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Policies, regulatory
framework and enforcement
for air quality management:
The case of China

Chan Yang

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ENVIRONMENT DIRECTORATE

**POLICIES, REGULATORY FRAMEWORK AND ENFORCEMENT FOR AIR QUALITY
MANAGEMENT: THE CASE OF CHINA – ENVIRONMENT WORKING PAPER No. 157**

By Chan Yang (1)

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Keywords: air pollution, regulatory policy, monitoring and enforcement, China

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Abstract

Four decades of rapid economic expansion in China has generated enormous pressure on the environment, natural resources and public health. Alarming smog outbreaks during the 2010-13 period prompted the government to introduce a number of reforms to control air pollution, including a re-organisation of environmental institutions, improving the coordination and integrity of enforcement actions across levels of government, and the rolling out of a permit system for all stationary pollution sources. This paper reviews these recent developments, and discusses key remaining challenges. The paper complements two case studies on air quality policies in Korea and Japan, and a third case study on international regulatory cooperation on air quality in North America, Europe and North-East Asia.

Keywords: air pollution, regulatory policy, monitoring and enforcement, China

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Résumé

Quarante ans d'expansion économique rapide ont mis à mal l'environnement, les ressources naturelles et la santé publique en Chine. Face aux alarmants épisodes de smog qui ont frappé le pays au cours de la période 2010-13, les autorités ont entrepris de maîtriser la pollution atmosphérique moyennant plusieurs réformes, qui visent notamment à réorganiser les institutions chargées de l'environnement, à renforcer la coordination et l'intégrité des mesures d'exécution à tous les niveaux de l'administration et à mettre en place un système de permis applicable à l'ensemble des sources fixes de pollution. Les travaux présentés ici portent sur l'évolution récente de la situation et proposent une analyse des grands défis restants. Ils viennent compléter deux études de cas sur les politiques en faveur de la qualité de l'air poursuivies en Corée et au Japon, ainsi qu'une troisième sur la coopération internationale en matière de réglementation sur la qualité de l'air engagée en Amérique du Nord, en Europe et en Asie du Nord-Est.

Mots clés : pollution de l'air, politique réglementaire, surveillance et application, Chine

Classification JEL : Q52, Q53, Q58

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Executive summary

Key findings

Four decades of rapid economic expansion in China has generated enormous pressure on the environment, natural resources and public health. Alarming smog outbreaks during the 2010-13 period prompted the government to take drastic measures to control air pollution. Almost half of all legislative developments or amendments since then occurred in the environmental field, with the 2013 Action Plan for Air Pollution Prevention and Control being probably the most influential environmental policy in China of the past five years. While improvements in air quality have been felt in many regions, challenges remain to achieve continuous attainment with air quality standards and further reduce emissions of a wider range of pollutants. The present country study focuses on urban air pollution; key findings include:

Since China entered the 13th Five-Year Plan (FYP) (2016-20), focus of air pollution control has shifted from total emission control to air quality improvement. Abatement of particulate matter emissions, notably PM_{2.5} and PM₁₀, occupy the centre of the policy attention. Air quality standards have been tightened, along with binding targets of emissions reduction and ambient air quality improvement enshrined in the FYP that directly affect officials' career promotion across all levels of governments. Nevertheless, despite improvement in air quality across the country, more than two thirds of the major 338 cities still have concentrations of SO₂, NO_x and PM_{2.5} several times in excess of WHO standards. Outbreaks of severe air pollution are still frequent in several major city clusters. Ground-level ozone and photochemical pollution are also becoming a growing source of public concern.

Air pollution control laws and regulations have become sounder and more comprehensive following a series of amendments since 2013, providing clearer regulations on pollutants such as PM_{2.5} and volatile organic compounds (VOCs) that have received heightened attention. A broader array of **policy instruments** are being deployed:

- **The long-awaited permit system is being rolled out and will cover all stationary sources across the country by 2020.** It sets clear, predictable and enforceable requirements for polluters, and will serve as a cornerstone for weaving together a string of other regulatory instruments, such as emission standards, environmental impact assessment (EIA), environmental taxes, total emission control and emission trading.
- **The stringency of the emission standards for stationary sources has increased considerably** in the past decade, and in some industries – like coal-fired power and steel, the emission limit values for new plants are comparable to those in the advanced OECD economies.
- **A growing number of market-based instruments have been adopted to provide more cost-effective abatement solutions and incentivise development of cleaner technologies.** Most notably, environmental taxes were levied starting 01/04/2018, replacing the decades-old pollution levy/fee, although the current tax rates are generally considered too low. China has also emerged as a global leader in green finance, along with efforts to establish a corporate environmental credit rating system.

As car ownership continues to grow along the pace of urbanisation, the government has taken further actions to tackle air pollution from mobile sources, notably diesel engine heavy-duty vehicles. Key measures include: stricter standards for vehicle emissions and fuel quality; scrapping of heavily polluting “yellow label” vehicles through a mix of policies such as compensatory subsidies, diesel engine retrofit and restrictions on circulation; and promotion of eco-friendly commuting through new energy vehicles and alternative mobility services.

To effectively implement policy decisions at the local level, the government has further stepped up regulatory oversight and enforcement efforts, including by:

- **Improving the quality and reliability of environmental information** by reforming the multi-level monitoring system. Broadening the pollutant coverage under urban air quality monitoring to include ground-level ozone, PM and VOCs emissions.
- **Requiring stricter enforcement of the amended EIA law** for new developmental planning and all proposals for new or expanded industrial facilities. Significantly increasing the penalty ceilings for unauthorised construction projects.
- **Considerably increasing the cost of non-compliance** through a mix of “zero tolerance” measures, such as consecutive daily penalties, suspension of production and business, seizure of facilities and equipment and administrative detention.
- **Enhancing local government accountability** through high-pressure inspections dispatched directly from the highest level of decision-making, as well as annual performance evaluation against a set of Green Development Indicators. Such top-down iron-fist approach to enforcement and compliance assurance is effective and made possible in China due to its unique and highly centralised political system. Nonetheless, its long-term effectiveness and sustainability need further considerations.
- Finally, recent institutional restructuring has helped foster more integrated approach to regulation and centralisation of environmental responsibilities. At the national level, the establishment of the Ministry of Ecology and Environment (MEE) entrusted with broader range of remits is expected to solve the accountability and ownership gap among disparate regulatory agencies. The “vertical reform” introduced in 2016 have aimed to enhance environmental monitoring, supervision and enforcement below provincial level governments. The reform has shown initial promising results in better insulating environmental authorities from local political interference and in improving coherent local implementation of central directives.

Key policy recommendations

Continue to shift focus from achieving a limited number of emissions reduction targets in Five-Year Plans to achieving a broader range of environmental quality objectives. Expand the coverage of pollutants subject to binding targets in the evaluation of local environmental performance. Consider tackling primary and secondary pollutants, notably precursors of PM_{2.5} (NO_x, VOCs), in a more coherent and integrated manner. Set up timetable to bring PM_{2.5} concentration levels closer to the WHO Air Quality Guidelines.

Further strengthen the linkages and coordination of various regulatory instruments to maximise synergies and reduce misalignments, including pollution permit, EIA, environmental taxes, emission standards, total emission control and emission trading platform. Conduct cost-effectiveness analysis of policies, and improve the efficiency, transparency and accountability of regulatory decision-making by establishing a framework of Regulatory Impact Assessment. Specifically, gradually limit the resort to campaign style regulations that incur high administrative cost with transient effects; progressively lift the pricing of pollution

(e.g. environmental tax rate) with continued use of incentive measures to encourage more abatement efforts; and conduct more empirical research to determine the possibility of realising first best abatement levels when both price and quantity type instruments co-exist.

Aggressively adopt measures with co-benefits that aim at reducing air pollution and GHG emissions. Given that the energy sector is at the origin of much of China's air pollution problem – and even more so with rising electrification of energy use, more aggressive efforts shall be taken to reduce fossil fuel use in the energy sector, starting with halting the construction of new coal-fired power plants as required in the Paris Agreement. Other key measures include: speed up implementation of post-combustion control technologies and improve energy efficiency in the industry and transformation sector; contain transport-related emissions in urban areas, with focus on enhancing emissions standards for heavy-duty vehicles; and accelerate the merging of climate change and environmental responsibilities at the subnational levels to better coordinate local implementation of mitigation policies.

Develop a more systematic, effective and consistent approach for securing compliance with environmental requirements, including by: developing an appropriate mix of activities involving compliance promotion, monitoring and enforcement, with greater use of soft measures that incentivise compliance (e.g. information and training on environmental laws and regulations for corporate sector professionals); strengthening the role of the permit system and ensure seamless integration with environmental taxation and law enforcement; adopting a risk-based approach to compliance monitoring so as to more efficiently use scarce inspection resources; and improving mechanisms for law enforcement, with emphasis on encouraging voluntary reporting by companies on their compliance record.

Strengthen regulatory capacity of sub-national environmental authorities. Expand the human, financial and institutional capacities needed to support more effective compliance and enforcement, and carefully assess how they would be financed; ensure that environmental agencies at all levels are fully equipped to perform their duties; increase the enforcement power and authority of local environmental supervisors; and establish a compensation and promotion system commensurate to the degree of specialisation and professionalisation of the regulatory and law enforcement officials.

Given the vast regional disparities, ensure the principles of equity and balanced development are respected in determining local environmental objectives and targets. In exceptional times of economic downturn, consider appropriate support (e.g. compensation) for regions most affected by developmental and environmental challenges (e.g. industrial rustbelts and less developed areas along the Fen-Wei Plains). For communities that rely on highly polluting industry, policies to support economic diversification and socially inclusive development are needed to accompany measures that tackle regulation or phasing out of the polluting industry.

Expand opportunities for, and reduce financial obstacles to, citizens and NGOs challenging non-compliance with environmental laws in courts. Further strengthen the ability of citizens to meaningfully participate in environmental decision-making, including by letting grassroots NGOs play a bigger role in promoting environmental education.

1. Introduction

This case study is part of a joint project of the OECD Environment Policy Committee and Regulatory Policy Committee focused on regulatory frameworks, enforcement and co-operation to address air pollution supported by the Ministry of Environment of Korea. The joint project comprises two pillars:

1. Country studies of policies, regulatory framework and enforcement for air quality management, covering China, Japan and Korea; and
2. Studies of international regulatory co-operation (IRC) initiatives to address air pollution, focusing on existing arrangements in North-East Asia, the Canada – United States Air Quality Agreement (Air Quality Agreement) and the Convention on Long-range Transboundary Air Pollution (CLRTAP).

This document complements two case studies that focus on policies, regulatory and enforcement frameworks for air quality management in Japan (ENV/WKP(2020)3), in Korea (ENV/WKP(2020)5) and third case study that analyses international regulatory cooperation on air quality in North America, Europe (the Convention on Long-Range Transboundary Air Pollution) and North-East Asia (COM/ENV/EPOC/GOV/RPC(2018)1).

These studies are carried out under Revised Output Proposal (ROP) for Intermediate Output 2.3.4.2.11. Environmental Policy Design and Evaluation- Regulatory quality and enforcement to address air pollution, under the 2017-2018 EPOC 2018 Programme of Work and Budget (ENV/EPOC(2017)1/ANN3). Overall, this joint project aims to support the broader ambition of countries in the region to improve their air quality policies by highlighting the challenges and possible solutions related to the design and enforcement of effective regulatory frameworks for air quality and the co-operation needs that transboundary air pollution generates.

This study builds on information collected by the Secretariat through deskwork, questionnaires, and interviews carried out during a fact-finding mission to China, Japan and Korea undertaken in May 2018. The case studies have also been revised based on comments received by EPOC and RPC Delegates as well as the participants at a project workshop in Beijing on 26-27 June 2019. The case study on China benefited from further comments and data provided by the Development Research Centre of the State Council of the People's Republic of China (DRC). This paper was drafted by Chan YANG (SGE/GRS/SPNI).

2. Historical and recent trends in air quality and emission

More than three decades of rapid economic expansion in China has generated enormous pressure on the environment while leaving an increasingly adverse effect on public health. The frequent heavy smog episodes in 2010-2013 triggered a wave of public anger, prompting the government to declare a “war on pollution” by taking drastic measures to shut down dirty factories, accelerate the shift to cleaner sources of energy supply, restrict traffic in urban areas and overhaul the environmental governance system.

One of China’s earliest anti-air pollution measures was released in 1987. The *Air Pollution Prevention and Control Law* aimed specifically at spot-treating Total Suspended Particles (TSP) from industrial and coal-burning activities. Since then, a significant number of laws, administrative measure and regulations have been issued, but the overall legislative and institutional framework remained weak throughout most of the 1990s. Looking back, the battle against air pollution has gone through three phases: First, the 1990s focused on controlling SO₂ emissions and acid rain. Second, the 2000s saw rapid increase of other pollutants such as NO_x and PM₁₀; policymakers reacted by revising the Air Pollution Law and established Total Emission Control as the cornerstone of the policy framework. Third, the latest decade has shifted focus to improving air quality – notably by lowering PM_{2.5} concentration, along with measures to enhance policy coordination and cross-regional co-operation (Table 2.1). It is also during the past decade, notably since 2013, that environmental legislation in China picked up speed: almost half of all new or revised laws and regulations of that period occurred in the environmental field.

Table 2.1. Timeline of key legislation and plans

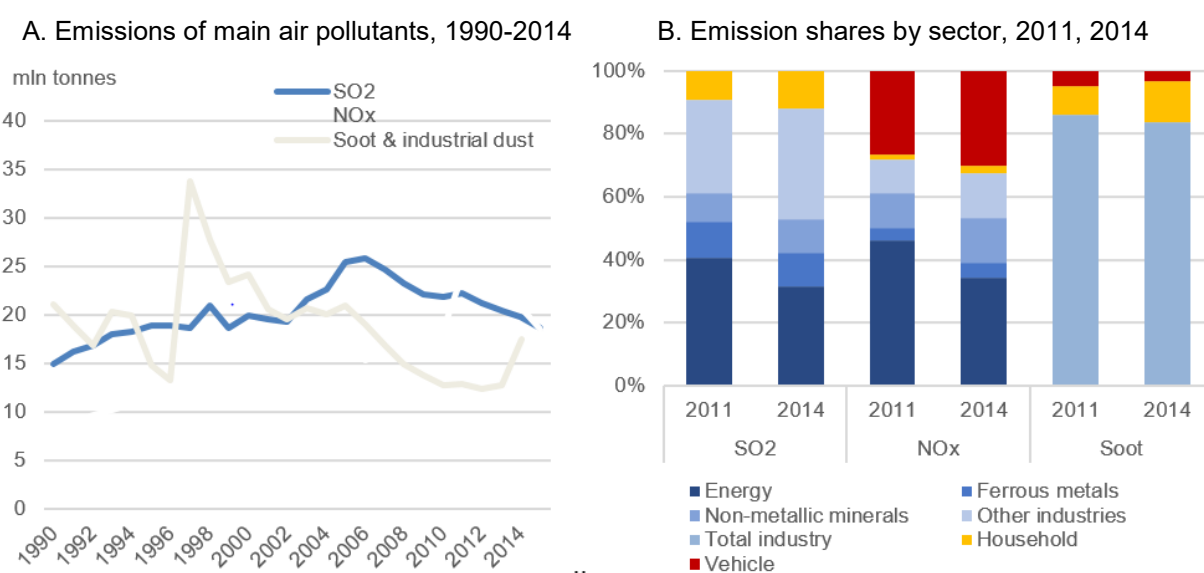
year	Law or action	Brief Description
1979	Establishment of the Trial Environmental Protection Law	Create a legal system for environmental protection
1987	Establishment of the Air Pollution Prevention and Control Law	Introduce control of soot emission from factories in designated area
1989	Enactment of the Environmental Protection Law	Mark the official start of environmental legislative and institutional building
1998	Establishment of Acid Rain Control Areas & SO ₂ Control Area	Introduce measures targeting SO ₂ emissions and acid rain caused by coal-burning activities in designated area
2000	Amendment of the Air Pollution Prevention and Control Law	Focus on SO ₂ and PM ₁₀ pollution from coal-burning in urban areas
2002	Establishment of the Environmental Impact Assessment Law	A first step away the “pollute first, clean up later” development model to address pollution from the sources
2008	Establishment of the Ministry of Environmental Protection (MEP)	Upgrade status of the State Administration of Environmental Protection to a ministry
2010	Establishment of the Ozone Depleting Substance Regulation	Control consumption, trade and production of ODS

2013	Action Plan for Air Pollution Prevention and Control	Set a "National 10 Measures" road map for air pollution control over 2013-18, including PM _{2.5} targets for three city clusters of Beijing-Tianjin-Hebei and the Yangtze and Pearl River Deltas
2015	Amendment of the Environmental Protection Law	Strengthen penalties for non-compliance, introduce mandatory EIAs for policies & plans, formalise public interest environmental litigation
2016	2 nd Amendment of the Air Pollution Prevention & Control Law	Introduce regional co-operation mechanisms & early warning alert system, place limits on levels of polluting compounds in vehicle fuels, and enhance local government accountability
2016	Amendment of the Environmental Impact Assessment Law	Enhance effectiveness & integrity of EIA for planning & facilities
2018	Establishment of the Ministry of Ecology and Environment	Restructuring of the MEP to give it broader remits
2018	Establishment of the Environmental Protection Tax Law	Replace the decades-old pollution fee system
2018	Action Plan for Winning the Blue Sky War (2018-20)	Considered as the second phase of the 2013 Action Plan, cover more cities including rust-belt along the Fen-Wei Plains, add targets for VOC and NOx for reducing ground-level ozone

Source: Author's elaboration.

Over the years, pollution control measures put in place since the early 2000s (start of the 10th Five Year Plan) have resulted in the peaking of conventional air pollutants such as SO_x and NO_x. Much of the subsequent reduction was achieved in the energy sector, for instance through widespread installation of desulfurization and denitrification equipment in coal-fired power plants, as required respectively in the 11th and 12th Five Year Plan. The SO_x emission in 2015 was nearly 30% lower than the peak level in 2006, while that of NO_x was almost 23% lower than the peak level in 2011. Soot and industrial dust, which contribute to PM emissions and recorded in the annual *Report on the State of Environment* until 2014, have also declined since the late 1990s (Figure 2.1).

Figure 2.1. Long-term trends in air pollution emissions



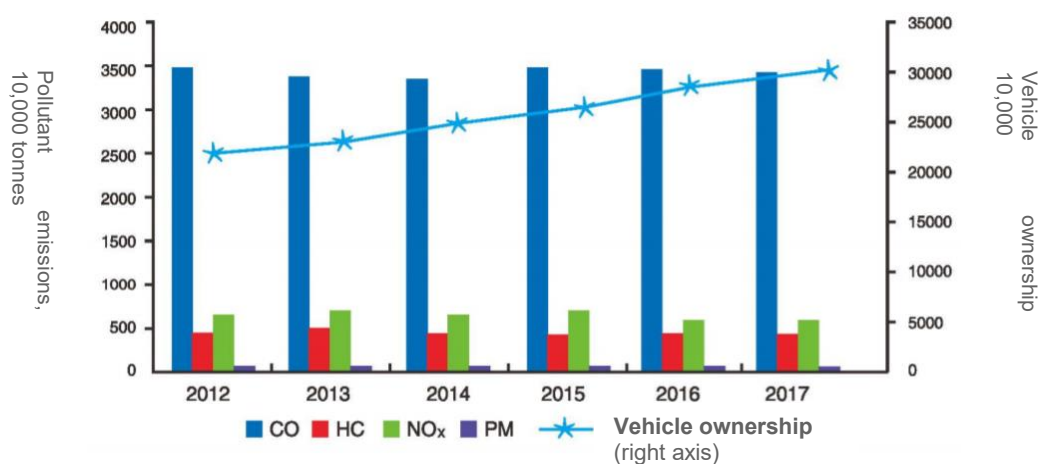
Notes: Figures of NO_x emissions for 2004-05 in Panel A are not officially published.

