

CWCC 2023

National Stakeholder Awareness Workshop in P.R. China on EANET



# China's 10-year Path Towards Cleaner Air - an Asian perspective

Dr. Wei WAN  
China Program Director  
Clean Air Asia

18 October 2023 @ Shanghai

# About Clean Air Asia



 **Manila, Beijing, Delhi**

 **6 Country Networks**

Indonesia, Malaysia, Nepal,  
the Philippines, Sri Lanka and Vietnam

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



## Vision

Asia Without Air Pollution



## Mission

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

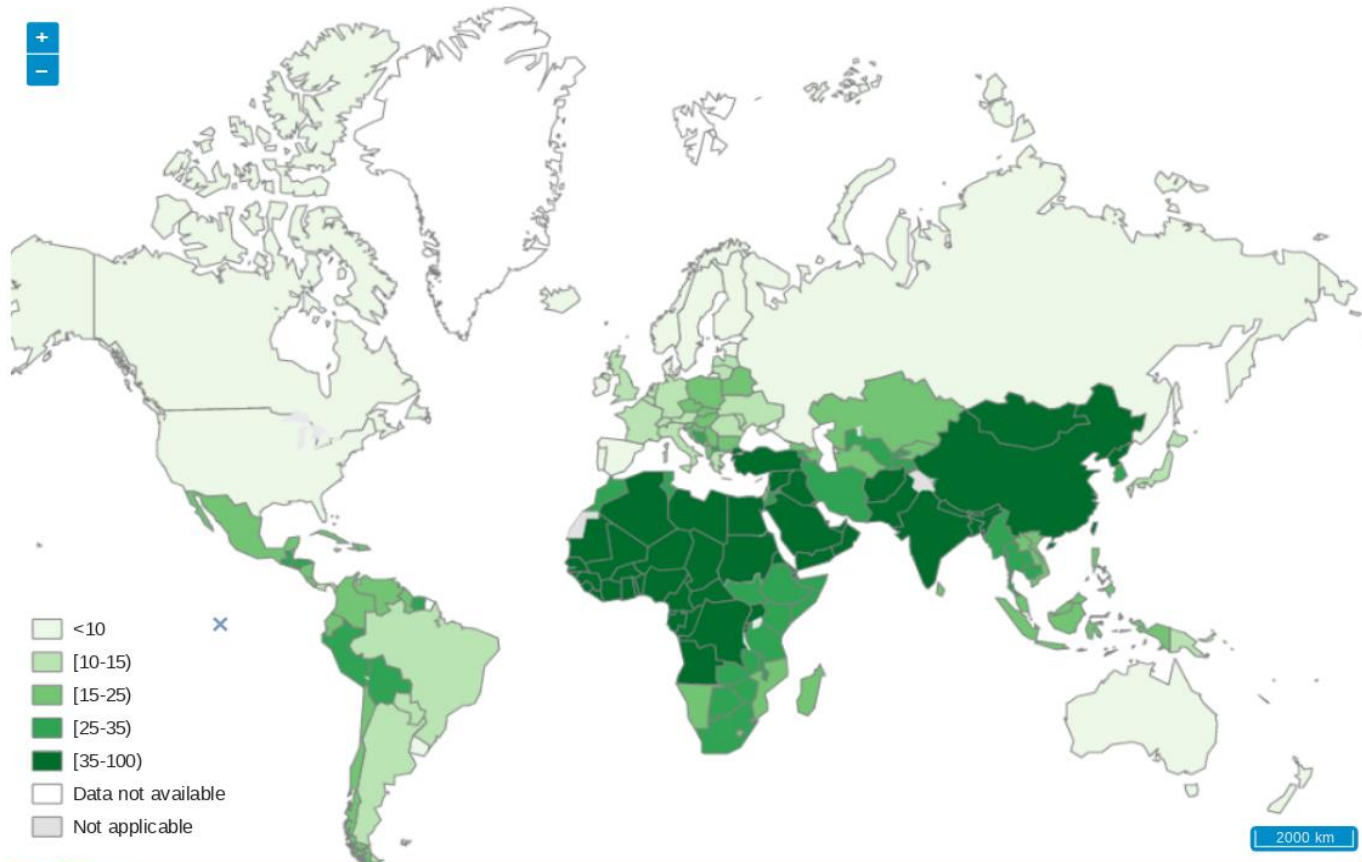


## Approaches

- ✓ Capacity building
- ✓ Policy research
- ✓ Public engagement
- ✓ Partnerships

# 空气污染仍然是全球普遍面临的问题，亚洲首当其冲需要采取行动

*Air pollution is a common issue for all, Asia needs to take stronger action*



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Source: WHO,2022

## WHO global air quality guidelines

Particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide



Almost all of the global population (99%) is exposed to air that fails to meet the new guideline (5 $\mu\text{g}/\text{m}^3$ ); the population-weighted annual average PM<sub>2.5</sub> 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 $\mu\text{g}/\text{m}^3$ ).

# 中国的空气质量快速改善，实现环境、经济“双赢”

## Rapid air quality improvement and win-win situation in China

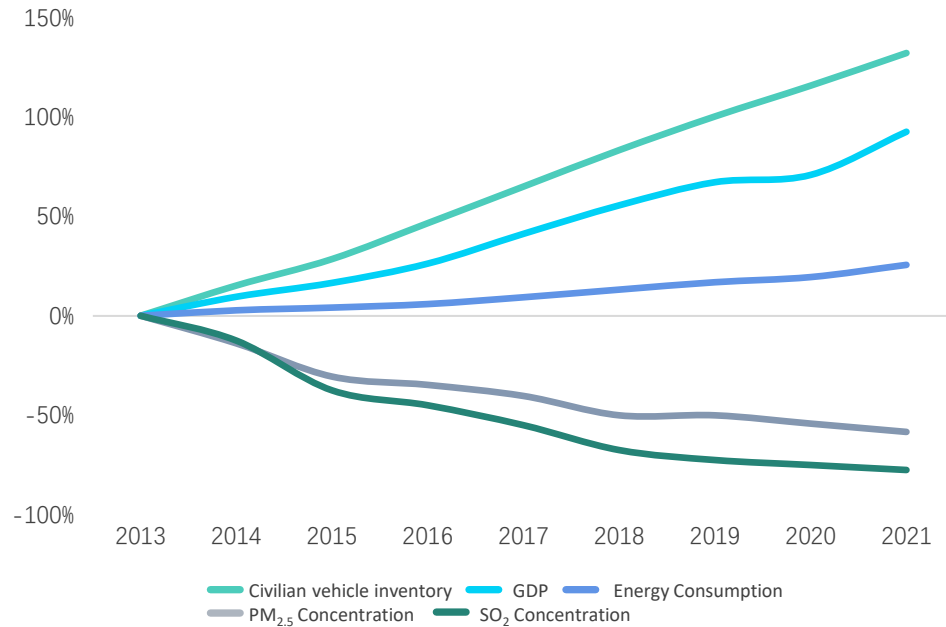


Figure Changes in China's GDP, Energy Consumption, Civilian Vehicle Inventory, and Air Pollutant Concentration, 2013-2021

