

Online Appendix of  
**Navigating and Evaluating the Labyrinth of Environmental Regulation in China**

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**A. China's Climate Change Regulation**

Compared to air and water pollutants, which act locally, globally-acting greenhouse gas emissions (GHGs) are relatively new on China's regulatory agenda, but have grown in prominence on China's policy agenda and shifted from an international to an increasingly domestic issue. In the early 1990s, China felt limited international pressure to control GHGs, and treated climate change as a pure scientific issue. During this period, the National Climate Change Coordinating Group (NCCCCG) under the State Meteorological Association shaped China's negotiating position, advancing the principle of nations' "common but differentiated responsibilities" depending on stages of development.

In 1998, recognition of climate change's economic implications led to the reorganization of the NCCCCG into the National Coordination Group on Climate Change Strategy (NCGCCS) under the State Development Planning Commission (SDPC), later the National Development and Reform Commission (NDRC), which is the state's highest economic planning body. As an Annex B nation to the Kyoto Protocol, China was not subject to binding targets, although it did participate actively in the Clean Development Mechanism (CDM), becoming the largest contributing nation in terms of tons of CO<sub>2</sub> offsets generated. Since 2000, energy-related CO<sub>2</sub> emissions have more than tripled, experiencing the most rapid growth in the first decade of the 2000s, before decelerating in step with economic growth since 2013. In 2007, China surpassed the U.S. to become the world's largest CO<sub>2</sub>-emitting nation and a major contributor to emissions of other greenhouse gases.

Efforts to limit the country's energy-related CO<sub>2</sub> emissions began in the second half of the 2000s. The NCGCCS became the National Leading Group on Climate Change (NLGCC), elevating its importance by placing it under the leadership of the country's Premier. Recognizing China's status as the world's largest emitter, at the 2009 Copenhagen climate change conference, China's delegation pledged to reduce the CO<sub>2</sub> intensity of its GDP by 40-45% by 2020, relative to 2005 levels. CO<sub>2</sub> intensity targets for provinces were subsequently incorporated into the

Twelfth Five-Year Plan (2011-2015), building on prior targets for energy intensity introduced in the Eleventh FYP, and regulators began to pilot regional CO<sub>2</sub> emissions trading systems starting in 2013. Prior to that point, China's Five-Year Plans included targets for energy intensity, which due to the country's high reliance on carbon-intensive coal, essentially targeted CO<sub>2</sub> emissions.

### **A.1. Climate Laws and Plans**

China has no law dedicated to climate change. The most relevant law is the *Renewable Energy Law* that was initially promulgated in 2005 and revised in 2009. The law provides a crucial long-term commitment to renewable energies by adopting feed-in tariffs. China's climate strategy is best summarized by *China's Policies and Actions for Addressing Climate Change*. Since 2008, this white paper has been updated annually and is prepared to help people fully understand China's actions and their performance in addressing climate change in each year.

China first affirmed its commitment to addressing climate change in the Tenth FYP and first set explicit targets for carbon emissions in the Twelfth FYP. The Twelfth FYP called for a 17% cut in carbon intensity and included a separate chapter on climate change. Reiterating the target of peaking carbon emissions by 2030 and making best efforts to peak earlier, the Thirteenth FYP further strengthened climate targets to reducing carbon intensity and energy intensity by 18% and 15% respectively and increasing the share of non-fossil energy in primary energy to 15% by 2020.

To help achieve these targets, the Chinese government released the *National Plan on Climate Change (2014-2020)* in 2014, and the *Work Plan for Controlling Greenhouse Gas Emissions* during the Twelfth and Thirteenth FYP periods. Providing concrete measures for climate goals, these sub-plans include key measures to address coal consumption and to develop low carbon models, including expanding renewable generation resources, limiting the operation of coal power plants, directing economically developed regions to peak carbon emission earlier than 2030, and establishing a national carbon market in 2017.

