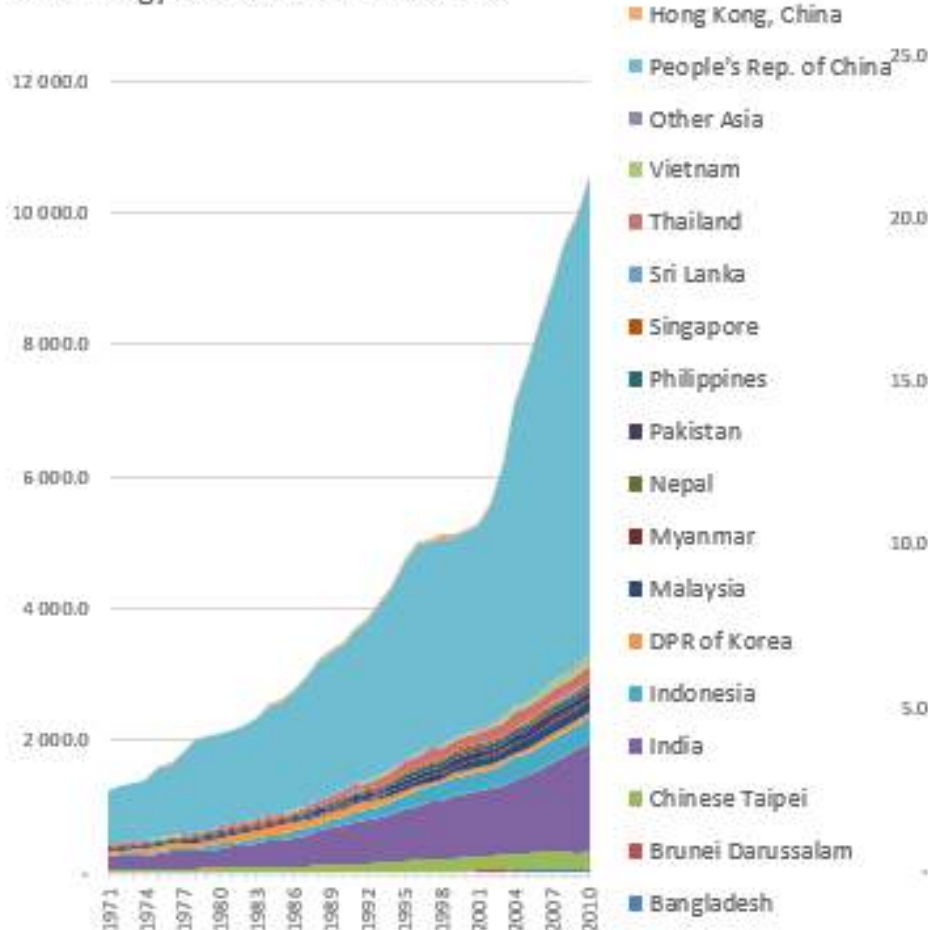
Annual Variation of Ambient NO2 Concentration in Bangkok



