

Strengthening Asian Regional Exchange for Effective Air Quality Management

Shared Challenges, Solutions, and Opportunities

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About Clean Air Asia



The UN recognizes Clean Air Asia and our partnership network comprised of more than 250 organizations around the world, including country partners in the region.

Clean Air Asia is an international non-profit organization that was established by ADB and WB in 2001.

Vision and Mission

ASIA WITHOUT AIR POLLUTION AND WITH A STABILIZED CLIMATE FOR PEOPLE AND THE PLANET

Reduce air pollution and GHG emissions in Asia and contribute to the development of a more sustainable, equitable, and healthier region.

Main Objectives

- ✓ City solutions
- ✓ Policy support
- ✓ Capacity building
- ✓ Awareness Raising
- ✓ Asia knowledge exchange

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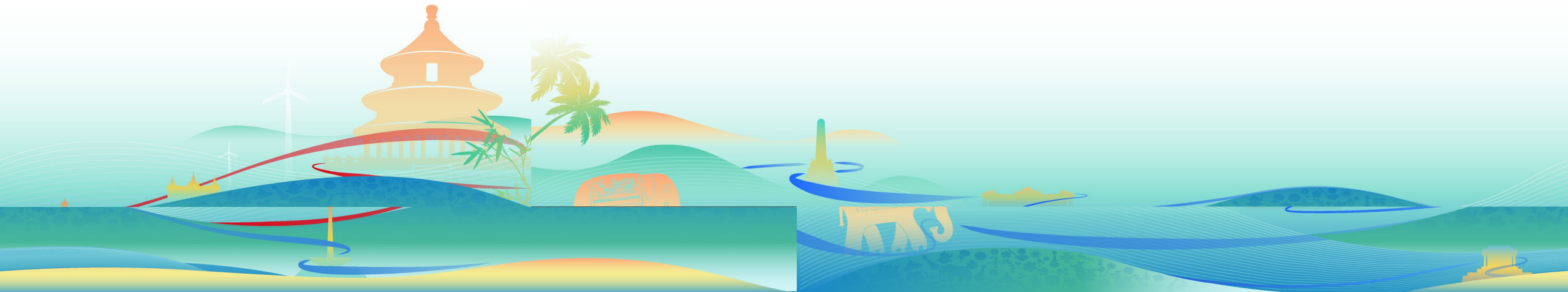
Air Quality Trends and Status in Asia

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Sectoral Management and Co-benefits with
Decarbonization Goals

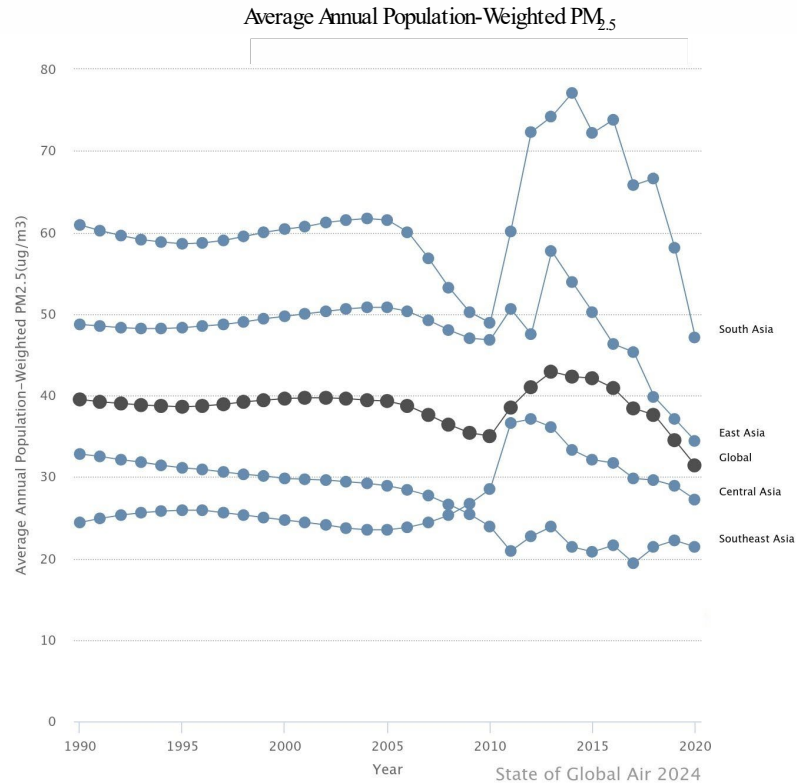
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The Asian Regional Exchange Program



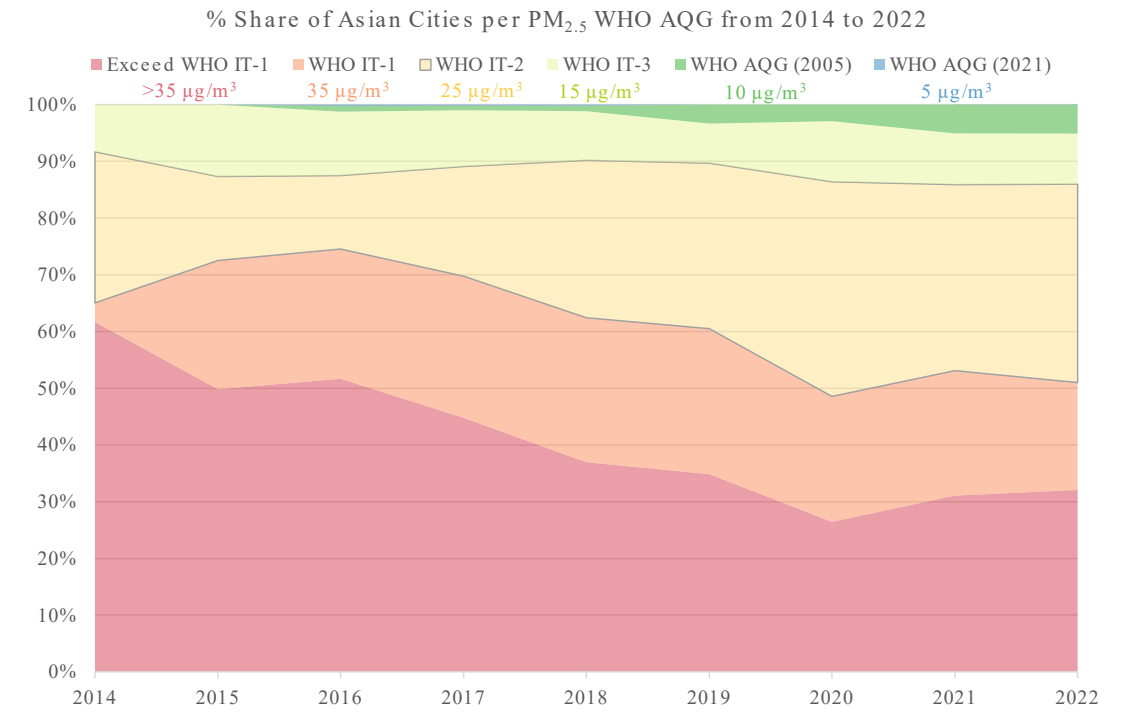
Overall positive progress in air quality improvement in Asia