### **A.2. Carbon emission regulations**

The cornerstone of China's effort to mitigate climate change is emissions trading. China has launched seven regional carbon market as pilots since 2013 (Auffhammer and Gong, 2015). The pilots cover all four province-level municipalities (Beijing, Shanghai, Tianjin, and Chongqing), two provinces (Guangdong and Hubei), and one special economic zone (Shenzhen). The total

allowances for the seven trading programs add up to 1.2 billion tons of carbon dioxide per year (Zhang, Wang, and Du, 2017). In December 2017, NDRC released the development plan of China's national carbon emissions trading scheme (ETS). The creation of a national carbon market shows China's commitment to meet its National Determined Contribution (NDC) under the 2015 Paris Agreement. Once fully implemented in the power sector, China's ETS will become the world's largest carbon market. However, the implementation of the National ETS has been repeatedly delayed because of concerns about the quality of emission data. A National ETS is currently expected by the end of 2020.

In addition to the emissions trading system for CO<sub>2</sub>, other policy instruments including renewable portfolio standards, energy efficiency programs, and low carbon cities initiatives have been introduced to reduce CO<sub>2</sub> emissions. Energy-related CO<sub>2</sub> emissions are generated from the same industrial processes that generate air pollution, and as a result of efforts to reduce CO<sub>2</sub> have been coupled to, or justified as, efforts to reduce local air pollution.

### **A.3. Regulatory Effectiveness of Climate Policies**

Early empirical studies of CO<sub>2</sub> emissions in China focused on the impacts of the Clean Development Mechanism and of the national energy intensity targets on CO<sub>2</sub>. Zhang and Wang (2011) examine the additionality of the CDM by examining changes in SO<sub>2</sub> emissions, which are co-emitted with CO<sub>2</sub>. Another study finds that energy intensity reduction in manufacturing firms corresponded to a more-than-proportional reduction in CO<sub>2</sub> emissions during the Eleventh FYP because reducing industrial coal use was the dominant abatement strategy (Cao and Karplus 2014).

Studies evaluating the *ex post* effectiveness of China's emissions trading pilots are few and far between. One of the challenges of conducting well-identified studies is the contemporaneous implementation of air pollution control measures from 2013-2017. Cui, Zhang, and Zheng (2018) find that environmental patenting increased after the start of the emissions trading pilots. To date, there are no papers we are aware of that systematically examine the performance of the emissions trading pilots. China's national emissions trading system is still in the design and testing phase, and is expected to cover the thermal power sector only when it initially launches. Eventually, the system is expected to cover the major energy-intensive industrial sectors and

aviation. Both the emissions trading pilots and the national system provide exciting possibilities for future research.

## **B. Assessment of Information Regulation and Auxiliary Policies**

With increasing disclosure of firm emission and ambient quality data, studies are emerging to investigate the effects of information provision. Tu et al. (2020) show that the release of Cai Jing's documentary *Under the Dome* in 2015 raised citizen willingness-to-pay for better air quality by 24.9%, or CNY 1,226 per capita. Barwick et al. (2019) evaluate the impact of providing information to citizens about the consequences of air pollution exposure, and find that the program increased online inquiries about air pollution and resulted in adjustments in day-to-day household consumption. Chen et al. (2021) show that the news coverage of cadmium tainted rice in 2013 prompted consumers to adopt defensive measures such as switching drinking water sources, thereby reducing bone diseases in the long run.

Although we focus on environmental policies in this paper, some other policies have been shown to lead to environmental impacts. For instance, Fu and Gu (2017) examine the impact of road pricing on air pollution, and find that eliminating tolls increases air pollution by 20% and decreases visibility by one kilometer. Li et al. (2019) show that the rapid buildout of subway lines in Beijing between 2008 and 2016 improved air quality by 2%. Viard and Fu (2015) show that one-day-per-week no-drive-day restrictions improved air quality by 21% in Beijing. In terms of water pollution, Qi et al. (forthcoming) argue that larger firms in China have lower COD emission intensities and higher TFP, but also face larger distortions. Removing such "correlated distortions" can help raise aggregate output and reduce emission intensities.