Source: *Reports on the State of the Environment*, varied issues.

Nevertheless, these significant emission reductions have not yet been fully translated into substantial improvement of the ambient air quality, and large differences exist across regions. As the pace of industrialisation and urbanisation continues to grow, the main sources of air pollution have expanded from coal-burning and industry to include motor vehicles and construction. As such, emissions of PM, VOCs, O₃ and NH₃ are rising fast. Widespread smog¹ days have increased sharply since 2000, and between 2010 and 2013, urban conglomerates and economic clusters like the Jing-Jin-Ji area (28 cities including Beijing), the Yangtze River Delta (surrounding Shanghai) and the Pearl River Delta (surrounding Guangzhou and Shenzhen) were shrouded in persistent haze almost one third of the years.

While coal burning remains the largest contributor to PM_{2.5} concentrations in most cities, motor vehicle emissions have become the primary source of PM_{2.5} emission in five first-tier cities, respectively accounting 52.1%, 45.0%, 29.2%, 28.0% and 21.7% of PM_{2.5} emissions in Shenzhen, Beijing, Shanghai, Hangzhou and Guangzhou in 2017 (MEE, 2018a). Despite steady increase in the vehicle ownerships, motor vehicle emissions slightly declined from 2012 to 2017 (Figure 2.2). Automobiles are the predominant contributors, accounting over 90% of NO_x and PM emissions and above 80% of CO and HC emissions in 2017. By vehicle type, commercial vehicles – in particular heavy-duty trucks – contribute above two thirds of NO_x emission and more than three quarters of PM emissions. By engine type, diesel vehicles contribute more than two thirds of NO_x emissions and nearly all of the PM emissions, while gasoline vehicles are responsible for 85% of CO emissions and slightly less than three quarters of HC emissions. Diesel commercial vehicles making up for barely 8.1% of the total car ownership have become the biggest sources of NO_x (57.3%) and PM (77.8%) emissions.

Figure 2.2. Motor vehicle emissions, 2012-17



Source: MEE (2018a).

A series of drastic measures put in place since 2013 have produced initial results, with the annual concentration level of PM_{2.5} decreasing gradually in most cities. The Jing-Jin-Ji area remains however the most heavily polluted among the three economic powerhouses, particularly during winter period due to increased use of coal burning for heating. The Yangtze River Delta fares better, and the Pearl River Delta achieved significant progress with nearly all cities keeping PM_{2.5} concentration at levels below 35 µg/m³ (equivalent to the WHO level-1 interim target, see Table 5.2) on average throughout the year (Figure 2.3). There is however further room of progress to make. In 2017, more than two thirds of the 338 surveyed

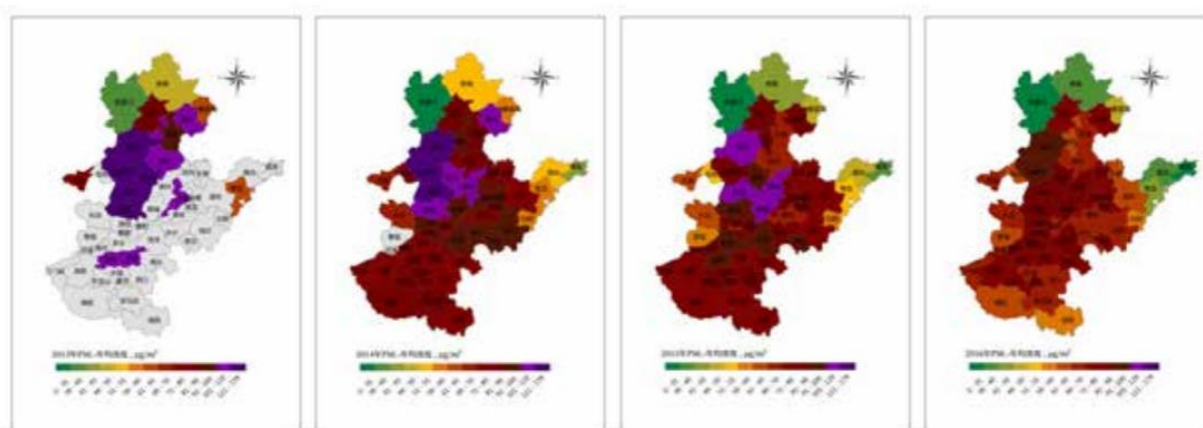
¹ The [China Meteorological Administration](#) defines smog as turbidity caused by suspension of a large amount of particles in the air, such as smoke and dust that are meteorologically called “aerosol particles” – the most harmful form of which is fine particles PM_{2.5}.

cities did not meet Grade I level of the new Air Quality Index standard, effective nationwide since 2016 (MEE, 2018b). Heavy and severe pollution occurred respectively 2311 and 802 day-times, nearly three quarters of which saw PM_{2.5} as the biggest source of pollutants, followed by PM₁₀ (20.4%) and O₃ (5.9%).

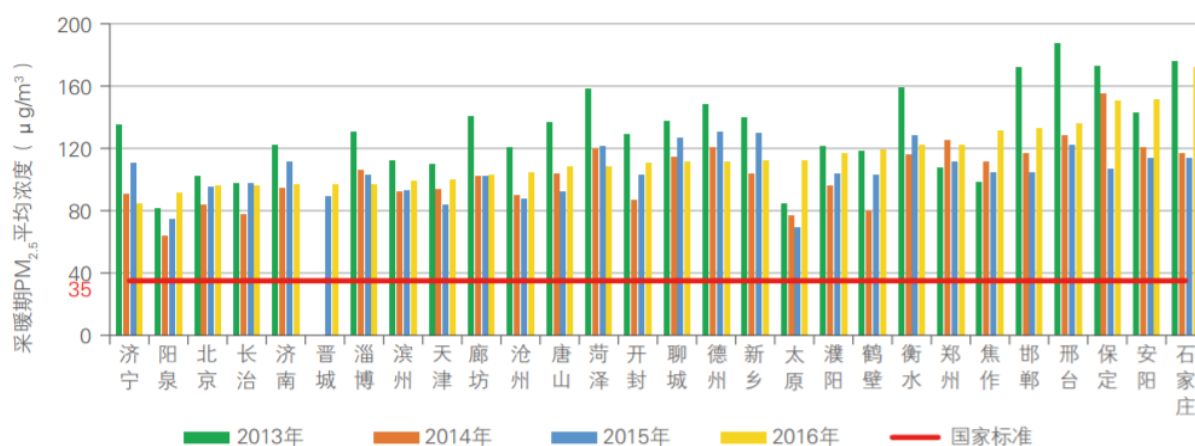
In addition to smog, ground-level ozone and photochemical pollution are becoming a growing source of public health concern, inflicting painful irritation of the respiratory system, chest pain, reduced lung function and difficulty in breathing even after short-term exposure. In the first half of 2018, the average concentration levels of PM_{2.5}, PM₁₀, SO₂, NO₂ and CO in the 338 surveyed cities have all decreased compared to 2017, whereas ozone concentration increased by 2.6% from 2017. In the Pearl River Delta area, ozone has overtaken PM_{2.5} to become the primary cause of local air pollution. Likewise, the priority of air pollution control in Shanghai has shifted from tackling PM_{2.5} to ozone and NO₂. Ozone pollution often occurs in summer and can be triggered by a set of complex chemical reactions of NO_x and VOCs in the presence of sunlight. Reducing ozone pollution thus requires addressing emissions of NO_x and VOCs, which are also the main causes of photochemical pollution and precursors of PM_{2.5}. The biggest source of NO₂ emissions is motor vehicle exhaust emissions, while most man-made VOCs emissions stem from industrial activities (e.g. petrochemicals, chemicals, use of industrial solvent and paint coating), fuel combustion and motor vehicle exhaust emissions.

Figure 2.3. Annual PM_{2.5} concentration level by region, µg/m³, 2013-2016

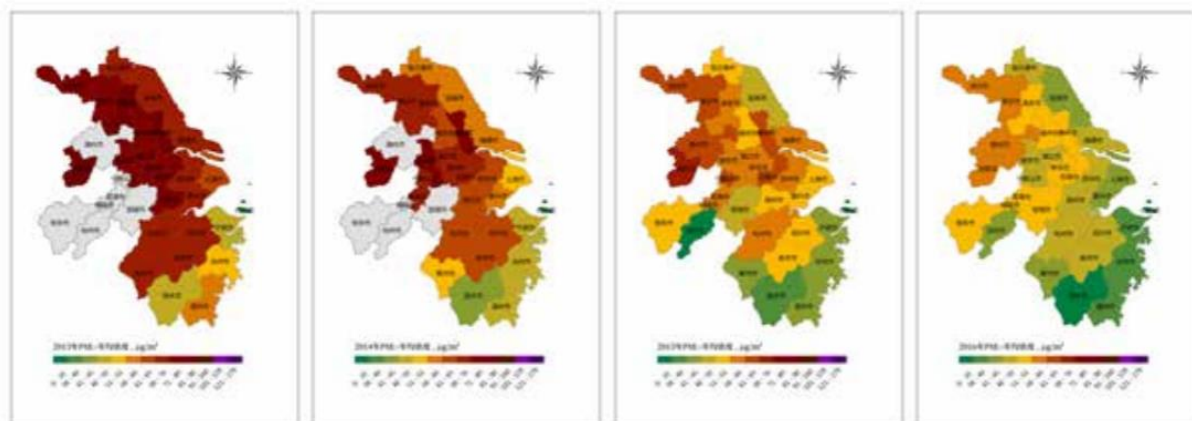
A. Jing-Jin-Ji area



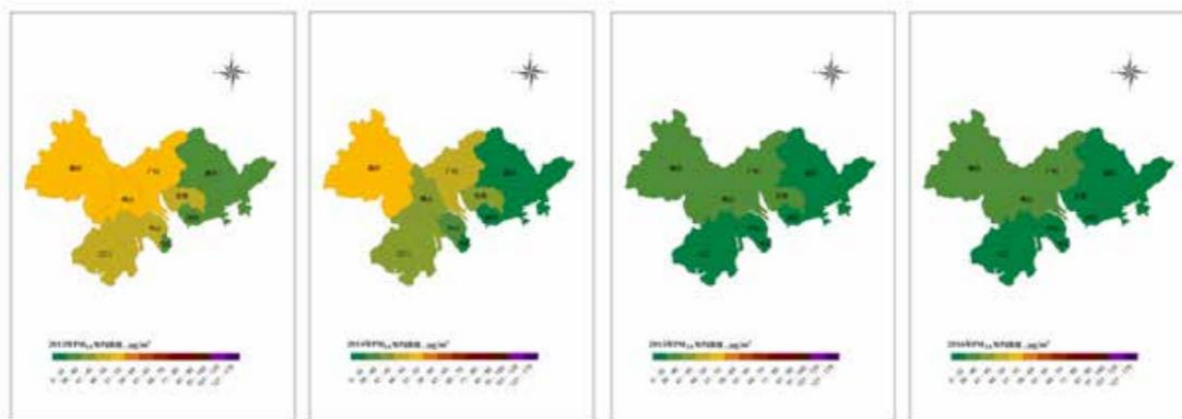
B. Average PM_{2.5} concentration in Jing-Jin-Ji and surrounding areas during winter heating period



C. Yangtze River Delta



D. Pearl River Delta



Notes: In Panels A, C and D, the level of PM2.5 concentration is represented by green (low), yellow (medium) and red (high). Red line in Panel B represents the national standard of PM2.5 concentration limit (35 µg/m³ daily average).

Source: CAAC (2017).

A growing body of research has further pointed to the macro-economic and welfare losses of outdoor air pollution. A 2016 OECD study shows that by 2060, the combined market impacts of air pollution could lower China's GDP growth by 2.7% than the projection excluding the pollution feedbacks on the economy (OECD, 2016a). These projected losses include reduced labour productivity; increased health expenditures, in particular facing an ageing population that is more vulnerable to air pollution; and crop yield losses. In 2015, it is estimated that an equivalent of 8.4% of the Chinese GDP, *i.e.* 1.6 million USD, was lost in the form of premature deaths from ambient PM and ozone pollution, by far the largest among 41 OECD and BRIICS economies (Roy and Braathen, 2017).

3. The environmental policy-making framework

3.1. Main policy actors and governance

3.1.1. Institutional restructurings at the national level

In China, environmental protection was first brought to policymakers' attention in the 1970s. Since then, the government has gradually established a four-tier governance system across the country, with responsibilities defined respectively at the central, provincial, prefectural and county levels. As China moved further towards market-based economy in the early 1990s, the role of the government in environmental issues gradually shifted from an administrative function to a supervisory role that governs under the rule of law. The status of the national environmental body has been raised over time, evolving from a vice-ministerial unit in the early days, to the State Environment Protection Agency in 1998, the Ministry of Environmental Protection (MEP) in 2008 with a Minister as a member of the State Council, and finally the Ministry of Ecology and Environment in 2018 with a wider range of responsibilities (Table 3.1). This has helped enhance the environmental voice within the government and enabled a gradual shift towards more specialisation and autonomy in the regulatory procedures and the management of environmental issues.

Table 3.1. Evolution of the national environmental authorities

year	Institutional restructuring	Institutional ranking
1974	Establish the Leading Group on Environmental Protection within the State Council	A temporary organisation
1982	Merge the Leading Group into the newly formed Ministry of Urban-Rural Environmental Protection	A department within the ministry
1988	Establish the independent Agency for Environmental Protection	A vice-ministerial department directly under the State Council
1998	Establish the State Agency for Environmental Protection (SAEP)	A ministerial department directly under the State Council
2008	Establish the Ministry of Environmental Protection (MEP), a significant upgrade from the SAEP	An integral part/member of the State Council
2018	Establish the Ministry of Ecology and Environment (MEE) with more concentration of environmental responsibilities	An integral part/member of the State Council

Source: DRC (2015).

Responsibilities for managing air, water, ocean and agricultural non-point pollution did not lie within the sole remit of the MEP. In fact, they are fragmented and shared among several other bodies including the National Development and Reform Commission, Ministries of Water Resources, Land and Resources, Agriculture, and Housing and Rural-Urban Development, amongst others. Specifically, in the area of air pollution management, responsibilities at the national level are scattered across 15 ministries and

agencies, with significant overlaps and lack of effective coordination (Table 3.2). As an example, this problem is particularly acute in the regulation of motor vehicle emissions, where close to ten ministries share responsibilities in six areas. As air pollution control is not considered a core responsibility in some ministries, this has resulted in insufficient investment in capacity building for regulatory oversight. There are also vacuums in the management of stench, light pollution and unorganised emissions due to the absence of clearly designated lead regulatory agency.

Table 3.2. Main regulatory bodies and responsibility overlaps under the 2013 Action Plan for Air Pollution Prevention and Control

Responsibility	NDRC	MEP	MIIT	MOH-URD	MOL	MOF	MOT	MPS	MOST	MOA	MOF-COM	SAIC	AQS-IQ	PBOC	CMA
Industrial pollution treatment	■	■	■	■	■	■	■	■	■						
Non-point source pollution control		■		■						■		■			
Mobile source pollution control	■	■	■			■	■	■	■			■	■		
Elimination of backward production capacity	■	■	■		■	■								■	
EIA approval & entry to environmental protection industry	■	■	■		■	■								■	
Oil and gas management (e.g. gas stations)		■					■				■			■	
Economic policy instrument	■	■	■			■								■	
Regional coordination and collaboration	■	■	■	■		■									
Early warning and emergency response		■													■

Notes: NDRC = National Development and Reform Commission, MEP = Ministry of Environmental Protection, MIIT = Ministry of Industry and Information Technology, MOHURD = Ministry of Housing and Urban-Rural Development, MOL = Ministry of Land Resources, MOF = Ministry of Finance, MPS = Ministry of Public Security, MOST = Ministry of Science and Technology, MOA = Ministry of Agriculture, MOFCOM = Ministry of Commerce, SAIC = State Administration of Industry and Commerce, AQSIQ = Administration of Quality Supervision, Inspection and Quarantine, PBOC = People's Bank of China, CMA = China Meteorological Administration.

Source: Shen et al. (2015).

The 13th Five Year Plan put an increasing emphasis on strengthening environmental governance, with particular focus on addressing the following dimensions: the organisation of national environmental institutions; coordinating environmental policies across levels of government; coordinating environment and other policies at the national level; and the relations between government, the public and other stakeholders. The latest governance reform was introduced in March 2018. To enhance MEP's authority in developing more coherent and integrated approaches to pollution prevention and control, the State Council consolidated staff and functions from a number of ministries into the new Ministry of Ecology and

Environment (MEE), replacing the former MEP. The restructuring will give MEE broader remit with functions including climate change and emissions reduction policies, environmental monitoring, air/water/soil pollution management, ecological/marine conservation, nuclear safety and radiation safety; amongst others (Figure 3.1).

Figure 3.1. Institutional restructuring in environment & resources: towards more centralisation of environmental powers



Source: image from [Pexels](#).

Details of the new Ministry's organisational structure and responsibilities were revealed in September 2018 (MEE, 2018c; Box 3.1.). The reorganisation will expand the number of departments within the ministry from previously 14 to 21, with an administrative staff ranks increase from 311 to 478 (MEE, 2018c). It also clarifies that the 240 administrative staffs employed in the six Regional Environmental Inspectorates (further details see next section 3.1.2) will come on top of the Ministry's headcount (MEE, 2018c). This will likely boost the regulatory capacity of the new Ministry, as the severe shortage of resources has long time constituted a challenge for MEP to tackle increasingly complex environmental issues. By way of contrast, it has only roughly one fifth of the total headcount of the US Environmental Protection Agency – despite the latter's recent shrinkage, and even the Environment Ministry of the Czech Republic with a population of barely 10.5 million (i.e. less than 1% of that of China's) had double the staff of China's MEP (OECD, 2017).

The reorganisation is expected to address the accountability and ownership gap among disparate agencies and streamline overlapping functions by removing policymaking bottlenecks. An important change in air pollution control concerns establishment of the Jing-Jin-Ji Ambient Environmental Bureau, to enhance power of the central authorities in managing regional (cross-province) air quality regulation. From an international perspective, the most significant change from the past is probably putting climate change together with the environment under the same Ministry. It remains to be seen whether the MEE could effectively drive air and carbon emission reductions from the power and heavy industry sectors, as energy (including both fossil fuel and renewable sources) continues to be handled by the NDRC. Given MEE's lower perceived hierarchical ranking than NDRC – also known as a “super ministry” or the mini-State Council, it is unclear to what extent it can lead and coordinate climate change actions that are generally spread among different arms of the administration.

Furthermore, MEE's role in regulating emissions from mobile sources and construction sites remains limited after the restructuring. At the national level, Ministry of Transport continues to retain primary responsibilities in shaping eco-friendly transportation policies, while Ministry of Housing and Rural-Urban

Development has more authority in regulating dust and other air pollutant emissions on construction sites. While mainstreaming environmental responsibilities in line ministries could represent internalisation of environmental responsibilities, current mechanisms that are in place to ensure horizontal coordination with the MEE generally remain weak. Further challenges lie ahead to turn MEE from a line ministry operating in silo, into an overarching, well-integrated regulatory body that is more professionalised, transparent and accountable, equipped with a diversified range of policy instruments and decision-making tools that are more incentive-driven and evidence and science-based.