Source: China Statistical Yearbook, 2014-2022

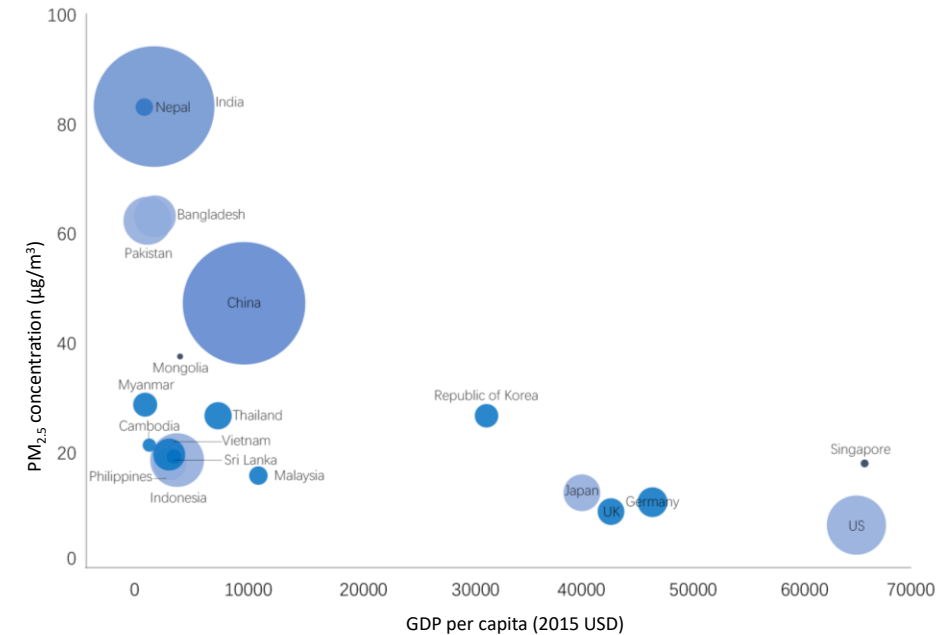


Figure PM<sub>2.5</sub> and GDP per Capita by Country, 2019

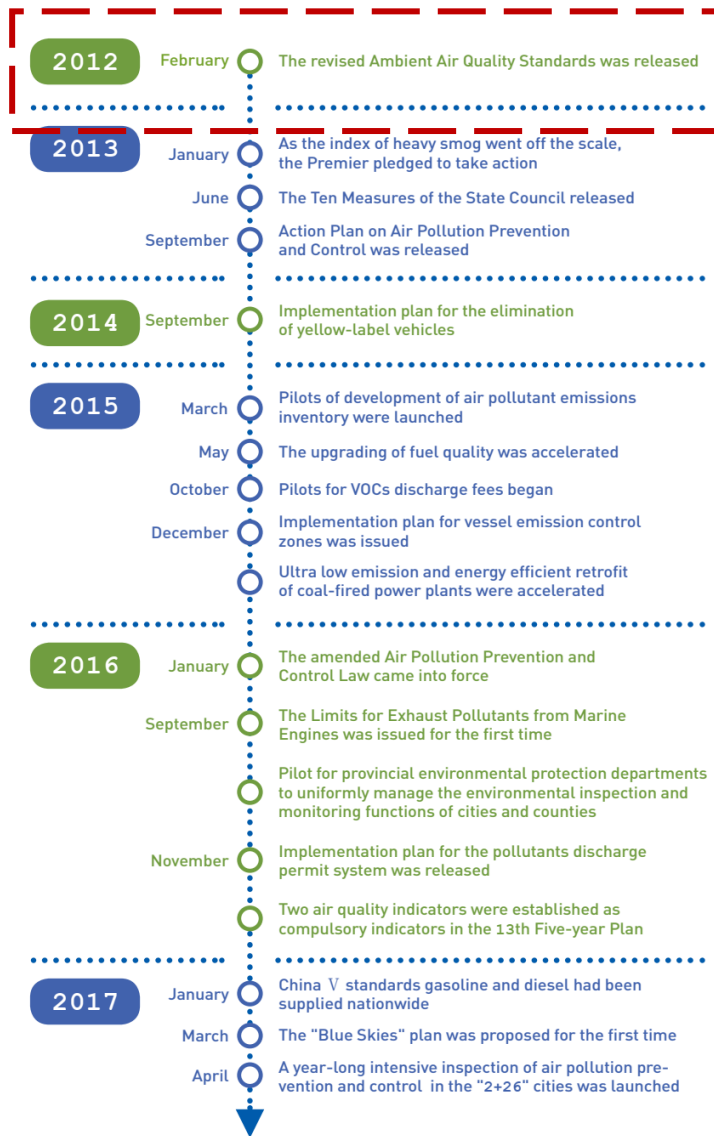
Note: GDP per capita is measured in 2019 US dollars; the size of the bubbles corresponds to the population of each country.

