S20 High Level Policy Webinar

APPLYING SCIENCE AND TECHNOLOGY FOR CL
AIR AND CLIMATE CO-BENEFITS

Climate Mitigation and Air Pollution

Thinking Globally, but Acting Locally

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Bank

Session: Applying Science and Technology fo
Air and Climate Co-benefits

30 June 2022

Economic Success Story…

- Since the early 1990s, Vietnam has had one of the fastest Gross Domestic Product (GDP) per capita growth rates (averaging 5.5 percent a year), yielding a three-and-a-half-fold increase in average income.

- Economic growth has brought dramatic structural transformations, with the agricultural sector's share in GDP falling from more than 40 percent in the late 1980s to less than 20 percent in recent years.

- More than 40 million people were lifted out of poverty between 1990 and 2014. Extreme poverty (US$ 1.90 per day) fell from 50 percent in 1993 to less than 3 percent today.

- Consumption for the bottom 40 percent grew (shared prosperity) by 6.8 percent annually over the same period.

- Building on the successful implementation of the Millennium Development Goals, Viet Nam is on track to achieve several of SDG-related results

Aspires to become a high-income economy by 2045

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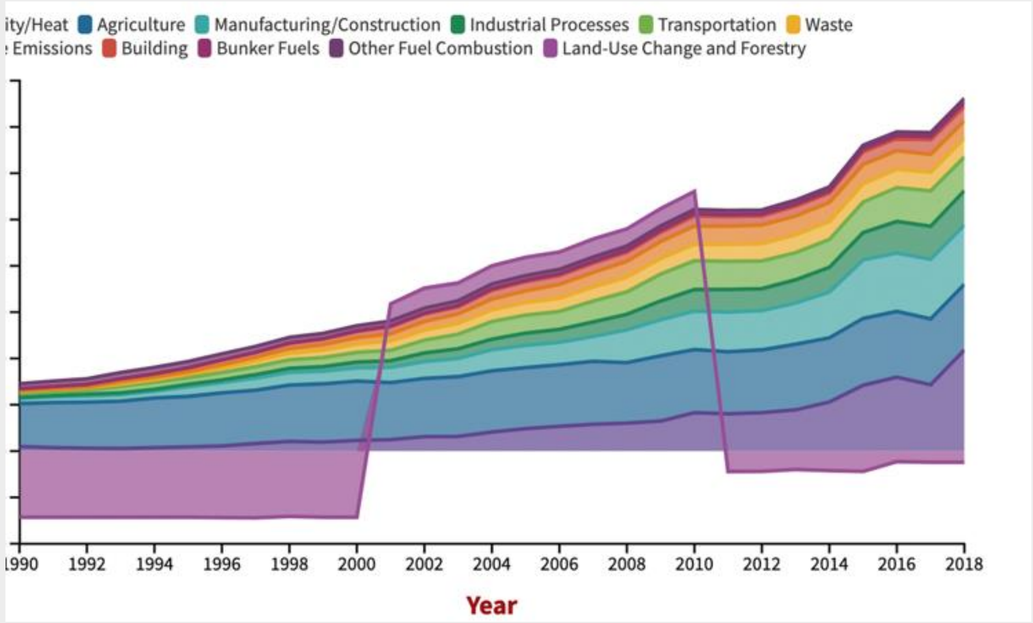
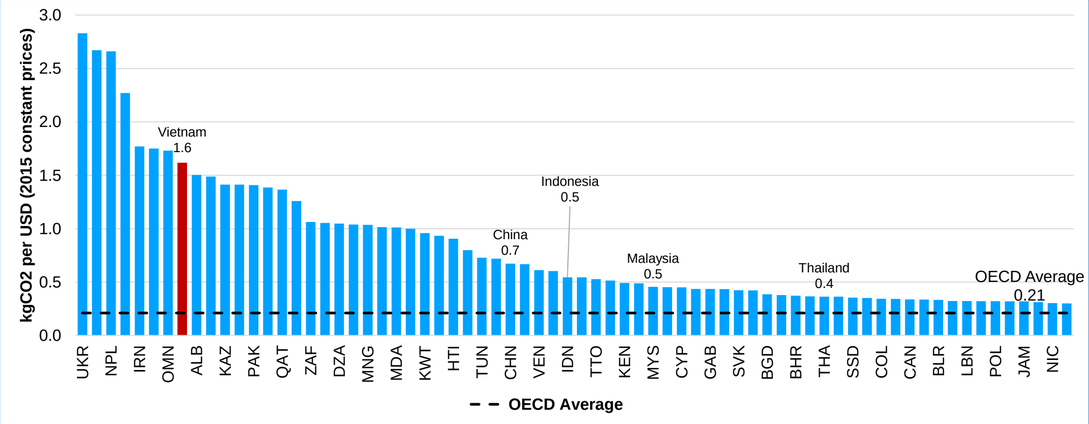
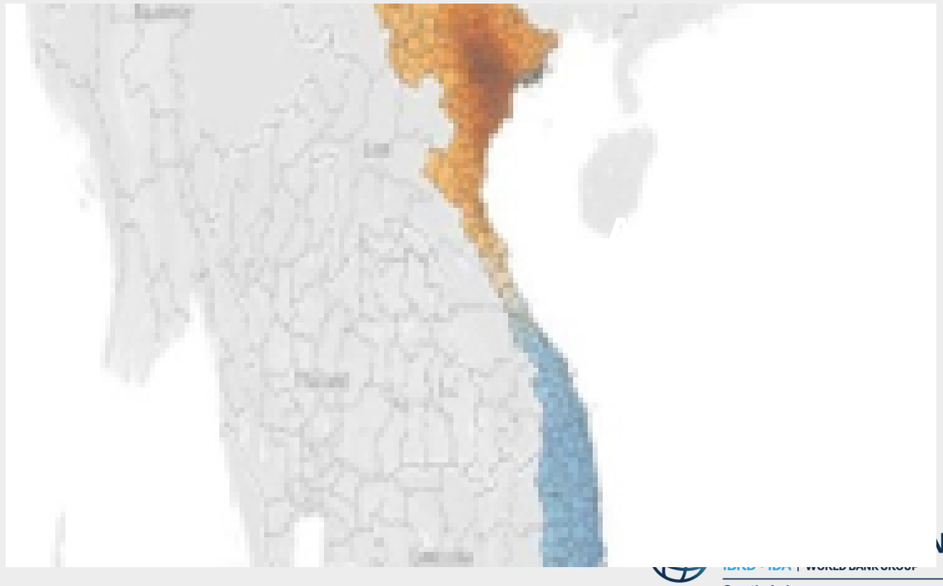
Rising Greenhouse Gas Emissions

- Over the past two decades, Vietnam has emerged as one of the fastest-growing per capita greenhouse gas (GHG) emitters in the world. [From 2000 to 2015, as gross domestic product (GDP) per capita increased from $390 to $2,000, carbon dioxide (CO2) emissions nearly quadrupled].
- While Vietnam is not a major contributor globally, its GHG emissions are associated with the toxic air pollution that plagues many of its cities, especially Hanoi, today and has implications for health and labor productivity.