## **C. Environmental Laws and Action Plans**

In this section, we describe environmental laws governing specific pollutants and list the Action Plans. The *Law on the Prevention and Control of Water Pollution* (LPCWP) was first adopted in 1984. The most recent amendment in 2017 led to the nationwide adoption of the "river chief system" after piloting in the first decade of 2000, which assigned to local officials the responsibility for stewardship of tracts of watershed land. Legislation on air pollution began in 1987 with the enactment of the *Atmospheric Pollution Prevention and Control Law* (APPCL). The 2015 revision, which became effective on Jan. 1, 2016, strengthened air pollution regulation and enforcement. Specifically, it required local governments to develop plans to meet air quality

targets and monitor progress towards them, established fines for failing to track or falsifying continuous emissions monitoring system data, and required local governments to protect confidentiality of citizens that report illegal polluting acts and reward them if claims are substantiated (Ma, 2015). Soil pollution, including contamination by heavy metals and organic chemicals, has placed increasing pressure on China's already scarce agricultural land, but legislative efforts to address it have lagged behind air and water pollution. China's *Law on the Prevention and Control of Soil Pollution* entered into effect on January 1, 2019. A major purpose of the law was to define the parties that should be held responsible for remediation and cleanup.

Other environmental laws govern solid waste, marine environment, noise pollution, and the safe handling of radioactive materials, as well as the quality of environmental data, the levying of environmental taxes, and the requirements of environmental impact assessments. The major environmental laws to date are summarized in Table C1.

**Table C1. The System of Environmental Laws in China<sup>1</sup>**

		Year Passed	Revision		Amendment		
			1 <sup>st</sup>	2 <sup>st</sup>	1 <sup>st</sup>	2 <sup>st</sup>	3 <sup>st</sup>
<b>Basic Law</b>	Environmental Protection Law	1989	2014				
<b>Specific Areas</b>	Law on the Prevention and Control of Water Pollution	1984	2008		1996	2017	
	Law on the Prevention and Control of Atmospheric Pollution	1987	2000	2015	1995	2018	
	Law on the Prevention and Control of Solid Waste	1995	2004	2020	2013	2015	2016
	Law on the Prevention and Control of Soil Pollution	2018					
	Marine Environment Protection Law	1982	1999		2013	2016	2017
	Law on the Prevention and Control of Environmental Noise Pollution	1996	2018				
	Law on the Prevention and Control of Radioactive Pollution	2003					
<b>Related Laws</b>	Environmental Impact Assessment Law	2002			2016	2018	
	Cleaner Production Promotion Law	2002			2012		
	Circular Economy Promotion Law	2008			2018		
	Environmental Protection Tax Law	2016			2018		

<sup>1</sup> The modification of Chinese laws includes amendment (修正) and revision (修订), with the later representing more extensive changes.

**Table C2. China’s Environmental Actions Plans**

<b>Period</b>	<b>Environmental Action Plans</b>
<b>Pollutant-based Pollution Control</b>	
2013-2017	Action Plan on Air Pollution Prevention and Control
2018-2020	Three-Year Action Plan for Winning the Blue-sky War
2015-2020	Action Plan on Water Pollution Prevention and Control
2016-2020	Action Plan on Soil Pollution Prevention and Control
<b>Region- and Industry-based Pollution Control</b>	
2018-2020	Action Plan for the War on Agricultural and Rural Pollution Control
2017-2020	Offshore Area Pollution Prevention Program
2018-2020	Action Plan for the Uphill Battles for the Integrated Bohai Sea Management
2019-2025	Action Plan for the Pollution Prevention and Control of Waste Lead-acid Batteries
<b>Energy Saving and Emission Reduction</b>	
2014-2015	Action Plan on Energy Saving, Emission Reduction, and Low-carbon Development
2016-2020	The 13th Five-Year Comprehensive Work Plan for Energy Saving and Emission Reduction
2014-2020	Action Plan on Upgrading and Reconstruction of Coal-Fired Power Plans for Energy Saving and Emission Reduction
<b>Ecological Conservation</b>	
2011-2030	National Biodiversity Strategy and Action Plan
2016-	Implementation Plans for National Ecological Civilization Pilots
<b>Integrated Management</b>	
2018-2020	Three-Year Action Plan to Improve the Rural Environment
2019-2020	“Zero-waste City” Pilot Program