Box 3.1. New structure and regulatory responsibilities of the MEE

The number of departments has expanded from previously 14 under MEP to 21 under MEE. Key internal structural changes include:

- 3 new departments are created: **Central Ecological and Environmental Inspectorate Office** (establishing the central environmental inspection as a routine supervisory practice, further details see section 5.2), **Comprehensive Department** (responsible for overall coordination and planning), and **Climate Change Department**;
- Pollution Prevention and Treatment Department is disintegrated into 5 parallel Departments, each targeting an environmental media – **Water, Ocean, Atmospheric Environment** (with new responsibility of establishing air pollution joint prevention and control co-operation in the Jing-Jin-Ji and surrounding region), **Soil** (with new responsibility of regulating agricultural non-point source pollution), **Solid Waste and Chemicals**;
- Planning and Finance Department is removed and partially incorporated into the **Technology and Finance Department** (renamed from Technology and Standard Department), with stronger emphasis on increasing the level of professionalisation of the MEE staff;
- The **General Office** will assume a new duty of building and managing the National Ecological and Environmental Information Network;
- The Department of Policies, Laws and Regulations will absorb the setting responsibilities of standards, benchmarks and technical specifications under the previous Technology and Standard Department, to become the new **Department of Laws, Regulations and Standards**;
- EIA Department is renamed **EIA and Emission Management Department**, and will undertake management of the newly established permit system;
- Environmental Monitoring Department is renamed **Ecological and Environmental Monitoring Department**, with greater emphasis on developing monitoring standards for ecological and environmental quality, GHG emissions, emergency monitoring and supervisory monitoring of pollution sources;
- Nuclear Safety Management Department is disintegrated into 3 new departments: **Nuclear Facility Safety Regulation, Nuclear Power Safety Regulation, and Radiation Source Safety Regulation**.

Source: MEE (2018c).

3.1.2. The regulatory governance and the “vertical reforms”

Aside restructuring at the national level, further measures have been taken to strengthen the coordination and integrity of environmental decision-making across levels of government. For years, the government implemented a territory-based, multi-level governance system, where the central government (i.e. MEP) retained responsibilities of formulating laws and regulations and providing guidance to the local governments. Local governments took responsibility of establishing dedicated regulatory agencies, securing staff and budget resources. They were held accountable for the environmental quality of their own jurisdictions, through actions of inspection and enforcement undertaken by the local environmental bureaus. The hierarchy in this multi-level governance is defined in such a way that **environmental bureaus at sub-national levels were subject to the dual leadership and oversight of both the same level government (for administrative issues as personal appointment, budget and material supply) and the superior environmental bureaus (for technical matters of environmental management).**

Under such territory-based and dual management governance, many local governments prioritised economic over environmental objectives and frequently interfered in the monitoring and enforcement duties of local environmental bureaus. This has often resulted in inconsistent approach across the Chinese territory and failure to adequately enforce environmental requirements in many jurisdictions. To enhance central oversight of local environmental authorities, the MEP established 6 **Regional Environmental Centres** between 2006 and 2008, each overseeing 5-6 provinces (in Southeast, South, Northwest, Southeast, Northeast and North China). To a certain extent, this facilitated convergence in environmental standard setting, emergency response practice and cross-regional dispute settlement. Yet administratively speaking the regional centres were not considered governmental departments and thus did not have jurisdiction over subnational authorities. Their impact and supervisory authority were in reality rather limited.

To make provinces more accountable for their environmental performance, the regional centres were upgraded in November 2017 to become **Regional Environmental Inspectorates** (Figure 3.2). These are dispatched enforcement agencies from the central authorities (i.e. MEE), and are charged with supervising implementation by sub-national authorities of national regulations and standards; undertaking activities mandated by the environmental inspectorate of the Central Party Committee; performing regulatory oversight duties (e.g. daily supervision of national major pollution sources, on-site inspection of construction projects approved by the central government); and settling disputes related to co-operation across provinces, river basins and sea areas.

Another centralised institutional arrangement concerned the “vertical reforms”, launched in September 2016, to enhance environmental monitoring, inspection and enforcement below provincial level governments and better insulate them from local political interference. Far-reaching changes are introduced in three aspects (Tan, 2018):

First, there is an explicit emphasis on strengthening the accountability of local party committees and governments through measures such as integrating targets of environmental quality into the performance assessment of local leaders.

Second, the reforms distinguish between environmental quality monitoring and environmental law enforcement monitoring. Environmental bureaus at prefectural and county levels will hand over duties of environmental quality monitoring to the provincial environmental bureaus, while at the same time focusing on enhancing their enforcement capacity. After the reallocation of responsibilities, provincial environmental bureaus will focus on monitoring environmental quality and evaluating prefectural and county level governments; prefectural environmental bureaus are more likely to better command and integrate county-level resources within their jurisdiction; and county environmental bureaus would be able to emphasise on

law enforcement (including supervisory monitoring of pollution sources). This change will allow the national government to grasp a more accurate and reliable picture at the local state of the environment, while empowering local environmental organs to better implement and enforce central policy decisions.

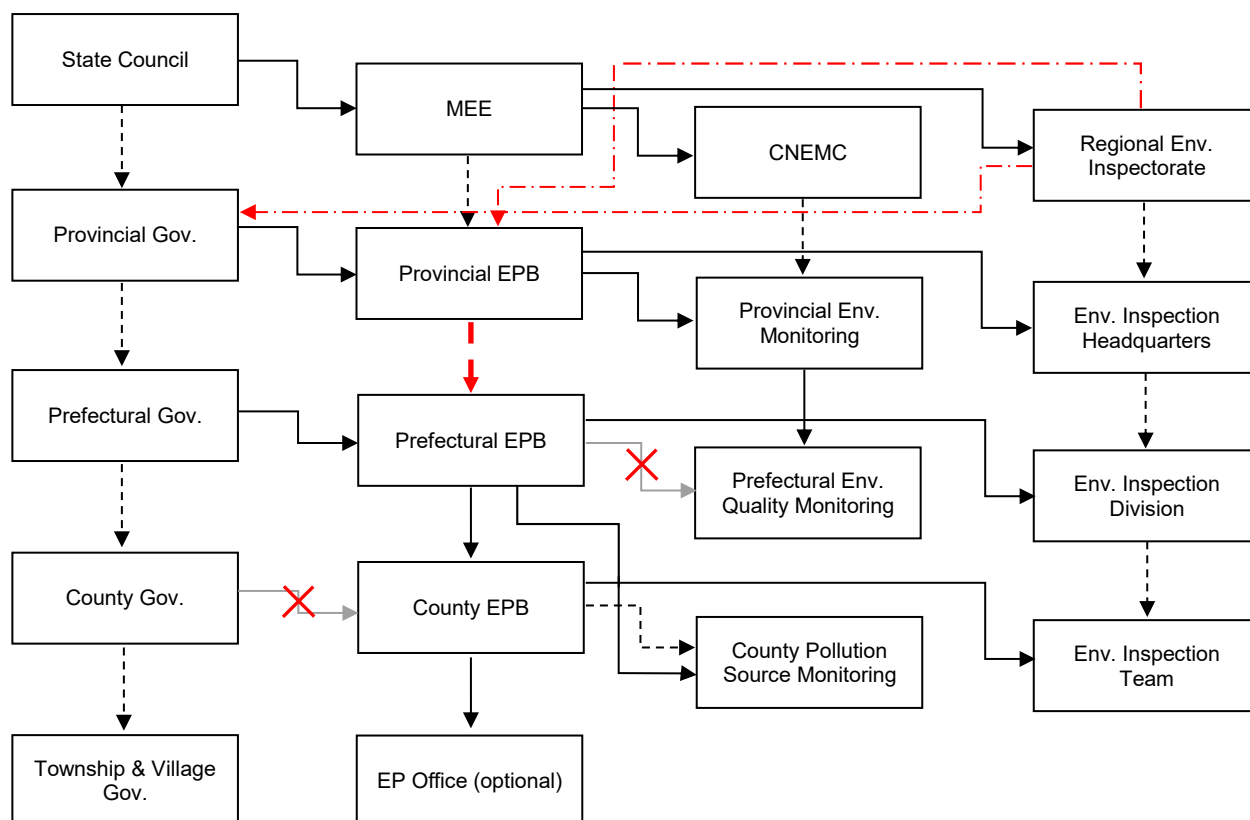
Third, reduce interference of local governments by granting greater autonomy and resources to the local environmental bureaus:

- Hierarchical affiliation: prefectural environmental bureau will be mainly subordinate to provincial environmental bureau while continuing to remain a department within the prefectural government; county environmental bureau will however become a dispatched agency from the prefectural environmental bureau and subject to the latter's sole supervision.
- Budget provision: staffing and budgeting decisions of the prefectural and county environmental bureaus will be separated from the same level governments, to be placed under the discretion of the provincial and prefectural environmental bureaus, respectively.
- Cadre appointment: county environmental chief will be appointed by the prefectural environmental bureau, while prefectural environmental chief will be nominated by the provincial environmental bureau and subject to final appointment of the prefectural government.

"Vertical reforms" were first piloted in two provinces (Chongqing and Hebei) before going nationwide in June 2018. The reforms are expected to be completed by 2020, and some potential institutional obstacles have been identified. For instance, county environmental bureaus will be placed under the sole responsibility of city environmental bureaus after the reform, with their formal link with the county governments removed. This might lead to absence of actual oversight at the lowest level, as currently city-level environmental authorities lack capacity to supervise their county peers (Tan, 2018). There is also the challenge of lack of incentives of implementing reforms at the local level. As seen in some provinces like Gansu, local environmental officials are likely to face more glass-ceiling barriers in their career advancement, as after the reforms they can only seek promotion vertically within the environmental functions, with less possibility of being transferred to other governmental departments (Chen and Xie, 2018). It was reported that approximately 180,000 environmental officials will be affected, among whom 50,000 are in environmental administrative departments, 59,000 in environmental monitoring agencies, and 63,000 in law enforcement agencies (of whom 74% are located at the county level) (Chen and Xie, 2018).

Furthermore, although the reform aims to empower local environmental authorities by rendering them independent from local governments, they will still need to rely on the latter's coordination to ensure coherence of economic policies with the environmental objectives they pursue. As the Chinese economy is slowing due to multiple challenges including overcapacity, population ageing and external demand shock, local governments, particularly those along the heavily polluted industrial rustbelts, will likely be torn with even stronger conflict of interests: on the one hand, the urgency of improving environmental conditions – as the local party and government chiefs are the ultimate accountable, and on the other hand, the necessity of maintaining economic and social stability of their communities.

Figure 3.2. Structure of China's environmental regulatory governance



Notes: EPB = Environmental Protection Bureau, CNEMC = China National Environmental Monitoring Centre

---> Leadership (Professional relations/substantive matters)

—> Leadership (Administrative relations/staffing, budget and material resources)

- - -> Leadership (Dominant professional relations)

Supervision

Source: Author's elaboration based on DRC (2015) and [Ma \(2017\)](#).

4. Environmental impact assessment of projects and regulations

4.1. Environmental Impact Assessment (EIA) of plans and projects

China's first *Environmental Impact Assessment Law*, effective since 2003, contributed to alleviating the environmental damage of China's run-away growth, but the limitations and flaws were soon felt, notably after 2012. EIA was frequently ignored in many construction projects. As an example, it was found that only 37.3% of the 1846 enterprises in one district of Jinan city had properly undergone an EIA in 2012 (Jiang et al, 2014). In other instances, the EIA was turned into a rent-seeking tool by the certified evaluators and profit-driven intermediary agencies. This brewed a natural hotbed for corruption and fraud and undermined the credibility and effectiveness of the EIA. Results of the EIA were also not fully disclosed to the public.

Furthermore, the linkages between the EIA and the (trial, barely functioning) permit system were weak, and there was no connection between the EIA and the assessment of a location's environmental carrying capacity (Cnenergy, 2015). As Pan Yue, then Vice Minister of the State Environmental Protection Administration, put it as early as 2007, although environmental authorities did have the power to approve an individual construction project, they did not necessarily have jurisdiction over the determination as whether the environmental carrying capacity of a specific location could withstand the cumulated environmental impacts of several projects at the same time (Liu, 2007). For a long time, many local governments had overlooked the importance of EIA and used their oversight of local environmental bureaus to protect local enterprises from actions to secure their compliance with environmental laws.

To address these systemic flaws and remain consistent with the *Environmental Protection Law*, amended in 2015, the EIA law was revised in 2016 with more stringent requirements to reduce pollution from the sources. The new law has strived to achieve the [balance](#) between ease of doing business and compliance with environmental requirements. It stipulates that new development planning (with respect to land use and specific sectoral development) and construction projects² need to undergo environmental impact assessments. The significance of this amendment lies in three aspects (Du and Bao, 2016):

First, the new law weakens administrative approval requirement by removing the approval of EIA as a pre-condition for obtaining other approvals, such as feasibility studies or construction projects. This means that EIA approval can proceed in parallel to, not before, the request of construction permissions. There are pros and cons to this amendment (Zhang, 2016):

² In 50 broad sectors or 192 sub-sectors, details see [Catalogue of EIAs of Construction Projects](#), effective since 29/06/2017 and [further revised](#) on 28/04/2018.

- Pros: under the old law, the objective of the EIA gradually shifted from improving projects' environmental quality to a tool that was used to get approval for construction projects. This led to fraudulent evaluation (rent seeking by the evaluating agency) and loss of credibility of the EIA system. It also caused considerable delays for businesses since EIA must be obtained before other construction permissions can be requested. Changing EIA from an ex ante requirement to a parallel procedure will speed the process and is considered part of the government's recent administrative simplification reforms.
- Cons: this change will weaken the effectiveness of EIA, because as soon as the time-consuming financial and construction approvals will have been granted (by other ministries such as the NDRC), the sunk administrative costs will make MEE harder to exercise its EIA veto. It remains to be seen whether the restructured MEE would have more power to enforce the EIAs.

Second, the amendment strengthens Strategic Environmental Assessment (SEA) for development planning and the interactions with EIAs for specific construction projects. This implies that: (i) The planning agencies must act on the conclusions rendered in the EIA (and provide reasons where opinions are not adopted); (ii) EIA for development planning shall be used as an important evidence for the EIA for construction, and the latter shall be consistent with the conclusions of the former. This change aims to push policymakers to proactively undertake EIA of new developmental proposals or to actively adopt EIA conclusions and recommendations.

Third, the law significantly increases the penalty ceilings for unauthorised construction projects from the previous 200,000 yuan to 1-5% of total project costs, and the violator shall restate all work undertaken to their first original state. For a billion-yuan worth project, the fine could go up to several million yuan, which is no longer easily affordable. This largely increases companies' cost of breaching the EIA law, acting as a more powerful deterrent compared to previous provisions³.

The subsequently released [Technical Guidelines for Environmental Impact Assessment for Atmospheric Environment](#), to be effective on 01/12/2018, provide further details as how the new EIA will proceed (MEE, 2018d). The Guidelines were updated in accordance with international best practices and relevant environmental quality standards in China. Projects are allocated into three categories based on a screening formula with thresholds related to project features, size, output and environmental parameters:

- Category I (Major) are projects that are likely to cause a range of significant adverse environmental impacts and thus need to produce a full EIA report;
- Category II (Light) are projects that are likely to cause limited adverse environmental impacts so a less detailed Environmental Impact Form is required;
- Category III (Minimis) are projects not expected to cause significant adverse environmental impacts so just need to fill in a basic Environmental Impact Registration Form.

In addition, the Guidelines determine that the impact of secondary pollutants – PM_{2.5} and O₃ – shall also be evaluated when the cumulated emissions of SO₂ and NO_x, or NO_x and VOCs exceed their predefined thresholds. The actual environmental quality of a location should also be considered when conducting the EIA of a proposed industrial facility.

³ Previously some companies would opt for paying a fine and retrospectively submitting a "make-up" assessment, thereby effectively circumvented the restrictions applied by the EIA. Other times, companies only needed to submit an updated assessment for re-approval after major modifications of the project nature, scope and pollution treatment facilities were undertaken, and the updates did not even need to conform to the originally approved EIA.

4.1.1. EIA of regulations

It is important to note that the revised EIA law does not apply to the development of policies or regulations. The MEE is reportedly considering setting up EIA requirements for regulations (Li, 2018). The amended *Environmental Protection Law* has provided the legal basis for EIA for regulations, stipulating that the development of economic and technology policies should fully consider their impact on the environment, in consultation with experts and relevant stakeholders.

By order of importance, regulatory impact assessment⁴ (RIA) shall precede the Strategic Environmental Assessment (SEA) of regional or sectoral developmental plans, and EIA of construction projects. In practice, it faces more complex challenges. For instance, the cycle of policy making in China is usually much shorter than in OECD countries; conducting an RIA is considerably time and resource-intensive and may slow down implementation of the policy in question. Unlike laws that are permanently effective (until abolishment or next amendment), some policies in China are time-bound; whether the need of a systematic RIA is justified is discussable. Alternative measures that are currently available should be used and reinforced, including ecological redline policy and main functional zone planning (Box 4.1.).

Box 4.1. Main functional zone policy in China

As regional policy can be an important tool of coordination between central and local governments, an interesting experiment in the past few years has been the “Main Functional Zone Policy” (see map below), which has been effective across China since 2011 to restrict over-exploitation of natural resources and more efficiently allocate land use. It is essentially a land planning policy, classifying the Chinese territory into four functional zones, which are respectively: **optimised for (economic) development** (red spots on the map), **focused for development** (brown), those in which **restricted development** can take place (yellow) and those in which **development is prohibited** (green).

⁴ Regulatory Impact Analysis (RIA) is a systemic approach to critically assessing the positive and negative effects of proposed and existing regulations and non-regulatory alternatives. It is an important element of an evidence-based approach to policy making.



The policy had been spearheaded by the NDRC before being transferred to the Ministry Natural Resources, established as part of the administrative reshuffling in March 2018. Since its inception, the policy has aimed to serve as a guideline for local governments in the formulation of regional and local economic development plans. In practice, its implementation has not been smooth, essentially because its restrictive nature directly runs against local governments' quest for developmental growth. The basic principle follows that differentiated environmental requirements shall be applied based on the carrying capacity (or vulnerability) of a place's environmental resources and the extent to which economic development would affect the state of the environment. As such, environmental requirements tend to be less stringent in areas where there is concentration of economic activities (e.g. developed areas along the coastal lines), whereas stricter in areas where the ecological condition is fragile. For key areas where development is set to be limited or prohibited, financial compensation is usually provided through general central budgetary transfer to support local development. Efforts are also underway to experiment horizontal compensatory transfer across river-basin provinces, but progress has been slow due to absence of specific legal framework (Liu, 2018).

Source: NDRC.

Furthermore, RIA should also be applied to critically assess the effects of existing environmental policies and regulations. While it is now almost universally practiced by countries of the OECD and the European Union to improve the quality and accountability of regulatory decision-making, there does not seem to be a formal, full-fledged RIA framework in place in China (Adelle et al., 2016). Although the policy making process does contain some of the elements found in formal RIA framework in OECD countries – e.g. brief description of the policy proposal rationale/objectives, and stakeholder consultation, this is not done systematically in China. The country has not yet established a permanent institutional structure to push ahead regulatory reforms; systematic and standardised RIA practices are missing; and for a long time, there are generally no legal requirements for carrying out an RIA.

Absence of a well-developed RIA framework in China may be related to several technical and institutional challenges (Wang and Tang, 2012). Aside the oft-cited difficulties of measuring regulatory impact due to asymmetry of information and the multifaceted, sometimes unpredictable nature of the policy effects, there is currently no effective external scrutiny of regulators in China, where the regulatory decision-making process has long lacked transparency and checks and balance. There is also a considerable gap in mastering the methodology of RIAs, as well as absence of a competent corps of experts capable of devising complex and consistent RIA indicators and schemes. It is therefore important to introduce an RIA culture to Chinese policy makers, starting by establishing an independent RIA body, strengthening the legal basis for RIA and ramping up institutional and technical capacity (Wang and Tang, 2012; Zhang and Wu, 2017).