The Asian sub-regions experienced a major turning point in the key air quality indicator average annual population-weighted PM_{2.5} around 2010, showing a trend of deterioration followed by improvement.



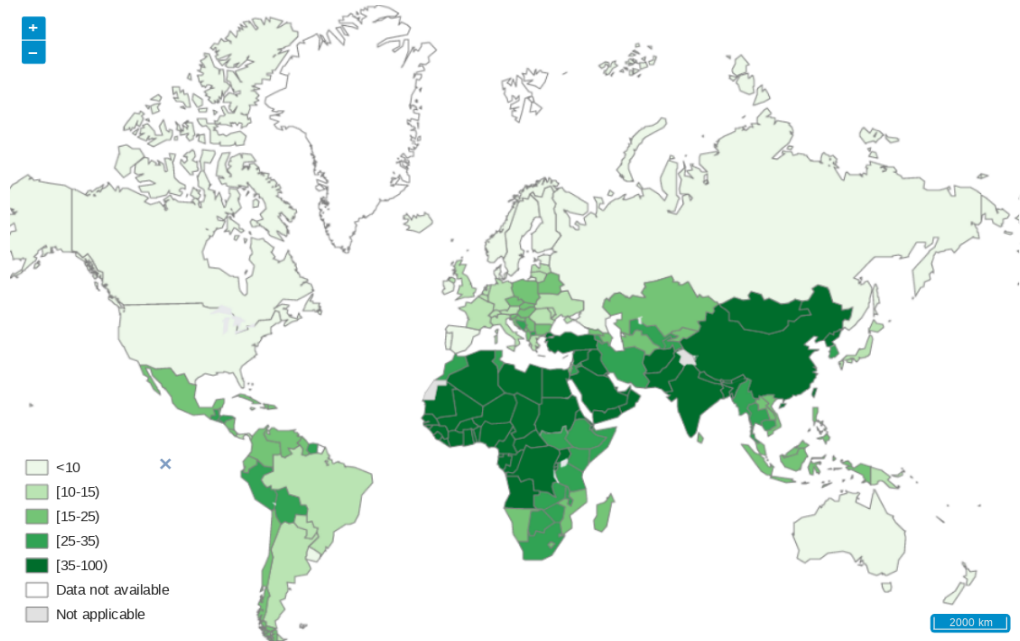
Health Effects Institute. 2024. State of Global Air 2024.
Data source: Global Burden of Disease Study 2021. IHME, 2024.

Percentage of cities with annual PM_{2.5} concentration **higher than 35 µg/m³** has generally decreased, while those **between 15 and 25 µg/m³** has increased.



*Based on Clean Air Asia database on annual average PM_{2.5} concentrations in Asian cities

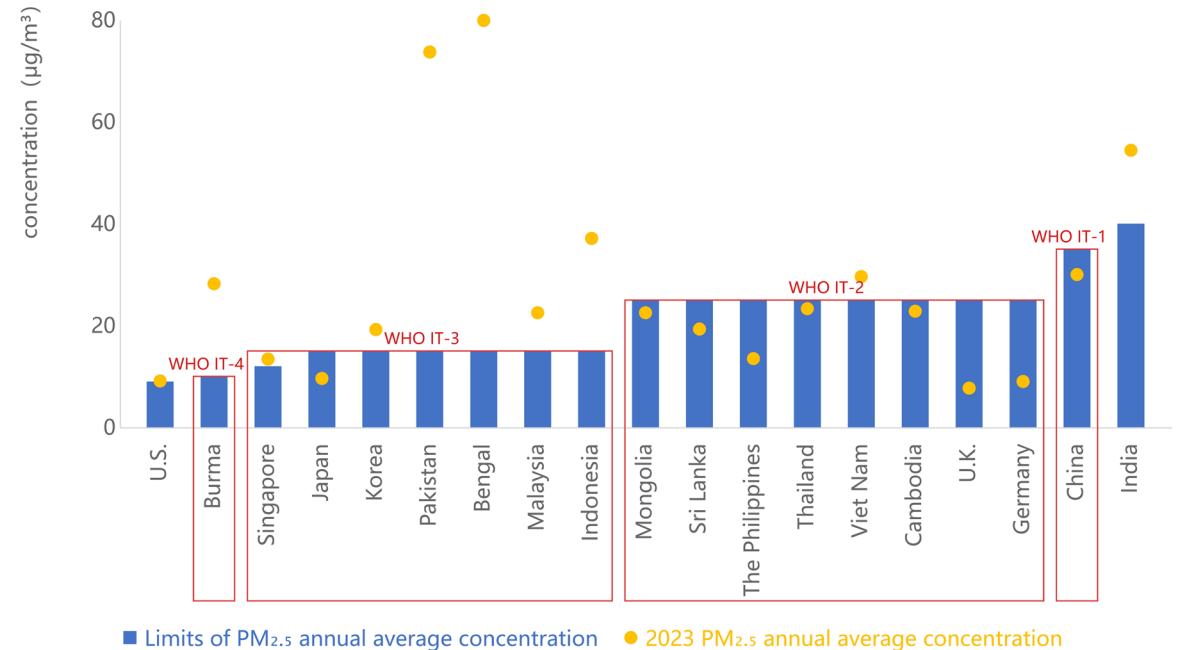
Asian countries still need to take action for better air quality



Based on monitoring data from over 6,000 cities in 117 countries, almost all of the global population (99%) is exposed to air that fails to meet the new guideline (5µg/m³); the population-weighted annual average PM_{2.5} concentration in South Asia, East Asia and West Africa is at or above the interim target 1 specified in the new guidelines (WHO IT-1, 35 µg/m³).