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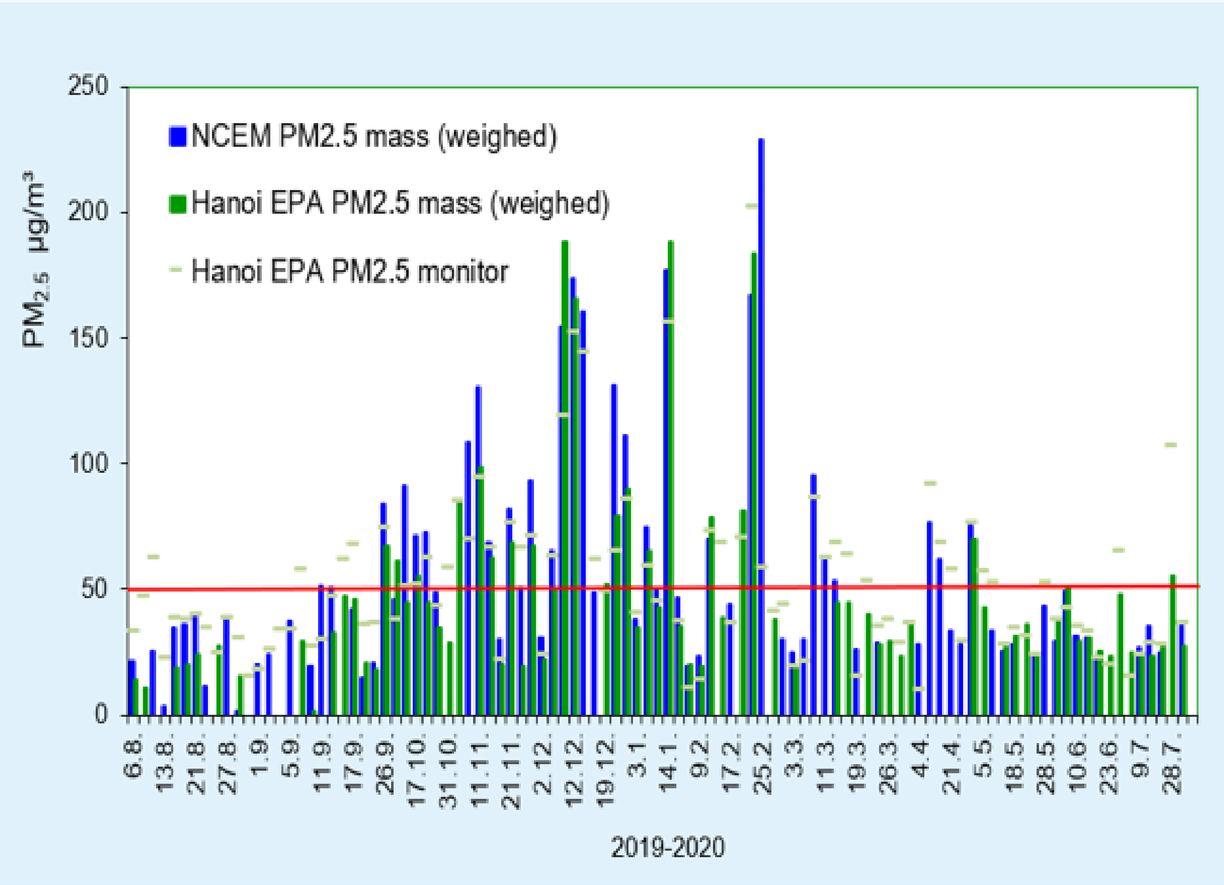
Significant seasonal air pollution measured from satellite images around Hanoi Region



Between October and February, the limit value was regularly exceeded with very high peaks to 150-200 µg/m3; 60,000-70,000 people deaths per annum

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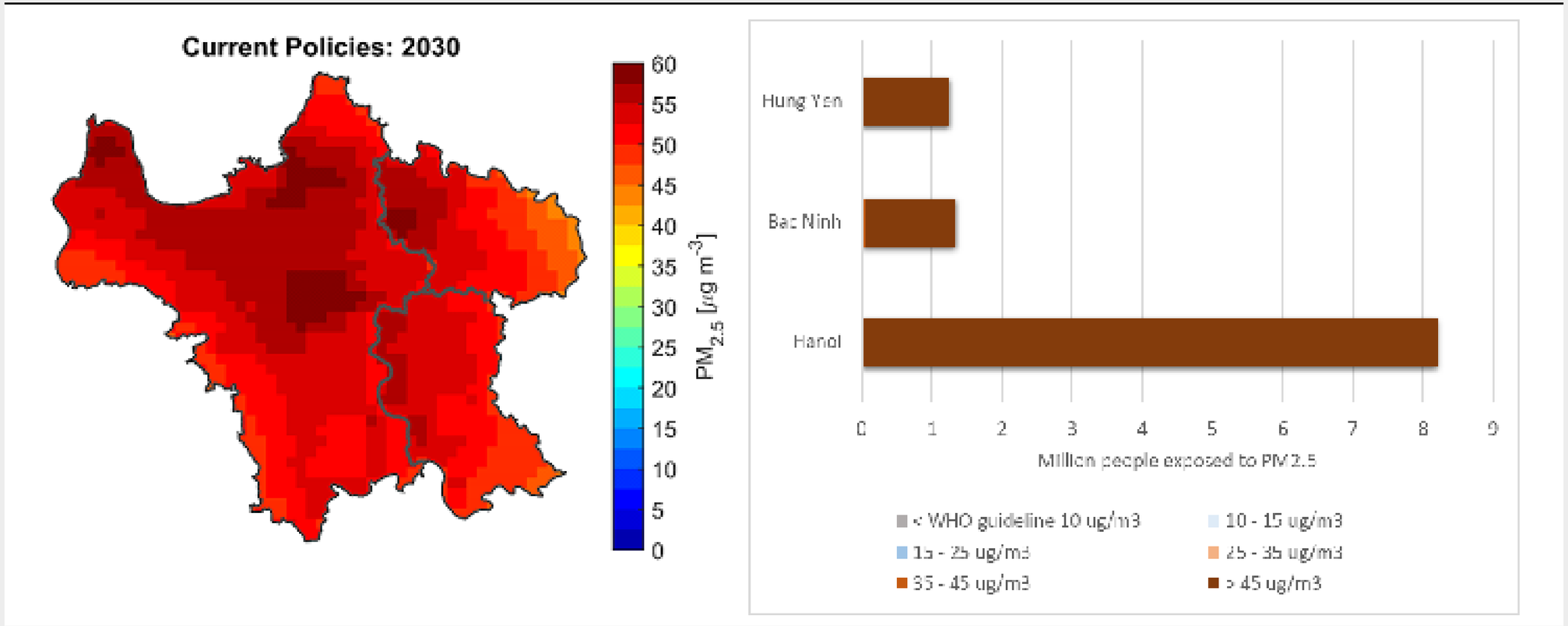
Expected exposure of people to PM2.5 pollution in 2030 with current air quality policies only