Source: Global Burden of Disease Study 2019, World Development Indicators

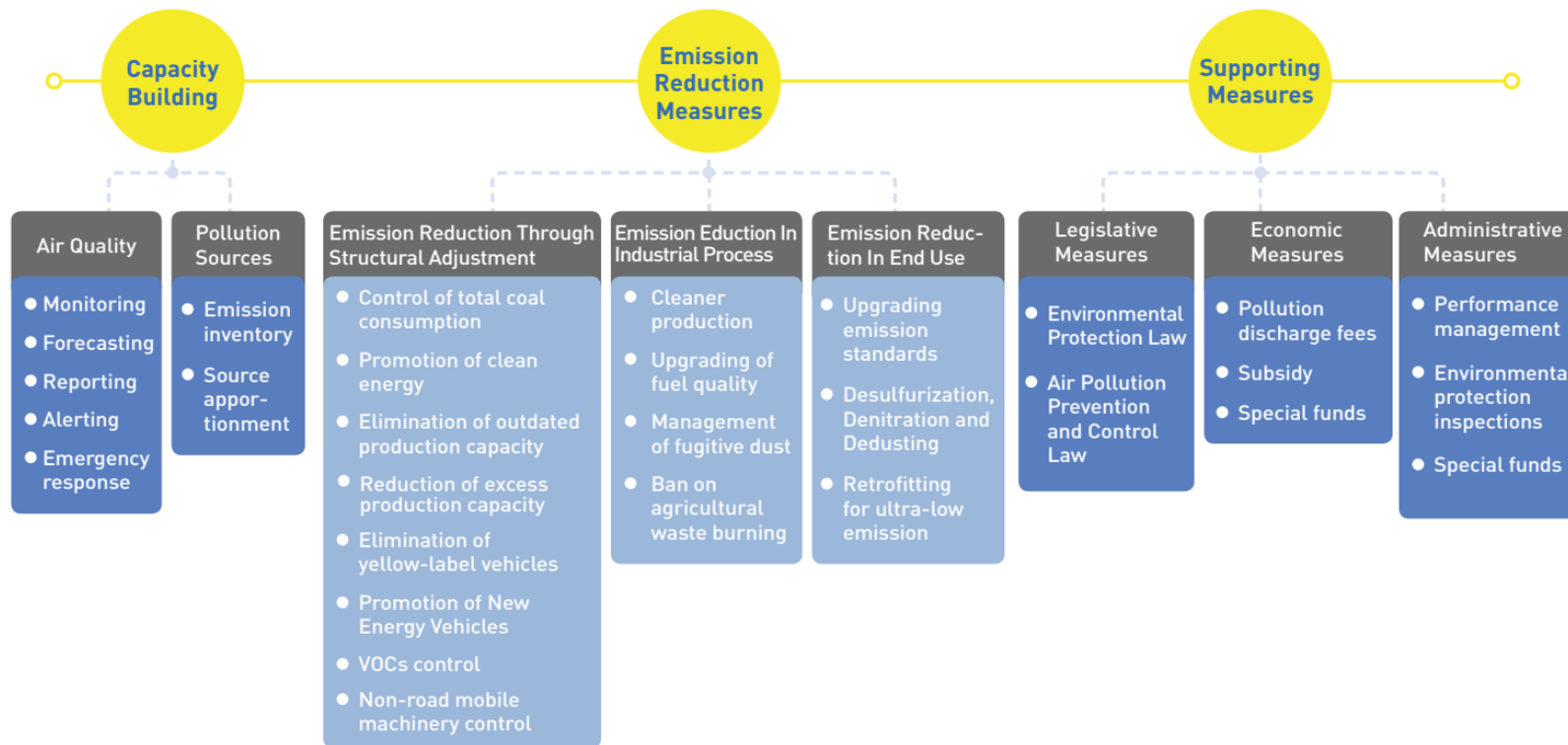
- From 2013–2021, China's overall annual average PM<sub>2.5</sub> and SO<sub>2</sub> concentrations have fallen by approximately 56% and 78%, respectively.
- China's GDP maintained a high average growth rate of 6.6%—nearly twice the average growth rate of developing economies.
- China's GDP per capita has exceeded the \$10,000 threshold, crossed the “turning point” and successfully broken the connection between economic development and air quality deterioration.
- Energy consumption and the number of civilian vehicles increased by 25.7% and 132.2%, respectively.

# 标准修订推动了中国空气质量管理体系的升级

## Revision of NAAQS started the AQM framework upgrading in China



### China's Policy Framework for Air Pollution Prevention and Control

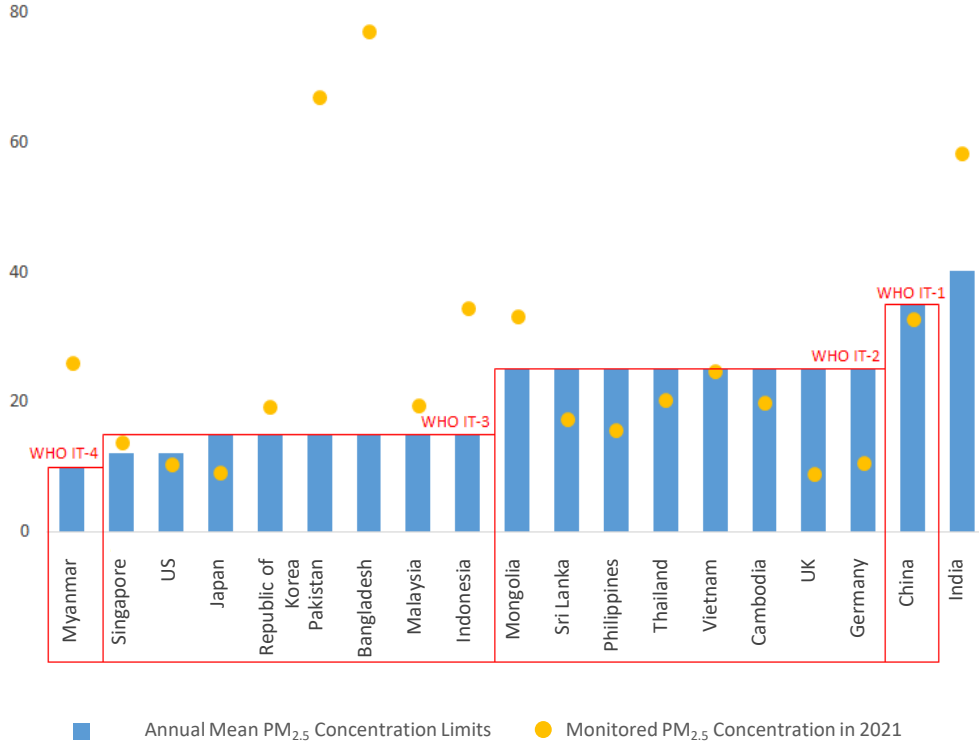


Milestones of China's AQM and Policy Framework

Source: Clean Air Asia, 2018. BREAKTHROUGHS: CHINA'S PATH TO CLEAN AIR 2013-2017

# 标准距离WHO新指导值差距较大，需要进一步提标保护公众健康

## WHO AQGs and emerging needs for further public health protection



- China's annual PM<sub>2.5</sub> concentration limit in the NAAQS is the same as WHO IT-1, the most lenient one.
- The monitoring data in cities showed annual average PM<sub>2.5</sub> concentration was about 30µg/m<sup>3</sup> in 2021, lower than the standard requirement. **Beijing: from 89.5 to 30 ug/m3.**
- Current air quality in nearly half of the Asian countries does not meet local standards. Some countries with relatively strict limits (with reference to WHO IT-3 and IT-4) still have poor air quality.
- **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 including China as the population is aging.