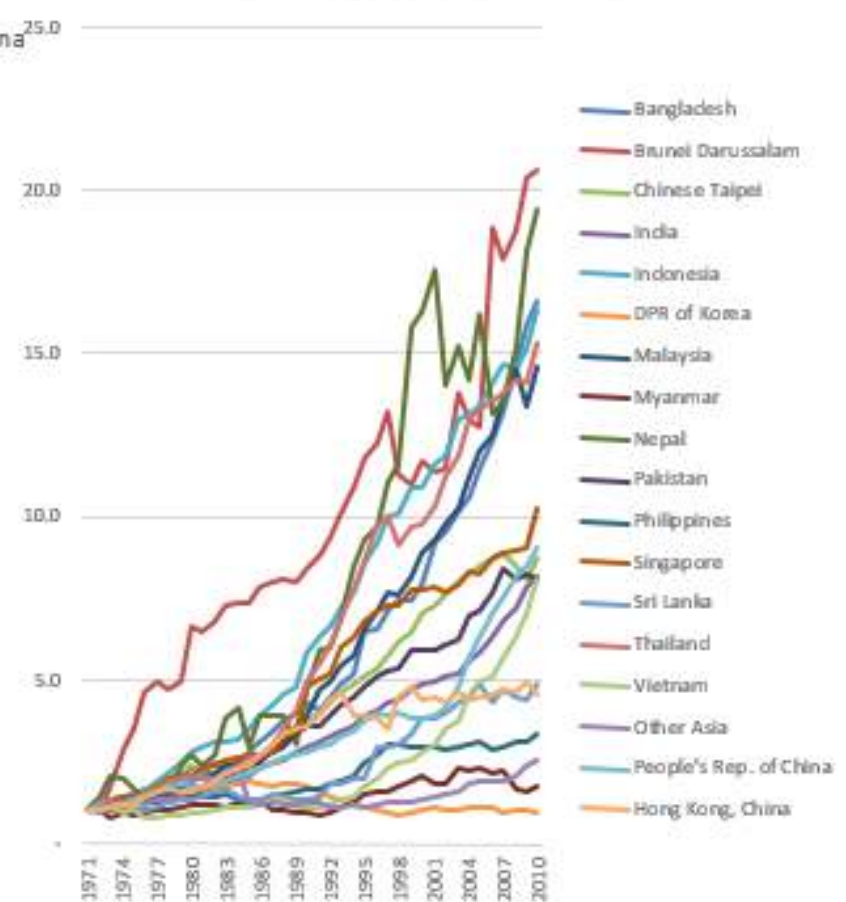


# Energy and GHG : Transport in Asia

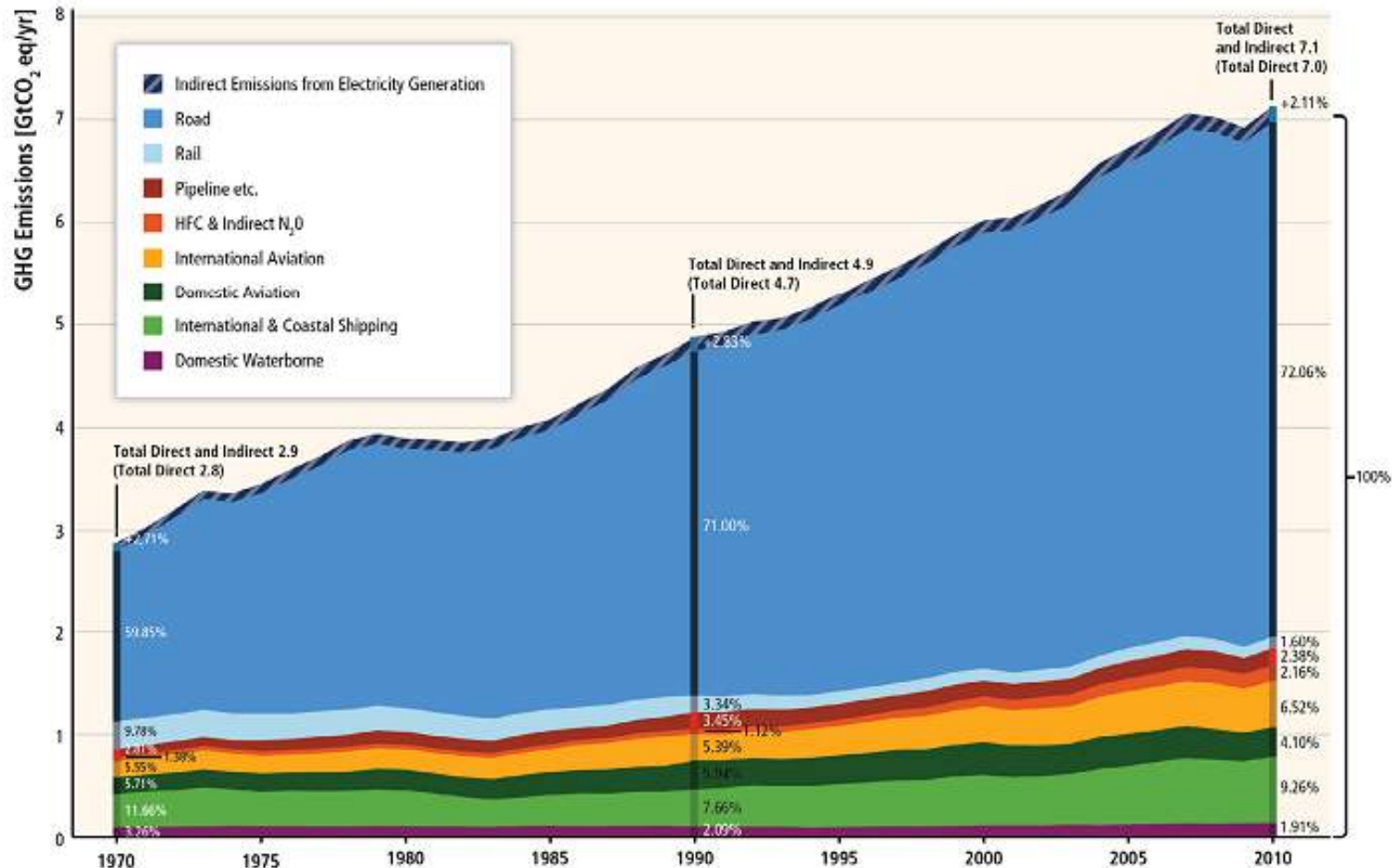
Total Energy-Related GHG Emissions



CO2/capita Index (1971=1)