Current air quality in **nearly half of the Asian countries does not meet their national standards**. Some countries have set relatively strict limits (with reference to WHO IT-3 and IT-4), but their monitored PM_{2.5} concentrations still exceed the standards.

Upgrading the standards and continuous improvement in air quality can further protect the health of the public (especially vulnerable groups such as the elderly and children), which is crucial for many Asian countries as the population is aging.



*Based on Clean Air Asia database on AAQS in countries.

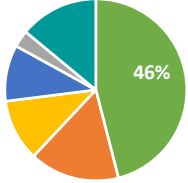
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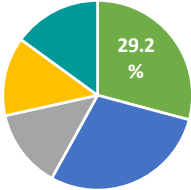


Primary contributor to PM_{2.5} pollution in mega cities

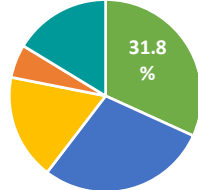
Beijing □ 2020-2021



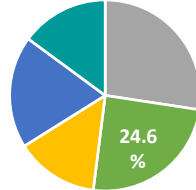
Shanghai □ 2014



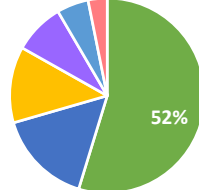
Chengdu □ 2017



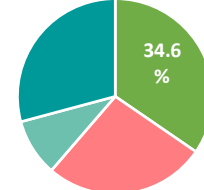
Nanjing □ 2014



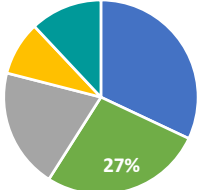
Shenzhen □ 2014



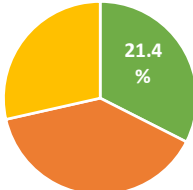
Delhi □ 2016-2017



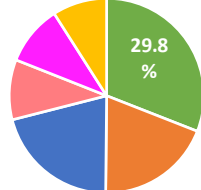
Wuhan □ 2014-2015



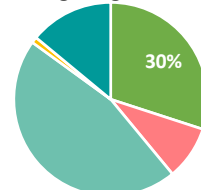
Xi'an □ 2014-2015



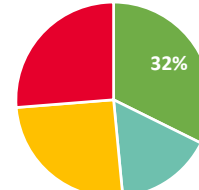
Guangzhou □ 2021



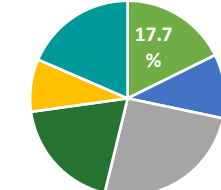
HongKong □ 2015



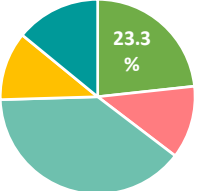
Jakarta □ 2019



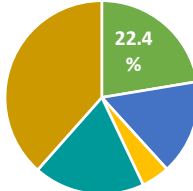
Mumbai □ 2010-2011



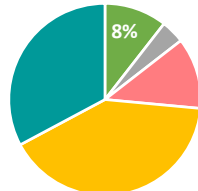
Seoul □ 2019-2020



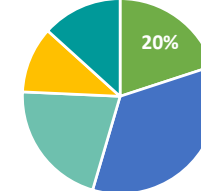
Kuala Lumpur □ 2017



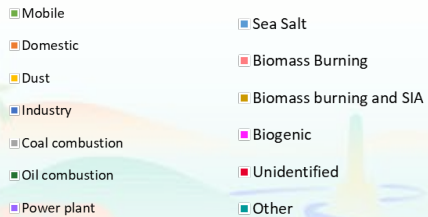
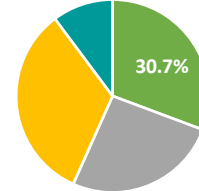
Hanoi □ 2015-2016



Manila □ 2016



Ulaanbaatar □ 2014-2016



* Please note that some cities have updated their source resolution results.

Source apportion study results published in the recent years ,

Source: Compiled by Philip Hopke, 2022

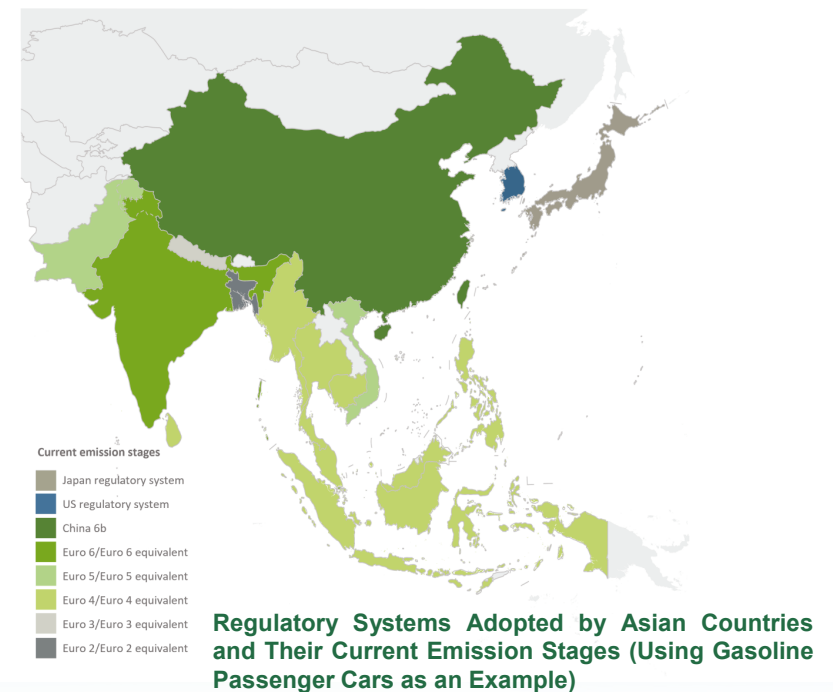
- Transport sector is the main contributor to PM_{2.5} in most cities.
- Dust, mobile, and coal combustion are the top three main contributors to PM_{2.5} in Ulaanbaatar.