## D. Comprehensive List of Environmental Standards in China

**Table D1. China's Ambient Environmental Quality Standards**

<b>Standards</b>	<b>Current Version</b>	<b>Retired Version(s)</b>
<b>• Water</b>		
Standards for Irrigation Water Quality	GB 5084-2005	GB 5084-1992
Environmental Quality Standards for Surface Water	GB 3838-2002	GB 3838-88, GHZB 1-1999
Sea Water Quality Standard	GB 3097-1997	GB 3097-82
Quality Standard for Ground Water	GB/T 14848-93	
Water Quality Standard for Fisheries	GB 11607-89	
<b>• Air</b>		
Ambient Air Quality Standards	GB 3095-2012	GB 3095-1996, GB 9137-88
Guideline for Air Quality Assessment of Passenger Car	GB/T 27630-2011	
Indoor Air Quality Standard	GB/T 18883-2002	
<b>• Noise</b>		
Technical Specifications for Regionalizing Environmental Noise Function	GB/T 15190-2014	GB/T 15190-94
Environmental Quality Standard for Noise	GB 3096-2008	GB 3096-93, GB/T 14623-93
Environment Standard of Aircraft Noise around Airport	GB 9660-88	
Standard of Vibration in Urban Area Environment	GB 10070-88	
<b>• Soil</b>		
Soil Environmental Quality Risk Control Standard for Soil Contamination of Agricultural Land	GB 15618-2018	GB 15618-1995
Soil Environmental Quality Risk Control Standard for Soil Contamination of Development Land	GB36600-2018	
Environmental Quality Standard for Soils	GB 15618-1995	



**Table D2. China's Water Pollution Emission Standards**

<b>Standards</b>	<b>Current Version</b>	<b>Retired Version(s)</b>
Discharge Standard for Water Pollutants from Ships	GB 3552-2018	GB 3552-83
Emission Standard of Pollutants for Petroleum Refining Industry	GB 31570-2015	
Emission Standard of Pollutants for Secondary Copper, Aluminum, Lead and Zink Industry	GB 31574-2015	
Emission Standard of Pollutants for Synthetic Resin Industry	GB 31572-2015	
Emission Standard of Pollutants for Inorganic Chemical Industry	GB 31573-2015	
Emission Standard of Pollutants for Battery Industry	GB 30484-2013	
Discharge Standard of Water Pollutants for Leather and Fur Making Industry	GB 30486-2013	
Discharge Standard of Water Pollutants for Ammonia Industry	GB 13458-2013	GB 13458-2001
Effluent Standard of Water pollutants for Citric Acid Industry	GB 19430-2013	GB 19430-2004
Discharge Standard of Water Pollutants for Bast and Leaf Fibres Textile Industry	GB 28938-2012	
Discharge Standards of Water Pollutants for Woolen Textile Industry	GB 28937-2012	
Discharge Standards of Water Pollutants for Reeling Industry	GB 28936-2012	
Discharge Standards of Water Pollutants for Dyeing and Finishing of Textile Industry	GB 4287-2012	GB 4287-92
Emission Standard of Pollutants for Coking Chemical Industry	GB 16171-2012	GB16171-1996
Emission Standard of Pollutants for Ferroalloy Smelt Industry	GB 28666-2012	
Discharge Standard of Water Pollutants for Iron and Steel Industry	GB 13456-2012	GB 13456-1992
Emission Standard of Pollutants for Mining and Mineral Processing Industry	GB 28661-2012	
Emission Standard of Pollutants for Rubber Products Industry	GB 27632-2011	
Discharge Standard of Water Pollutants for Fermentation Alcohol and Distilled Spirits Industry	GB 27631-2011	
Discharge Standard of Water Pollutants for Motor Vehicle Maintenance and Repair	GB 26877-2011	
Effluent Standards of Water Pollutants for Ammunition Loading Industry	GB 14470.3-2011	GB 14470.3-2002
Discharge Standard of Pollutants for Vanadium Industry	GB 26452-2011	
Discharge Standard of Water Pollutants for Phosphate Fertilizer Industry	GB 15580-2011	GB 15580-95
Emission Standard of Pollutants for Sulfuric Acid Industry	GB 26132-2010	
Emission Standards of Pollutants from Rare Earths Industry	GB 26451-2011	
Emission Standard of Pollutants for Nitric Acid Industry	GB 26131-2010	
Emission Standard of Pollutants for Magnesium and Titanium Industry	GB 25468-2010	
Emission Standard of Pollutants for Copper, Nickel, and Cobalt Industry	GB 25467-2010	
Emission Standard of Pollutants for Lead and Zinc Industry	GB 25466 -2010	