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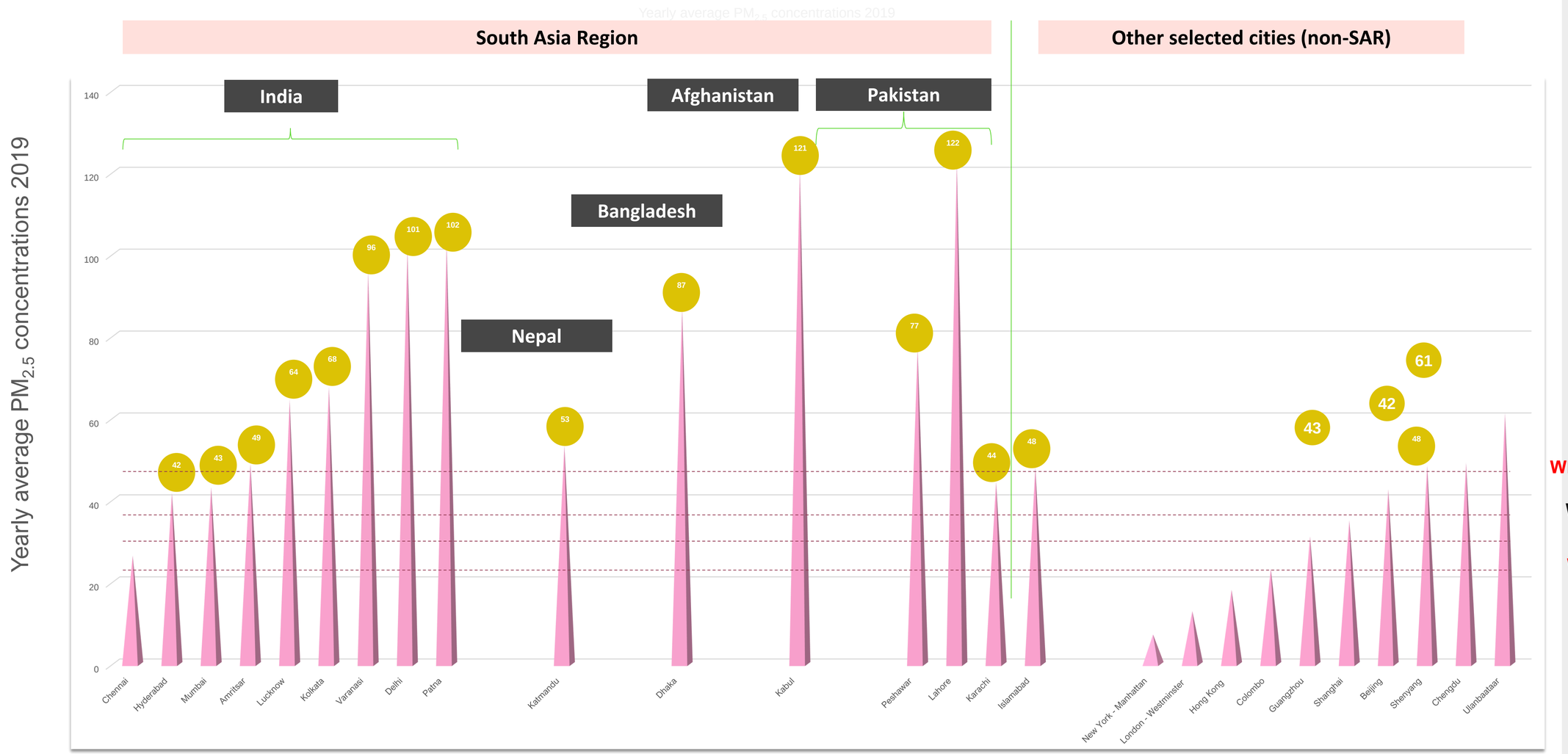
SAR AS GLOBAL HOT SPOT FOR HIGH AIR POLLUTION in 2019 (2/2)
Most cities in SAR 3 – 12x higher than WHO standard for $PM_{2.5}$



Source: Calculations from 2019 AQ data from openaq.org and airnow.org

Asia Region: Global Hotspot for Air Pollution

- $PM_{2.5}$: fine inhalable particles with diameters 2.5μm and smaller.

- Excessive $PM_{2.5}$ exposure is linked to:

  - chronic bronchitis,
  - reduced lung function
  - lung cancer
  - heart disease
  - Covid-19

- WHO guidelines: Annual Mean of 10 $\mu g/m^3$

- Most cities in Asia 3-12 times higher than WHO standards for $PM_{2.5}$

Our understanding is evolving…

New approaches to merge satellite-based, CTM and ground monitoring data, e.g., combine satellite-based estimates with land use data

Increasing importance of transportation of pollution and secondary particles (e.g. Ammonia)

- Risks
  - Additional health endpoints
    - Pre-term birth and Term Low Birthweight
    - Diabetes
    - Asthma
    - Cognitive aspects (stunting etc.)
    - COVID-19
- Dose Response (IER)
- Studies across the entire global range of exposure: Chinese and Indian $PM_{2.5}$ cohort studies
- Costs
- Moving beyond “Direct” costs of illnesses from ambient air pollution to include reduced work hours and lost labor productivity, as well as health care expenditures.

Sources of air pollution

Human vs. Environmental Sources

- Human sources often come from combustion, including fuels for cooking or electricity generation, domestic heating, and vehicle engines
- $PM_{2.5}$ occurs naturally from sources like sea salt, dust, and pollen
- Environmental $PM_{2.5}$ concentrations naturally high in Western Pakistan, but not in other areas

Indoor vs.Outdoor

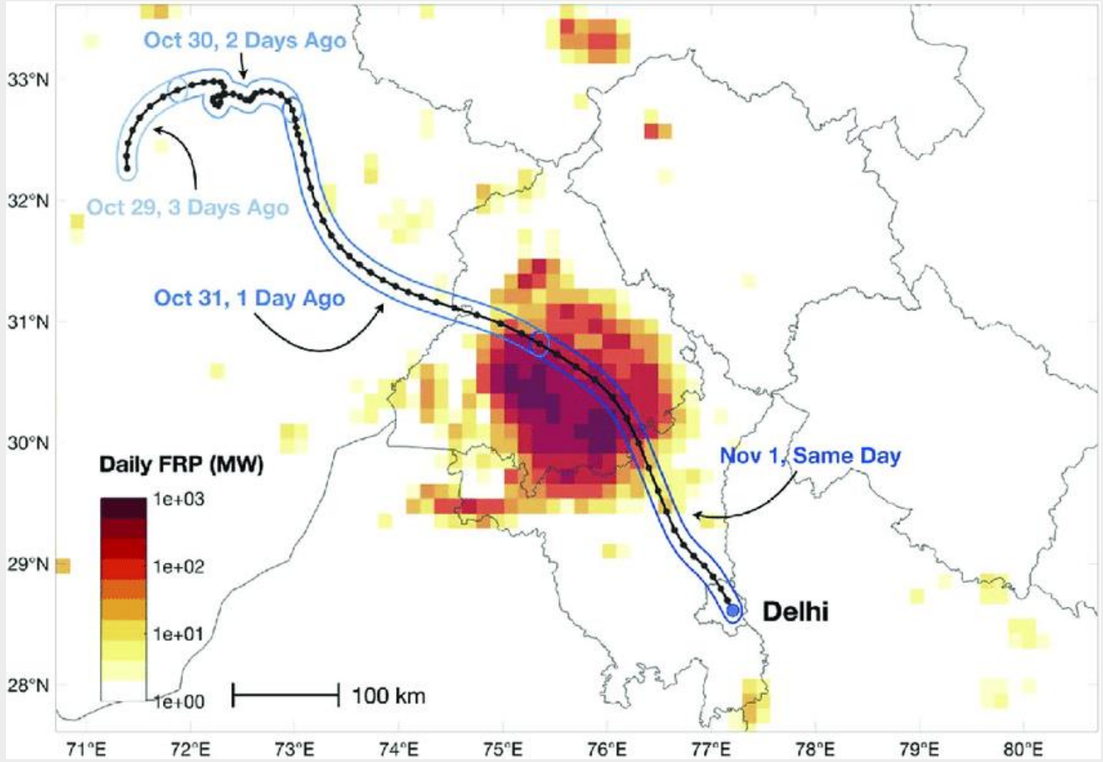
- People spend 80-90% of their time indoors
- Household Air Pollution (HAP) is often high from solid fuel use for cooking such as wood, coal, and biofuel