Progress in motor vehicle pollution control

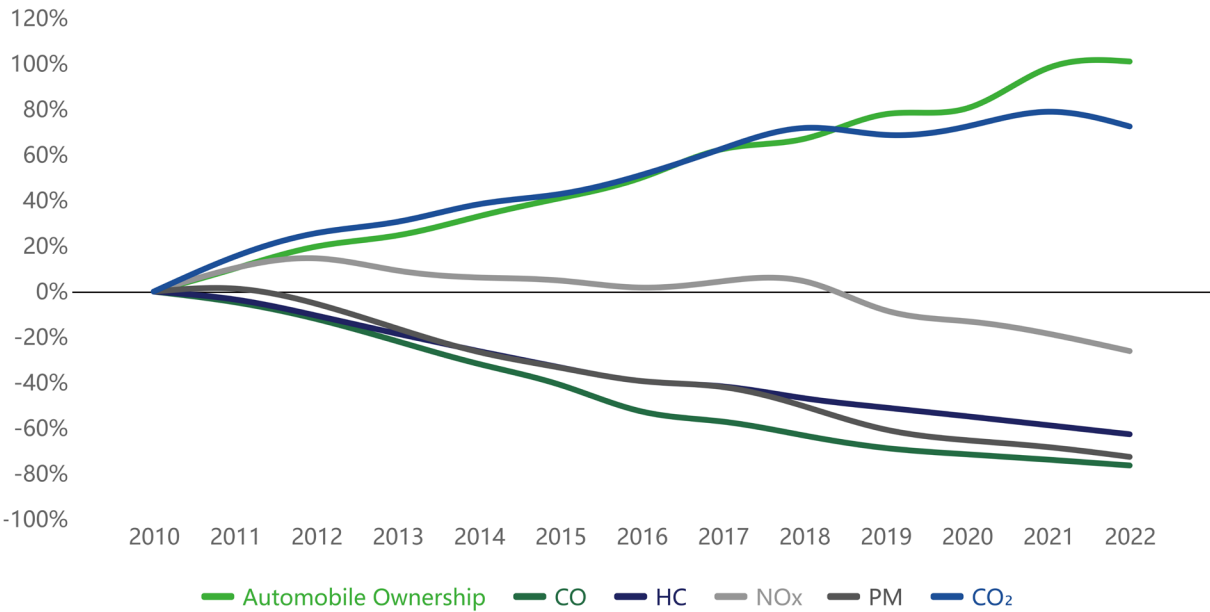
— Adopting tighter emission standards

There are substantial differences between the emission standards across Asia. The limits used by China, the Republic of Korea, Japan, India, and Singapore are the most stringent among Asian countries, and most other Asian countries are at the stage of Euro 4. In recent years, some Asian countries have leaped toward using stricter limit values, including India (Euro 4 to Euro 6), Nepal (Euro 1 to Euro 3), and Indonesia (Euro 2 to Euro 4).

Adopting tighter emission standards and control measures are essential for pollutant reduction in the transportation sector. Taking China as an example, the growth of China’s automobile ownership has been decoupled from air pollutant emissions. In 2010-2022, although automobile ownership continued to grow in China, the emission of major pollutants such as CO, NOx, HC, and PM had substantially dropped, which has been driven by comprehensive measures including the changes in emission limits.



Historical Changes in Light-Duty Vehicles’ Emission Limits in China, the EU and the US (Using Gasoline Passenger Cars as an Example)



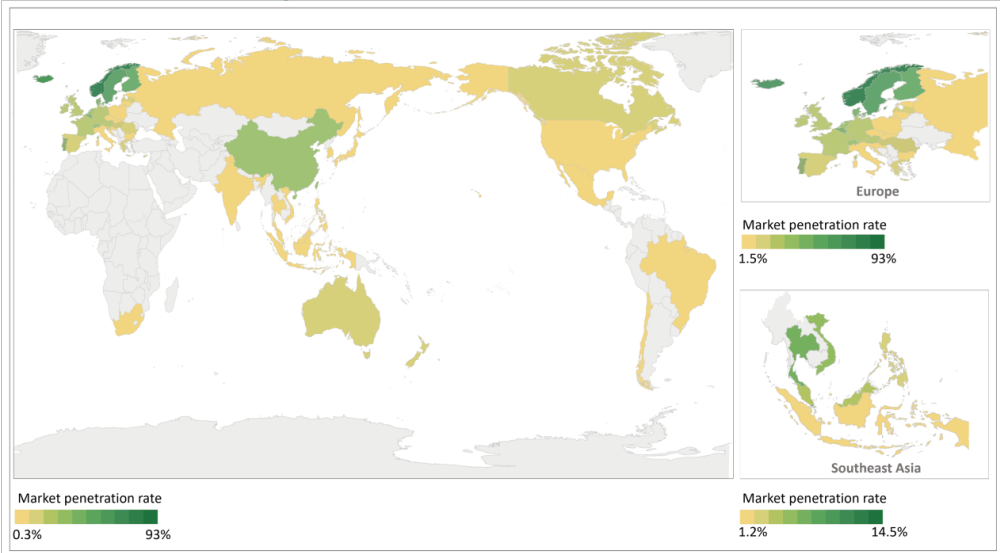
Changes in China’s Automobile Ownership, Air Pollutants, and GHGs Emissions from Road Transportation, 2010-2022

Sources: Tsinghua University EMBEV-China Model; Wen et al., 2023.

Progress in motor vehicle pollution control

— Transferring to EVs

Global Electric Passenger Car Market Penetration in 2023



In 2023, the global promotion of electric passenger cars continued, with market penetration rate reaching 18%. Various countries have had large differences in their promotion progress, with the penetration rate varying from 0.3%-93.0% in 2023. China, Europe, and North America have been the major promoters.