Pollutant	Averaging time	Interim target				AQG level
		1	2	3	4	
PM <sub>2.5</sub> µg/m <sup>3</sup>	Annual	35	25	15	10	5
	24-hour <sup>a</sup>	75	50	37.5	25	15

Figure Annual Mean PM<sub>2.5</sub> Concentration Limits and Monitored Concentration Levels in 2021 of

Each Country

Source: see report references for details.

# 空气质量监测网络跨越式发展，站点类别仍待提升

## Leap-frogging of monitoring stations and needs for more comprehensive network

City	No. of continuous monitoring stations	Ranking by No. of stations per million habitants	Ranking by No. of stations per 1,000 sq km <sup>2</sup>	PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	CO	O <sub>3</sub>	NO	Ox	NH <sub>3</sub>	TSP	PM <sub>1</sub>
London, UK	129	2	2	✓	✓	✓	✓	✓	✓					
Tokyo, Japan	82	14	6	✓	✓	✓	✓	✓		✓	✓			
Bangkok, Thailand	64	3	5	✓	✓		✓	✓	✓					
Guangzhou, China	52	10	16	✓	✓	✓	✓	✓	✓					
Seoul, South Korea	51	4	1	✓	✓	✓	✓	✓	✓	✓				
Xi'an, China	41	9	17	✓	✓	✓	✓	✓	✓					
Delhi, India	40	18	8	✓	✓	✓	✓	✓	✓	✓		✓		
Beijing, China	35	16	22	✓	✓	✓	✓	✓	✓					
Hangzhou, China	33	11	23	✓	✓	✓	✓	✓	✓					
Mumbai, India	30	15	4	✓	✓	✓	✓	✓	✓	✓		✓		
Singapore	22	7	7	✓	✓		✓	✓	✓					
Wuhan, China	22	17	21	✓	✓	✓	✓	✓	✓					
Shanghai, China	19	22	20	✓	✓	✓	✓	✓	✓					
Hong Kong, China	18	12	10	✓	✓	✓	✓	✓	✓					
Berlin, Germany	17	5	9	✓	✓		✓	✓	✓					
Los Angeles, USA	15	6	12	✓	✓	✓	✓	✓	✓					
Shenzhen, China	15	23	15	✓	✓	✓	✓	✓	✓					
Ulaanbaatar, Mongolia	15	1	18	✓	✓	✓	✓	✓	✓	✓				
Chengdu, China	14	24	25	✓	✓	✓	✓	✓	✓					
Nanjing, China	11	19	24	✓	✓	✓	✓	✓	✓					
Hanoi, Vietnam	10	20	19	✓	✓	✓	✓	✓	✓					
Jakarta, Indonesia	9	21	11	✓	✓	✓	✓	✓	✓					
Kathmandu, Nepal	7	13	14	✓	✓								✓	✓
Dacca, Bangladesh	3	25	13	✓	✓	✓	✓	✓	✓					
Colombo, Sri Lanka	2	8	3	✓	✓	✓	✓	✓	✓	✓				

- Prior to 2012, China's national ambient air quality monitoring network covered only 113 key cities with 661 state-controlled sites monitored PM<sub>10</sub>, SO<sub>2</sub>, and NO<sub>2</sub>.
- In 2021, the number of state-controlled monitoring sites for ambient air quality in 339 cities of China was 1734, monitoring PM<sub>2.5</sub>, PM<sub>10</sub>, O<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub> and CO.