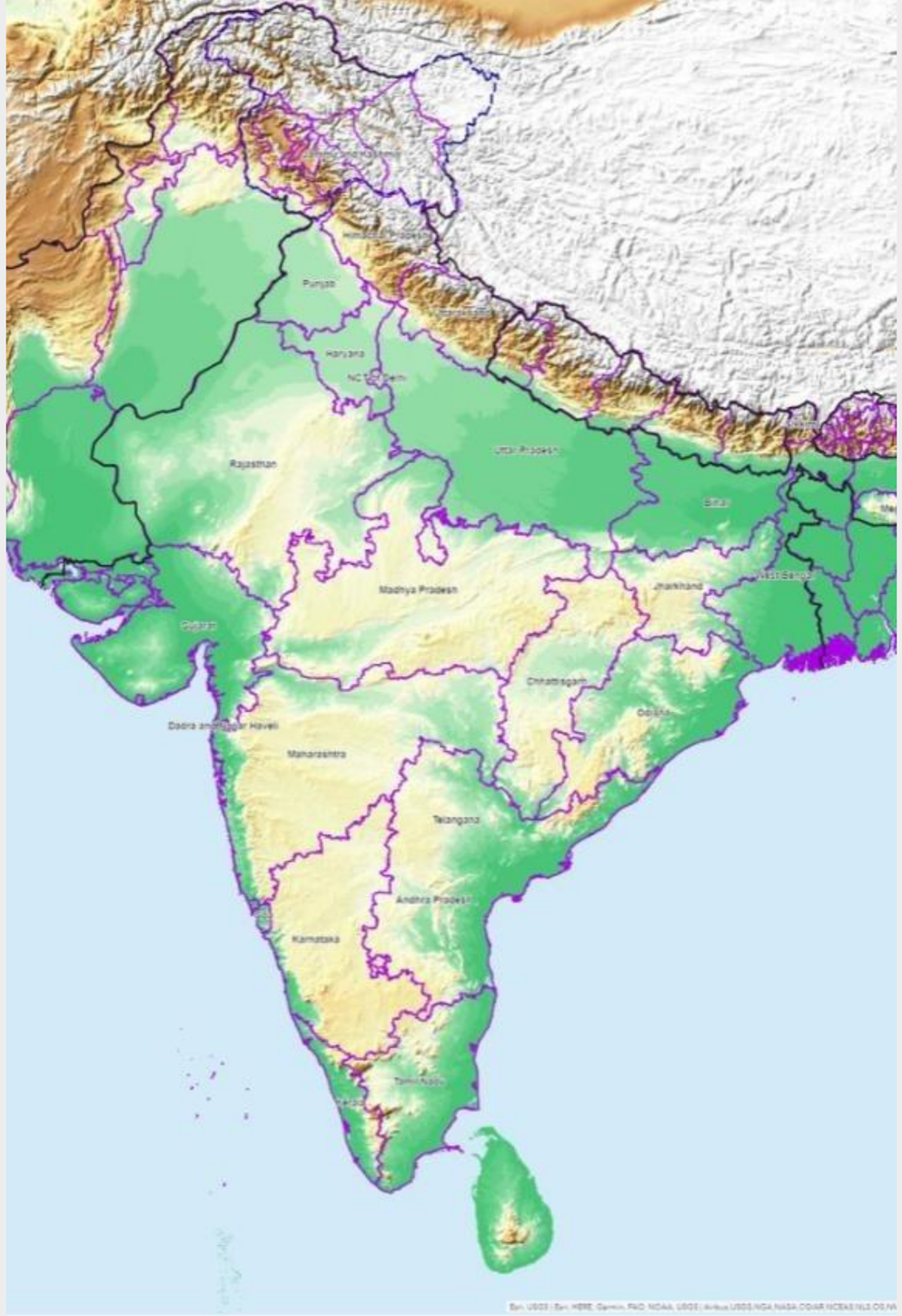
Going beyond the current approach

- **Air pollution management in Asia has thus far focused on city-level air pollution (mobile & stationary sources) within political boundaries.**

- **However, air pollution is transported long distances across boundaries and is a function of wind climatology and cloud chemistry.**

- **Recognizing the transboundary nature of air pollution is critical to better understand the sources and impacts of air pollution and formulate appropriate policy responses.**





Airshed Approach

A geographic area affected by the same air mass due to topography, meteorology and/or climate. Air quality within the airshed will depend on pollution sources within it, but not outside it.

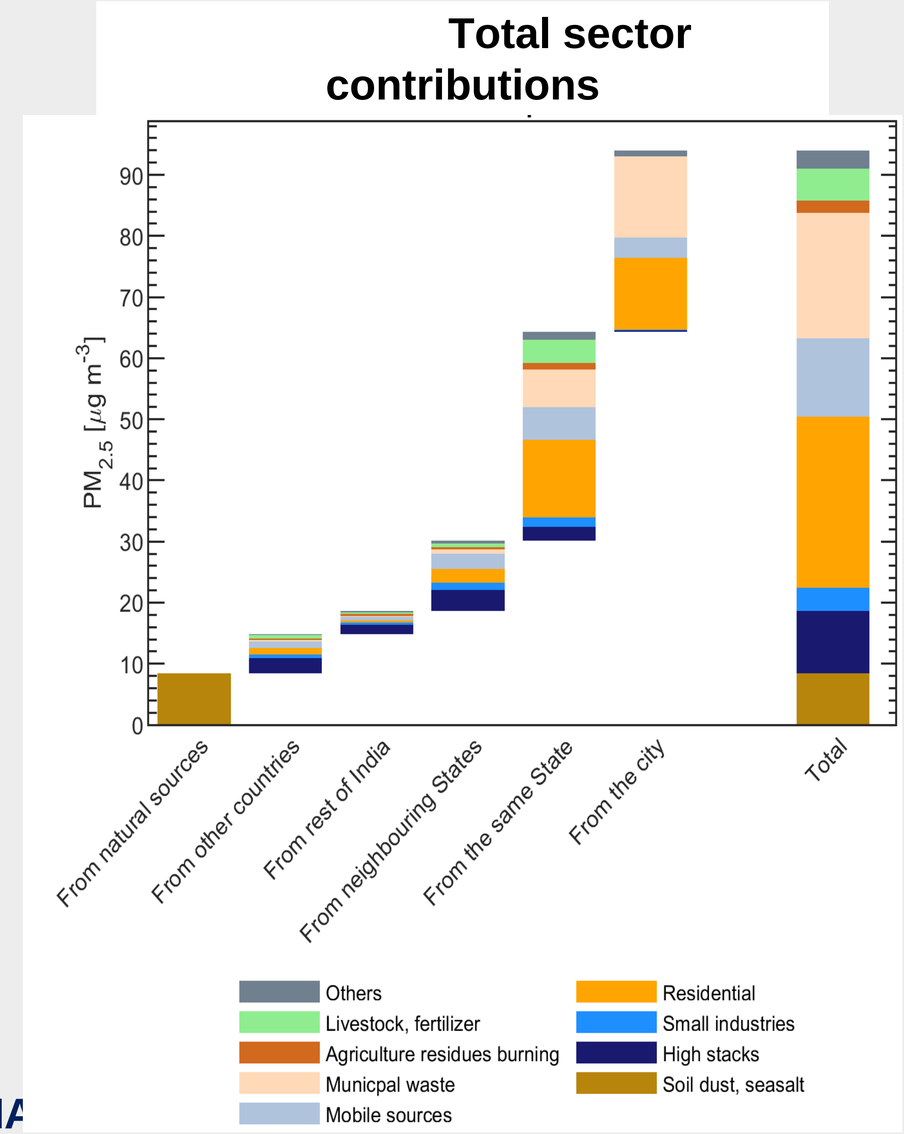
• Pollution levels within an airshed can vary.