In China, the market penetration of electric passenger cars has accelerated, achieving the 2025 target of 20% set in the New Energy Vehicle Industry Development Plan (2021-2035) three years ahead of schedule in 2022. The market penetration rate of China's electric passenger cars has risen to 38% in 2023.

The promotion of electric cars in most Asian countries is in its initial stage. In 2021-2023, the market for electric passenger cars began to emerge in countries such as India, Viet Nam, Malaysia and Indonesia, leading to an initial breakthrough in demand. Meanwhile, some Asian countries have set their mid-term and long-term development goals for electric vehicles.

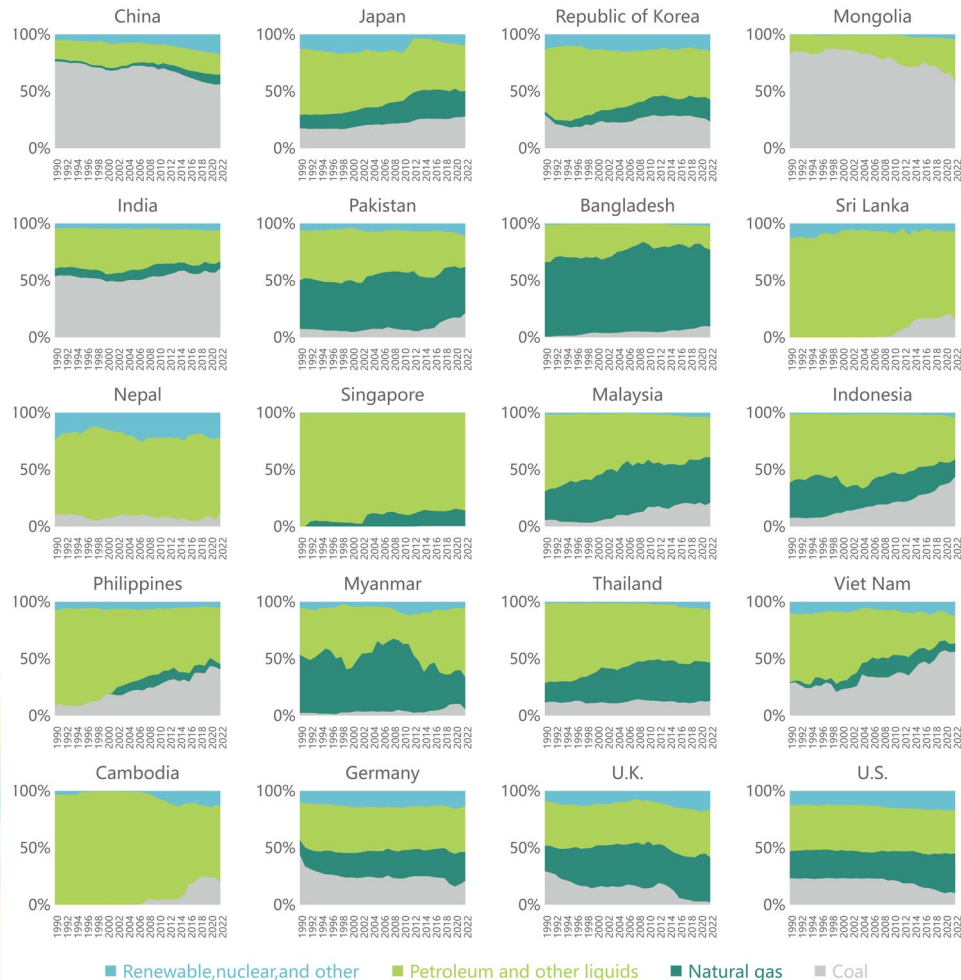
For example, in Singapore, all new car registrations will have to be of cleaner-energy models from 2030, and all vehicles will run on cleaner energy by 2040. Thailand aspires to manufacture Zero Emission Vehicles that account for at least 30% of the total motor vehicle production by 2030. Against the background of the green and low-carbon transition of the transportation sector, automobile energy transition in Asia is looking promising.

Type of Target	Country	2025	2026	2027	2030	2035	2040	2050
Sales	Malaysia				20%		50%	80%
	US				50%			
	Nepal	20% Public transport			60% Public transport			
	Japan					100% Passenger car	100% Small commercial vehicle	
	Singapore				100%			
	India				30% Passenger car			
	Indonesia							100%
	UK					100% Passenger car and van		
Ownership	China	20% 80%		45%	40%			
	Pakistan				30%			
	Germany				15 million vehicles			
	Philippines						50%	
	Republic of Korea	2.83 million vehicles			7.85 million vehicles			
	Cambodia							40%
	Mongolia		20,000 vehicles					
	Bangladesh							50%
	Myanmar	14%			32%		67%	100%
	Sri Lanka	100% Government vehicle					100%	
	Singapore						100%	
	Viet Nam							100%
Production	Thailand				30%			

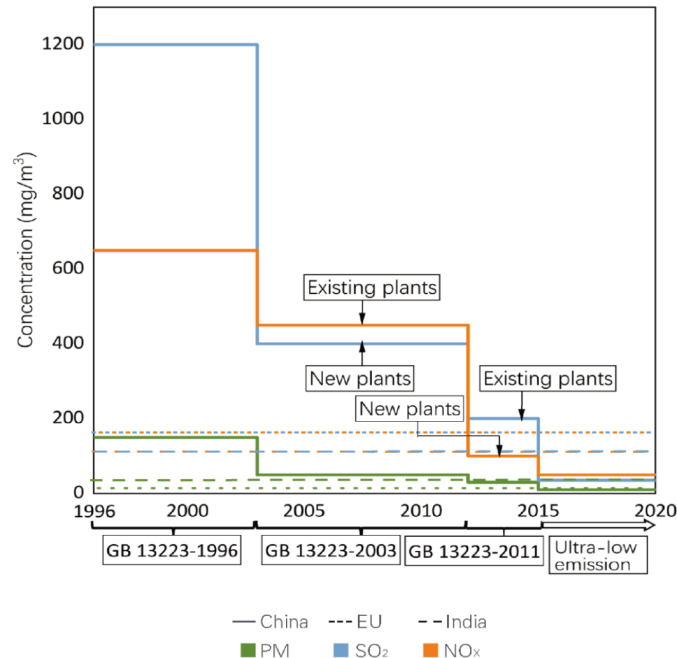
Promotion Targets of Electric Cars in Some Countries