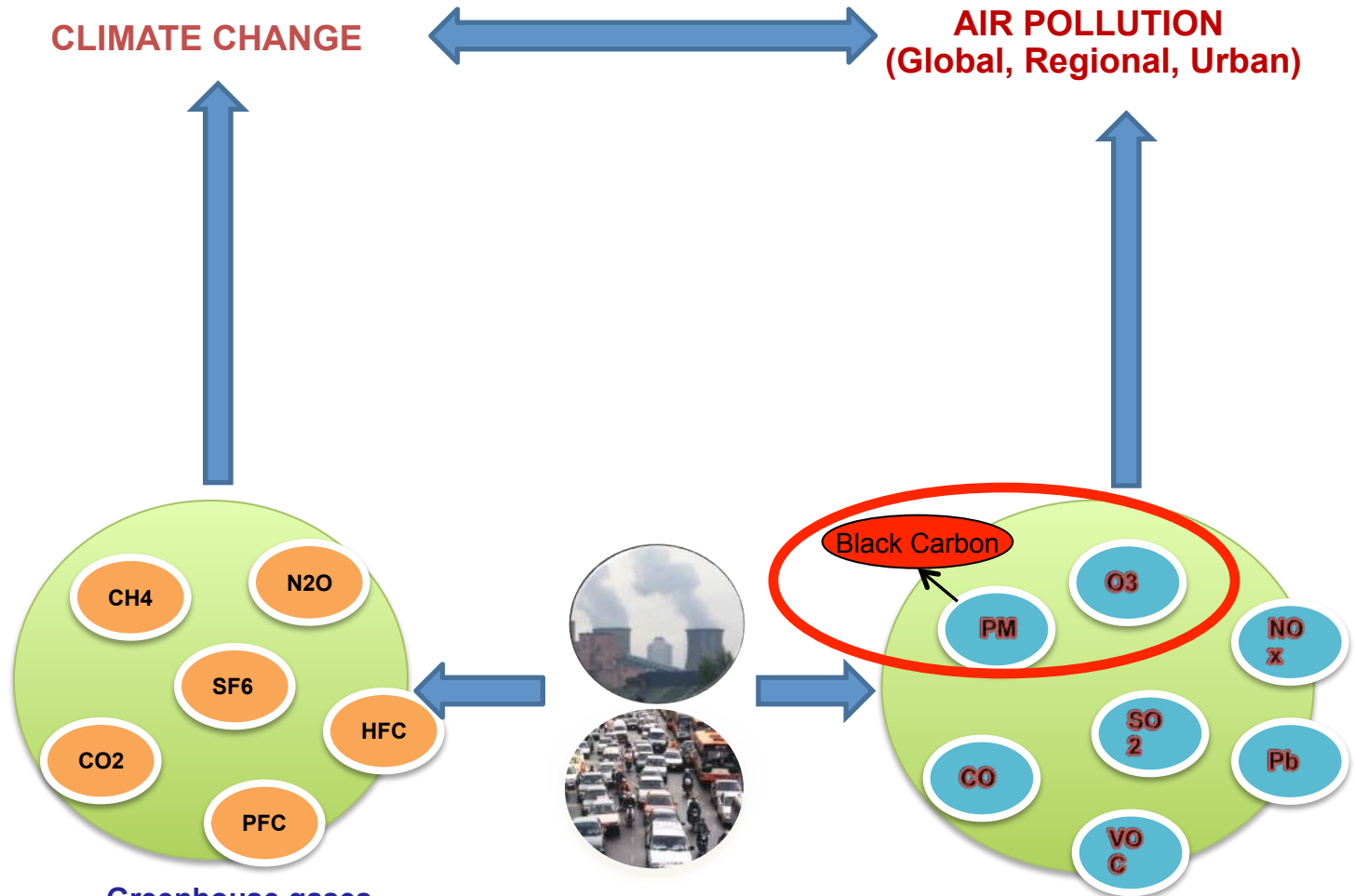
# GHG Emissions from the Transport Sector