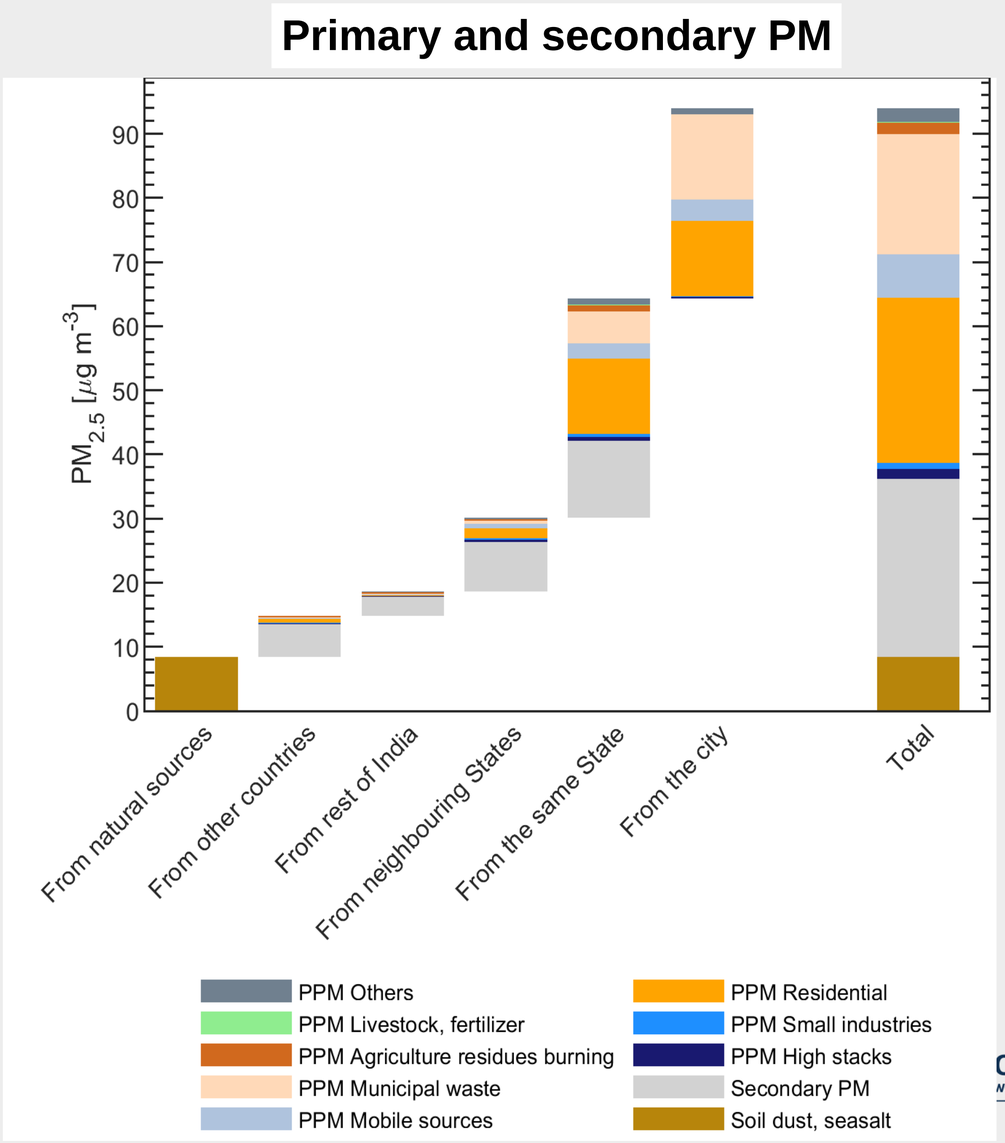
• Within an airshed there may be areas where pollution levels are elevated because of an individual or group of emission sources, such as one or two polluting industries or proximity to a congested roadway.

• Analogous to watershed concept but may be more demanding to sample as air pollution comes from a variety of nonpoint sources.

• Airsheds as planning units already standard in many countries, such as New Zealand and Philippines. China and India also starting to utilize regional air pollution planning.