4.2. Stakeholder participation

Owing to the idiosyncrasies of China's development and governance model, the government has long been the dominant force in the country's environmental decision-making, at times overshadowing the roles of other participants. Since the 18th Party Congress in 2012, public participation has been strengthened in areas ranging from public hearing to environmental public interest litigation. The increasing public awareness of environmental protection has also played a critical role in promoting environmental information disclosure of the government and companies (details see Section 5.1).

4.2.1. Public participation in law making and implementation

The notion of environmental democracy or public participation in environmental decision-making was first put forth by the United States in the 1969 National Environmental Policy Act. Thereafter, many countries followed suite. The 1992 Rio Declaration on Environment and Development further enshrined the "Access Principle", or the "Public Participation Principle", as one of the 27 globally shared principles for protecting the integrity of the environmental and developmental system.

In China, the 1979 *Trial Environmental Protection Law* first floated the idea that "All organisations and individuals shall have the obligation to protect the environment and the right to report and lodge complaints against organisations and individuals that pollute and damage the environment". This set the legal mandate for citizen engagement in environmental affairs and triggered regulations on public participation in EIAs and the rights to information and trial in front of an environmental court. Nevertheless, public participation in the early years had been rather limited, both in scope and in depth: access to information was often insufficient or blocked due to limited disclosure and lack of public consultation in decision-making; participation of the public was ineffective or unrepresentative; some projects would even make fake reports on public consultation to circumvent the EIA procedure (Zhang, 2016). The 2015 amended *Environmental Protection Law* and the subsequent EIA-related legal documents put a stronger emphasis on the importance of citizen engagement in environmental protection, by ways of opinion survey, consultation, expert seminar and public hearing.

Other forces have also propelled the stronger public voice in China. A number of high-profile campaigns in the late 1990s were led by early NGO pioneers to protect the Tibetan antelope and the Yunnan snub-nosed monkey (Chang, 2012). Over the years, they had played an important role in pushing ahead legislation and rules with respect to enhancing information disclosure, public opinion solicitation and exposure of pollution issues. The vast majority of China's environmental NGOs were created after 2000. According to data collected by the All-China Environment Federation, a total of 2768 environmental NGOs were registered in China as of 2015, with a staffing of 224,000, representing a tiny fraction (less than 1%) of the total 315,000 NGOs in China (with a staffing of more than 3 million) (CCIA, 2016). Unlike their peers in advanced OECD countries, most of China's grassroots NGOs had limited influence in mobilising public environmental action. They are held back by a complicated registration process and limits on fund raising,

and are often unable or do not dare to launch public campaigns (Chang, 2012). The Overseas NGO Law, enacted on 01/01/2017, further restricted the political space available for foreign NGOs in China by requiring them to register with the Ministry of Public Security or its provincial-level equivalents before establishing an office within mainland China. Many foreign NGOs were reportedly concerned with such requirements as finding one single “professional supervisory body” (essentially a government sponsor) or subjecting their annual plans for programmes and funding to their supervisory body for approval.

The rise of social media and penetration of mobile phone in the last decade have given Chinese citizens the tools with which to organise themselves. People directly affected by pollution or construction projects have acted outside formal organisations to make their views heard and safeguard their interests. The most famous example is perhaps the walking protest against a chemical plant in Xiamen, in 2007, where tens of thousands of local residents marched through the city’s streets and eventually led to relocation of the planned factory.

4.2.2. Environmental public interest litigation (EPIL)

There has not been a legal basis for EPIL in China until the amendment of the *Civil Procedure Law* in 2012, which allows organisations “to bring a suit against environmental pollution and other acts that undermine the public interest”. The amended *Environmental Protection Law*, effective since 01/01/2015, specified that eligible NGOs can file EPIL even if they do not have a direct interest in the suit. In addition, a pilot programme was launched in July 2015 to allow procuratorates in 13 provinces to bring public interest cases against polluters. To further enhance law enforcement, the amended *Administrative Procedure Law* in 2017 formally empowered the procuratorates to file administrative lawsuits against acts of nonfeasance or abuse of power in cases related to environmental and natural resources protection, food and drug safety, preservation of state assets and transfer of state-owned land use rights.

These legislative changes sparked a steady stream of public interest cases filed by NGOs and prosecutors throughout the country. According to statistics collected by Friends of Nature, around one fifth of the EPIL cases filed in 2015 involved air pollution, with most targeting stationary source pollution. Following many successful verdicts or mediations among these, more cases targeting air pollutants such as SO_x, NO_x, and dust were brought to the court in 2016 against automobile emitters (e.g. CBCGDF vs. Volkswagen, Friends of Nature vs. Hyundai), in addition to stationary emitters (e.g. CBCGDF vs. Hami Coal Power Co., Friends of Nature vs. Jilin Petrochemical and Anshan Iron and Steel) (De Boer and Whitehead, 2016). The targets have also enlarged to include bigger polluters such as multinationals and Chinese state-owned enterprises.

While about 700 NGOs are currently considered to be eligible parties (Chen and Xie, 2018), only a dozen brought a total of 112 EPIL cases to court in 2015-16 (Xinhua, 2017). Most NGOs face difficulties in investigating and collecting evidence for filing an EPIL, as well as lack of financial resources and a competent legal team (Box 4.2.). They also lack power to file administrative EPIL against environmental agencies when they fail to fulfil their legal duties. In contrast, the procuratorate has more advantages in the staffing, expertise and procedural authority required to initiate an EPIL. They are also authorised to bring government officials and departments to court for their failure to enforce the law. As such, EPIL led by the procuratorate reached 6527 cases in the pilot provinces between July 2015 and July 2017, representing more than two thirds of all public interest litigation cases during the period (Gong, 2017).

Box 4.2. Barriers to EPIL for environmental NGOs in China

Environmental NGOs in China face considerable obstacles in having their cases filed in local courts. Some of these challenges include:

- The standing requirements before courts for NGOs are more restrictive in China than in Europe. Rules on EPIL concerning who may qualify as a plaintiff were very vague under previous Chinese law. With the amended Environmental Protection Law, Chinese NGOs seeking to file a suit before courts against acts that pollute the environment or cause ecological damage are required to be legally registered with the Civil Affairs Agencies. They must also have been engaged in public service activities in environmental protection for five consecutive years, without any record of having violated laws.
- High upfront litigation costs (including case acceptance fees paid to courts and damage assessment fees) probably constitute the most important barrier to NGOs filing EPIL cases. Only about 30 among the 700 eligible NGOs have the financial ability to do so. This differs from the EU where there is the possibility for NGOs who comply with the plaintiff requirements to be exempted from judicial costs and qualify for free access to justice.
- EPIL cases in China are generally directed at suing companies responsible for environmental damage, while it does not seem possible for NGOs to sue the public administration for negligent acts regarding environmental matters, as it has been left entirely in the hands of the procuratorates. In contrast, the US Citizen Suit allows NGOs to challenge both polluting industry for illegal pollution and government agencies for failure to perform mandatory duties.
- Establishing causation and estimating environmental damages can be difficult, particularly for air pollution cases or in cases where there are multiple polluters, the harm may be invisible, diffuse and long-term. In most cases the burden of proof falls on the plaintiff but in some cases the courts will commission their own assessment. In contrast, most environmental statutes in the US permitting citizen suits are “strict liability” laws. Hence, NGOs are not required to prove environmental damage, just legal violation.

Source: De Boer and Whitehead (2016), Yu (2016), Dosdad and Ruiz-Bautista (2017).

5. Key policies and regulations for air quality management

5.1. Objectives: ambient air quality standards

China issued its first set of air quality standards in 1982, with primary focus on pollutants generated from fuel combustion (SO₂, NO_x, CO and TSP). The standards were revised subsequently in 1996 and 2000, covering more pollutants with stricter limits and more in line with international standards (Table 5.1). A feature of the Chinese standards is that different concentration limits are allocated to three “environmental functional zones” – protected, residential and industrial areas, which are classified according to the concentration of human/economic activities. Zoning is determined by the environmental bureaus at county-level and above, and should be approved by the same-level governments. Generally, environmental requirements in protected areas are more stringent.

Table 5.1. Revisions of national air quality standards

Year of entry into force	Standard	Regulated pollutants	Basis for standard setting
1982	GB 3095-1982	SO ₂ , NO _x , CO, TSP, Photochemical oxygen agent	SO ₂ , CO, NO _x and airborne dust are the main sources of air pollution, and 70% of their emissions come from fuel burning
1996	GB 3095-1996	SO ₂ , NO _x , CO, TSP, NO ₂ , O ₃ , PM ₁₀ , Pb, BaP, F	Revisions made to be more aligned with international standards: <ul style="list-style-type: none"> Added NO₂ because of its levels of concentration (2X NO) and toxicity (5X NO); Replaced photochemical oxygen agent with O₃ as the latter takes up at least 90% of the total oxidants; Renamed airborne dust into PM₁₀
2000	GB 3095-1996 (Rev)	SO ₂ , CO, TSP, NO ₂ , O ₃ , PM ₁₀ , Pb, BaP, F	Deleted NO _x and relaxed emission limits of NO ₂ and O ₃
2012 (in pilot provinces) 2016 (nationwide)	GB 3095-2012	SO ₂ , NO _x , CO, TSP, NO ₂ , O ₃ , PM ₁₀ , PM _{2.5} , Pb, BaP	<ul style="list-style-type: none"> Added limitations for PM_{2.5} and the 8h-maximum concentration for O₃ Re-included NO_x, given it's the main source of pollution in some regions and monitoring NO₂ emission concentrations does not truly reflect the level of NO_x pollution Lowered concentration limits for PM₁₀, NO₂, Pb and BaP Provided reference limits for 4 heavy metal pollutants for provinces: Cd, Hg, As and Cr(VI) Put F into list of reference limits due to high concentration in certain regions only, hence no need to set national standards for this local air pollutant

Source: MEP. See [Zhang & Zhou \(2016\)](#) for more details on the historical and comparative review of environmental standard developments in China.

Table 5.2. Maximum permissible concentrations of main air pollutants, $\mu\text{g}/\text{m}^3$

Pollutant	Sampling time	GB 3095-1982			GB 3095-1996			GB 3095-2012		WHO	
		Zone I	Zone II	Zone III	Zone I	Zone II	Zone III	Zone I	Zone II	AQGs	IT-1
PM ₁₀	24h average	50	150	250	50	150	250	50	150	50	150
	Annual mean				40	100	150	40	70	20	70
PM _{2.5}	24h average							35	75	25	75
	Annual mean							15	35	10	35
SO ₂	Hourly average				150	500	700	150	500		
	24h average	50	150	250	50	150	250	50	150	20	125
	Annual mean	20	60	100	20	60	100	20	60		
NO ₂	Hourly average				120	120	240	200	200	200	
	24h average	50	100	150	80	80	120	80	80		
	Annual mean				40	40	80	40	40	40	
CO	Hourly average				10	10	20	10	10	30	
	24h average	4	4	6	4	4	6	4	4		
O ₃	Hourly average	120	160	200	120	160	200	160	200		
	8h max							100	160	100	160

Notes:

- Unit for CO concentration is mg/m^3 . IT-1 refers to WHO Air Quality Interim Target-1.
- Up until 2016, **zone I** referred to areas which require special protection (i.e. more stringent environmental standards), such as natural reserves and scenic spots; **zone II** referred to residential areas, commercial-traffic-residential mixed area, cultural districts, general industrial areas and rural areas; **zone III** referred to specific industrial areas. When the latest standards started to be implemented nationwide in 2016, zone III was merged into zone II. Zoning is determined by the environmental protection bureaus at county-level and above, and should be approved by the same-level governments.
- The new standards took effect nationwide in 2016, but many cities and regions in China were required to implement the standards earlier than the national timeline, as follows:
 - 2012: Key cities including cities in Beijing-Tianjin-Hebei, Yangtze River Delta, and Pearl River Delta regions, and provincial capitals
 - 2013: Key environmental protection cities
 - 2015: All prefecture-level cities
 - 2016: Nationwide implementation

Source: MEE.

Following the 2005 WHO Air Quality Guideline, countries around the world have amended their national air quality standards, although few are in line with the recommended limits for PM and SO₂, and large regulatory discrepancies exist across countries (Joss et al., 2017). China too revised its standards in 2012, to be in line with at least the WHO interim targets. The [Ambient Air Quality Standards](#) [GB3095-2012] were effective since 01/01/2016 (Table 5.2). As an effort to ensure data comparability, the monitoring methods were further revised in August 2018 to be consistent with international practices. Standards for some pollutants like CO are more stringent in China than the WHO or advanced economies (Box 5.1.).

Box 5.1. Air quality standards in China: a comparative view

- The hourly average concentration limit of CO emissions is only one third the levels of the WHO, United States, EU and Japan (ranging between 30-40 mg/m³);
- The daily average concentration limit of SO₂ emissions in residential areas (150 µg/m³) situates towards the lower end among countries such as the United States, EU, Germany, Japan and the UK (ranging between 110-500 µg/m³), but remains more lenient than the WHO interim target-1 (125 µg/m³) and largely above the WHO Guideline (20 µg/m³);
- The daily and hourly average concentration limits of NO_x emissions are comparable to those of the advanced economies and of the WHO;
- The 8h average concentration limit of O₃ emissions in residential areas (160 µg/m³) are somewhat above the WHO Guideline (100 µg/m³) and the standards in the United States, EU and UK (ranging between 120-150 µg/m³), although the limit in protected areas (100 µg/m³) is in line with international standards;
- The annual and daily concentration limits of PM₁₀ emissions in residential areas are in line with WHO IT-1, while the limits in protected areas are between IT-2 and IT-3;
- The annual and daily concentration limits of PM_{2.5} emissions in residential areas are in line with WHO IT-1, while the limits in protected areas are close to the IT-3 as well as the standards of the United States in 2006.

Data from 2015 to 2017 show that above 96% of the 338 major cities achieved compliance with the SO₂ and CO emission standards almost 100% of the time (Table 5.3). Just above four fifths complied with the NO₂ emission standards in 2017, a slight setback from 2015-16. However, attainment rate (by number of cities) for O₃ emissions dropped from above 80% in 2015-16 to 67.8% in 2017. Attainment rates (by number of cities) for PM₁₀ and PM_{2.5} improved significantly but remained at low levels. As of end 2017, none of the 338 cities achieved WHO guideline for PM_{2.5} annual concentration (10 µg/m³), and just above one third reached the WHO IT-1 level (35 µg/m³).

Table 5.3. Achievement rates of air quality standards in 338 major cities, 2015-17

Pollutant	Year	Annual average, $\mu\text{g}/\text{m}^3$	Attainment rate (by Nb. Of cities)	Attainment rate (by Nb. Of days)
PM ₁₀	2015	87	34.6%	87.9%
	2016	82	41.7%	89.6%
	2017	75	47.0%	92.9%
PM _{2.5}	2015	50	22.5%	82.5%
	2016	47	28.1%	85.3%
	2017	43	35.8%	87.6%
SO ₂	2015	25	96.7%	99.3%
	2016	22	97.0%	99.5%
	2017	18	99.1%	99.7%
NO ₂	2015	30	81.7%	98.4%
	2016	30	83.1%	98.4%
	2017	31	80.2%	98.5%
CO	2015	2.1	96.7%	99.5%
	2016	1.9	97.0%	99.6%
	2017	1.7	98.8%	99.7%
O ₃	2015	134	84.0%	95.4%
	2016	138	82.5%	94.8%
	2017	149	67.8%	92.9%

Notes: The measurement unit for CO is daily average concentration (mg/m^3) that for O₃ is 8h average concentration ($\mu\text{g}/\text{m}^3$). Achievement rates are measured by per-pollutant compliance with the respective air quality standards.

Source: *Bulletins on the State of Environment in China*, 2015-17.

5.2. Ambient Air quality monitoring

Accurate air quality monitoring is key to the effective control of air pollution and provides useful evidence for the development and evaluation of emission reduction policies. The website of the China National Environmental Monitoring Centre releases daily reports of ambient air quality in the 338 major cities that includes Air Quality Indices (AQI), concentration data on primary pollutants and air quality grade. The AQI is developed in line with the new air quality standards, and the AQI grade is based on the level of the 6 atmospheric pollutants, namely SO₂, NO₂, CO, PM₁₀, PM_{2.5} and O₃, with higher score associated to lower air quality (Table 5.4). An individual score (Individual Air Quality Index, IAQI) is assigned to each pollutant and the final AQI takes the highest of these 6 scores. When IAQI is greater than 100 (i.e. not meeting Grade II level), it is called a non-attainment pollutant. Higher AQI levels are most often reported for large cities and the values correlate well to the diminished air quality reported by air monitoring stations. The AQI scores are updated every hour. The Institute of Public and Environmental Affairs (IPE), an environmental NGO led by a well-respected journalist and environmental activist (Ma Jun), provides a real-time AQI map from official sources across the country (Figure 5.1).

Table 5.4. AQI values and corresponding pollutant concentrations

Pollutant index					Pollutant concentrations (daily averages, $\mu\text{g}/\text{m}^3$; unit for CO: mg/m^3 ; measure for O_3 : 8h moving average)					
AQI	Range	Grade	Category	Health implications	SO_2	NO_2	PM_{10}	$\text{PM}_{2.5}$	CO	O_3
50	0-50	I	Excellent	No health implications	50	40	50	35	2	100
100	51-100	II	Good	Some pollutants may slightly affect very few hypersensitive individuals	150	80	150	75	4	160
150	101-150	III	Lightly polluted	Healthy people may experience slight irritations and sensitive individuals will be slightly affected to a larger extent	475	180	250	115	14	215
200	151-200	IV	Moderately polluted	Sensitive individuals will experience more serious conditions. The hearts and respiratory systems of healthy people may be affected	800	280	350	150	24	265
300	201-300	V	Heavily polluted	Healthy people will commonly show symptoms. People with respiratory or heart diseases will be significantly affected and will experience reduced endurance in activities	1600	565	420	250	36	800
400	>300	VI	Severely polluted	Healthy people will experience reduced endurance in activities and may also show noticeably strong symptoms. Other illnesses may be triggered in healthy people. Elders and the sick should remain indoors and avoid exercise. Healthy individuals should avoid outdoor activities	2100	750	500	350	48	
500					2620	940	600	500	60	

Source: [Trial Technical Regulation on Ambient Air Quality Index](#) [HJ633-2012], MEE.

Figure 5.1. AQI map



Source: [Real-time air quality map in China](#), IPE.

China began developing its environmental information system in the mid-1980s. During 2006-10, a three-tier system was established, consisting of national, provincial and prefectural level institutions. The frequent outbreaks of smog in recent years have exposed vulnerabilities in the quality control and management of the air quality monitoring network. For instance, data were often distorted by local governments when they reported to their superiors or to the public; PM_{2.5} concentration was generally not monitored before 2013, except in a minority of economically developed regions; layout of the monitoring stations was not adjusted accordingly with the progress of urbanisation and changes in the land use patterns (Wang and Gao, 2017).

A number of recent measures, such as the 2015 [Plan on Environmental Monitoring Network Construction](#) and the 2016 [Action Plan on Quality Management for Environmental Monitoring](#), have aimed to enhance the reliability, accuracy and comparability of environmental data through better institutional setting and technical standards. Today, the air quality monitoring network spreads some 5000 monitoring stations at the national, provincial, prefectural and county levels. These stations are divided into seven broad categories, as illustrated in Table 5.5. The most significant change occurred in the 1436 monitoring stations across 338 major cities. These stations used to be managed by local authorities, who reported to the central authorities on the data they collected. This had often undermined the credibility of the information used to evaluate local environmental performance. By the end of 2016, the National Environmental Monitoring Centre had taken over the operations of all 1436 stations. The new system enhances the autonomy of the monitoring authorities by synchronizing the transmission of freshly collected air quality data to the monitoring centres at the city, provincial and national levels. In addition, the monitoring responsibility of key regional and trans-boundary environmental quality is retained at the central level.