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Emission Standard of Pollutants for Aluminum Industry	GB 25465-2010	
Emission Standard of Pollutants for Ceramics Industry	GB 25464-2010	
Discharge Standard of Water Pollutants for Printing Ink Industry	GB 25463-2010	
Discharge Standard of Water Pollutants for Yeast Industry	GB 25462-2010	
Discharge Standard of Water Pollutants for Starch Industry	GB 25461-2010	
Discharge Standard of Water Pollutants for Sugar Industry	GB 21909-2008	
Discharge Standard of Water Pollutants for Pharmaceutical Industry Mixing/Compounding and Formulation Category	GB 21908-2008	
Discharge Standards of Water Pollutants for Pharmaceutical Industry Bio- Pharmaceutical Category	GB 21907-2008	
Discharge Standard of Water Pollutants for Pharmaceutical Industry Chinese Traditional Medicine Category	GB 21906-2008	
Discharge Standard of Water Pollutants for Pharmaceutical Industry Extraction Products Category	GB 21905-2008	
Discharge Standards of Water Pollutants for Pharmaceutical Industry Chemical Synthesis Products Category	GB 21904-2008	
Discharge Standards of Water Pollutants for Pharmaceutical Industry Fermentation Products Category	GB 21903-2008	
Emission Standard of Pollutants for Synthetic Leather and Artificial Leather Industry	GB 21902-2008	
Emission Standard of Pollutants for Electroplating	GB 21900-2008	
Discharge Standard of Water Pollutants for Down Industry	GB 21901-2008	
Discharge Standard of Water Pollutants for Pulp and Paper Industry	GB 3544-2008	GB 3544-2001
Effluent Standards of Pollutants for Heterocyclic Pesticides Industry	GB 21523-2008	
Emission Standard for Pollutants from Coal Industry	GB 20426-2006	GB 8978-1996, GB 16297-1996
Discharge Standard of Water Pollutants for Sapogenin Industry	GB 20425-2006	GB 8978-1996
Discharge Standard of Water Pollutants for Medical Organization	GB 18466-2005	
Discharge Standard of Pollutants for Beer Industry	GB 19821-2005	
Discharge Standard of Pollutants for Monosodium Glutamate Industry	GB 19431-2004	
Discharge Standard of Pollutants for Citric Acid Industry	GB 19430-2004	
Discharge Standard for Water Pollutants from Ordnance Industry Powder and Explosive	GB 14470.1-2002	
Discharge Standard for Water Pollutants from Ordnance Industry Initiating Explosive Material and Relative Composition	GB 14470.2-2002	
Discharge Standard of Pollutants for Municipal Wastewater Treatment Plant	GB 18918-2002	

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Discharge Standard of Pollutants for Livestock and Poultry Breeding	GB 18596-2001	
Standard for Pollution Control of Sewage Marine Disposal Engineering	GB 18486-2001	
Discharge Standard of Water Pollutants for Ammonia Industry	GB 13458-2001	
Integrated Wastewater Discharge Standard	GB 8978-1996	GB 8978-88
Discharge Standard of Water Pollutants for Caustic Soda and Polyvinyl Chloride Industry	GB 15581-95	
Discharge Standard of Water Pollutant and Standard of Analytical Method for Space Propellant	GB 14374-93	
Discharge Standard of Water Pollutants for Meat Packing Industry	GB 13457-92	
Discharge Standard of Water Pollutant for Dyeing and Finishing of Textile Industry	GB 4287-92	
Effluent Standards for Oil-Bearing Waste Water from Offshore Petroleum Development Industry	GB 4914-85	
Emission Standards for Pollutants from Ship Building Industry	GB 4286-84	
Effluent Standard for Pollutants from Ship	GB 3552-83	

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**Table D3. China's Air Pollution Emission Standards (Stationary Sources)**