Source apportionment of (population-weighted) PM2.5 exposure Kanpur 2018





Source: IIA

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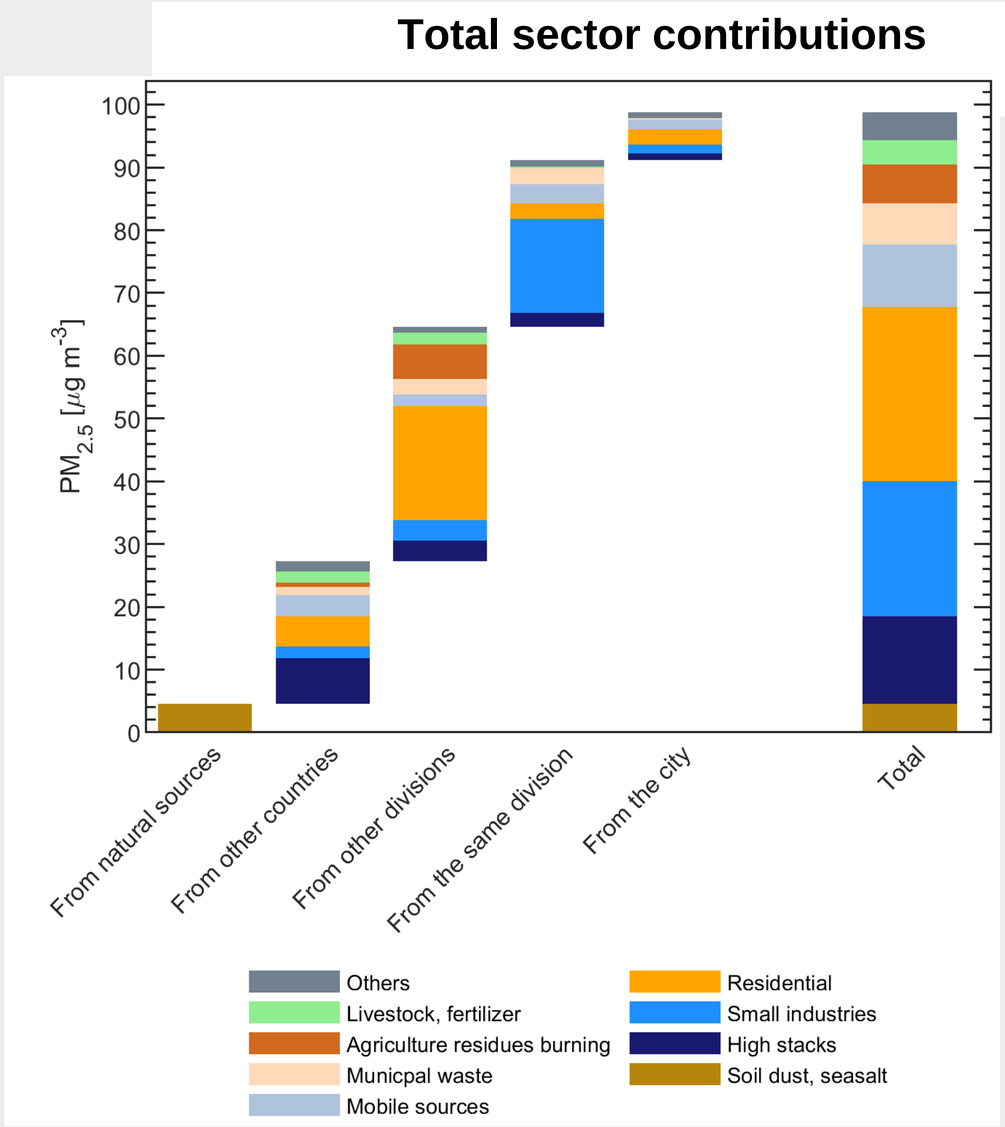
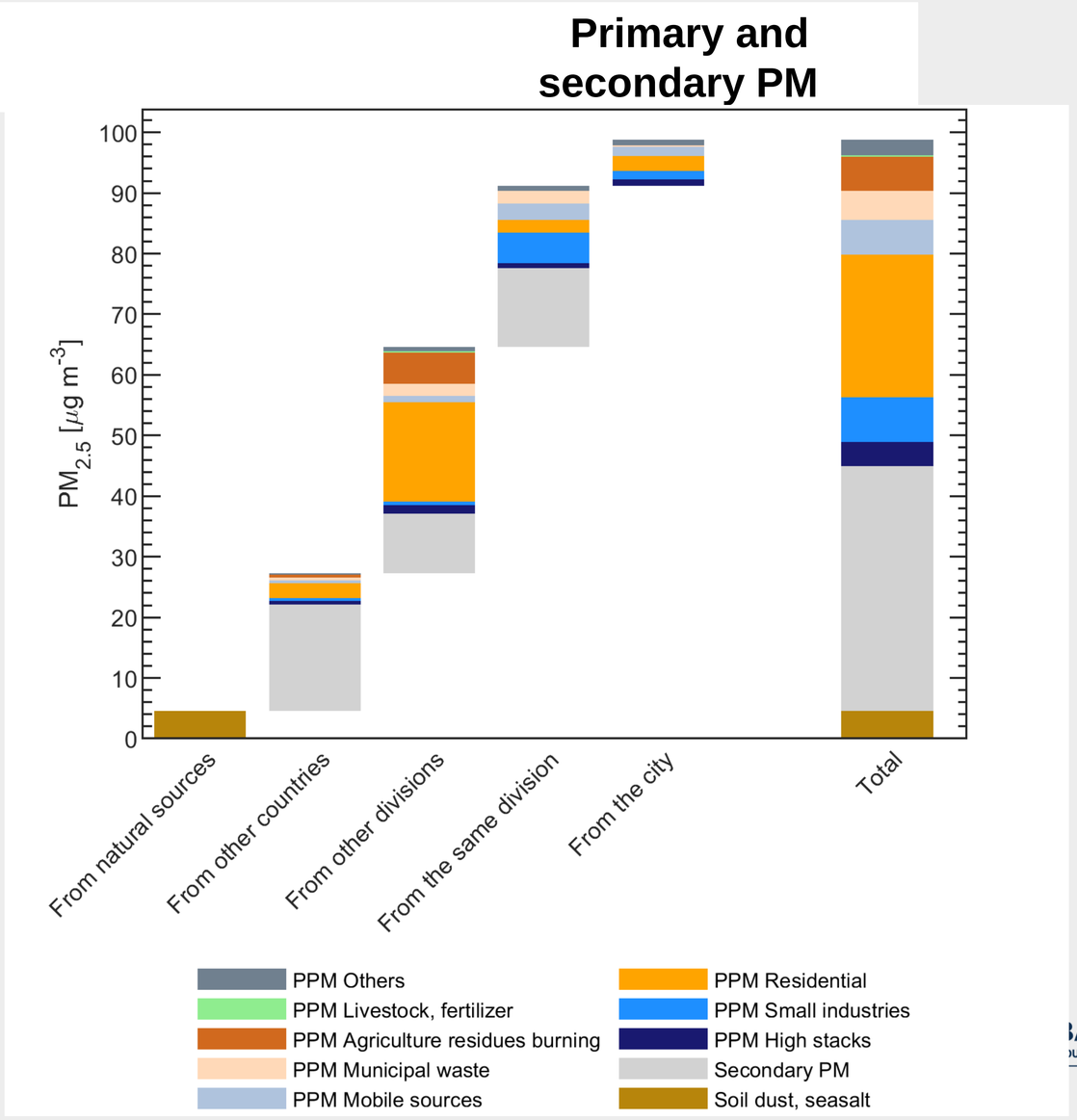
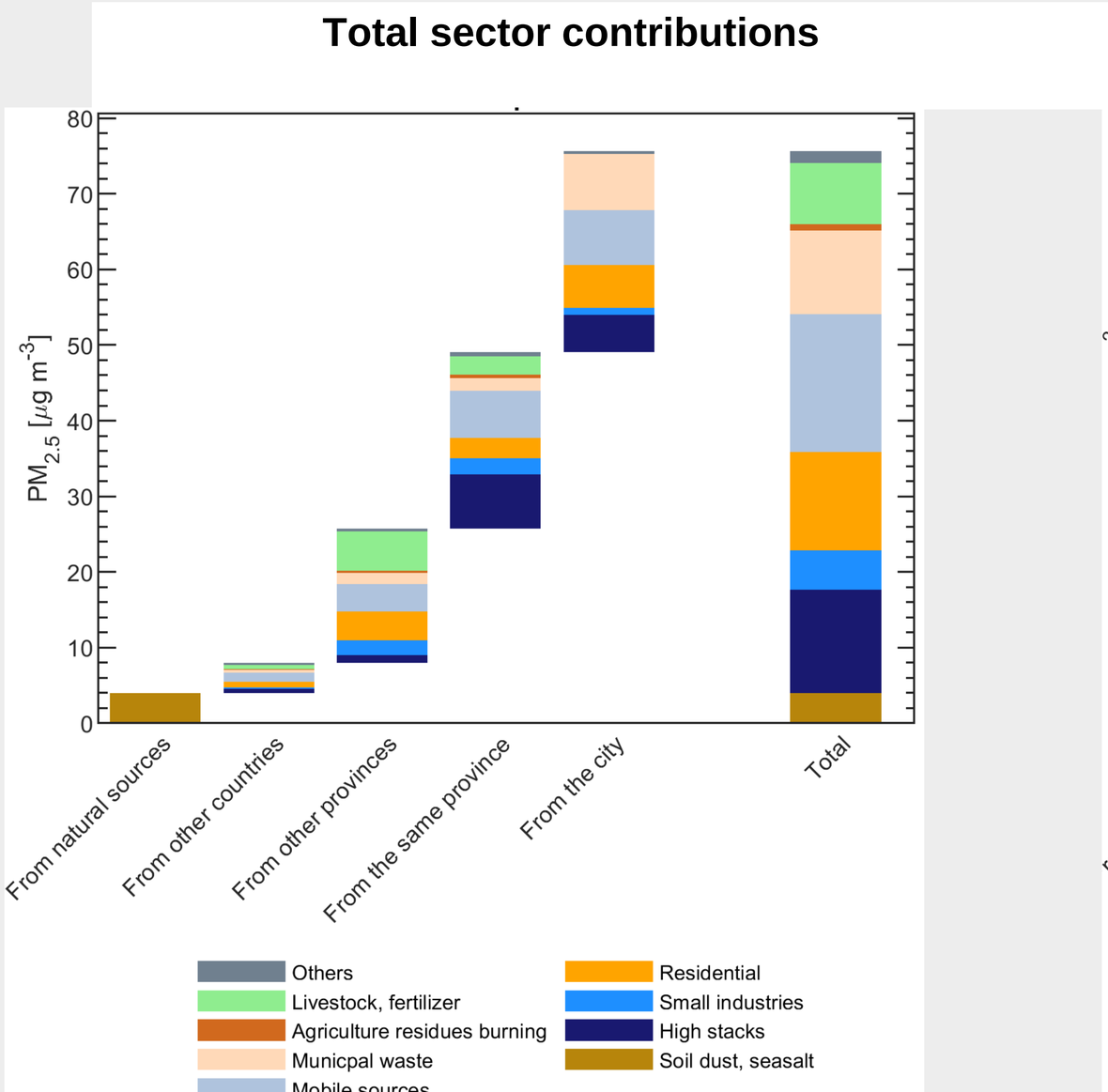
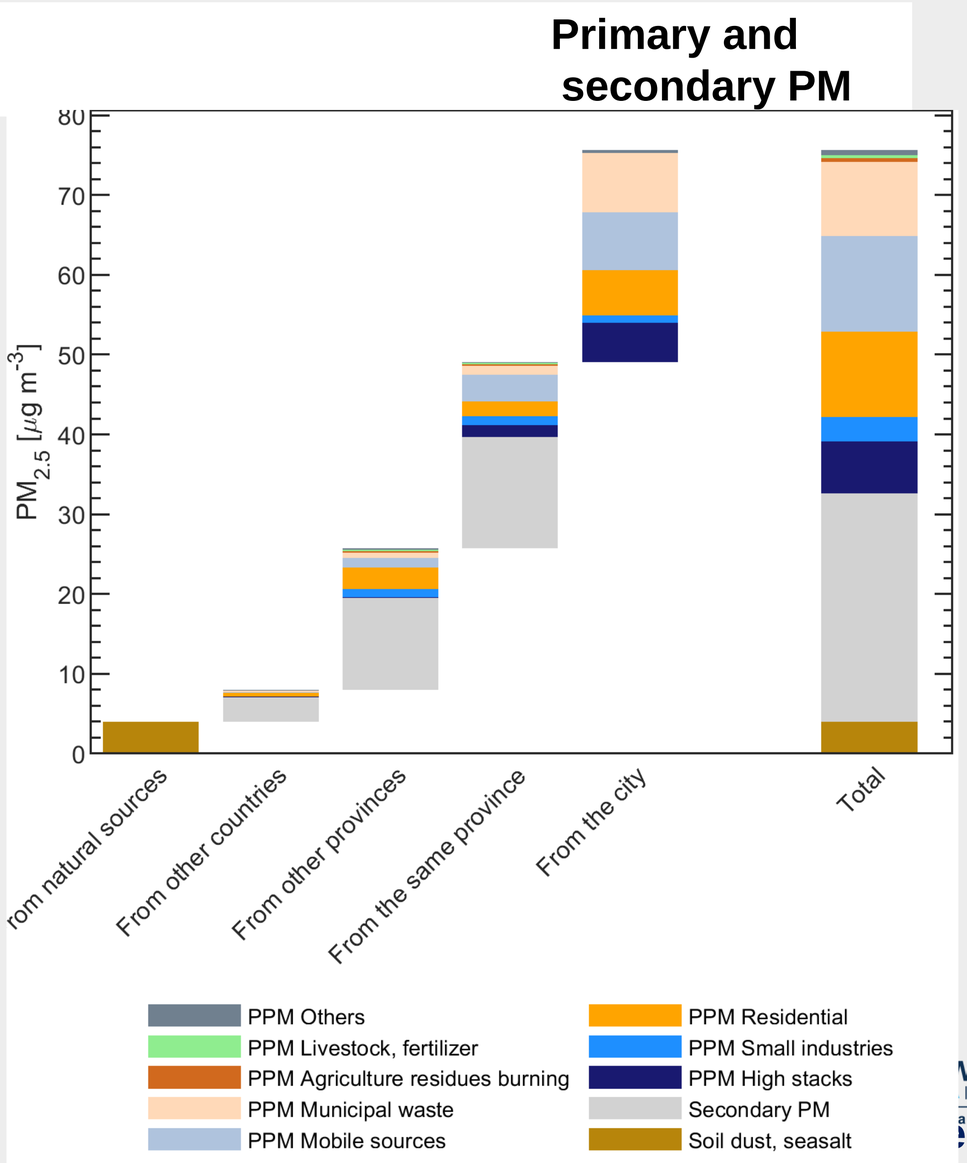
Source apportionment of (population-weighted) PM2.5 exposure Dhaka (city area) 2018