Source: IPCC WG III AR5, 2014

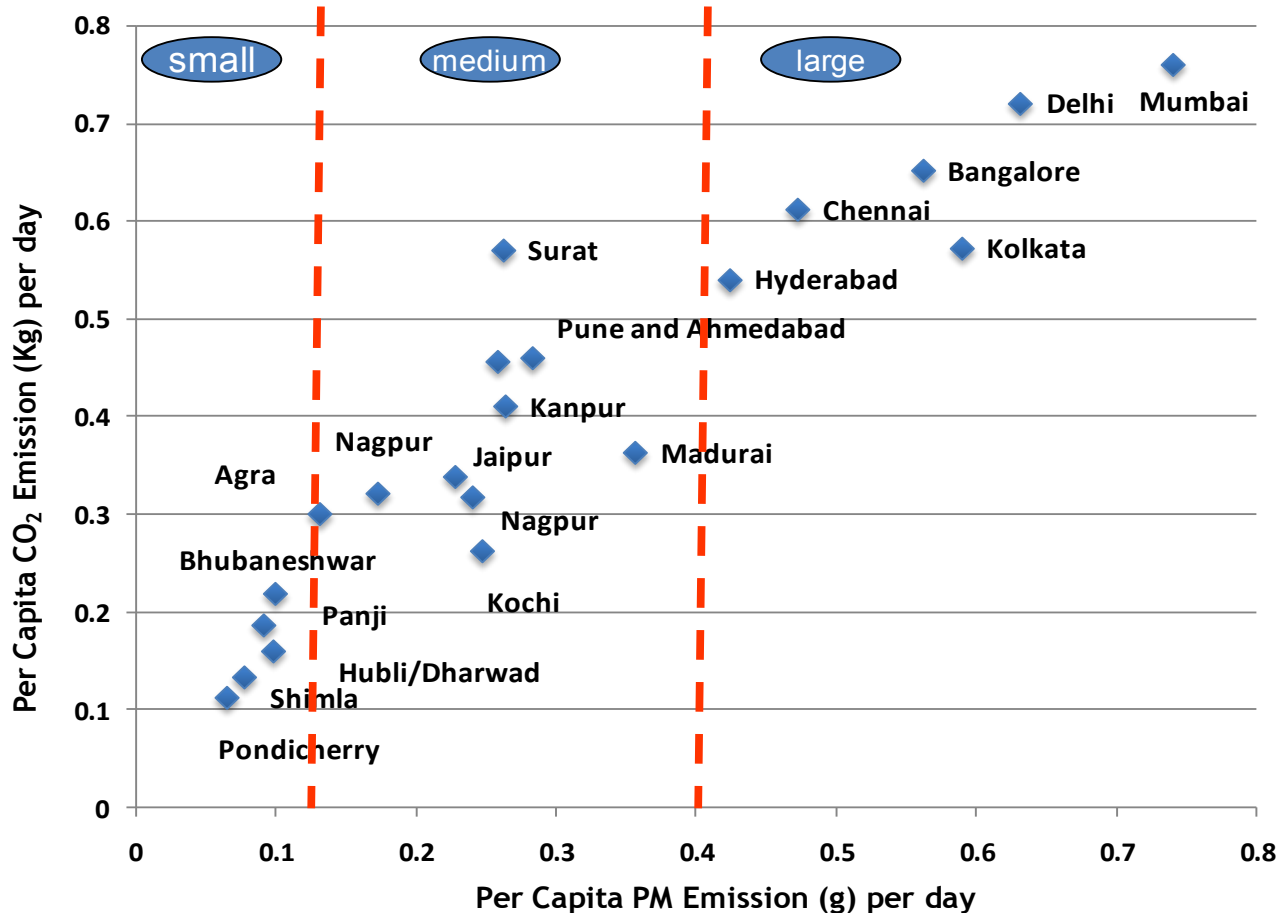


*“Integrating air pollution abatement and climate change mitigation policies offers potentially large cost reductions compared to treating those policies in isolation” - IPCC*



# GHG and Air Pollution in Indian Cities

Per Capita CO<sub>2</sub> and Per Capita PM Emissions



- Indian cities show strong correlation between emissions of air pollutants and GHGs
- As cities grow in size, transport emissions increase
- Importance of catching cities early before they start to grow

Source: 2008. MOUD- Study on Traffic and Transportation Policies and Strategies in Urban Area. Analysis By CAI-Asia