<b>Standards</b>	<b>Current Version</b>	<b>Retired Version(s)</b>
Emission Standard of Air Pollutants for Paint, Ink and, Adhesive Industry	GB 37824-2019	
Emission Standard of Air Pollutants for Pharmaceutical Industry	GB 37823-2019	
Standard for Fugitive Emission of Volatile Organic Compounds	GB 37822-2019	
Emission Standard of Pollutants for Caustic Alkali and Polyvinyl Chloride Industry	GB 15581-2016	GB 15581-95
Emission Standards of Pollutants for Inorganic Chemical Industry	GB 31573-2015	
Emission Standard of Pollutants for Petroleum Chemistry Industry	GB 31571-2015	
Emission Standard of Pollutants for Petroleum Refining Industry	GB 31570-2015	
Emission Standard of Air Pollutants for Crematory	GB 13801-2015	
Emission Standards of Pollutants for Secondary Copper, Aluminum, Lead, and Zink Industry	GB 31574-2015	
Emission Standard of Pollutants for Synthetic Resin Industry	GB 31572-2015	
Emission Standard of Air Pollutants for Boiler	GB 13271-2014	
Emission Standards of Pollutants for Stannum, Antimony, and Mercury Industries	GB 30770-2014	
Emission Standard of Pollutants for Battery Industry	GB 30484-2013	
Emission Standard of Air Pollutants for Cement Industry	GB 4915-2013	GB 4915-2004
Emission Standard of Air Pollutants for Brick and Tile Industry	GB 29620-2013	
Emission Standard of Air Pollutants for Electronic Glass Industry	GB 29495-2013	
Emission Standard of Air Pollutants for Steel Rolling Industry	GB 28665-2012	
Emission Standard of Air Pollutants for Steel Smelt Industry	GB 28664-2012	
Emission Standard of Air Pollutants for Iron Smelt Industry	GB 28663-2012	
Emission Standard of Air Pollutants for Sintering and Pelletizing of Iron and Steel Industry	GB 28662-2012	
Emission Standard of Air Pollutants for Thermal Power Plants	GB 13223-2011	GB13223-2003
Emission Standard of Air Pollutants for Flat Glass Industry	GB 26453-2011	
Emission Standard of Coalbed Methane/Coal Mine Gas (On Trial)	GB 21522-2008	
Emission Standard of Air Pollutant for Gasoline Filling Stations	GB 20952-2007	
Emission Standard of Air Pollutant for Bulk Gasoline Terminals	GB 20950-2007	
Emission Standard for Pollutants from Coal Industry	GB 20426-2006	GB 8978-1996, GB 16297-1996
Emission Standard of Air Pollutants for Cement Industry	GB 4915-2004	GB 4915-1996
Emission Standard of Cooking Fume	GB 18483-2001	GWPB 5-2000
Integrated Emission Standard of Air Pollutants	GB 16297-1996	

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Emission Standard of Air Pollutants for Industrial Kiln and Furnace	GB 9078-1996
Emission Standards for Odor Pollutants	GB 14554-93

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**Table D4. China's Air Pollution Emission Standards (Mobile Sources)**

<b>Standards</b>	<b>Current Version</b>	<b>Retired Version(s)</b>
Limits and Measurement Methods for Emissions from Gasoline Vehicles under Two-Speed Idle Conditions and Short Driving Mode Conditions	GB 18285-2018	GB18285-2005, HJ/T240-2005
Limits and Measurement Methods for Exhaust Smoke from Non-Road Mobile Machinery Equipped with Diesel Engine	GB 36886-2018	
Limits and Measurement Methods for Emissions from Diesel Vehicles under Free Acceleration and Lug Down Cycle	GB 3847-2018	GB3847-2005, HJ/T 241-2005
Limits and Measurement Methods for Emissions from Diesel Fueled Heavy-Duty Vehicles (CHINA VI)	GB 17691-2018	GB 17691-2005
Limits and Measurement Methods for Emissions from Light-Duty Vehicles (CHINA VI)	GB18352.6-2016	GB18352.5-2013
Limits and Measurement Methods for Emissions of Pollutants from Mopeds (CHINA IV)	GB 18176-2016	GB 18176-2007, GB 20998-2007, GB 14621-2011
Limits and Measurement Methods for Exhaust Pollutants from Marine Engines (CHINA I , II)	GB 15097-2016	GB/T 15097-2008
Limits and Measurement Methods for Emissions from Motorcycles (CHINA IV)	GB 14622-2016	GB 14622-2007, GB 20998-2007, GB 14621-2011
Technical Requirements and Measurement Methods for Emissions from Light-Duty Hybrid Electric Vehicles	GB 19755-2016	GB/T 19755-2005
Limits and Measurement Methods for Exhaust Pollutants from Diesel Engines of Non-Road Mobile Machinery (CHINA III, IV)	GB 20891-2014	GB 20891-2007
Limits and Measurement Methods for Emissions from Light-Duty Vehicles (CHINA V)	HJ 689-2014	
Limits and Measurement Methods for Exhaust Pollutants from Motorcycles and Mopeds under Two-Speed Idle Conditions	GB 14621-2011	GB14621-2002
Limits and Measurement Methods for Exhaust Pollutants from Small Spark Ignition Engines of Non-Road Mobile Machinery (CHINA I , II)	GB 26133-2010	
Limits and Measurement Methods for Exhaust Pollutants from Gasoline Engines of Heavy-Duty Vehicles (CHINA III, IV)	GB 14762-2008	GB 14762-2002
Limits and Measurement Methods for Emissions from Diesel Vehicles under Free Acceleration and Lug Down Cycle	GB 3847-2018	