Source apportionment of (population-weighted) PM2.5 exposure Islamabad 2018





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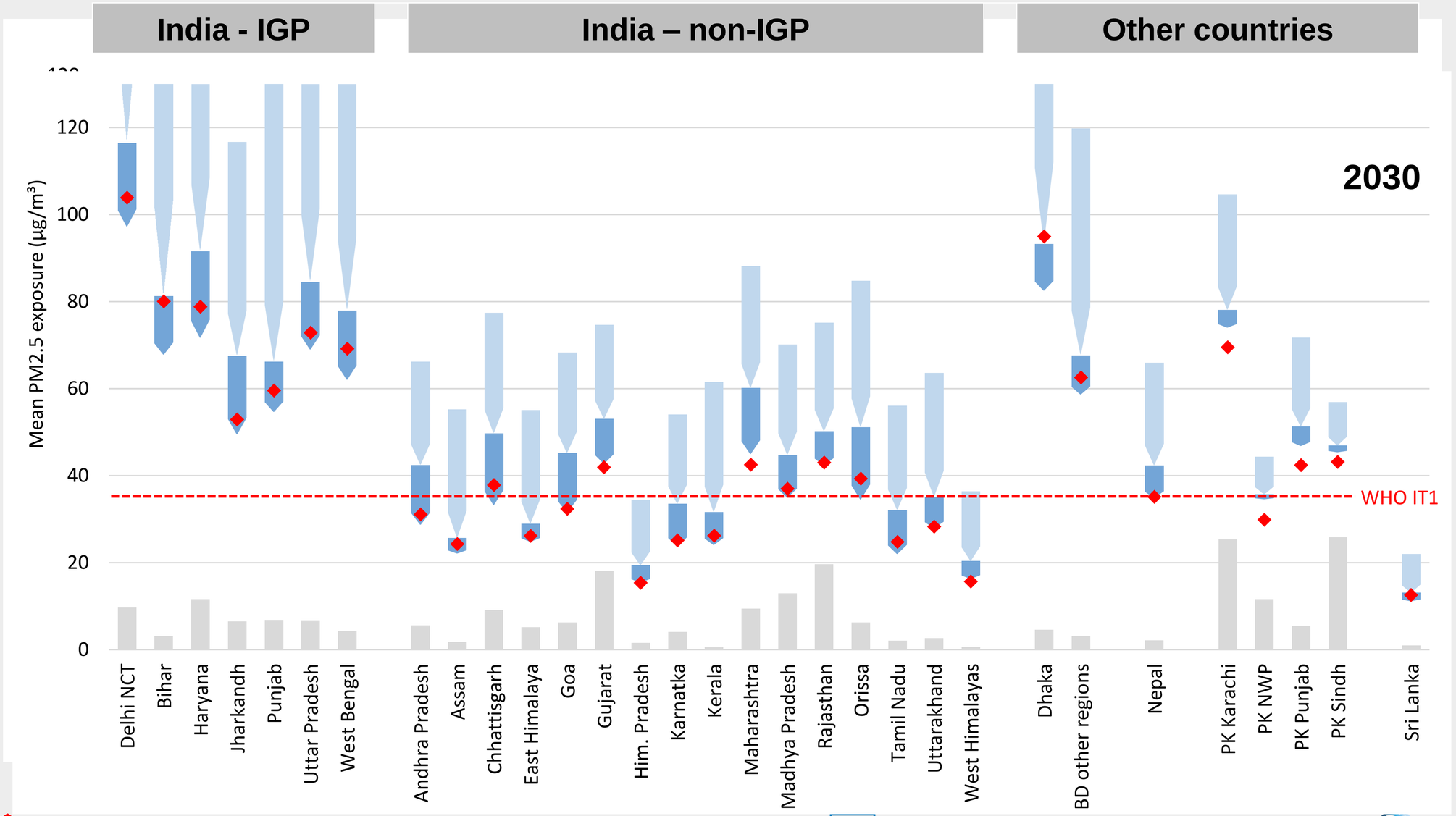
Future air quality will be determined by policy interventions and their enforcement