Table 5.5. National air quality monitoring network

	Scope of monitoring	Range of pollutants monitored
Urban area air quality	1436 national monitoring centres across 338 cities	SO ₂ , NO ₂ , PM ₁₀ , CO, O ₃ , PM _{2.5} , meteorological parameters, visibility, etc.
Regional (incl. rural area) air quality	96 regional monitoring centres	SO ₂ , NO ₂ , PM ₁₀ , CO, O ₃ , PM _{2.5} , meteorological parameters, visibility, acid deposition, etc.
Background air quality	15 monitoring centres	SO ₂ , NO ₂ , PM ₁₀ , CO, O ₃ , PM _{2.5} , PM ₁ , meteorological parameters, visibility, acid deposition, GHG, black carbon, particulates, particle concentration, VOCs, etc.
Acid rain	440 monitoring spots across 359 cities	Rainfall level, pH, EC, SO ₄ ²⁻ , NO ₃ ⁻ , F ⁻ , Cl ⁻ , NH ₄ ⁺ , Ca ²⁺ , Mg ²⁺ , Na ⁺ , K ⁺
Sand and dust weather	82 monitoring spots across 82 cities in 14 provinces	Mandatory: TSP, PM ₁₀ Optional: visibility, wind speed, wind direction, atmospheric pressure
GHG emissions	31 monitoring stations in provincial capital cities	CO ₂ , CH ₄ , N ₂ O, etc.
Atmospheric particle composition / photochemical substance	38 monitoring spots across 2+26 cities	PM _{2.5} , VOCs

Source: [China National Environmental Monitoring Centre](#).

5.3. Policies tools and regulations to improve air quality

5.3.1. Long-term air quality objectives

The Five-Year Plan Targets

Total pollution emission control has been a consistent feature of China's environmental governance, particularly in the establishment of binding emission targets for SO₂, NO_x, COD and ammonia nitrogen under the Five-Year Plan (FYP) system. These targets are initially set at the national level, then allocated to sub-national governments based on a list of assessment factors, such as level of economic development, local environmental quality and progress made in achieving targets of previous FYPs, and the potential to reduce pollution and increase energy conservation (Box 5.2.). The main functional zone policy is also said to be factored in when decomposing the national targets. Generally, provinces with similar characteristics are given the same targets. Local targets are eventually the result of bargaining between central and sub-national governments, although the majority of the decision-making power rests with central authorities.

The 11th, 12th and 13th FYPs have progressively integrated more ambitious environmental objectives (Table 5.6). This has helped to raise public awareness, focus national efforts, mobilise resources and achieve tangible environmental results. The main air pollutants that have decreased in total emissions – particularly SO₂, NO_x – have featured in these plans. Nevertheless, the number and type of environmental targets that can be included in Five Year Plans are limited. There is growing recognition that the links between emission reductions achieved in the Plans and the environmental impacts of emissions on human health and natural resources are complex (OECD, 2017).

The inclusion of **ambient environmental quality** targets in the 13th Five Year Plan is a positive step in this regard. Sound design of national targets and their decomposition across provinces are important prerequisites to the successful implementation of the Five-Year Plans, otherwise the results may not be cost-effective and give rise to some perverse effects (OECD, 2017). The 13th Five Year Plan requires 338 major cities to meet at least Grade II air quality (i.e. AQI up to 100) for more than 292 days (i.e. 80%) throughout a year. While the achievement rates remain low, there has been noticeable progress since 2015, particularly in the number of moderately or heavily polluted days. In 2017, 175 (more than half) of the 338 monitored cities achieved Excellent (Grade I) or Good (Grade II) AQI grades throughout more than 80% of the year (Table 5.7).

Table 5.6. Environmental targets in China's 11th, 12th and 13th Five Year Plans (FYP)

Environmental issues and indicators		11 th FYP (2006-2010)		12 th FYP (2011-2015)		13 th FYP (2016-2020)
		Target	Actual	Target	Actual	Target
Main air pollutant emission reduction (%)	SO ₂	-10	-14.29	-8	-18	-15
	COD	-10	-12.45	-8	-12.9	-10
	NO _x	-	-	-10	-18.6	-15
	Ammonia Nitrogen	-	-	-10	-13	-10
Energysupply intensity per unit of GDP (%)		-20	-19.1	-16	-18.2	-15
Carbondioxide emission intensity per unit of GDP (%)		-	-	-17	-20	-18
Non-fossil energy share in primary energy supply (%)		-	-	11.4	12	15
Waterconsumption per unit of industrial added value (%)		-30	-36.7	-30	-35	-20
Water consumption per unit of GDP (%)		-	-	-	-	-23
Total use ofwater (billion cubic meters)		-	-	-	-	< 670
Air quality	Days with good urban air quality ¹ in cities at or above Prefecture-level	-	-	-	-	> 80
	Reduction of PM2.5 concentration in substandard ² cities at or above Prefecture-level (%)	-	-	-	-	-18
Surface water quality	Surface water of at least Grade III quality ³ (% of monitored sections)	-	-	-	-	> 70
	Surface water worse than Grade IV quality (% of monitored sections)	-	-	-	-	< 5

Notes:

1. Good air quality refers to the Grade I and II in Air Quality Index (AQI), corresponding respectively to 0-50, and 50-100. 338 cities at the prefecture level and above are included in the evaluation.
2. Substandard cities refer to those whose PM2.5 annual concentration is higher than 35µg/m³.
3. As in other countries, China uses a grading system for monitoring and reporting surface water quality across the country, with Grade I water the highest quality and Grade V-plus the worst. The number of monitored water sections increases from 972 during the 12th Five-Year Plan period (FYP) to 1940 during the 13th FYP period.

Source: MEE.

Table 5.7. Share of days by the AQI grades, 2015-17

Year	Excellent days	Good days	Lightly polluted days	Moderately polluted days	Heavily polluted days	Severely polluted days
2015	76.7%		15.9%	4.2%	2.5%	0.7%
2016	26.0%	52.9%	14.8%	3.7%	2.0%	0.6%
2017	25.6%	52.4%	15.6%	3.9%	1.9%	0.7%

Source: *Bulletins on the State of Environment in China*, 2015-17.

Box 5.2. Allocation of national environmental targets under the 12th FYP

In the 12th FYP target allocation process, a region's potential to reduce emission is considered the preponderant factor. A 20-expert panel was convened by the MEP to calculate each province's abatement potential. The decision-making process follows that: as a first step, the panel calculates the theoretical maximal reduction volume, i.e. the abatement potential, for each province without considering factors of regional diversity. During this process, consistent assessment methodology and coefficients are applied for all provinces, although some of the key local features are accounted for, such as differences in industrial structure. The panel then converts each province's abatement potential into targets, taking into consideration each province's proposal, its environmental quality, pollution abatement performance in the previous FYP period, stage of development and pollution reduction capacity. Concretely:

- Provincial governments propose a set of abatement targets based on their pollution abatement potential and national targets; in principle, the proposed targets should not exceed the maximal abatement potential calculated by the MEP-led panel.
- The panel combines the above proposals with their own calculations, ensuring consistency with targets under the previous FYP and that appropriate adjustments have been made in light of the province's environmental performance achieved during the previous FYP period.
- Geographical differentiation is pursued in favour of equitable and balanced regional development. Key economic development zones in the eastern regions such as the Yangtze and Pearl Rivers Deltas and the Beijing-Tianjin-Hebei-Shandong area are expected to take on more abatement efforts and are thus assigned higher-than-average targets; provinces in the central regions are assigned close-to-average targets; and the less-developed, inland, western regions receive lower-than-average targets. The few autonomous regions where ethnic minority population are concentrated are given lower abatement targets, given their relative environmental vulnerabilities and lower developmental needs.
- Environmental quality is also an important factor. More polluted areas are assigned higher targets to prevent further deterioration of the environment. As such, south-western provinces affected by acid rain receive targets higher than the average for the inland, western provinces.

Source: Zong (2011).

The 2018-20 Action Plan for Air Pollution

The 2013 Action Plan for Air Pollution Prevention and Control may have been China's most influential environmental policy of the past five years. A "Ten Measures" roadmap was devised to improve air quality, requiring significant PM_{2.5} reductions in key regions between 2013 and 2017 (Table 5.8). These targets were considerably over-achieved, however not without costly and controversial measures⁵. In June 2018, a second plan was published, significantly expanding the scope of PM_{2.5} reductions to cities beyond the clusters of Jing-Jin-Ji and the Yangtze and Pearl River Deltas. Around 230 cities that did not reach the 35 µg/m³ PM_{2.5} standard in 2017 will be pressured to reduce concentration by 18% from the 2015 baseline by 2020.

Table 5.8. Targets in Action Plans for Air Pollution

PM _{2.5} concentration reduction (unless otherwise specified)	2013 Action Plan (change 2013-17)	Outcomes in 2017 (change 2013-17)		2018 Action Plan (change 2015-20)
PM ₁₀ concentration reduction in cities at prefecture level and above	-10% from 2012	-36.4%	VOC total emission reduction	-10%
Jing-Jin-Ji area	-25%	-39.6%	NOx total emission reduction	-15%
Yangtze River Delta area	-20%	-34.3%	PM _{2.5} concentration reduction in cities not meeting AQI Grade II	-18%
Pearl River Delta area	-10%	-27.7%	Share of excellent or good days	80% by 2020
City of Beijing	60 µg/m ³ by 2017	58 µg/m ³	Share of heavily & severely polluted days	-25%

Source: *Report on the State of Environment in China, 2017*; MEE.

The new Plan also puts ozone in focus by adding targets for both VOCs and NO_x, two main precursors of ground-level ozone pollution. In addition, Pearl River Delta is no longer considered a "key region" in the battle for blue skies, owing to its significant improvement over the past five years. Instead, it has been replaced by the Fen-Wei Plains, an industrial rust-belt that stretch across Xi'an and parts of Shaanxi, Henan and Shanxi provinces. These provinces suffer from the country's highest levels of SO₂ and PM_{2.5} pollution. Finally, the plan explicitly calls for "large reductions in total emissions of major pollutants in coordination with reduction in emissions of greenhouse gases", in line with the recent institutional restructuring which shifted NDRC's climate change and carbon emission responsibilities to the MEE. There is continuous emphasis on end-of-pipe treatment, with more detailed measures aimed at tackling the sources of pollution down at the sectoral level (energy, industry, transport, etc.) (Feng, 2018).

⁵ For instance, Beijing slashed its annual PM_{2.5} concentration by closing coal-fired power plants and banning residents in surrounding areas from burning coal for heating purposes.

5.3.2. Stationary sources

Given that China's air pollution problem is predominantly related to its energy sector, efforts to combat air pollution have consistently been complemented by policies to improve the structure of the energy mix and enhance energy efficiency. To transition towards a less energy-intensive model for economic growth, the Chinese government pledged at COP21 to increase low-carbon fuel use to 20% of the overall energy mix by 2030 (from around 10% today) and to reduce carbon intensity by 60-65% in 2030, relative to 2005. To reduce its heavy reliance on coal, the country has capped coal consumption at the level of 4.1 billion tonnes in 2020. The 13th Five-Year Plan has also established targets for increasing the share of non-fossil fuel energy to 15% (in total primary energy supply) by 2020.

The chances of achieving these targets appear strong. For example, China is investing more in renewable energies than any other country in the world and has adopted stringent energy efficiency standards, in particular in the industry and transport sectors (IEA, 2018a). In addition, coal use had been declining in absolute terms three years in a row since 2014, and despite a slight rebound in 2017 due to growth in electricity demand, it remained below its 2013 peak (IEA, 2018b). The share of coal in the power mix has also dropped from the peak of 81% in 2007 to 65.5% in 2017, a decrease attributable to the small but growing portion of renewable energy sources (IEA, 2018a). Clean-air measures envisaged in the 2018-20 Action Plan will continue to constrain coal demand in the coming years, starting with reducing direct coal use and small boilers in residential heating and in the commercial and industrial sectors such as cement and steel. These measures, along with China's commitment to investing in renewable energy and energy efficiency, are expected to contribute substantially to reducing air pollution across Chinese cities.

The section below will focus on discussion of standard policy instruments deployed in the environmental field.

Tighten emission limit values

Following enactment of the first-ever Air Pollution Prevention and Control Law in 1988, China released the [Integrated Emission Standard of Air Pollutants](#) in 1996. The standards provide a baseline for hourly **maximum allowable emission concentrations** of 33 ambient air pollutants at plant-level facilities. For each pollutant, the emission limit values from organised sources (e.g. chimneys) are vintage-differentiated and tend to be more stringent for new plants built after 01/01/1997. Different **maximum allowable emission rates** (i.e. speeds) are also assigned for each pollutant according to the plant location, which falls under three categories of "environmental functional zones" – protected, residential and industrial areas that are classified according to the concentration of human/economic activities. As such, emission rate limits are strictest in protected areas and laxest in industrial areas. New plants can only be located in residential and industrial areas. SO₂ emissions in Acid Rain Control Areas and SO₂ Control Areas are regulated not only by the standard but also subject to **total emission limits**.

The 1996 standard governs air pollution emissions for all sectors *not* regulated by **sector-specific standards**. For a given sector, the emission limit values are set specific to the production process or equipment. By the end of 2015, 47 sectoral standards had been developed separately for highly polluting stationary sources⁶, with tougher limits for SO₂ and NO_x emissions than the economy-wide integrated standard. Together with the 26 standards developed for mobile sources, they capture more than 95% of the country's total PM, SO₂ and NO_x emissions (MEP, 2017a). Subnational environmental bureaus can set stricter limits than the national standards and regulate pollutants not readily covered. The stringency of the emission standards in China has increased considerably in the past decade, and in some industries – like coal-fired power and steel, the emission limit values for new plants (constructed after the release of

⁶ These include sectors such as thermal power, coking, steel, cement, petroleum refinery, petrochemical, chemicals, industrial boilers, glass, light vehicles, and non-ferrous metals (e.g. aluminium, copper, etc.).

the corresponding sector-specific standards) are comparable to those in the OECD countries (OECD, 2017). Since 2013, emission standards have been tightened thrice in pollution-plagued areas:

- In February 2013, the MEP ordered 47 cities in 19 provinces including the clusters of Jing-Jin-Ji, Yangtze and Pearl River Deltas to adopt stricter standards in six industries (thermal power, steel, cement, petrochemical, chemical and nonferrous metals) and coal-fired boiler projects;
- In February 2017, all steel plants and coal-fired boilers in 28 cities of the Jing-Jin-Ji and surrounding area were ordered to follow stricter standards of SO₂, NO_x and PM emissions;
- Starting March 2018, the above measure will extend to existing plants in thermal power, cement, petrochemical, chemical, nonferrous metals and coking chemical industries, and additional emission limits for VOCs will also apply.

Following the nationwide implementation of the revised 2012 Ambient Air Quality Standard, an update of the 1996 economy-wide integrated emission standard is currently under way, scheduled to be released in 2020. It will be more closely linked to the EIA process, and support the implementation of the newly established permit system by incorporating more technical requirements such as assessment of compliance and corresponding emission accounting. The existing 47 sectoral standards will also be updated and further expanded into 70 standards by the end of the 13th Five-Year Plan in 2020. New standards will be developed for emerging industries such as coal chemical and shale gas, as well as key point sources that generate VOCs emissions, for instance automotive painting, container manufacturing, printing and packaging, furniture manufacturing, pharmaceuticals, paint coating, shipbuilding and textile and printing.

Revamp the permitting system

In OECD countries, environmental permits are fundamental instruments for translating environmental policies into explicit and enforceable requirements for industrial and other stationary sources of pollution. They have helped drive the modernisation of industry by linking permit requirements with the use of best available technologies (OECD, 2017). China has been experimenting the permitting system since the late 1980s, setting up pilots in 16 cities in early 1990s. The permits were largely unsuccessful and loosely linked to the EIA process, the environmental quality standards or the total emissions control targets.

Recognising the inadequacy in the existing permitting system, the State Council approved a plan in November 2016 to establish a new permit system (Box 5.3.). It sets the objective of issuing permits for all stationary sources by 2020, and takes an **integrated approach** covering all main air and water pollutants, noise and solid waste discharges. Pollution from mobile sources and agricultural non-point sources are excluded. As in many OECD countries, the requirements are differentiated according to the size, location and potential environmental impact of the pollution sources. Large, potentially hazardous plants require a customized permit in order to operate and should disclose information on the planned projects before submitting a request for permit, while smaller, less hazardous plants follow simplified approach by submitting a declaration before starting operation, and then complying with general binding conditions that have been formulated for that type of installation.

Box 5.3. The new permit system in China

[Information on permit](#) request and issuance is disclosed on the MEE website. Polluters' identities can be traced using their certificate number (which correspond to their [social credit identifier + suffix 001P](#)) and a QR code. Permits issued for the first time are valid for 3 years, while renewed permits are valid for 5 years. Validity of the permit shall not exceed the planned phase-out period for outdated production capacity.

The regulation has adopted the following rules and principles:

- A facility can only discharge pollution if granted a permit, and only up to what the permit allows
- Facility-specific management applies to large polluters, and simplified procedure for small ones
- One facility (plant), one permit
- Connected to the EIA by reflecting its decisions and recommendations
- Loading limits are determined following a top-down approach which breaks all the way down the national emission control targets

Permits contain the following information which should be monitored and publicly disclosed:

- **Emission limits on concentration, rate** (or "speed", when applicable) **and loading** (may vary from year to year) **by pollutants** and company's voluntary pledges on stricter emission concentrations (so far absent) collected from main and secondary exhaust tubes/chimneys
- (When applicable) **Permitted discharge period and usually stricter emission limits** on concentration and loading (per day and per month) by pollutants **during peak pollution**
- Limits on facility's total load orderly emissions by pollutants (i.e. sum of load limits from main and secondary chimneys) should be close to its allocated emission targets. The stricter of the two prevails

Permits cannot be issued in either of the following situations:

- If the facility is located within off-limit zones for construction projects
- Obsolete production process equipment or products that are required to be eliminated in the Industry Policy Catalogue devised by NDRC (in coordination with other relevant ministries)
- Any other situations not authorised by laws and regulations

Permits can be issued if **all** of the following conditions are fulfilled:

- EIA approved
- Able to meet the emission concentration limits requirements (for pollution prevention or treatment equipment or measures)
- Actual emission concentration and load meet emission limits requirements
- Self-monitoring meets relevant technical specifications

Source: [Trial Pollution Discharge Permit Regulation](#) (MEE, 2018e).

The implementation has followed a phased approach, starting with thermal power and paper making industries in 2016, gradually spreading to textiles, petrochemical, chemical, cement, flat glass, ferrous and nonferrous metals in 2017 before covering all stationary sources and territory by 2020 ([MEP](#), 2017b). By end 2017, permit issuance was completed in six industries, namely thermal power, printing and dyeing,

electroplating, steel rolling, and copper smelting. According to the [MEE permit information portal](#), approximately 50,000 permits have so far been granted.

The full implementation of the permitting system during the 13th Five Year Plan period (2016-20) has important implications in several respects. First, the system sets clear and predictable rules to polluters for what is legal and what is not. Second, as a basic instrument for environmental regulation the permit can weave together a string of other regulatory tools, such as standards, EIA, environmental taxes, total emission control and emission trading. Third, from the perspective of regulatory reform, integrated permit approach could help foster closer co-operation among departments within the MEE through the establishment of an institutionalised mechanism for information sharing and regulatory coordination. Nevertheless, important challenges remain to make the permitting system effective, and simultaneous efforts are needed to reform environmental regulatory governance (OECD, 2017).