Progress in energy sector — Adopting tighter emission standards and transferring to renewable energy

Changes in the Energy Consumption Structure of Various Countries, 1990-2022



Data Source: U.S. Energy Information Administration database



Notes: Existing plant refers to the power plant in service at the time of publication of the standard

Course of Upgrades for the Coal-fired Power Plants Emission Standards in China

Most developing Asian countries generally rely on fossil fuels. China's, India's, Mongolia's and Viet Nam's coal consumption ratios in energy consumption structure are at over 50%. Meanwhile, Southeast Asian countries rely more on oil.

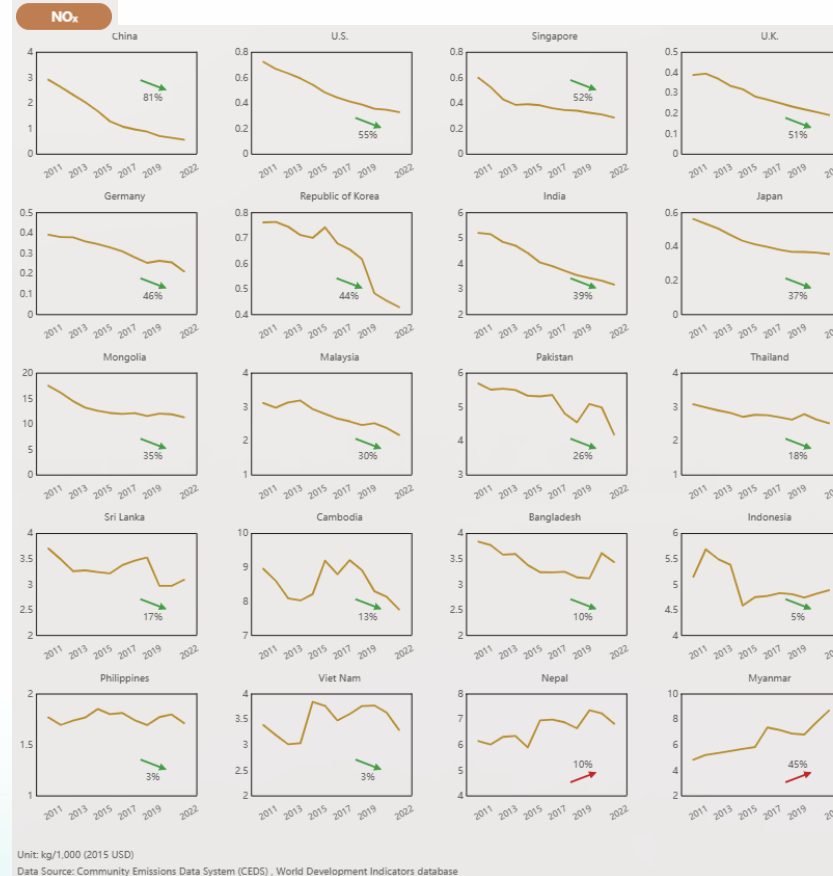
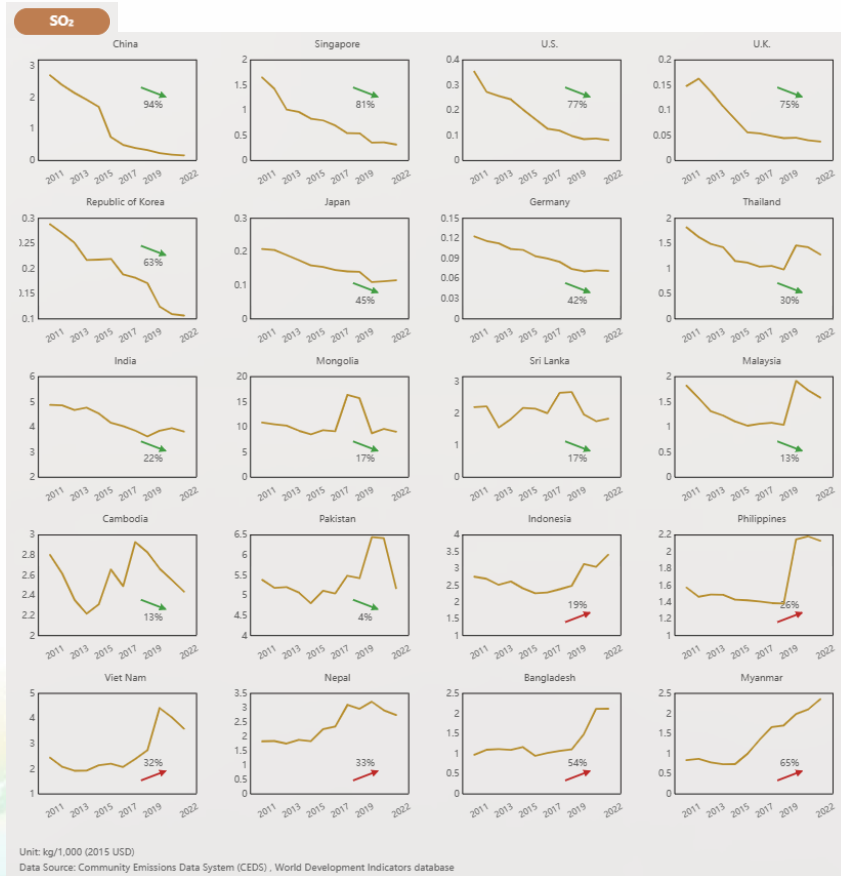
In this context, controlling coal-related emissions and transitioning to cleaner energy are both essential.