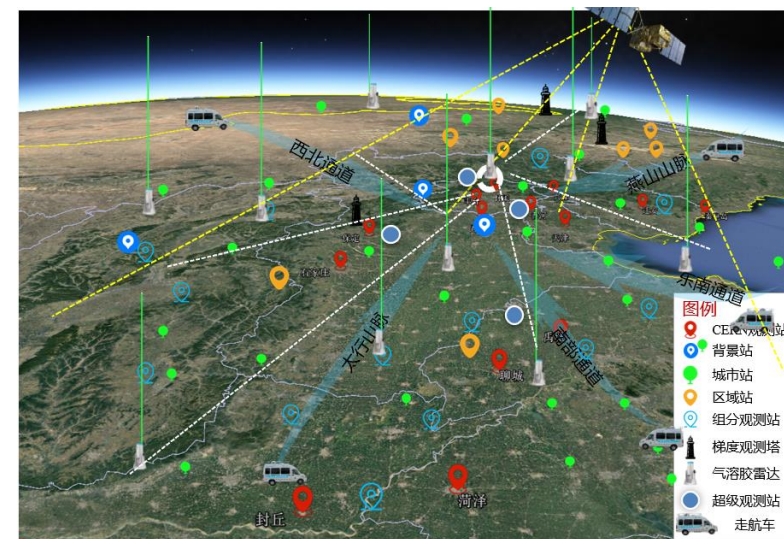
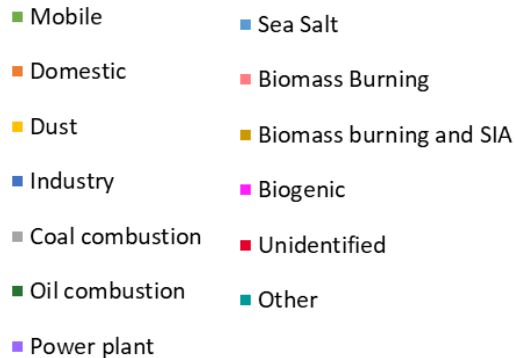
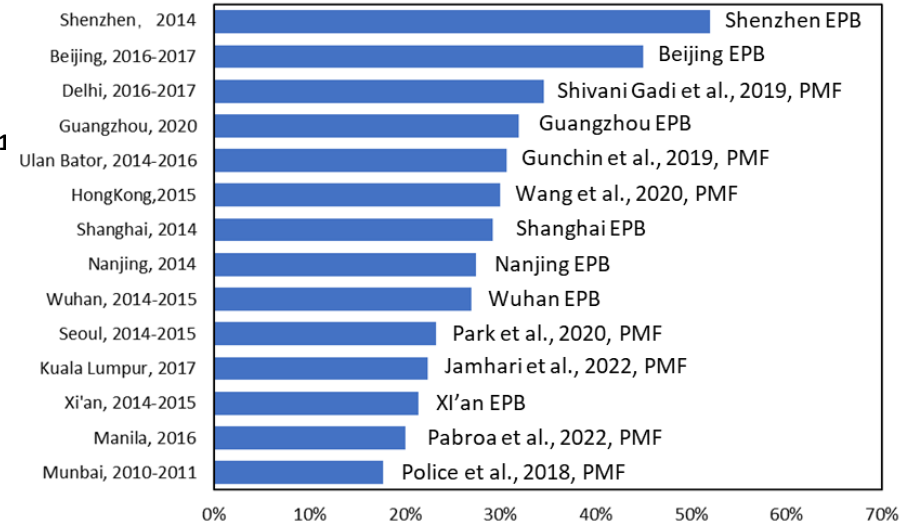
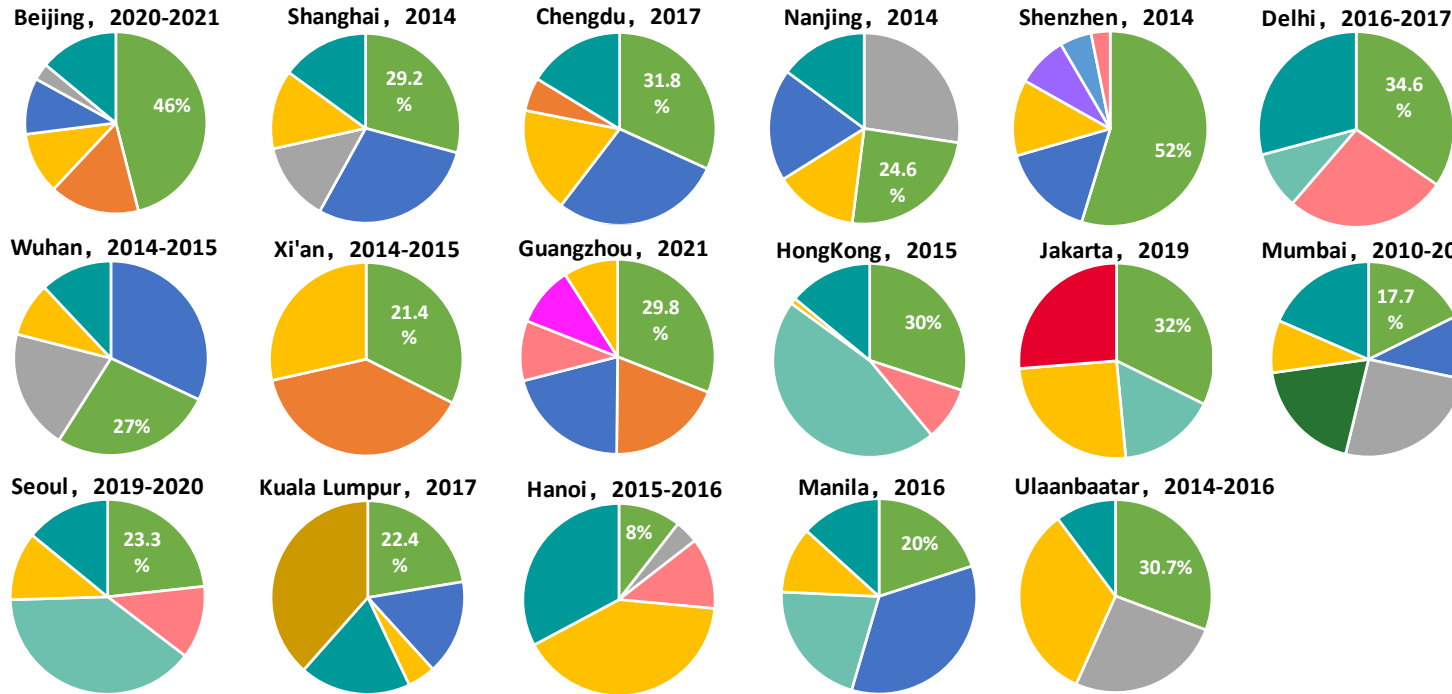


Figure Integrated ground-air-space stereo observation network in BTH 2+26 cities

Source: CRAES, 2021

# 交通是大城市PM<sub>2.5</sub>污染的首要贡献来源

Transport is the primary contributor to PM<sub>2.5</sub> pollution in mega cities

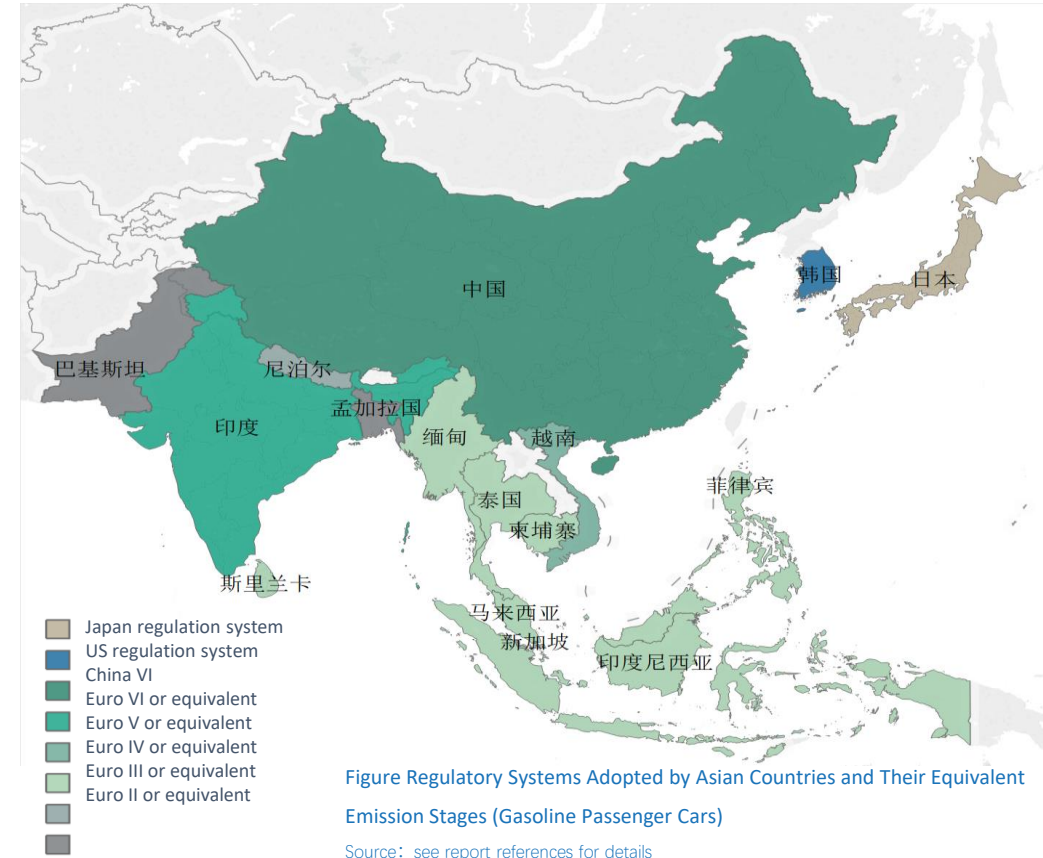
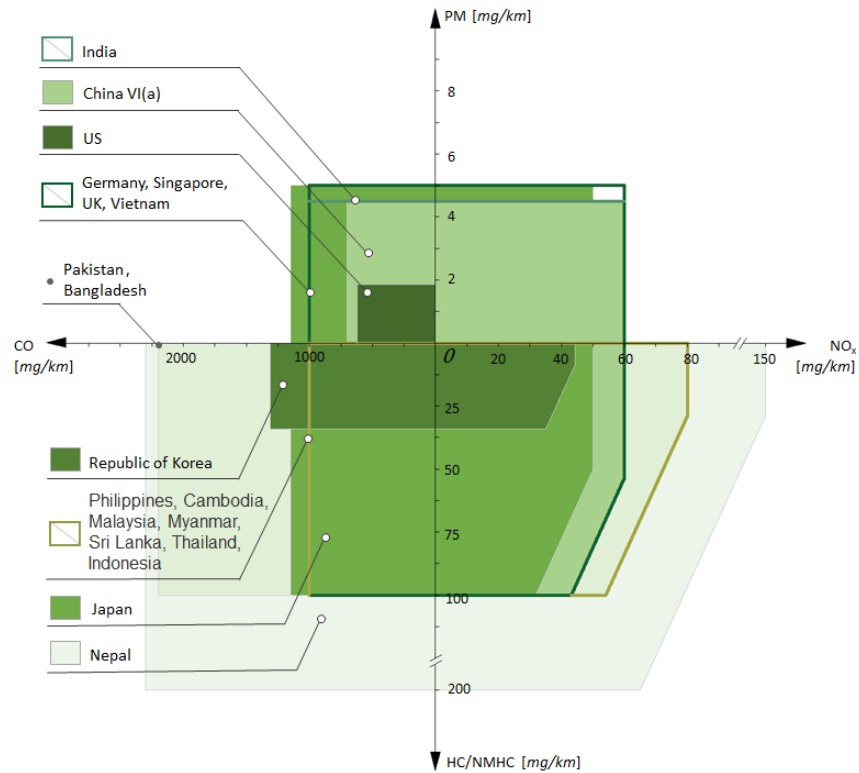


