China Adopts World-Class Pollutant Emissions Standards for Coal Power Plants

Key Points

- China's new emissions standards for power plants are comparable to standards in the developed world in important respects.
- These standards are being phased in quickly. They apply to new plants starting January 1, 2012, and existing plants have just 2½ years to meet the standards.
- The standards include provisions for even greater stringency in highly polluted areas.
- China has raised electricity rates to fund the $41 billion investment in new pollution abatement equipment as well as the operating costs needed to comply with the standards.
- These measures also encourage greater energy efficiency and the use of renewables, as they raise the cost of coal-fired power.

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China's new state-of-the-art national air pollution standards for thermal power plants went into effect January 1, 2012, replacing standards that had been in effect since 2003.[1] Not only are these standards much more stringent than the previous standards, but they bring Chinese power plant regulation generally in line with developed world standards in important respects. This is true for both new and existing power plants. The new Chinese law gives existing power plants a 2½ year grace period to meet the new standards, but then all existing plants will be subject to the new standard. Older plants will also see a tightened standard (and sometimes stricter than the US or the EU for existing plants).

There are separate standards for oil and natural gas-fired power plants, with the oil standards being at least as strict as coal and the natural gas standards much stricter. However, since most of China's power generation comes from coal, the coal standards are the most relevant to addressing China's air pollution challenges. The chart on the following page compares China's new standards to the US[2] and EU[3] standards for coal-fired power plants.[4]

Coal-fired power plants consume more than half of China's annual coal production, and emit over 40% of China's sulfur dioxide (SO_2) and nitrogen oxides (NO_X) pollutants.

Not only are the new standards strict, but they are even more stringent for new plants in large regions that have the most serious air pollution problems. In regions designated by China's Ministry of Environmental Protection (MEP) as having severe air pollution problems, the limits will be 50 mg/m^3 for SO_2, 100 mg/m^3 for NO_X, and 20 mg/m^3 for particulates.

These new regulations are a major commitment to environmental investment by China. The Chinese government estimates compliance with the new MEP standards will require power companies to invest about $41 billion to upgrade pollution abatement equipment, and the annual operating cost for NO_X control equipment alone will be around $9.6 billion (61.2 billion RMB). To pay for the investment, on December 1, 2011, China's National Development and Reform Commission raised electricity prices for industrial users by RMB 0.03 (or .47 US cents) per KWh.[5] This increase includes RMB 0.008 for NO_X control. This both supports the costs of the environmental investments and operating costs, and it raises the price of coal-fired power, increasing the incentives for efficiency and making renewable energy more competitive.

During China's 11th Five Year Plan (2006-2010) SO_2 control equipment was installed on the vast majority of China's coal-fired power plants. The new pollution abatement equipment combined with the closure of 76 GW of the most highly polluting old coal-fired power plants reduced China's total sulfur emissions by over 14%.[6] NO_X control was added in March 2011 in the 12th Five Year Plan. According to the Chinese Electricity Council, by the end of 2010 (before the requirement came into force) 14% of coal-fired power plants (totally 90 GW) had already installed NO_X control equipment. During the next five years this number will grow considerably, and additional equipment will be added to control mercury and to meet tighter standards for other pollutants.

CHINA, EU, AND U.S. COAL-FIRED POWER PLANT STANDARDS (All units mg/m^3)

		China	European Union	United States	
NO_x	**New Plants**	100	500 until 12/31/2015, then 200	117	
	Existing Plants (defined in China as built 1/1/04-12/3/11) (defined in US as built after 2/28/05)	100	500 until 12/31/2015, then 200	117	
	Existing Plants (defined in China as built before 1/1/04) (defined in US as built before 2/28/05)	200	500 until 12/31/2015, then 200	160 (built between 1997-2005)	640 (built between 1978-1996)
SO_2	**New Plants**	100	200	160 (built after 2005)	
	Existing Plants (28 provinces) (four provinces with high sulfur coal)[7]	200 400	400	160 (built between 1997-2005)	640 (built between 1978-1996)
Particulates	**New and Existing Plants**	30	50, with an exception of 100 for low quality coal (eg lignite)	22.5	
Mercury	**New and Existing Plants**	0.03	0.03 (A German standard only. No EU wide standard)	**New:** 0.001 (bituminous, gangue), 0.005 (lignite) **Existing:** 0.002 (bituminous, gangue), 0.006 (lignite)	

NOTES

1. A summary (in English) and the full text of the new regulations (in Chinese) are available from the Chinese Ministry of Environmental Protection online at: http://english.mep.gov.cn/standards_reports/standards/Air_Environment/Emission_standard1/201201/t20120106_222242.htm

2. The United States uses performance metrics (e.g., pounds/GWh, pounds/million Btu heat input), rather than concentration standards, in regulating power plants. To compare, we converted the U.S. standards to concentrations. Full regulations online at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr60_main_02.tpl (subparts D/DA)

   See also: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr63e_main_02.tpl (subpart UUUUU)

3. The European standards are based on power plant size. The values in the table are based on larger power plants (>500 MW) comparable to Chinese facilities (where no new small plants are allowed and most existing small plants have been decommissioned). New plants are those placed into service after 2003. Full regulations online at: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2001/l_309/l_30920011127en00010021.pdf

4. The chart is based on work by the US-based Energy Foundation and the Regulatory Assistance Project (RAP). RAP is "a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors, providing technical and policy assistance to policymakers and regulators on a broad range of energy and environmental issues." www.raponline.org

   We are grateful for the advice of Jeremy Schreifels in how to compare the different standards given different approaches to regulatory design.

5. Lu, Hui. "China hikes power tariffs, adjusts coal prices to ease power shortages." *Xinhua*. 30 November 2011. Online at: http://news.xinhuanet.com/english2010/china/2011-11/30/c_131280061.htm

6. Deng, Shasha. "China meets pollution control targets for 2006-2010." *Xinhua*. 29 August 2011. Online at: http://news.xinhuanet.com/english2010/china/2011-08/29/c_131081860.htm

7. The four provinces are Guangxi, Sichuan, Guizhou, and Chongqing.

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