Standards: China's standards for CFPPs constantly being upgraded and tightened. Under the ultra-low emission policy requirements, the current emission limits of PM, SO₂, and NO_x are 10 mg/m³, 35 mg/m³, and 50 mg/m³, respectively. The emission limits of SO₂ and NO_x are 1/5 and 1/3 of the European Union (EU) standard, respectively.

Renewable energy: By the end of 2022, China's installed renewable energy capacity was 32 times higher than in 1990, with actual generation nearly 22 times greater. Since 2010, most Asian countries have seen rapid growth in renewable capacity, with energy generation in Cambodia and Mongolia increasing more than 8 and 14 times, respectively.

Overall decrease in major air pollutant emissions intensity

Changes in SO₂ and NO_x Emission per Unit of GDP of Various Countries, 2011-2022

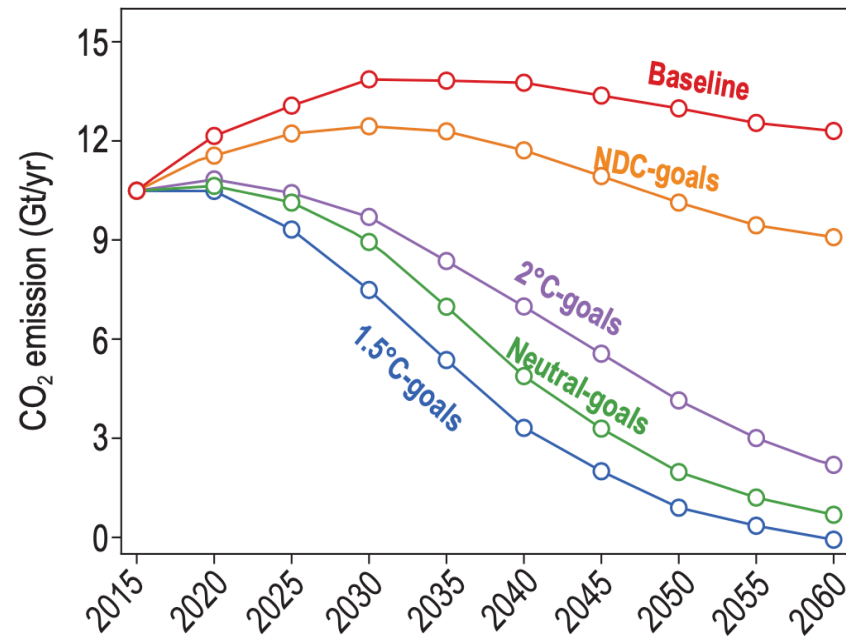


There has been an overall decrease in major air pollutant emissions intensity. Developed countries generally saw greater reductions compared to other developing Asian countries. The range of reductions in SO₂ emissions per unit of GDP for Singapore, the US, the UK, Republic of Korea, Japan, and Germany was between 42% and 81%, while the range of reductions in NO_x emissions was between 37% and 55%.

From 2011 to 2022, China's SO₂ emissions per unit of GDP decreased by more than 94%, and NO_x emissions decreased by more than 81%.

Synergies and Co-benefits with Decarbonization

As the world moves towards carbon neutrality and net-zero emission, many Asian countries have announced their decarbonization goals. Moving towards "carbon neutrality" will provide momentum for continuous improvement of air quality and fundamentally solve the air pollution problem.



Future anthropogenic emission pathways and energy transitions over China — Emissions between 2015 and 2060
Cheng, et al, *National Sci Rev*, 2021

Country	CO ₂ emissions in 2020 (million tons)	Year	Goal
 China	11,680.4	2060	Carbon neutral
 US	4,535.3	2050	Net zero
 India	2,411.7	2070	Net zero
 Japan	1,061.8	2050	Net zero
 Germany	636.9	2045	GHG neutral
 Republic of Korea	621.5	2050	Net zero
 Indonesia	568.3	2060	Net zero
 Viet Nam	321.9	2050	Net zero
 UK	313.7	2050	Net zero
 Malaysia	262.2	2050	Carbon neutral
 Thailand	255.5	2050	Net zero
 Pakistan	217.0	2050	Net zero
 Philippines	139.2		
 Bangladesh	108.5		
 Singapore	56.1	2050	Net zero
 Mongolia	38.2		
 Myanmar	37.7	2050	Net zero
 Sri Lanka	23.7	2060	Carbon neutral
 Nepal	17.9	2045	Net zero
 Cambodia	15.8	2050	Net zero

Notes: The blanks indicate the country has yet to release the goals related to Carbon Neutrality or Net Zero
Data Source: Zerotracker

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REGIONAL COOPERATION IS KEY TO ACHIEVING CLEAN AIR IN ASIA

For cities and countries to learn good policies, practices, and programs from the cities and countries that have successfully controlled and managed air pollution

For advanced cities and countries to share their knowledge and expertise on air pollution abatement and air quality management with others

Join Us for Asian Regional Exchange
Program for Clean Air



Asian Regional Exchange Program for Clean Air and Climate Change

Strengthen regional partnership

Enhance capacity for policy-making and action

Increase awareness and understanding

Goal → Inspiring and facilitating learning among Asian countries and cities, and so accelerate implementation of measures reducing air pollution and achieving co-benefits of GHG emissions reduction

Focus for the Initial Phase



Scientific Basis

Air quality forecasting and pollution emergency response, air quality modeling, integration of air pollutant and greenhouse gas source inventories, PM_{2.5} source apportionment, health effects of air pollution and climate change, interactions between climate change and air pollution.



Policy Framework

Air pollution prevention and control action plans, standard and regulatory systems, sector-specific measures, and policy enforcement (governance models, administrative and economic incentives).



Case Studies

Science-based governance strategies; ultra-low emission retrofitting for coal-fired power plants and key sectors; green transportation promotion; and green and low-carbon development of industrial parks.

2024

Baseline study and needs assessment

Identify technical and management gaps and needs for air quality improvement and identify representatives of key stakeholders for the exchange, through investigation, survey and consultation.

Exchange meeting and visiting tours in China

Host an exchange week in Beijing in Q4 2024, involving discussions on network building, cooperation promotion, and collaboration needs and proposals.