Source apportionment study results published in the recent years,  
Source: Compiled by Philip Hopke, 2022

- The average contribution of mobile sources to PM<sub>2.5</sub> in major Asian cities is about 30%.
- **Transport sector is the main contributor to PM<sub>2.5</sub> in most cities**, including Chinese cities such as Beijing, Shanghai, Chengdu and Shenzhen, as well as Delhi and Jakarta, with the highest ratio over 50% for Shenzhen.

# 交通排放标准“起步慢、进展快”，快速跃升至先进水平

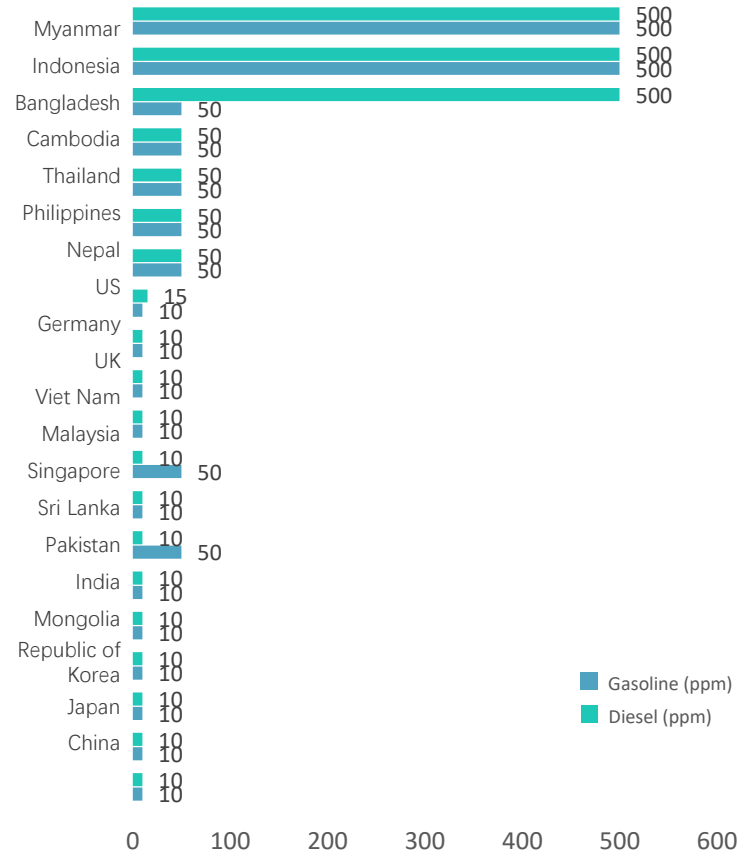
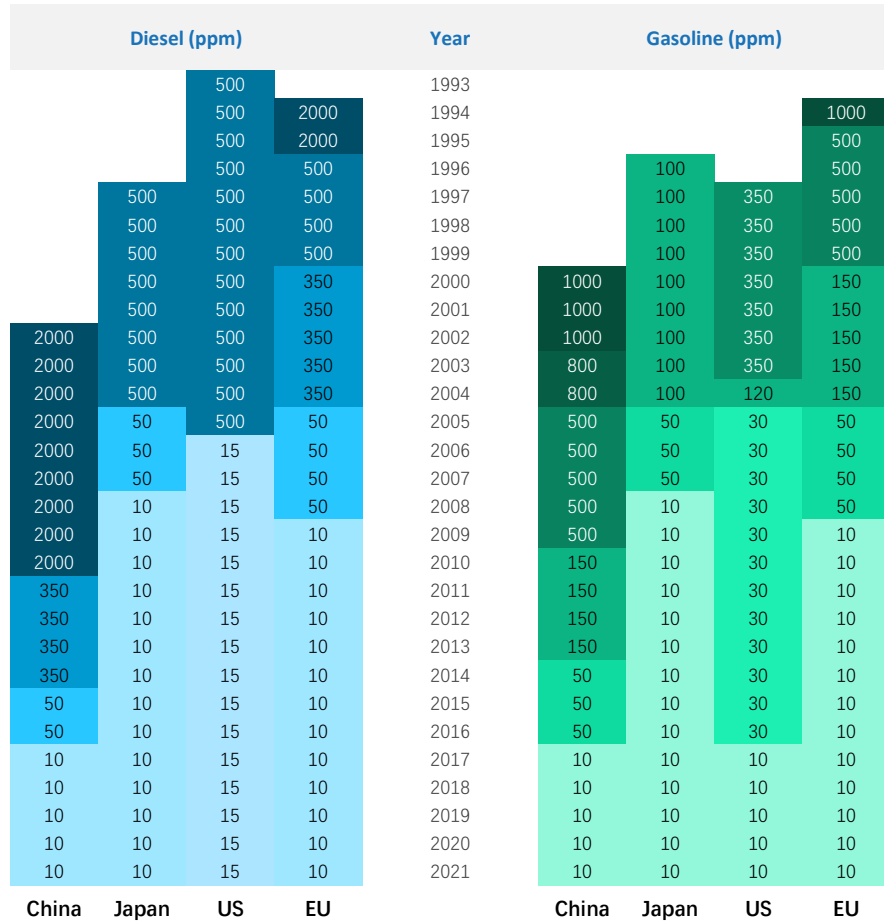
China upgraded the automobile emission standards to most stringent levels