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Limits and Measurement Methods for Emissions from Diesel Fueled Heavy-Duty Vehicles (CHINA VI)	GB 17691-2018
Limits and Measurement Methods for Emissions from Light-Duty Vehicles (CHINA VI)	GB18352.6-2016
Limits and Measurement Methods for Emissions of Pollutants from Mopeds (CHINA IV)	GB 18176-2016
Limits and Measurement Methods for Exhaust Pollutants from Marine Engines (CHINA I , II)	GB 15097-2016
Limits and Measurement Methods for Emissions from Motorcycles (CHINA IV)	GB 14622-2016
Technical Requirements and Measurement Methods for Emissions from Light-Duty Hybrid Electric Vehicles	GB 19755-2016
Limits and Measurement Methods for Emissions from Light-Duty Vehicles (CHINA V)	HJ 689-2014
Limits and Measurement Methods for Exhaust Pollutants from Motorcycles and Mopeds under Two-Speed Idle Conditions	GB 14621-2011

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**Table D5. China's Noise Emission Standards**

<b>Standards</b>	<b>Current Version</b>	<b>Retired Version(s)</b>
Emission Standard of Environment Noise for Boundary of Construction Site	GB 12523-2011	GB 12523-90, GB 12524-90
Emission Standard for Community Noise	GB 22337-2008	
Emission Standard for Industrial Enterprises Noise at Boundary	GB 12348-2008	GB 12348-90, GB 12349-90
Limit and Measurement Method of Noise Emitted by Stationary Motorcycles and Mopeds	GB 4569-2005	
Limits and Measurement Methods for Noise Emitted by Accelerating Tri-Wheel and Low-Speed Vehicle	GB 19757-2005	
Limit and Measurement Method of Noise Emitted by Accelerating Motorcycles and Mopeds	GB 16169-2005	
Limits and Measurement Methods for Noise Emitted by Accelerating Motor Vehicles	GB 1495-2002	GB 1495-79, GB 1496-79
Limits of Noise Emitted by Stationary Road Vehicles	GB 16170-1996	
Emission Standards and Measurement Methods of Railway Noise on the Boundary alongside Risky Line	GB 12525-90	



**Table D6. China's Solid Wastes Control Standards**

<b>Standards</b>	<b>Current Version</b>	<b>Retired Version(s)</b>
Safety Requirements for Near Surface Disposal of Low and Medium Level Radioactive Solid Waste	GB 9132-2018	GB 9132-1988, GB 16933-1997
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Compressed Piece of Scrap Automobile	GB 16487.13-2017	GB 16487.13-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Waste and Scrap of Plastics	GB 16487.12-2017	GB 16487.12-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Vessels and Other Floating Structures for Breaking Up	GB 16487.11-2017	GB 16487.11-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Metal and Electrical Appliance Scraps	GB 16487.10-2017	GB 16487.10-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Waste Wires and Cables	GB 16487.9-2017	GB 16487.9-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Waste Electric Motors	GB 16487.8-2017	GB 16487.8-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Nonferrous Metal Scraps	GB 16487.7-2017	GB 16487.7-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Waste and Scrap of Iron and Steel	GB 16487.6-2017	GB 16487.6-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Waste and Scrap of Paper or Paperboard	GB 16487.4-2017	GB 16487.4-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Wood and Wood Articles Wastes	GB 16487.3-2017	GB 16487.3-2005
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials —Smelt Slag	GB 16487.2-2017	GB 16487.2-2005
Standard for Pollution Control on Polychlorinated Biphenyls (Pcbs) —Contaminated Wastes	GB 13015-2017	GB 13015-91
Standard for Pollution Control on the Municipal Solid Waste Incineration	GB 18485-2014	GB 18485-2001
Safety Requirements for Near Surface Disposal of Low and Medium Level Radioactive Solid Waste	GB 9132-2018	GB 9132-1988, GB 16933-1997
Standard for Pollution Control on Co-Processing of Solid Wastes in Cement Kiln	GB 30485-2013	
Standard for Pollution Control on the Landfill Site of Municipal Solid Waste	GB 16889-2008	GB 16889-1997