5.3.3. Make wider use of economic instruments

As the range of air pollution sources becomes more numerous, diverse and complex, the government has started to broaden its policy mix, notably by making greater use of market-based instruments that are more cost-effective and enhance incentives for the development of cleaner technologies.

Pollutant emission trading

An experimental SO₂ emission trading scheme was rolled out in seven provinces and cities⁷ in 2002, inspired by the United States' model. Since 2007, over ten provinces have been authorised by the MEP to establish pollutant emission rights trading pilots; some also volunteered their own cities and counties to take part in the pilots. Most of the trading schemes cover the four main air and water pollutants (SO₂, NO_x, COD and NH₃-N) for which the Five-Year Plans have set mandatory targets of emissions reduction. From 2014 on, allowances (or emission rights) are allocated for every five years for all pilots, in line with the cycle of the Five-Year Plans. Allowances that are not used before expiry date are no longer valid. Inter-city trading within the same pilot province is authorised, subject to prior approval from the provincial emission trading centre. Cross-province trading is not allowed, and provinces that have not met environmental quality standards are forbidden from trading with other provinces. Finally, trading can only occur within industry in principle, and thermal power plants may not trade emission allowances with plants from other industries (Wu and Zeng, 2018).

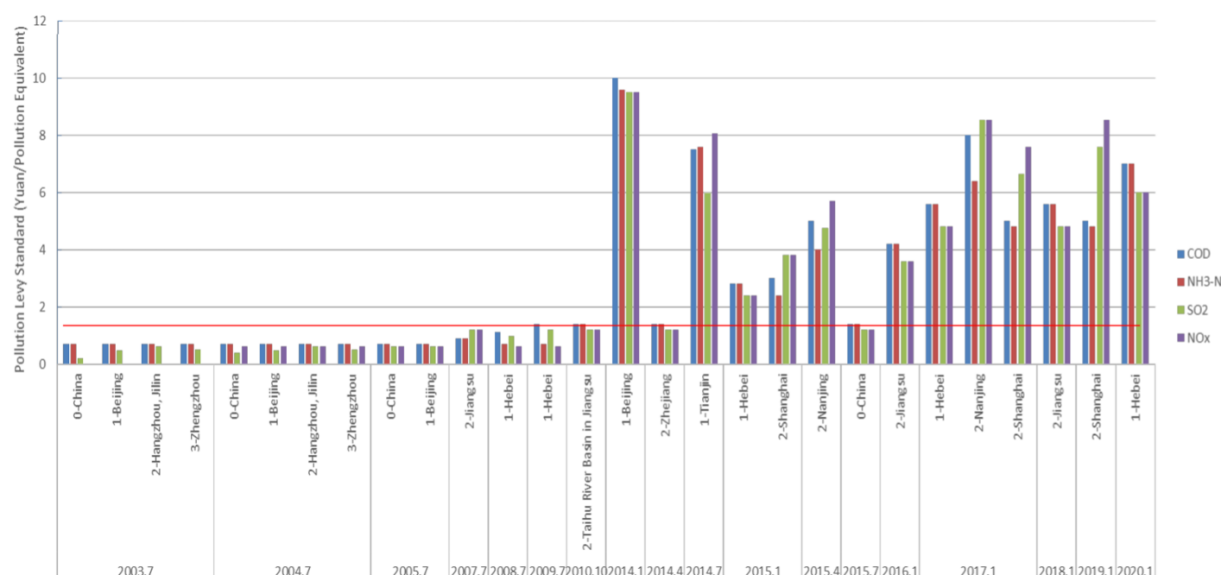
For many years, the actual implementation achieved mixed results. Several challenges have been identified. First, for the trading scheme to work, certainty needs to be provided on the amount of pollution that will be reduced. This requires environmental authorities to scientifically and accurately quantify the emission cap in each pilot province and then allocate allowances (or trading rights) specifying how much pollution each permit holder can emit. This in turn requires reliable monitoring of the emissions data at each plant (Liu, 2006). Second, combinations of multiple instruments have reduced the effectiveness of the trading pilots. Local governments have continued to heavily rely on command and control measures, for instance imposing strict emission limit targets on coal-fired power plants and forcing the installation of desulfurization equipment. This, coupled with subsidies on electricity tariffs, de facto removed companies' incentives in participating in emission trading as the reduction targets were already achieved under the effect of the other policies (Li, 2011).

⁷ These include Provinces of Shandong, Shanxi, Jiangsu, Henan, and cities of Shanghai, Tianjin and Liuzhou.

Taxes

China has had several decades of experiment with pollution levies⁸ (also called pollution fee or charge) before moving to a tax system in 2016. A pollution fee was formally levied on SO₂ starting 1982, to provide incentives to companies to reduce emissions and to increase budget and funds for environmental governance and enforcement. In the early days, when pollutants were discharged in excess of the standards, a fee was only paid for the excessive part of emissions. In 2003 pollution fees became collectable on all the emissions and on multiple pollutants (SO₂, NO_x, COD and NH₃-N). Despite an increase in the fee rates, pollution fee remained too low to incentive emission reduction. As an example, the pollution fee for SO₂ was 0.63 yuan/kg in 2005, while the average abatement costs of SO₂ in coal fired power plants were 4-6 yuan/kg (Huang, 2006). From 2007 on, several local governments increased their fee rates, and by June 2015, the national rates were doubled again, with differential fee rates applied based on the emission concentration levels for more effective abatement incentives. The fee rates in the Jing-Jin-Ji region and the Yangtze River Delta were far above the national levels (Figure 5.2). A pilot of pollution levy on VOC was also introduced in 2015.

Figure 5.2. Evolution of pollution fee/tax rates in China



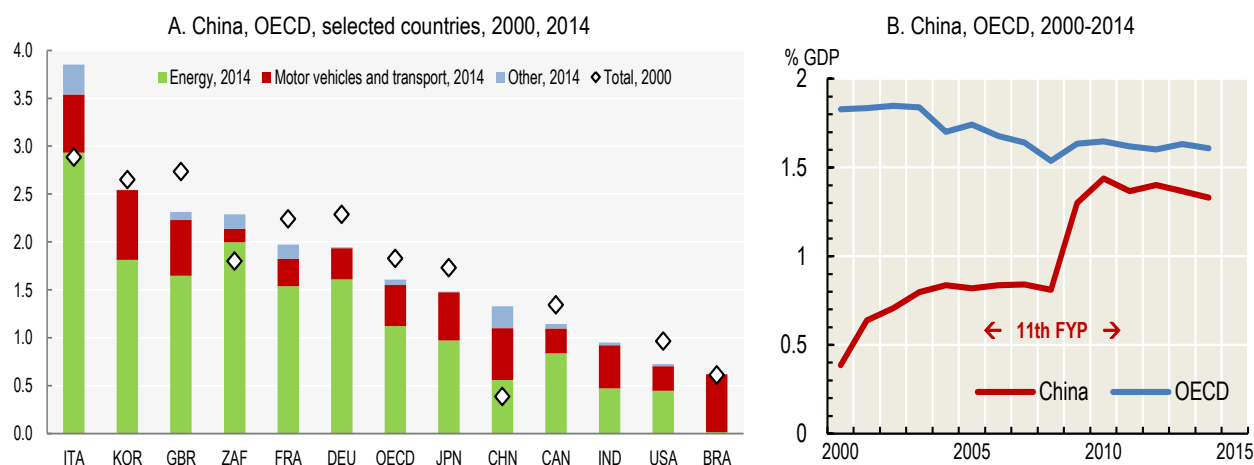
Source: Wu and Tal (2017).

In the past 10 to 15 years, the use of environmentally related fees/taxes has been growing and the share of their revenues in total tax revenue and in GDP has increased significantly, in particular since the implementation of the 11th Five Year Plan. The revenue generated grew from 0.4% in 2000 to 1.3% of GDP in 2014, placing the country at the 7th lowest among 35 OECD and 6 BRIICS economies. As in OECD countries, the tax base in China is dominated by transport and energy. Direct taxes on energy represent 42% of total environmentally related tax revenue, lower than the 70% on average among OECD countries (Figure 5.3).

⁸ Pollution levy has similar functions as pollution tax but lack the legal authority and transparency of the latter.

Figure 5.3. Environmentally related taxation is increasingly used

Environmentally related fee/tax revenues, % GDP



Source: OECD Environment Statistics database.

In December 2016, the [Environmental Protection Tax Law](#) was approved by the country's top legislators, marking China's official transition from a pollution fee to environmental tax system. The shift strengthens the legal basis for economic incentives as a key tool to control pollution from stationary sources (Wu and Tal, 2017). The update presents progress in several design aspects. For example, the new law expands the coverage to a much wider range of air (and water) pollutants. Provincial authorities are authorised to add further pollutants for the tax base. Moreover, the law has continued a "carrot and stick" approach to encourage meaningful pollution reduction: companies discharging pollutants at below concentration emission limits are eligible to varying levels of tax discounts – more than the two grades under the levy system. Automatic monitoring of emissions data is also prioritised to improve total emission accounting accuracy.

Nevertheless, problems remain with the new tax system. The tax rates have adopted the existing pollution fee rates, which have been shown in the past to be far below the marginal abatement cost; besides, no calendar of rate adjustment is given. This will likely limit the effectiveness of the tax system in promoting further pollution reduction. Effectiveness of the tax system will also rely on the accuracy of source-level emission monitoring, which needs to be strengthened with clearer guidelines as implementation of the permit system further unfolds. Furthermore, there remains considerable scope to improve the use of taxation of energy use to reduce pollution and combat climate change. The country has among the lowest tax rates on energy on an economy-wide basis among the 41 OECD and BRIICS economies; only 18% of carbon emissions from energy use are currently covered by a price, the majority of which stem from the road sector (gasoline and diesel used in off-road transport), whereas emissions from the industry, residential and commercial, and the electricity sectors remain largely untaxed (OECD, 2016b; OECD, 2018). The untaxed consumption of coal and coke, which are the main energy source for the industry and electricity sector, is particularly problematic given their polluting and carbon intensive nature (OECD, 2018).

Some researchers estimate that the economic loss measured as decline in GDP associated with a higher environmental tax rate is fairly acceptable (Qin et al., 2015). There is also debate about the need for differential tax rates for different industries, as some studies point to significant cross-industry

discrepancies in the abatement costs (Wu and Tal, 2017). However, tax rates should ideally reflect the degree of harm⁹ the emissions cause to the environment and human health, rather than abatement costs.

The advantage of using an environmental tax is that it eliminates the need to refer to abatement costs of the different installations: those that can abate at low cost will do so, while those who can only abate at high cost would rather pay the tax rate instead. Nevertheless, there are examples of industry differentiation in tax rates in OECD countries, generally due to competitiveness concerns rather than differences in abatement costs.

Subsidies

Subsidies, as well as performance evaluation and greater accountability of local leaders, have been important instruments for achieving the environmental targets in the Five-Year Plans. Substantial public financial support was provided to install end-of-pipe technologies to reduce emissions of SO_x, NO_x and COD, notably under the 11th Five Year Plan in 2006-2010 (OECD, 2017). Examples include subsidises for electricity generated by coal-fired power plants with installed desulphurization equipment (as of July 2007) and with installed denitrification equipment (as of January 2013). While this can be an effective way for power plants to achieve emission reduction targets, it contravenes the Polluter-Pays Principle, and may remove incentives for them to develop more efficient means of reducing pollution in the longer run.

An important prerequisite for the effective application of market-based instruments is the reform of any subsidies that may negate their impact. This is especially the case for subsidies for fossil fuels that provide incentives for the generation of GHGs and local air pollutants such as SO_x and NO_x. Such subsidies are usually economically inefficient and a drain on public resources as well as being environmentally damaging. Efforts have been made recently to phase out these harmful fossil fuel subsidies and to move towards more market-based pricing of energy and resources (OECD, 2017). As the energy sector is the most important source of SO₂ and NO_x pollution, the government has also provided massive subsidies for renewable energy like solar and wind, as an effort to reduce the dominance of coal in the country's primary energy supply and power generation. Recent studies show that the cost of renewable electricity generation in China is already dropping below that of conventional energy, such as coal, and this is the case even without accounting for the environmental and social costs of conventional sources (Ram et al., 2018). This provides a powerful economic case for aggressive adoption of renewables in the energy mix.

Green finance

More recently, China has emerged as a global leader in green finance, starting with the establishment of a G20 Green Finance Study Group under its 2016 G20 Presidency. The State Council approved a set of guidelines in August 2016 to incentivise and promote green loans, green bonds, green funds, green insurance and mandatory environmental information disclosure, among others. According to statistics collected by The Climate Bonds Initiative and the China Central Depository & Clearing Company, green bond issuance in China reached USD 37 billion in 2017, a 4.5% increase from 2016 and second only to the United States (USD 42 billion) (CBI and CCDC, 2018). However, 38% of the total issuance did not meet international green definitions, a 5 percentage points increase from 2016. Over 60% of these non-internationally aligned bonds are due to differences between the eligibility of green projects under Chinese domestic guidelines and that under international definitions. For instance, the following project types are considered green by domestic but not by international investors: retrofits of fossil fuel power stations, clean coal and coal efficiency improvements, electricity grid transmission infrastructure that carries fossil fuel energy, large new hydro projects (>50MW) and landfill waste disposal (CBI and CCDC, 2018).

⁹ Generally, a tonne of pollutants emitted from one industry will do the same harm as a tonne of the same pollutants emitted from another industry. There can be some exceptions related to where the different industries are located: those located in densely populated areas will cause more harm to human health than industries located in remote areas.

Five pilot areas for green finance were announced in June 2017, covering provinces of Guangdong, Guizhou, Jiangxi, Zhejiang and Xinjiang (State Council, 2017). These provinces were selected for different strategic reasons. Guangdong and Zhejiang are economic powerhouses eager to combine the advantage of their relatively sophisticated financial markets with the need to upgrade their industry; Guizhou and Jiangxi are less-developed provinces with plentiful natural resources and the desire to avoid the rerun of “pollute first, clean up later” growth path; and Xinjiang, aside being rich in coal resources, is located at the heart of the Belt and Road initiative and can serve as demonstration inducing green investment practices of Chinese companies going abroad (Wang, 2017). The PBOC estimated that the sum of total green loans in the pilot zones had reached more than 260 billion yuan by the end of March 2018, a 13% increase from June 2017 and 2% above the growth rate of other loans in the same period (Lv, 2018).

Efforts are also underway to screen loans for environmental risk, including environmental stress testing led by financial institutions, with an initial focus on energy-intensive, highly polluting industries such as thermal power and cement (ICBC, 2016). Already in December 2013, MEP, NDRC, PBOC and the China Banking Regulatory Commission jointly issued [Measures of Assessing Corporate Environmental Credit](#), requiring environmental credit ratings to be established for companies operating in more than 16 highly polluting industries¹⁰ and those plagued with overcapacity. Ratings should be disclosed publicly and pegged with decisions on administrative licensing or approval, government purchase, financial and tax policy preferences (e.g. loans and subsidies). Implementation of the rating system has however been slow. As of August 2017, only 52 out of 293 municipalities disclosed the environmental credit rating results of companies operating in their jurisdictions, and only 6 out of 31 provinces published rating results in provincial-level database (Chen and Xie, 2018).

5.4. Mobile sources

As car ownership continues to grow along the pace of disposable income growth, the government has taken actions in several areas to reduce air pollution emissions from motor vehicles. Given that diesel vehicles, notably the heavy commercial ones, bear the biggest bane for NO_x and hazardous airborne particulates like PM_{2.5}, many of these measures have aimed to tackle this category of vehicles.

5.4.1. Tighten emission standards for on-road engines and vehicles

Vehicle and engine emission standards are issued jointly by the MEE (formerly MEP) and the Standardisation Administration. In addition to national standards, which are mandatory nationwide, local standards that are stricter than the national ones may be issued by local governments. The motor vehicle emission standards have been upgraded six times since the first regulation came into effect in the 1990s. They are all based on European regulations, adopted with a certain time delay. Large metropolitan areas, including Jing-Jin-Ji and the Yangtze and Pearl Rivers Deltas have adopted more stringent regulations on an accelerated schedule, ahead of the rest of the country. Coloured labels attached to the vehicle are used to identify which vehicles meet the required emission standards.

When the 2013 Action Plan for Air Pollution Control began implementation, all cars had switched to National IV standards with stricter emission limits (Table 5.9 Table 5.10). The upgrade from National IV to National V further strengthened the emission limit values by 25-28% for NO_x and 82% for PM. By January 2018, all cars except heavy gasoline vehicles have adopted National V standards, and by mid-2020 National VI-a standards will apply nationwide, followed by National VI-b by mid-2023. For passenger cars

¹⁰ These include: thermal power, steel, cement, aluminium, coal, metallurgy, chemical, petrochemical, construction, paper, pharmaceutical, brewing and fermentation, textile, leather and mining industries.

and light commercial vehicles, the National VI standards are fuel neutral with the same limits applied for gasoline and diesel vehicles.

Fuel quality has also been improved along with the upgrade of vehicle emission standards. A nationwide desulfurization of gasoline and diesel fuel kicked off in early 2013 to reduce emissions from all motor vehicles while enabling advanced emission control technologies to be deployed. To encourage and assist refineries to meet the quality improvement timeline, the NDRC which sets China's fuel prices raised in September 2013 the prices of National V gasoline and diesel by approximately 5-6% (ICCT, 2014). It is scheduled that by January 2019 the National VI fuel standards will go into effect. The new standards are generally more stringent than the Euro V fuel standards currently in force across the EU. In October 2017, 28 cities in the Jing-Jin-Ji and surrounding area have started to implement the VI fuel requirements ahead of the national schedule (ICCT, 2018).

Table 5.9. National V-VI emission standards for passenger cars, selected pollutants

Panel A. Emission standards for diesel cars							
Vehicle weight (GVW, tonne)	Type of test	Year of introduction	Unit	PM	NOx	CO	N ₂ O
≤ 2.5	WLTP	2015 (IV)	g/km	0.0250	0.250	0.500	/
	WLTP	2016 (V)	g/km	0.0045	0.180	0.500	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.060	0.700	0.020
	WLTP	2023 (VI-b)	g/km	0.0030	0.035	0.500	0.020
Panel B. Emission standards for gasoline cars							
≤ 2.5	WLTP	2011 (IV)	g/km	/	0.080	1.00	/
	WLTP	2016 (V)	g/km	0.0045	0.060	1.00	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.060	0.700	0.020
	WLTP	2023 (VI-b)	g/km	0.0030	0.035	0.500	0.020

Notes: GVW = gross vehicle weight; WLTP = Worldwide Harmonized Light Vehicles Test Procedures.

Source: MEE.