- Compared to Europe, Japan, and the US, China had a late start in the emission control of motor vehicles. The implementation time for setting the same level of limits for light-duty vehicles was 5-8 years behind that of the EU.
- However, in the last 10 years, China has raised its emission standards quickly. Comparing CHINA 6b with CHINA 1, the limits for CO and HC+NO<sub>x</sub> have become stricter by 82% and 91%, respectively. **China has reached the global advanced level of light-duty vehicles emission control.**

# 燃油快速实现“低硫化”，已达全球领先水平

China upgraded the fuel quality standards to most stringent levels



- In recent years, China has rapidly progressed in tightening its fuel sulfur content. **In 2017, both its diesel and gasoline sulfur contents decreased to 10 ppm.**
- There is a marked difference in fuel sulfur content among Asian countries, ranging from 10–500 ppm. China, India, Japan, the Republic of Korea, and Singapore have implemented the most stringent motor vehicle emission standards and stringent fuel standards at the same time.

Figure Timeline of the Tightening of Sulfur Content in Automobile Fuel in China, the EU, Japan, and the US

Source: see report references for details

Figure Current Gasoline and Diesel Sulfur Content Limits in Various Countries

Source: see report references for details

# 中国电力行业排放控制力度空前，排放标准全球最严

*China upgraded the emission control standards of coal-fired power plants to most stringent levels*

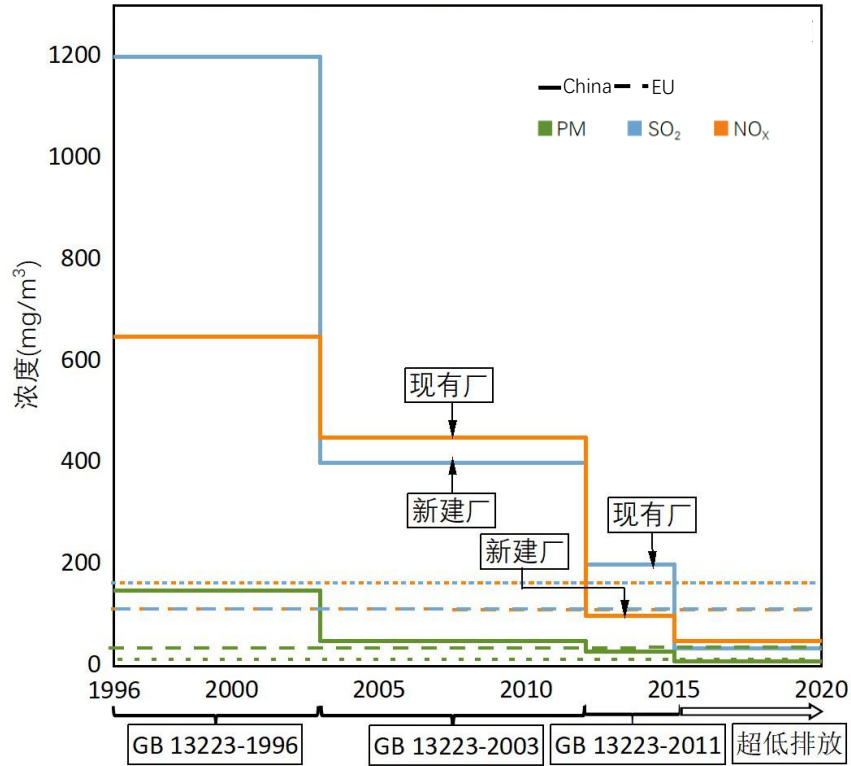


Figure Cause of Upgrades for the Power Sector's Emission Standards in China  
Source: see report references for details

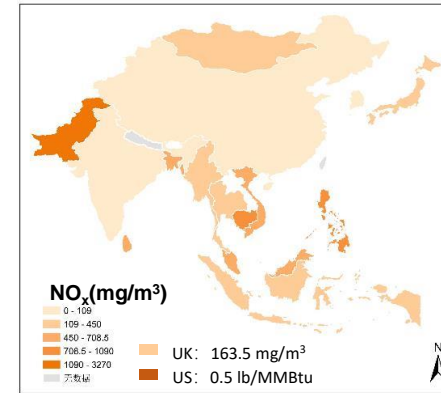
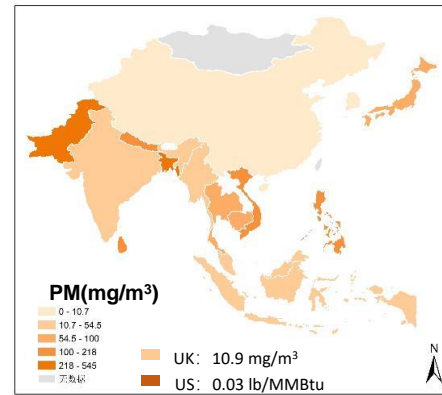
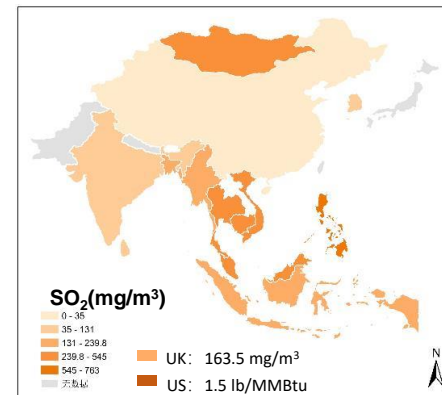


Figure Emission Standards of the Power Sector in Various Countries

Source: see report references for details



- Over the past 30 years, the emission control of air pollutants in China's power sector has developed rapidly, with the standards constantly being upgraded and tightened. **Under the ultra-low emission policy requirements, the current emission limits of PM, SO<sub>2</sub>, and NO<sub>x</sub> are 10, 35, and 50mg/m<sup>3</sup>**, respectively, which are stricter than the original standard limits in 1996 (by 93%, 97%, and 92%, respectively).
- The emission limits of SO<sub>2</sub> and NO<sub>x</sub> are 1/5 and 1/3 of the European Union (EU) standard, respectively.