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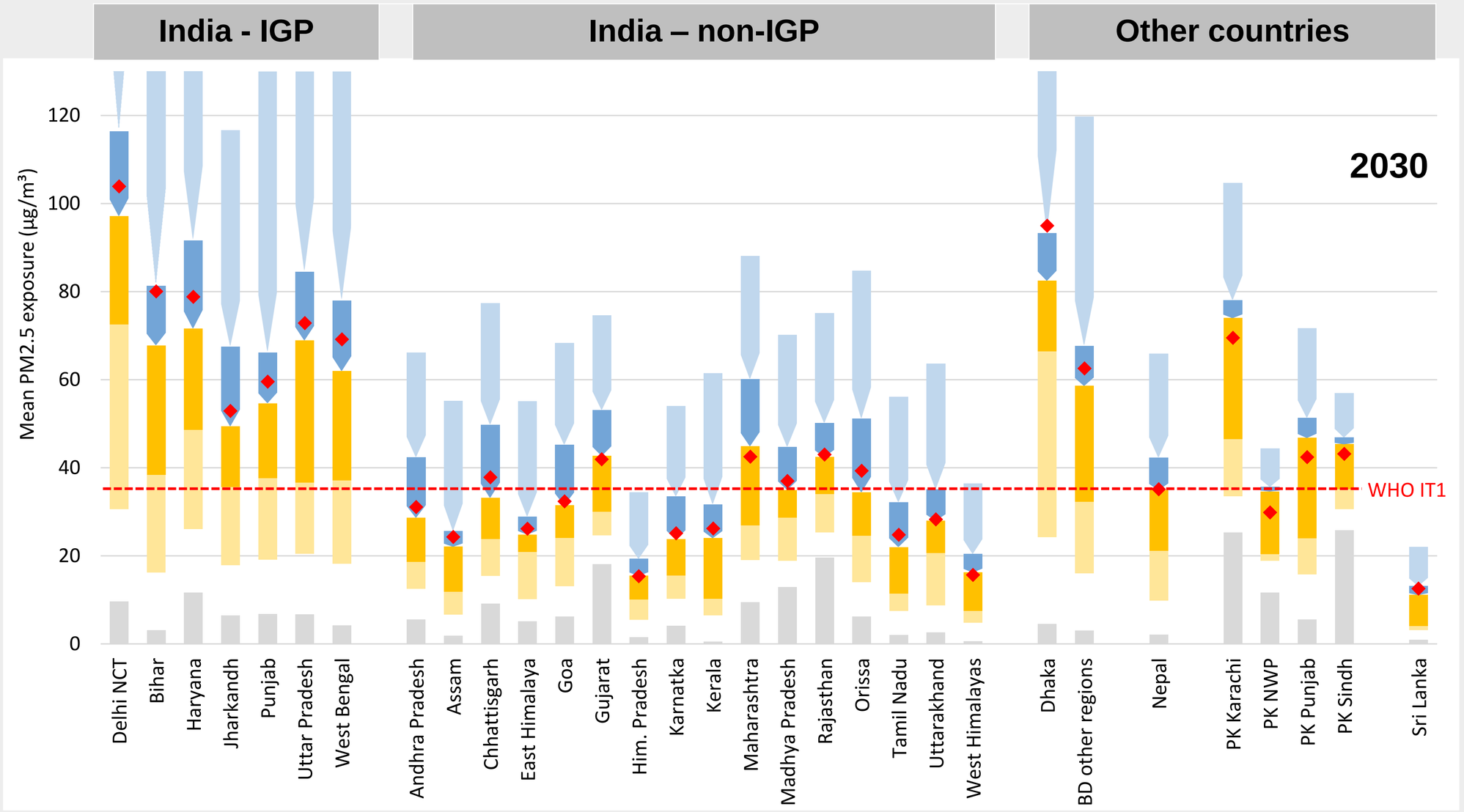
Technical potential for additional exposure reductions in 2030



2018

Avoided through economic policies and 2015 legislation

Technical potential from further measures within the same Stat

Contributions from natural sources

Reductions from full implementation of 2018 legislation

Scope for further technical measures in other regions

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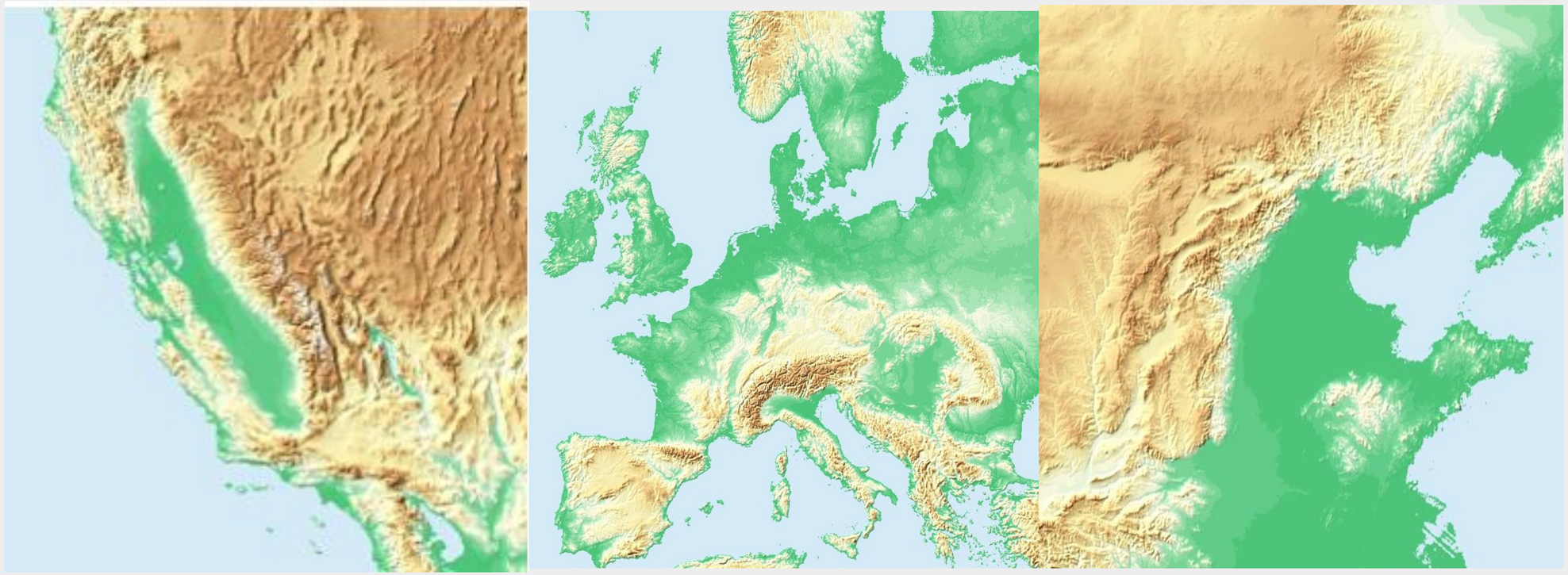
Regional Approaches Have Worked Well



California organized its 58 counties into 35 air quality management districts and 15 air sheds

Considering the area of the EU as one airshed, its clean air legal framework provides an effective response mechanism to manage the complex links between the diversity of pollution sources and the regionally dispersed impacts on air quality

Following a high pollution event in the North China Plain in early 2013, the Chinese government decided to establish a collaboration between the Beijing and Tianjin municipalities, and Hebei Province, the so-called Jingjinji area, through which the Beijing Environmental Protection Bureau (EPB) was assigned to coordinate air quality management planning and yearly revisions of the plans of the three jurisdictions

Thank you