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Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Vessels and Other Floating Structures for Breaking Up	GB 16487.11-2005	GB 16487.11-1996
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Waste and Scrap of Fibers	GB 16487.5-2005	GB 16487.5-1996
Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials—Wastes of Bones	GB 16487.1-2005	GB 16487.1-1996
Standard for Pollution Control on Hazardous Waste Storage	GB 18597-2001	
Standard for Pollution Control on the Storage and Disposal Site for General Industrial Solid Wastes	GB 18599-2001	
Standard for Pollution Control on the Security Landfill Site for Hazardous Wastes	GB 18598-2001	
Pollution Control Standard for Hazardous Wastes Incineration	GB 18484-2001	GWKB 2-1999
Control Standard on Ploy Chlorinated Biphenyls for Wastes	GB 13015-91	
Control Standards of Pollutants in Fly Ash for Agricultural Use	GB 8173-87	
Control Standards for Urban Wastes for Agricultural Use	GB 8172-87	
Control Standards for Pollutants in Sludge from Agricultural Use	GB 4284-84	

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## References:

- Auffhammer, M. and Y. Gong. 2015. China's carbon emissions from fossil fuels and market-based opportunities for control. *Annual Review of Resource Economics*, 7(1), pp.11-34.
- Barwick, Panle Jia, Shanjun Li, Ligu Lin, and Eric Zou.. 2019. "From Fog to Smog: The Value of Pollution Information." <http://www.nber.org/papers/w26541>.
- Cao, J., and V. J. Karplus. 2014. "Firm-Level Determinants of Energy and Carbon Intensity in China." *Energy Policy* 75 (December): 167–78.
- Chen, X., J. Zhao, and L. Zhou. 2021. "Knowledge is safety: effects of the cadmium rice event in China," Working paper.
- Cui, J., J. Zhang, and Y. Zheng. 2018. "Carbon Pricing Induces Innovation: Evidence from China's Regional Carbon Market Pilots". *AER Papers and Proceedings*, 108, pp. 453–57.
- Fu, Shihe, and Yizhen Gu. 2017. "Highway Toll and Air Pollution: Evidence from Chinese Cities." *Journal of Environmental Economics and Management*. <https://doi.org/10.1016/j.jeem.2016.11.007>.
- Li, S., Y. Liu, A.O. Purevjav, and L. Yang. 2019. "Does Subway Expansion Improve Air Quality?" *Journal of Environmental Economics and Management* 96 (July): 213–35. <https://doi.org/10.1016/j.jeem.2019.05.005>.
- Ma, Tianjie. 2015. China's environment in 2015: a year in review. *China Dialogue*. <https://chinadialogue.net/en/pollution/8497-china-s-environment-in-2-15-a-year-in-review/>
- Qi, J., Tang, X. and Xi, X., forthcoming. The Size Distribution of Firms and Industrial Water Pollution: A Quantitative Analysis of China. *American Economic Journal: Macroeconomics*.
- Tu, M., B. Zhang, J. Xu, F. Lu, 2020. Mass media, information and demand for environmental quality: Evidence from the "Under the

Dome". *Journal of Development Economics*, 143, p.102402.

Viard, V.B., S. Fu, The effect of Beijing's driving restrictions on pollution and economic activity, *Journal of Public Economics*, Volume 125, 2015, 98-115.

Zhang, J., and C. Wang. 2011. "Co-benefits and additionality of the Clean Development Mechanism: An empirical analysis." *Journal of Environmental Economics and Management*, 62(2):140-154.

Zhang, J., Z. Wang, and X. Du. 2017. "Lessons learned from China's regional carbon market pilots." *Economics of Energy and Environmental Policy*, 6(2): 1-20.