# 大气污染物排放总量与单位GDP排放趋势

## Emission reduction of key air pollutants

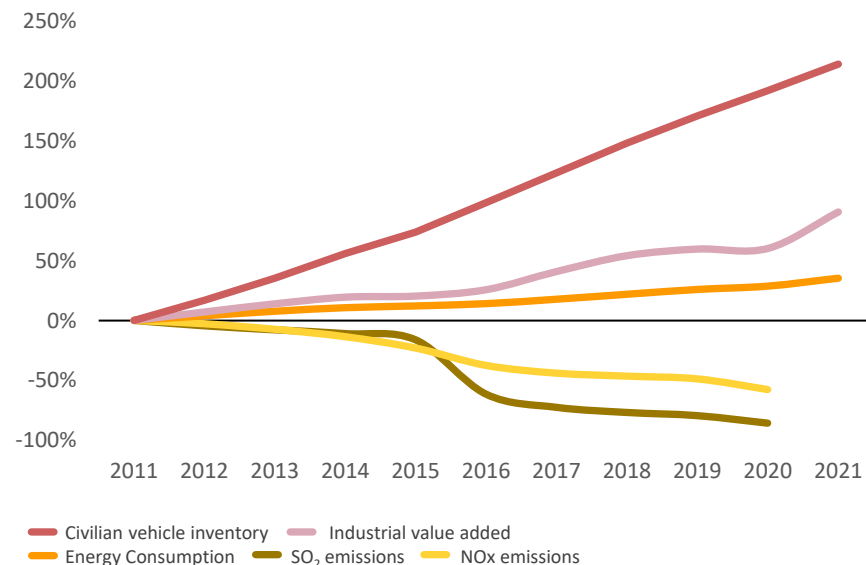
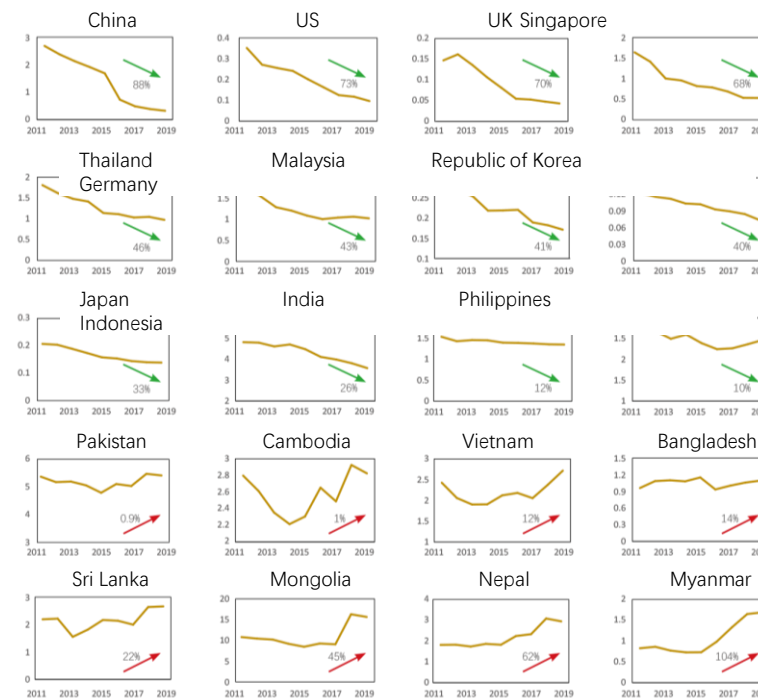


Figure Changes in China's Industrial Value Added, Energy Consumption Inventory, Civilian Vehicle Inventory, and Air Pollutant Emission, 2011 -2021

Source: China Statistical Yearbook, 2012-2022



Unit: kg/1,000 (2015 USD)

Figure Changes in SO<sub>2</sub> Emission per Unit of GDP of Various Countries, 2011-2019

Source: Community Emissions Data System (CEDS) , World Development Indicators

- China's energy consumption, industrial value added, and the number of vehicle had a steady growth of 35%, 91%, and 214%, respectively.
- **China's emissions of SO<sub>2</sub> and NOx, both major air pollutants, rapidly declined.** SO<sub>2</sub> emission decreased by 86%, from 22.179 million tons to 3.182 million tons, while NOx emission decreased by 58%, from 24.043 million tons to 10.197 million tons.
- From 2011–2019, **SO<sub>2</sub> emission per unit of GDP in China dropped by 88%.**

# 亚洲迈向脱碳目标，将为清洁空气提供动能

## *Decarbonization of Asia will bring driving forces and co-benefits to clean air*

- 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.
- However, approximately 1/3 of the world's energy consumption and 1/2 of the world's CO2 emission comes from Asia, making the task of emission reduction for developing Asian countries challenging.
- China has promised to achieve carbon neutrality from peak CO2 emissions in about 30 years, much shorter than that promised by developed countries. It will take great efforts to achieve this with the "China speed".





















Country	2020 CO <sub>2</sub> emissions (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
 Vietnam	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

Figure Carbon Reduction Goals of Various Countries

Note: Empty cells mean that the country haven't announced carbon neutral or net zero related goal.

Source: Zerotracker

# BAQ 2023

BETTER AIR QUALITY  
CONFERENCE 15-17 NOV • MANILA



**BAQ 2023 is themed *Ambition to Action: Clean air for health and the climate.***

With a comprehensive focus on science as the basis for action, integrated solutions, and innovative financing mechanisms, the BAQ2023 Conference will strongly advocate for heightened ambition and enhanced action addressing the critical issues of air pollution and climate change.

**Applications to attend the Better Air Quality conference (BAQ) are now open!**

<https://cleanairasia.org/baq/registration>

[wei.wan@cleanairasia.org](mailto:wei.wan@cleanairasia.org)

[baq@cleanairasia.org](mailto:baq@cleanairasia.org)