Avoid

Shift

Improve

A

Activity

*How much is the reduction in travel demand?*

S

Structure

*Was there a shift towards more environmentally-friendly modes?*

I

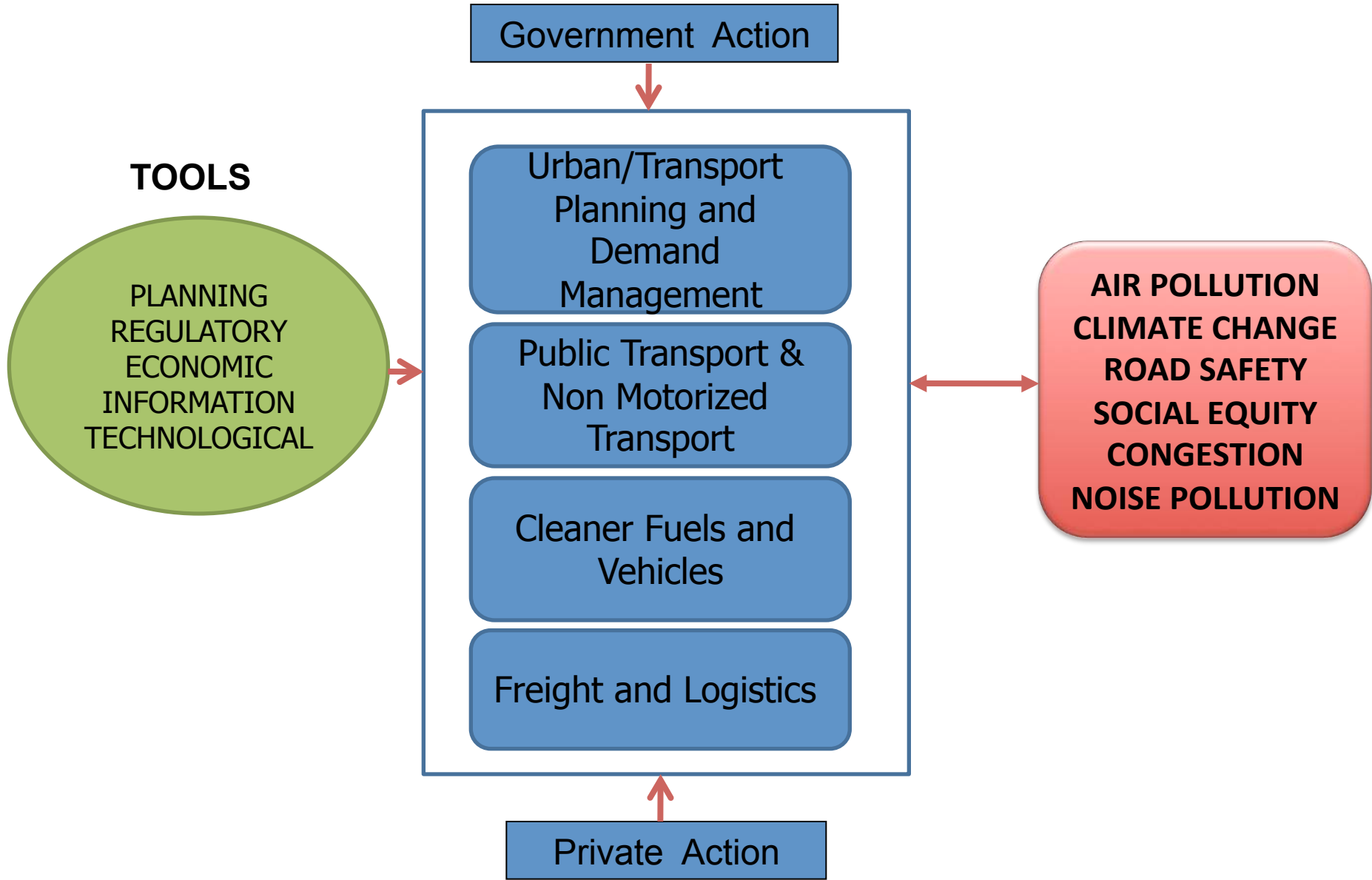
Intensity

*Was there an improvement in fuel efficiency?*

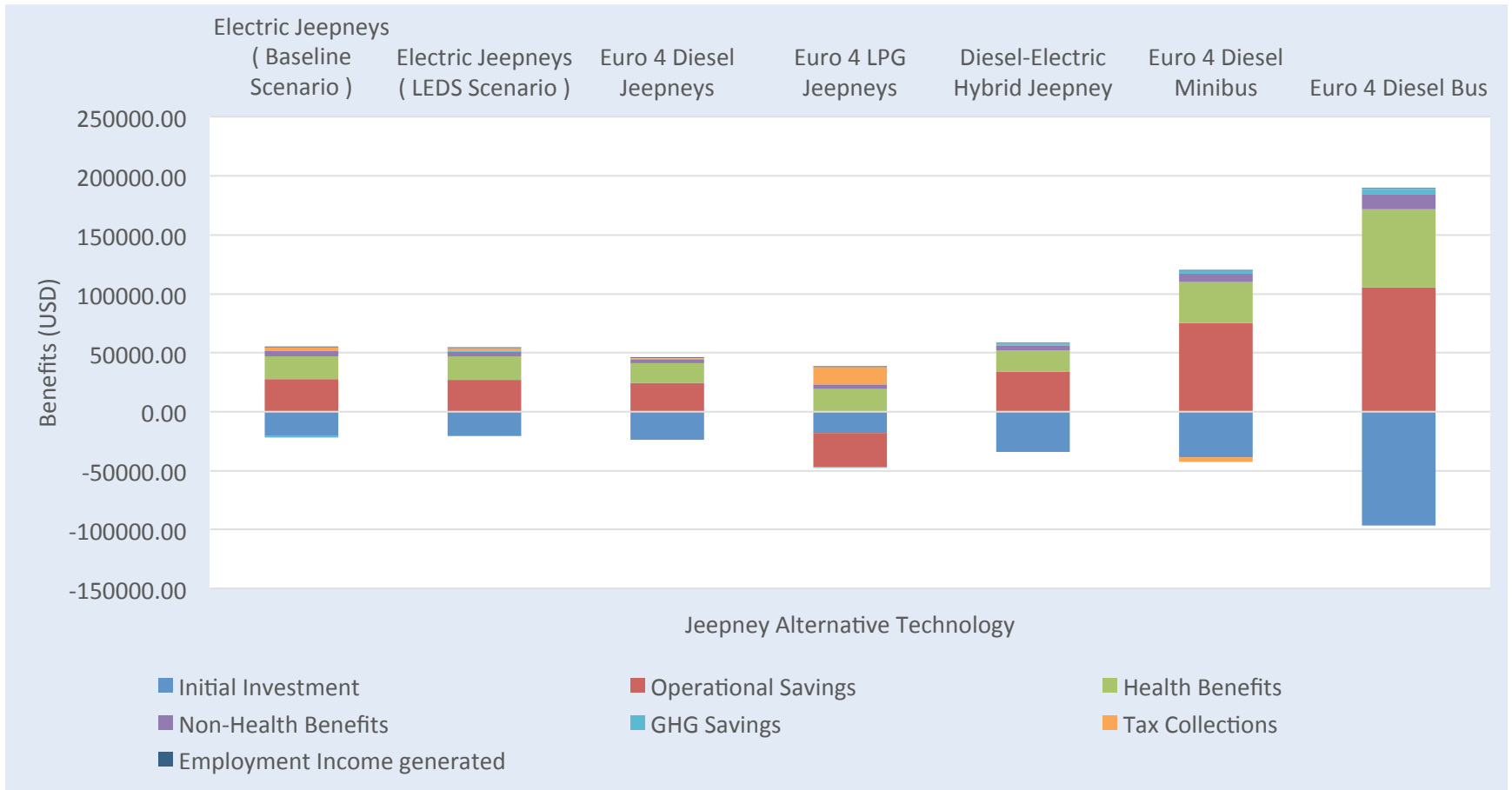
F

Factor of emissions

*Was there are reduction in the emission factor? (e.g. shift to lower carbon intensive fuel?)*



# Example : Analysis of Options - Jeepney



Source: Biona, Mejia, Tacderas, Dematera (forthcoming)

# Examples: Metro System

- Can lead to substantial air pollutant reduction due to mode shifts
- Construction GHG emissions from infrastructure development are significant for such large projects
- MRT construction was found to emit about 20% of the total emissions (ADB, 2010)



# Example: Fossil fuel switch options for public transport : CNG

- New CNG buses can substantially cost more than the diesel counterparts; infrastructure costs associated with CNG distribution and delivery are significant.
- Significant reductions in pollutants such as PM vs traditional diesel
- CH<sub>4</sub> emissions from the production, distribution of CNG may negate the climate benefits