Table 5.10. National V-VI emission standards for commercial vehicles, selected pollutants

Panel A. Emission standards for diesel light commercial vehicles							
Vehicle weight (RM, kg)	Type of test	Year of introduction	Unit	PM	NOx	CO	N ₂ O
≤ 1305	WLTP	2015 (IV)	g/km	0.025	0.25	0.50	/
	WLTP	2016 (V)	g/km	0.0045	0.18	0.50	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.06	0.70	0.02
	WLTP	2023 (VI-b)	g/km	0.0030	0.035	0.50	0.02
(1305, 1760]	WLTP	2015 (IV)	g/km	0.040	0.33	0.63	/
	WLTP	2016 (V)	g/km	0.0045	0.18	0.50	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.075	0.88	0.025
	WLTP	2023 (VI-b)	g/km	0.0030	0.045	0.63	0.025
> 1760	WLTP	2015 (IV)	g/km	0.060	0.39	0.74	/
	WLTP	2016 (V)	g/km	0.0045	0.28	0.74	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.082	1.00	0.03
	WLTP	2023 (VI-b)	g/km	0.0030	0.05	0.74	0.03
Panel B. Emission standards for gasoline light commercial vehicles							
≤ 1305	WLTP	2015 (IV)	g/km	/	0.08	1.00	/

	WLTP	2016 (V)	g/km	0.0045	0.06	1.00	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.06	0.70	0.02
	WLTP	2023 (VI-b)	g/km	0.0030	0.035	0.50	0.02
(1305, 1760]	WLTP	2015 (IV)	g/km	/	0.10	1.81	/
	WLTP	2016 (V)	g/km	0.0045	0.075	1.81	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.075	0.88	0.025
	WLTP	2023 (VI-b)	g/km	0.0030	0.045	0.63	0.025
> 1760	WLTP	2015 (IV)	g/km	/	0.11	2.27	/
	WLTP	2016 (V)	g/km	0.0045	0.082	2.27	/
	WLTP	2020 (VI-a)	g/km	0.0045	0.082	1.00	0.03
	WLTP	2023 (VI-b)	g/km	0.0030	0.05	0.74	0.03
Panel C. Emission standards for diesel heavy commercial vehicles							
All weights	WHTC	2015 (IV)	g/kWh	0.03	3.7	4.0	/
	WHTC	2016 (V)	g/kWh	0.03	2.8	4.0	/
	WHTC	2021 (VI)	g/kWh	0.01	0.46	4.0	/

Notes: RM = reference mass; WLTP = Worldwide Harmonized Light Vehicles Test Procedures; WHTC = World Harmonised Transient Cycle.

Source: MEE.

Scrap “yellow-label” vehicles

China has accelerated the elimination of “yellow label” vehicles that are 1-5 times more polluting than cars with “green label”. These vehicles are typically used cars that fail to meet the minimum emission standards National I for gasoline vehicles or National III for diesel vehicles. By the end of 2012, there were 14.5 million yellow label cars in circulation in China. They accounted for 13.4% of total car ownerships but produced 58.2% of NO_x emissions, 56.8% of HC, 52.5% of CO and 81.9% of PM (Zhuang, 2014). The 2013 Anti-Air Pollution Action Plan ordered cities in Jing-Jin-Ji area and the Yangtze and Pearl Rivers Deltas to eliminate by 2015 five million yellow label vehicles that were registered before 2006, followed by a nationwide purge through to 2017.

Between 2014 and 2017, more than 20 million used and yellow label cars were scrapped, exceeding the original target. This was achieved in three ways. First, subsidies were provided to yellow label car owners to have their cars taken off circulation. Second, accelerate the pace of scrapping by limiting the circulation hours and zones for yellow label cars. Third, require yellow label cars to retrofit engines or install after-treatment equipment to be upgraded to green label cars. The implementation was met with considerable challenges in the first few years, as the majority of yellow label car owners found the subsidy compensations too low or unfairly defined. While many cars seemed to have been removed on paper, they were in fact sold to rural areas or small towns where the restrictions were less tough (Xue and Li, 2016). In September 2018, it was reported that a new plan is being developed to replace as many as 1 million heavy duty diesel trucks in the northern regions with ones that are powered by cleaner fuels ([Reuters](#), 2018).

Promote eco-friendly vehicles

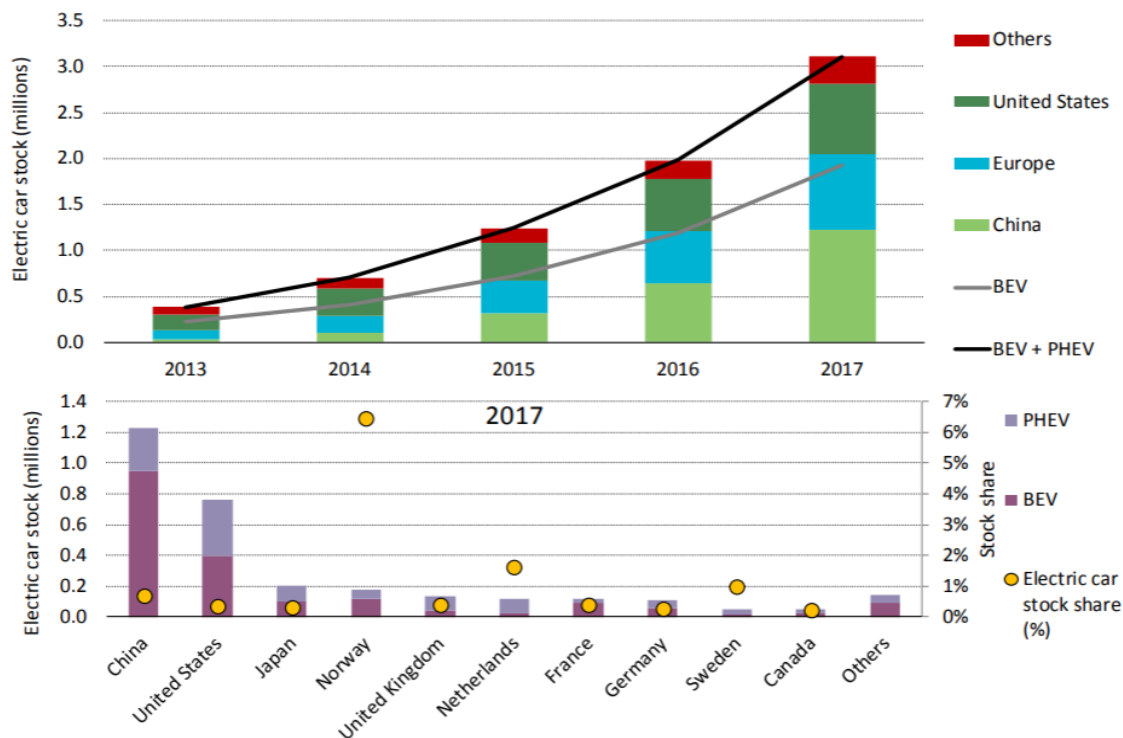
Since 2013, the government has supported the development of new energy vehicles through a swathe of incentive policies such as direct credit line, grant, subsidies or other tax reliefs. While the official motivation is to reduce urban air pollution and carbon emissions, a more strategic goal has been to create a next generation automobile industry that could vie for global dominance, as well as to reinforce energy security by easing dependence on overseas oil supply. A plan issued in 2012 set a sales target of half a million new energy vehicles by 2015 and five million by 2020 ([State Council](#), 2012).

To spur demand, a national subsidy scheme was introduced in September 2013 – following a successful subsidy programme in pilot cities in 2010. The scheme planned to inject up to 60,000 yuan for the purchase of a battery electric passenger vehicle and up to 500,000 yuan for an electric bus, and up to 35,000 yuan for a plug-in hybrid electric passenger car and up to 250,000 for a hybrid electric bus ([MOF, 2013](#)). The level of subsidy allocated depends on three criteria: vehicle range (km), energy efficiency (kWh/100 km), and battery pack energy density (Wh/kg). On top of what the national government spends, local governments can separately offer incentives to make electric cars more appealing. These include exemptions from acquisition and excise taxes that range between 35,000 yuan and 60,000 yuan per car purchase. Local governments can complement these within the limit of 50% of the central subsidies. It was reported by the Ministry of Finance that between 2009 and 2015, a total of 33.4 billion yuan central government budget was spent on new energy vehicle subsidies ([MOF, 2016](#)). In addition, seven major cities also allow total or partial waivers from licence plate availability restrictions.

As of December 2017, China boasted the world's largest fleet of electric vehicles with over 1.2 million units in circulation, accounting for 40% of the global stock. It overtook in 2016 both the US and Europe in terms of cumulative sales (Figure 5.4), and is also the world's largest electric bus market and the largest electric car battery producer (IEA, 2018c). The government also committed to building a nationwide charging-station network to power the 5 million electric vehicles by 2020.

Despite this impressive growth, issues like subsidy fraud and inconsistent product quality (including safety features) have led to recent adjustments of the subsidy policies. Part of the subsidies were withheld in 2016 in wake of extensive subsidy fraud by several car manufacturers ([MOF, 2016](#)). More recently, the government has started to peddle back on the subsidy scale to place more emphasis on the need for technological improvements in the long term. The [2016-20 Subsidy Schemes and Product Technology Requirements for the Promotion of New Energy Vehicles](#) announced a reduction of 20% subsidies in 2017-18 from the 2016 level, and a further 40% reduction in 2019-20. A new set of policies announced in February 2018 further elevated the technical qualification thresholds for subsidy eligibility ([MOF, 2018](#)). Vehicles may be required to be able to go at least 200 km on a single charge to be eligible for incentives, up from 150 km currently. Subsidies for plug-in hybrid electric vehicles and low-range battery electric vehicles (< 300 km) were lowered by varying degrees, while the incentive for long-range BEVs (> 300 km) were raised to 50,000 yuan per car purchase. In addition, battery technologies delivering higher energy densities and vehicles with higher efficiency will receive more subsidies. Furthermore, local governments are encouraged to gradually shift away from subsidies to infrastructure development, such as by supporting the construction of more charging-stations. China is also reportedly considering a national ban on new factories that produce fossil-fuel powered vehicles ([The Economist, 2017](#)).

Figure 5.4 Passenger electric car stock in major regions and the top-ten EVI countries



Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Stock shares are calculated based on country submissions and estimates of the rolling vehicle stocks developed for the IEA Mobility Model. The vehicle stocks are estimated based on new vehicle registration data, lifetime range of 13-18 years, and vehicle scrappage using a survival curve that declines linearly in the last five years of the active vehicle life. Lifetimes at the low end of the range are used for countries with higher income levels (and vice versa).

Source: IEA (2018c).

Restrict car purchase

Despite rapid growth in motorisation in the past decade, vehicle ownership rate in China remains a fraction of the levels observed in OECD countries – 83 motor vehicles per 1,000 persons in 2014 compared to almost 800 per 1,000 in the United States and generally above 600 per 1,000 in Western Europe and Japan ([NationMaster](#), 2014). Concerned with the air pollution impact of continuous high vehicle stock growth, a number of large cities have issued policies to restrict the vehicle purchase, usually using a lottery or an auction system or a combination of the two. For example, Shanghai promulgated a vehicle control policy as early as 1995, using monthly license auctions to limit the number of new car registrations, while Beijing started to restrict license plates in 2011 via a random lottery. By the end of 2017, eight cities had reportedly put limits on car purchases ([Zhang](#), 2017).

As explicitly stated in the 2013 Anti-Air Pollution Action Plan, mega cities like Beijing, Shanghai and Guangzhou are required to strictly limit their motor vehicle stock and encourage alternative and more eco-friendly ways of travelling. As such, purchase of new energy vehicles is not subject to any registration quota. Changing mobility patterns in the past few years have also seen the rising popularity of car-pooling and bike-sharing services in large cities.

5.4.2. International co-operation

Recognising that clean air is an important shared goal, China has also been co-operating with neighbouring countries and international and regional initiatives to address air quality and transboundary pollution challenges. Two principles can be consistently found in China's environmental diplomacy: common but differentiated responsibility in global environmental issues, and partnerships and friendship development with neighbouring countries (Otsuka, 2018).

Regional co-operation has generally focused on information exchange, technical assistance and capacity building for pollution prevention and control. Several bilateral and multilateral arrangements have been established, for instance between China, Japan and Korea, to share experience on best implementation practices and policy approaches for reducing urban and regional pollution¹¹. In the East Asia region, Japan, as an early economic and developmental frontrunner, has long been an important source of assistance for China to learn its experiences as well as to benefit from Japan's affluent financial aid or technological transfer aimed at building up local capacities for implementation. As air pollution reduction becomes a growing domestic priority in recent years, observers point to the positive shift in China's attitude to and participation in regional transboundary air pollution issues (Otsuka, 2018). Besides, China has taken on a more proactive and prominent role in global environmental governance – including for instance through its commitments to the Paris Agreement and expansion of the Belt and Road Initiative into environmental and energy fields.

¹¹ For a more detailed account of the benefits and challenges of air quality regulatory co-operation in the East Asia region, see companion OECD working paper COM/ENV/EPOC/GOV/RPC(2018)1: Study of International Regulatory Co-operation (IRC) arrangements for air quality.

6. Monitoring and enforcement of regulations¹²

6.1. Air pollution source monitoring

6.1.1. Stationary sources

OECD countries have adopted laws requiring industrial and other plants to disclose information about their releases of pollutants to the environment. This makes industrial plants more accountable to local communities, improves monitoring of pollutant releases, and strengthens the basis for policy development and evaluation. In the US, this took the form of the Toxics Release Inventory (established in 1986), and in the EU, the Pollutant Release and Transfer Register (fully implemented in 2009).

Information disclosure that has proved to be so critical to environmental enforcement in many other countries was non-existent in China prior to 2000. The Trial Measures for Information Disclosure promulgated in 2007 only mandated companies operating in highly polluting industries such as thermal power, steel and cement to disclose their environmental information. Due to absence of effective enforcement, only a fraction of companies complied, most of which are listed companies, while the coverage and quality of the information disclosed were largely uneven (Chen and Xie, 2018). A **quarterly** reporting system was established to monitor environmental performance of a pool of large polluters, known as the “enterprises subject to intensive monitoring and control of the state” or “**national level key monitored firms**”. The number of such firms has more than doubled in ten years, from 6,723 in 2007 to more than 14,000 in 2017 (Table 6.1). They account for 65% of main pollutant emissions generated by industry. The set of benchmark pollutants and firm selection method vary slightly from year to year. From 2013, the list expands to any firms that generate or effectively emit pollution above the designated thresholds.

Environmental monitoring agencies across the country have also been tasked to strengthen inspection of enterprises’ self-monitoring and ensure the authenticity and integrity of the information transmitted to higher-level authorities. Inspection is typically carried out by county or city-level environmental agencies, except for thermal power plants with installed capacity of over 300,000 kilowatts that were supervised by provincial environmental bureaus (Wang and Gao, 2017). Between 2007 and 2013, national level key-monitored firms were inspected once every quarter, and the monitoring results were released on a **quarterly** basis. There was no official way to know the situation outside the occurrence of the quarterly inspections. In effect, there have been precedents that some firms cheated in emission tests by manipulating their monitoring devices or influencing the chemical nature of the exhaust gas that was being

¹² This section will focus on the monitoring and enforcement of stationary sources of air pollutants, given that they are the target of most of the recent policy developments. Monitoring and enforcement of mobile sources will be presented briefly.

examined¹³. This may be related to the fact that many inspectors focused solely on collecting firms' self-monitoring data, whereas paying insufficient attention to how those data were generated in the first place. They also lacked experience, technical knowledge and legal authority to conduct on-site forensics (Wang and Gao, 2017), and would sometimes choose to withhold information that would make them look bad to higher-level authorities.

Table 6.1. Evolution of national level key monitored firms, 2007-17

Year	Total Number	Number of waste gas firms	Benchmark Pollutants	Inclusion Thresholds	
				Emissions	Generations
2007	6,723	3,592	SO ₂ , Soot, Industrial Dust	65% of total industrial emissions of every pollutant	/
2009	8,265	3,715	SO ₂ , NOx	idem	/
2010	8,970	3,472	SO ₂ , NOx	idem	/
2011	11,421	4,425	SO ₂ , NOx	idem	/
2012	15,379	3,605	SO ₂ , NOx, Soot and Dust	idem	50% of total industrial generation of every pollutant
2013	15,797	4,189	SO ₂	1,200 tonnes/year	20,000 tonnes/year
			NOx	4,000 tonnes/year	10,000 tonnes/year
			Soot and Dust	400 tonnes/year	/
2015	14,920	3,268	SO ₂	1,500 tonnes/year	50,000 tonnes/year
			NOx	3,000 tonnes/year	12,000 tonnes/year
			Soot and Dust	8,00 tonnes/year	400,000 tonnes/year
2016	14,312	3,281	/	/	/
2017	14,200	3,365	/	/	/

Notes: The list includes firms discharging air, water, heavy metals and hazardous waste pollutants, as well as sewage treatment plants and large livestock poultry farms. Between 2011 and 2013, above-scale firms in pollution-intensive industries such as thermal power, steel, cement, nonferrous metals, oil refinery were added to the list irrespective of the amount of pollution they generate or emit.

Source: MEP, IPE.

Hazardous levels of PM_{2.5} in 2011-13 triggered intense public pressure for better environmental information, *i.e.* more accurate, reliable, broader coverage and real-time. In December 2014, new rules¹⁴ were released, which significantly expanded the mandatory disclosure of firm-level environmental data. From 2015 on, cities are required to develop and release annual directorates of **key polluting firms**, which constitutes an extension of national level key monitored firms to provincial and city level key monitored firms. Key polluting firms are required to disclose the following information to the public:

- Basic information on the firm (e.g. company name, legal representative, address, contact details, main activities/business, product and size);

¹³ As an example, the MEP revealed that 10 firms were accused of tampering with pollution monitoring results in the second half of 2015. Such discoveries are usually uncovered by ad hoc enforcement examinations organised by higher-level environmental authorities.

¹⁴ Details see Measures for the Disclosure of Environmental Information by Enterprises and Public Institutions, released by MEP on 19/12/2014 and effective on 01/01/2015.

- Information on pollutant discharge (e.g. pollutant discharging methods, number and location of smokestacks, emission concentration and emission load, situation of attainment and the applicable emissions standards);
- Construction and operation status of pollution prevention and control facilities;
- Information on the EIA of construction projects and other environmental administrative licensing;
- Emergency response plans for environmental emergencies; and
- Other environmental information that should be disclosed.

A key polluting firm included in the list of national level key monitored firms shall also disclose its self-monitoring plan, of which the information typically includes: emission concentration of main air pollutants (SO₂, NO_x and soot), their respective emission limit value set by national or local standards, attainment achieved or not, and the location and time of data collection. Since 2014, their self-monitoring data have been published **hourly** by the provincial environmental monitoring agency, and are presently consolidated on the platform of [China's Social Credit System](#) (MEP, 2013). The 2016 Air Pollution Prevention and Control Law further requires key polluting firms to install and operate automated air pollution monitoring equipment and connect the monitoring data with MEE's integrated real-time information disclosure platform. The automated monitoring results can serve as legal evidence for regulatory enforcement¹⁵.

So far, only a minority of cities have developed and released directories of key polluting firms. As estimated by the Institute of Public and Environmental Affairs (IPE), the vast majority (88%) of the evaluated city-level key monitored firms have not yet complied with the Air Pollution Control Law's information transparency requirements, either failing to disclose data outright or displaying data only on screens on their own premises that are not readily accessible by the public (IPE, 2018).

6.1.2. Mobile sources

The revised Air Pollution Prevention and Control Law provides that environmental information (e.g. emission test results, pollution control technology) on motor vehicles shall be disclosed prior to their introduction to the market. New vehicles, whether produced domestically or imported, will be tested before they are put into market to ensure they fully comply with emission standards. MEE and provincial environmental bureaus can conduct on-site inspection and sampling inspection on newly introduced vehicles, to be supported by relevant agencies in the fields of quality supervision, licensing and registration. Once in-use, an annual inspection will be carried out. Random road checks are also organised as part of the routine inspection. To tackle emissions from heavy-duty diesel trucks, regular inspections will be conducted. In one of the recently released measurement methods and specifications, NO_x emission was added in the testing of exhaust pollutants from in-use diesel vehicles.

In July 2016, a [Joint Notice](#) was issued by the MEP, Ministry of Public Security and the National Certification and Accreditation Administration to further enhance regulation and inspection of motor vehicle emissions. Vehicle emissions and safety inspections will now be synchronised. Emission inspection in places outside the vehicle registration location will be piloted in provinces that have completed the establishment of real-time transmission of data across the national, provincial and city levels. Sampling inspection of in-use vehicles will be enhanced, targeting trucks, buses, taxis and long-distance passenger cars in major parking lots and maintenance and repair centres. The MEP will also enhance collaboration with the Transport Ministry and the Market Regulation Administration to speed up the establishment of a motor vehicle recall system based on environmental criteria (Liu, 2018).