2025

China-Viet Nam knowledge exchange

Technical sessions on AQM

Roundtable Discussions between universities in China and Research Institutions in Philippines and Mongolia

China-Indonesia Cooperation

Technical support and research capacity building for AQ management

2024



Advancing Science-based Local Action to Combat Air Pollution in Greater Jakarta, 2-3 September



Indonesia International Sustainability Forum, 5-6 September



2024 Beijing International Forum for Metropolitan Clean Air and Climate Actions, 14-15 September



Fellowship for Building Leadership in Atmospheric Environment and Air Quality Management in East Asia, 27 July–09 August



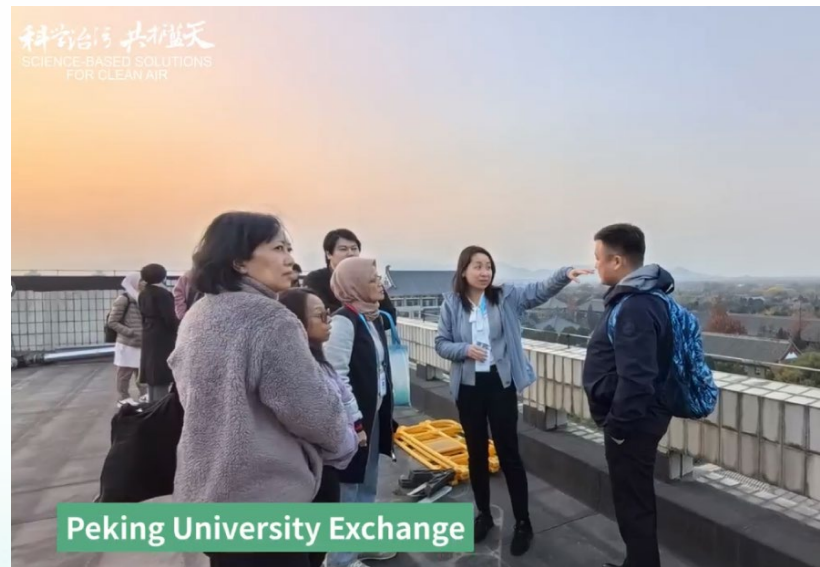
International Conference on Air Benefit and Cost and Attainment Assessment & Symposium on Atmospheric Haze Chemistry (ABaCAS 2024), 20-22 September



Beijing Municipal Ecological and Environmental Monitoring Center Exchange



Tsinghua University Exchange



Peking University Exchange

Asian Regional Exchange for Clean Air, Beijing, China 18-21 November 2024



Vehicle Emission Control Center of China Academy of Environmental Sciences Exchange

2025

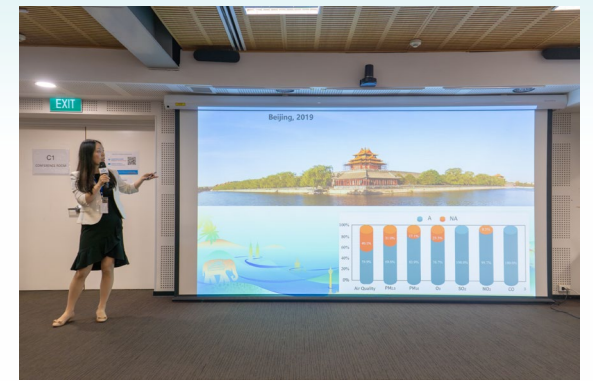


**Mongolia Delegation
Exchange Meeting in
Peking University, 28 May**

**Asian Regional Exchange for Clean Air: China
Delegation visiting in Manila, 8-10 April**



**Air Quality Data Management Systems
Training for Hanoi, 22 April**



**Training Workshop on Science-Based Tools
for Air Quality Management , 23 April**

**National Conference on Combatting Air
Pollution and Improving Air Quality For
Major Cities in Viet Nam, 24-25 April**



Asian Regional Exchange Visit in Beijing, 9-12 September

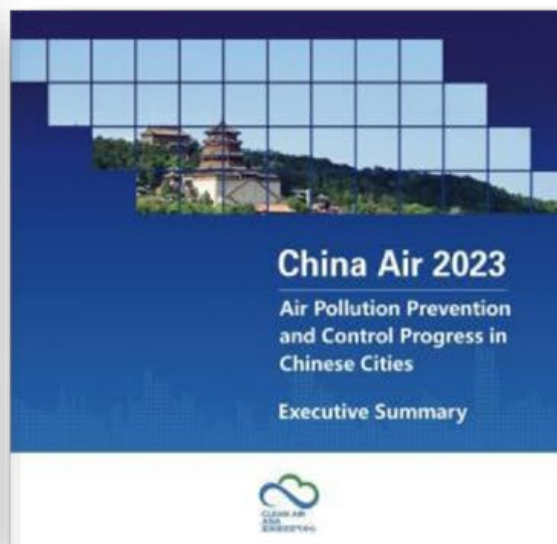
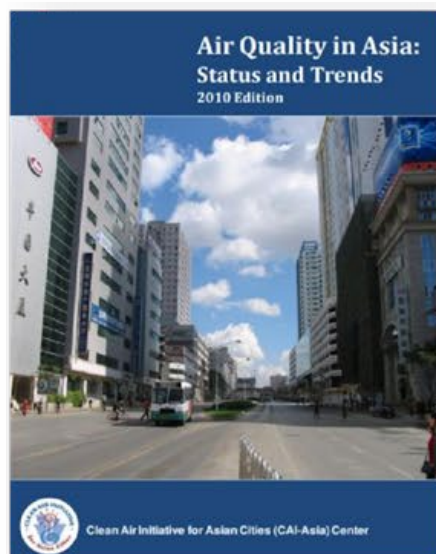
科学治污 共护蓝天
SCIENCE-BASED SOLUTIONS
FOR CLEAN AIR

科学治污 共护蓝天
SCIENCE-BASED SOLUTIONS
FOR CLEAN AIR

亚洲区域清洁空气交流活动

Asian Regional Exchange for Clean Air

Thank you!



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CHINA'S 10-YEAR PATH
TOWARD CLEANER AIR:
AN ASIAN PERSPECTIVE

2024 CHINA AIR SPECIAL ISSUE