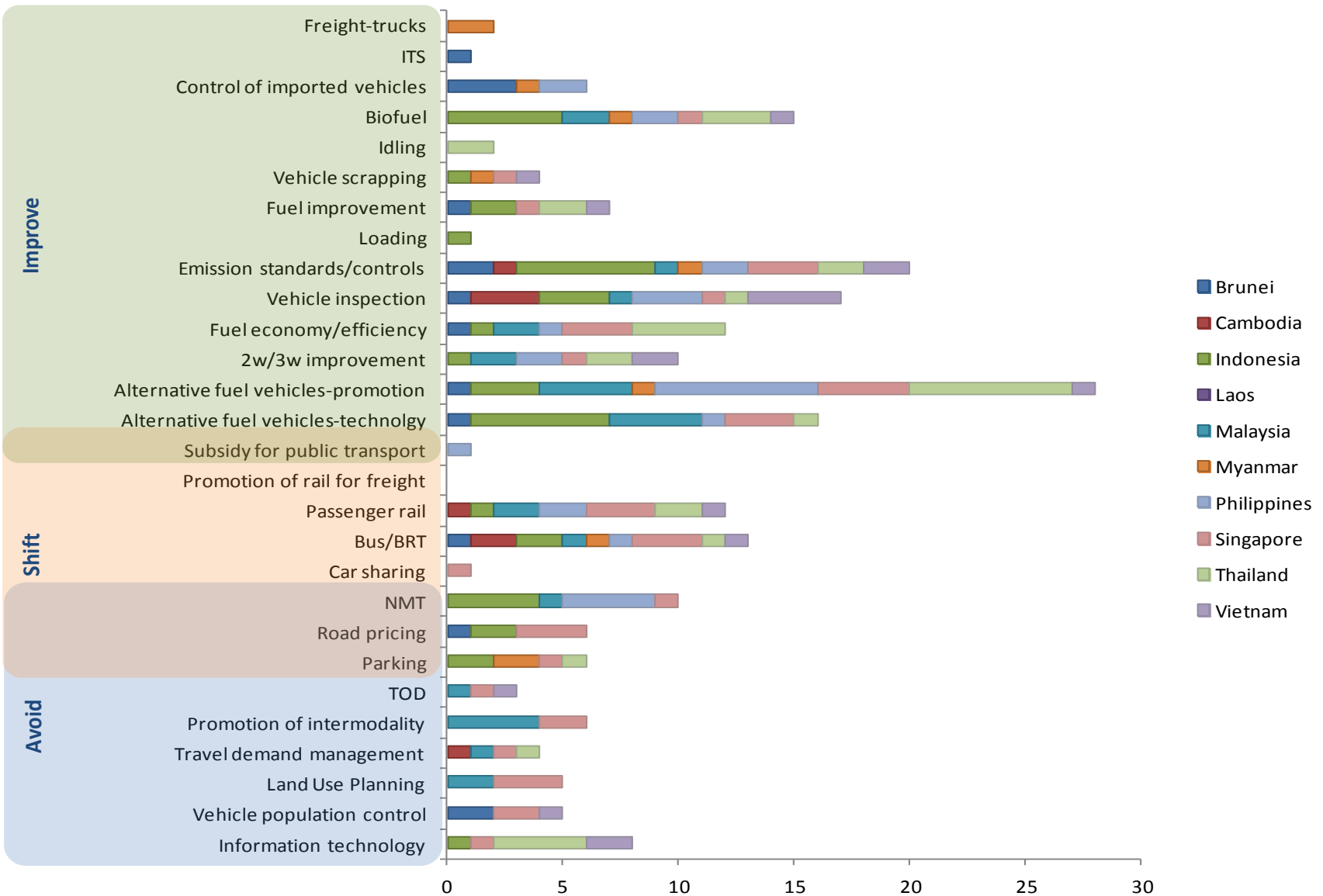


# Example: Off-hour deliveries

- Air Pollutant concentrations may increase if diesel trucks are only allowed to travel at night time due to lowered mixing heights and poor ventilation (case to case)