¹⁵ Details see Opinions on Deepening Environmental Monitoring Reform and Improving Quality of Data, issued by the Central Party Committee and the State Council, September 2017.

As of June 2018, China had established a national-provincial-city three-tier platform that connects nearly 90% of stations operating new vehicle inspection and periodic emission testing, with the information system of the environmental protection bureaus (Kou, 2018; Liu, 2018). Multiple monitoring methods¹⁶ are deployed to ensure accuracy of the emission data and construct a nationwide interconnected network of vehicle emissions monitoring. High emitters such as diesel trucks will be put under continuous supervision. In 2017, ten stationary remote sensing equipment and two mobile remote sensing equipment were installed across nearly 30 cities in the Jing-Jin-Ji area, covering major crossings of high emitters, notably diesel trucks and high emitting gasoline vehicles (China Association of Environmental Protection Industry, 2018).

The *2018-20 Anti-Air Pollution Action Plan* requires further strengthening of mobile source emissions monitoring, by establishing a nationwide interconnected remote sensing monitoring system by end 2019. Information on vehicles that exceed emission standards will be gathered into a nationwide database, which will trace accountability through all stages of the vehicle lifecycle, from its production and import, registration location, to emission inspection agency, maintenance and repair centre location.

6.2. Enforcement

6.2.1. Stationary sources

Despite the efforts of the central government to strengthen environmental policies, the impact and enforcement of laws has remained inadequate for a long time. One of the main factors in weak enforcement has persistently been the role that sub-national authorities played in impeding environmental law enforcement. Provincial and local authorities have primary responsibility for environmental enforcement. At the same time, local enterprises play a key role in meeting economic targets and generating a major part of local fiscal revenues. There is a clear conflict of interest. For a long time, many local governments prioritised economic over environmental policy objectives and used their oversight of local environmental protection bureaus to protect local enterprises from actions to secure their compliance with environmental laws (OECD, 2017).

Typical measures of penalties

Six measures of administrative penalties are typically used since 2010¹⁷. In descending order according to their frequency of use, these measures include: fines, suspension of production until rectified, warning, suspension of production or closing business, revocation of license or permit, and confiscation of illegal income or property (DRC, 2015). Early studies found production suspension or closing of business and fines to be the most effective measures (Lu et al., 2006). The amended 2014 Environmental Protection Law considerably strengthened the penalties for environmental violations, including by restricting access to credit and tax breaks. In 2014, three additional “zero tolerance” directives¹⁸ were issued by the MEP to support enforcement of the new law by local authorities. They include: consecutive daily penalties, suspension of production and business, and seizure of facilities and equipment.

¹⁶ Typical methods include remote sensing monitoring, periodic emission testing, roadside remote sensing of heavy-duty diesel vehicles, and road inspections.

¹⁷ Details see [Measures of Environmental Administrative Penalties](#), MEP, 2010.

¹⁸ These include measures for [imposing fines on a consecutive daily basis](#), [seizing and impounding the polluting facilities and equipment](#), and [restricting or shutting down production](#).

Consecutive daily penalties

The most potent of the penalty measures altered the basis of punishing lawbreakers from a “per infringement” fine to a consecutive daily fine until rectification is completed, and the amount can be uncapped. The daily penalty measures target the four following situations:

- Exceeding mandatory emissions caps for key pollutants, or exceeding national or local standards on emission limit values;
- Discharging pollutants in ways intended to escape supervision, such as through underground pipelines, seepage well, seepage pit, falsifying monitoring data or improper operation of a pollution prevention equipment;
- Discharging prohibited pollutants;
- Illegally dumping hazardous waste.

The daily penalty measure also specifies how the fines are calculated and the procedure for imposing the penalty. When the government initially identifies illegal discharging, it should issue a rectification order, called “First Order”, to the polluter. Within 30 days of the service of the First Order, reinspection should be conducted at the polluter’s premises. If the polluter is found to have failed to stop the illegal discharging, a continuous penalty will then be imposed on a daily basis calculated from the day after service of the First Order until the date of the reinspection. Another rectification order, called “Second Order”, will be issued, which specifies the reason for imposing the penalty and how it is calculated. The government can conduct multiple re-inspections. If the polluter is still found to have resisted to co-operate, the government can again issue a fine up to the date of the reinspection. The consecutive daily fines will continue to be calculated on a rolling basis, uncapped, until rectification is finally completed. The continuous fines may also be applied simultaneously with other enforcement measures such as suspension of production, seizure, or administrative detention.

Seizure of facilities and equipment

The new law also grants greater power to environmental authorities to seize facilities and equipment where a polluter’s illegal discharge causes or may cause severe pollution. In furtherance of this new power, the Measures for Seizure and Detention, effective on 01/01/2015, identify six situations subject to seizure and detention and establish the required procedure for implementing the sanctions.

Suspension of business

If a polluter discharges excessive amount of pollutants, the authorities may order the polluter to suspend or shut down its production. In this way, the revised Environmental Protection Law substantially raises the cost of illegal discharging. When rectification is completed, a follow-up inspection should be conducted within 30 days starting the day the sanction is lifted.

Administrative detention

Responsible senior managers could be put under administrative detention by the Public Security Ministry for up to 15 days at a time for repeated infringements by their company. This is a step ahead of the old Environmental Protection Law, under which responsible individuals were subject to legal liability only in the event that the violation constituted a criminal offence. The Supreme People’s Court also issued a judicial interpretation in December 2016, which defines 18 types of environmental crimes as “serious environmental pollution” and 13 types of “severe consequences” that are subject to increased penalties. Notably, falsifying monitoring data is considered for the first time a crime, which could lead to more effective deterrence and punishment of such kind of violations. Companies may now also be criminally charged if

they fail to operate pollution controls required by law, for instance by illegally saving money that should have been committed to operating required pollution control equipment.

Between January 2015 and August 2018, more than half a million enforcement actions have been taken throughout the country, totalling 31.6 billion yuan in the sum of fines applied (Table 6.2, Figure 6.1). The numbers have jumped rapidly from year to year. Among the new measures developed to enhance law enforcement, seizure of facilities and equipment is used most frequently, involving over 46,000 cases for the said period. The least oft-used measure is consecutive daily penalty, with less than 3,500 cases in four years, the highest penalty being 90 million yuan in a single case and 3.3 billion yuan in the total sum (Li, 2017). Most of these were imposed on polluters in the chemical, thermal power, steel and glass industries. In practice, the daily penalty measure has not been very effective. It can entail significantly high administrative costs as it requires constant surveillance by the law enforcement authorities to prove that the polluter has committed serious infringements and refused to take actions to rectify. Close to 10% of firms were found to recidivate after receiving a consecutive daily fine in 2016 (Li, 2017).

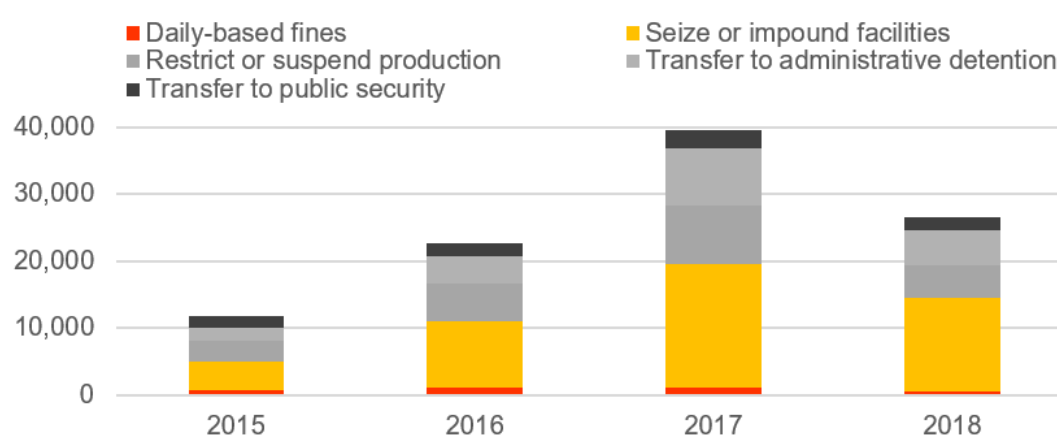
Table 6.2. Enforcement of Environmental Protection Law, 2015-18

Year	Nb. of administrative penalties rendered	Total amount fined or confiscated, mln yuan	Selected measures of penalties					
			Consecutive daily fine		Seize or impound facilities	Restrict or suspend production	Transfer to administrative detention	Transfer to public security
			Nb. of cases	Amount, mln yuan				
2015	97,422	4,252	716	569.5	4,192	3,100	2,083	1,685
2016	124,700	6,633	1,017	814.4	9,976	5,673	4,041	2,023
2017	233,000	11,560	1,165	1,075.4	18,332	8,756	8,604	2,736
2018	109,696	9,123	537	881.7	14,054	4,731	5,276	1,853
Total	564,818	31,568	3,435	3,341	46,554	22,260	20,004	8,297

Notes: Figures for 2018 refer to January-August. The 2017 figure for total amount of daily-based fines refers to January-November.

Source: [MEE](#).

Figure 6.1. Five measures of environmental administrative penalties, 2015-18



Notes: Figures for 2018 refer to January-August.

Source: [MEE](#).

Increase the use of random spot checks

An environmental supervisory system called “double random, one open” was introduced by the State Council in July 2015 to increase the use of random spot checks and supervision, including by: establishing a random check list and a “double random” spot check mechanism; determining the proportion and frequency of random sampling; and enhancing the use of random inspection results. In October 2015, the MEP issued detailed regulations on random sampling subjects, spot checks contents, object, ratio, and method. By end 2017, all city and county-level environmental bureaus have established random spot check supervision. 2,960 dynamic supervision of pollution sources were set up, covering 805,500 stationary sources of pollutants. 632,260 inspections, including random inspections, were conducted in 2017 and found 37,900 cases of violations.

Enhance local government accountability

A key factor to the success of the environmental law is to persuade provincial and local officials to effectively enforce its provisions. The national government has sought to address this by strengthening the importance of achieving environmental targets in the performance management and career advancement of senior subnational officials. This is enshrined in the revised Environmental Protection Law (Article 26) as well as a 2015 measure that holds both senior party and government officials accountable for environmental damages¹⁹. A set of green development indicators was elaborated to support the performance evaluation and enhance local government accountability through “race to the top” competition. In addition, the law provides that local officials will face tougher penalties, including demotion or even dismissal, if they are found responsible for a failure to meet pollution targets.

In July 2015, China’s political leadership – the Central Party Committee – passed a Trial Environmental Protection Inspection Scheme, which explicitly mentions that party officials responsible for causing environmental damages will be held accountable throughout their lifetimes, whether they have already been transferred, promoted or retired (the so called “lifetime accountability”). It was decided that the central government will send high-profile environmental inspection teams in 2016-17 to provinces and cities to assess how well they were enforcing environmental laws and regulations. Focus of the central inspection will shift from previously supervising companies to supervising local governments. Specifically, party chiefs and government leaders in provinces and cities will be inspected, together with relevant governmental departments and local enterprises. Inspection results will be held as important evidence for officials’ performance evaluation.

The central inspection teams have considerable influence and are sometimes compared to the sweeping anti-corruption inspections carried out since 2013. Chief inspector of each team is appointed by the central party leadership, seconded by a vice chief inspector who is usually Vice Minister of the MEP. The rest of the team is made up of officials from the Regional Environmental Inspectorates, officials responsible for cadre performance evaluation coming from the Central Commission for Discipline Inspection and the Central Organisation Department, as well as environmental officials and professional inspectors from other provinces (Chen and Xie, 2018). Inspections generally last for one month. Rectification plans shall be submitted to the State Council for approval within 30 days following the end of the inspection period, and outcomes of the rectification shall be reported within 6 months and disclosed to the public simultaneously. Inspections can take place in response to complaints. In 2017, the majority (close to 57%) of complaints received concerned air pollution (MEE, 2018f).

¹⁹ Details see [Trial Measures for Investigating the Responsibility of Senior Party and Government Officials for Damage to Ecology and Environment](#), issued in 2015 by the Central Party Committee and the State Council.

Four rounds of inspections were completed in 31 provinces and cities in 2016-17. Activities consisted of interviewing local officials, conducting visits and spot checks, and responding to information provided by the public (tip-offs and whistleblowing). Inspections generally go through 3 phases:

- **Phase I: Provincial-level inspection.** Individual interviews are conducted with provincial officials, including the party chief, governor, senior managers in economic, planning and housing and construction bureaus that are closely linked to environmental issues. Additional interviews, meetings and field visits are held to identify key issues.
- **Phase II: Fact-finding inspection** to verify statements by provincial authorities and collect further evidence.
- **Phase III: Report drafting.** A comprehensive report is elaborated. Each of the problems investigated is substantiated with a dozen materials including interview transcripts.

Typically, local government accountability is enforced in the following ways:

- **During the inspection phase:** local authorities investigate acts of negligence and pin down accountability based on reports and complaints provided by the central inspection team;
- **Post-inspection phase:** the central inspection team transfers to local authorities the investigated cases for them to take necessary actions;
- **During the rectification phase,** local authorities proactively seek to hold accountable those who fail to rectify their actions, or conduct accountability investigations based on problems identified through additional, special inspections.

The 2016-17 inspections have revealed some serious breaches and resulted in the application of sanctions, including fines, detention and Party disciplinary punishment (Box 6.1.). A total of 135,000 offence complaints were examined, resulting in:

- Fines totalling 1.43 billion yuan levied in 29,000 cases;
- 1,527 persons detained in 1,518 cases;
- 18,448 persons interviewed (among which 768 senior officials at provincial level and above, 677 departmental chiefs), 18,199 persons held accountable, and many received party disciplinary sanctions

A number of the problems identified are reflection of deeper tensions, such as misalignment between environmental objectives with the development model of certain communities that is resource intensive, mono-industry, and heavily reliant on land finance to provide the developmental proceeds. While large-scale production suspension delivers the quickest pollution abatement effects and is one of the most oft-used rectification measures, its effectiveness in the longer term is questionable. Further diversifying the economic structure and developing the environmental sector would be crucial for some communities that are heavily dependent on the revenues generated from single dominant industry that is highly polluting.

Furthermore, the effectiveness of environmental enforcement is also influenced by the institutional framework within which these activities are embedded. A key challenge is to ensure that environmental inspectorates are shielded from the undue influence of sub-national governments. As illustrated, the vertical environmental governance reforms introduced in 2017 marks an important step to enhance law enforcement below provincial level governments.

Box 6.1. Key findings of the 2016-17 central environmental inspections

Many of the environmental violations discovered would not have been possible without the consent and implicit or explicit support from the local governments, while others have exploited the local environmental bureaus' lack of capacity and consistency to strengthen enforcement. Key findings include:

- Some construction projects had either not undergone a proper EIA before construction began or altogether ignored the EIA recommendations (e.g. Shanxi province approved more than 20 low calorific value coal-fired power plants against the opinions of the EIAs and despite the severe air pollution and thermal power overcapacity in the region);
- Some cities that had not completed an evaluation of their social and economic development received an excellent grade for their performance;
- Nature reserve areas have been sacrificed for urban development, particularly real estate development that constitutes an important source of local fiscal revenue;
- Some companies were found falsifying pollution data, sometimes by interfering with the activity of the air quality monitoring stations;
- In some jurisdictions, fiscal resources have been repeatedly used to pay pollution charges of companies (e.g. the prefectural government of [Leping, Jiangxi](#) used its own fiscal resources to cover pollution levies worth 11,47 million yuan for 36 companies over 2012-14);
- Some local governments prevented the environmental bureaus to perform normal inspection and enforcement duties.

Source: [Xinhua News Agency](#).

Finally, while the central inspection teams are helping to identify and rectify environmental enforcement failures, they are an ad hoc measure and highly antagonistic. The decision to set up a Central Inspectorate Office within the MEE represents the first step towards normalising this unconventional approach and maintaining constant pressure on local authorities and enterprises. While the deterrent power is effective, its administrative cost is high and not necessarily sustainable in the long term. A key challenge for the government is how to use scarce inspection resources most efficiently. Many OECD countries now use a risk-based approach that analyses several types of risk: the magnitude of the environmental risks; the potential exposure of populations or sensitive ecosystems; and risk of non-compliance based on companies' compliance history (OECD, 2017).

In the future, further efforts will be needed to develop a broader, more systematic approach to environmental enforcement that involves an appropriate mix of activities in three areas: **compliance promotion, compliance monitoring and enforcement**. In the longer term, as the law-abiding culture and environmental awareness gradually gaining grounds in business and society at large, the government should consider giving a bigger role to activities that encourage compliance but do not involve sanctions for non-compliance. These could include actions to facilitate dissemination and understanding of policies and regulations, technical assistance and training, and regulatory and financial incentives (OECD, 2017). These actions aim to help companies understand the environmental requirements they are facing, what possible measures to take to achieve compliance and how to lower the cost of compliance. Typically, the preparation of customised permits provides opportunities for regulators to explain the necessity and benefits of compliance, especially to large companies. To communicate with small and medium-sized enterprises that are subject to general binding rules, many OECD countries have found that using communication tools that emphasise the economic benefits of compliance are often the most effective (OECD, 2017). The emerging Social Credit System in China also constitutes an innovative approach to incentivising companies to self-police and reinforce compliant behaviour.

6.2.2. Mobile sources

The amended 2014 Air Pollution Law requires in-use motor vehicles not meeting emission standards to be retrofitted or scrapped if retrofitting is proved insufficient to reduce emissions. It also prohibits a dozen behaviours with varying degrees of penalties (Table 6.3). Besides punishing companies that produce or sell vehicles failing the emission standards, the law specifically prohibits the vehicle manufacturer, the emission test centre and the vehicle owner from tampering with emissions control devices or systems.

Over the past three years, the MEP has reportedly conducted inspections of certified vehicle emission test centres. In 2017, the MEP and the Certification and Accreditation Administration (CNCA) jointly inspected 200 test centres and found over half that were in violation with laws and regulations (CNCA, 2018). The MEP also set up a special task force to investigate two diesel vehicle manufacturers, and found evidence of tampering with emission control devices and car fleets not meeting emission standards. The two companies received a total of 37 million yuan fine (MEE, 2018g), marking the first sanction against car manufacturers since enactment of the revised Air Pollution Law in 2016.

Table 6.3. Selected prohibited behaviours and penalties for mobile source emissions

Prohibited behaviours	Penalties	Enforcement agencies
Produce motor vehicles and non-road mobile machinery not meeting emission standards	(a) Confiscate illegal sales income, fine 1-3 times the value of goods, destroy prohibited vehicles and machineries	(a) Environmental bureaus at provincial level and above
	(b) Suspend production until rectification completed in case of refusal to co-operate	(b) Responsible departments within State Council (AQSIQ, NDRC, SAIC)
Import or sell motor vehicles and non-road mobile machinery not meeting emission standards	(a) Confiscate illegal sales income, fine 1-3 times the value of goods, destroy prohibited vehicles and machineries	(a) Industry and commerce administration and Entry-exit inspection and quarantine at county level and above
	(b) Criminal penalty applied in case of smuggling	(b) Customs
Vehicle producer tampering with motor engines or emissions control devices or systems	(a) Confiscate illegal sales income, fine 1-3 times the value of goods, destroy prohibited vehicles and machineries	(a) Environmental bureaus at provincial level and above
	(b) Suspend production	(b) Responsible departments within State Council (AQSIQ, NDRC, SAIC)
Fail to disclose information on emission test results and in-use pollution control technology	Fine 50,000-500,000 yuan	Environmental bureaus at provincial level and above
Inspection station tampering with emission test results	Confiscate illegal income and fine 100,000-500,000 yuan	Environmental bureaus at county level and above

Source: [Air Pollution Prevention and Control Law](#).

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