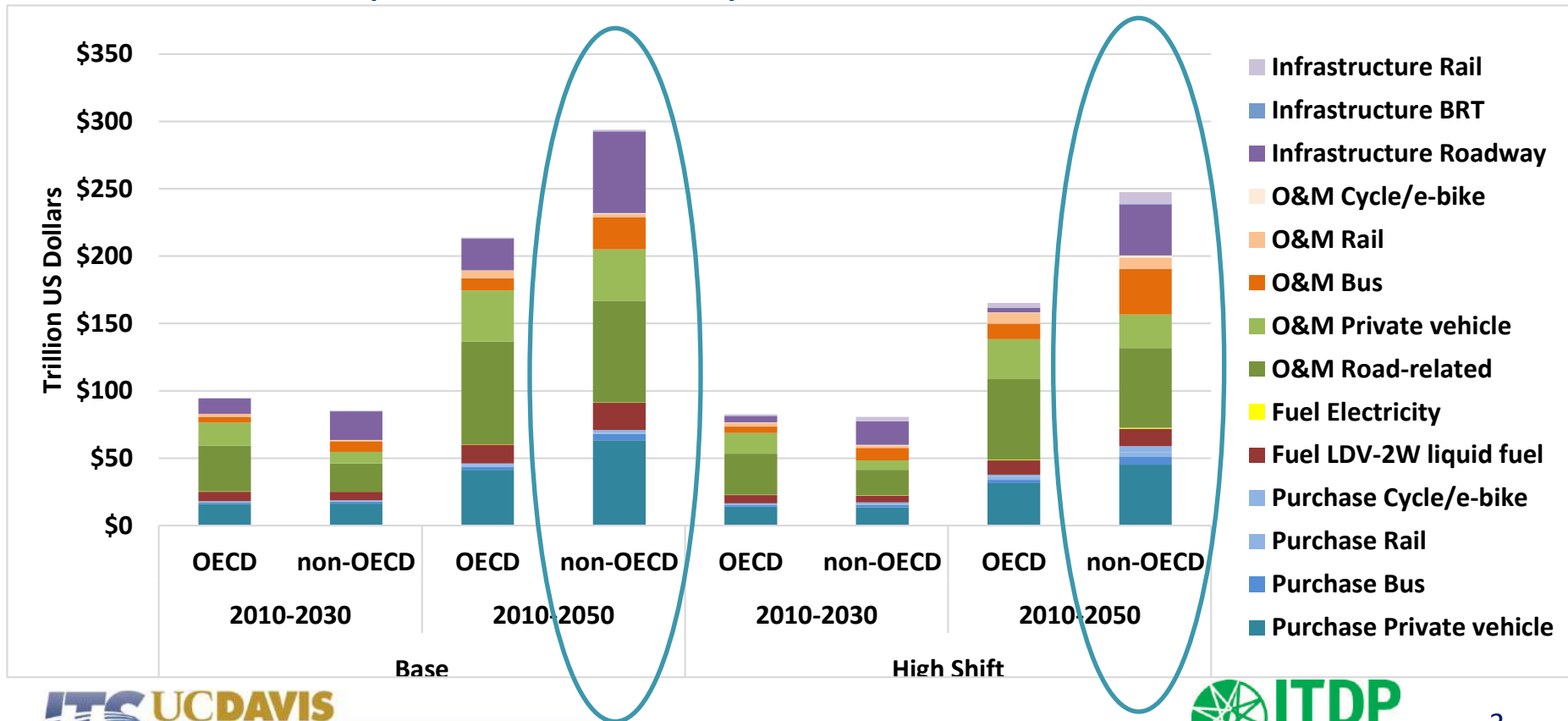
# “Improve” Policies Dominating



## High Shift Scenario lowers total costs in all categories

- Vehicle purchase costs (all modes)
- System infrastructure costs (road, rail)
- Vehicle and system operating costs
- Fuel costs (liquid fuel, electricity)

**Cumulative Savings of \$100 trillion 2010-2050**



# Key Considerations and Take-aways

- Transportation is, and will continue to be a key sector : air pollution, climate issues
- Policy challenge for developing countries : service provision first
- Change of paradigm in intervention assessment is needed to include broader impacts
- Different solutions at different levels
- Different solutions for different contexts
- Trade-offs exist, but can be balanced

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Better Air Quality,  
Livable Cities.

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## ABOUT US

Clean Air Asia leads efforts to enable Asia's

# 1000+ CITIES

to reduce both air pollution and CO<sub>2</sub> emissions and thereby contribute to more livable and healthy cities with blue skies and low carbon footprint. We help to reduce emissions through policies, plans, programs, and concrete measures that cover air quality, transport and industrial emissions and energy use.



## WHAT WE DO



AIR QUALITY &  
CLIMATE CHANGE



CLEAN FUELS &  
VEHICLES



GREEN FREIGHT &  
LOGISTICS



LOW EMISSIONS  
URBAN  
DEVELOPMENT



# Fostering the air quality community in Asia Better Air Quality (BAQ) Conferences



BUSAN, SOUTH KOREA  
29 AUG - 2 SEP 2016



<http://baqconference.org/>



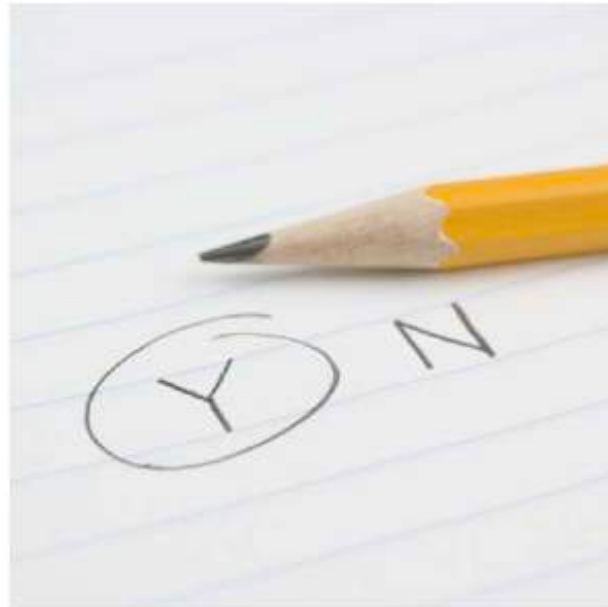
TIME FOR Q&A



Questions ?

# SURVEY

- How did we do?
- Your feedback is important!



YOUR PARTICIPATION IS APPRECIATED

Thank You!

Contact:

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