

# EARLY ADOPTION OF CHINA 5/V VEHICLE EMISSION STANDARDS IN GUANGDONG PROVINCE

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WORLDWIDE.

On February 15, 2015, the Guangdong Environmental Protection Department (EPD) announced a province-wide plan for early adoption of China 5/V (Euro 5/V-equivalent) tailpipe emission standards.<sup>1</sup> Guangdong province becomes the third region in China (after Beijing and Shanghai) to move from China 4/IV to China 5/V standards on an advanced schedule, though with a 9- to 12-month postponed timeline announced on March 27, 2015.<sup>2</sup> The early adoption plan includes both light-duty vehicle (GB 18352.5–2013) and heavy-duty vehicle (GB 17691–2005) standards.

## BACKGROUND

Guangdong province has prioritized air-quality management under the State Council's Air Pollution Prevention and Control Action Plan.<sup>3</sup> The Pearl River Delta (PRD) region<sup>4</sup>—a critical sub-region in Guangdong province—is identified in the plan as one of three regions to achieve aggressive air quality improvements. Reducing vehicle emissions is a key focus. From 2000 to 2012, the number of vehicles registered in Guangdong grew from 1.7 million to 11 million. Such rapid and extensive growth in the vehicle fleet has generated traffic congestion and worsened air pollution problems in cities throughout Guangdong province. The average ambient PM<sub>2.5</sub> concentration for last winter (quarter 4, 2014) was around 51 µg/m<sup>3</sup> province-wide and 55 µg/m<sup>3</sup> in the PRD area, both significantly over China's nationwide standard of 35 µg/m<sup>3</sup>.<sup>5</sup> (The World Health Organization annual standard is 10 µg/m<sup>3</sup>.) Meanwhile, the people of Guangdong, one of

- 1 The announcement of China 5/V vehicle emission standards early adoption in Guangdong province. Retrieved from [http://gdep.gov.cn/zwx\\_x\\_1/zfgw/shbtwj/201502/t20150215\\_199209.html](http://gdep.gov.cn/zwx_x_1/zfgw/shbtwj/201502/t20150215_199209.html)
- 2 The preparation for the early adoption of China 5/V vehicle emission standards in Guangdong province. Retrieved from [http://www.gdep.gov.cn/zwx\\_x\\_1/ggtz/201503/P020150327748829576282.pdf](http://www.gdep.gov.cn/zwx_x_1/ggtz/201503/P020150327748829576282.pdf)
- 3 The State Council of the People's Republic of China is increasingly emphasizing a regional approach to air-quality management. In September 2013, the State Council released a major air-quality improvement plan that establishes concrete environmental targets for three selected key regions: the greater Beijing "Jing-Jin-Ji" region, the Yangtze River Delta region (YRD), and the Pearl River Delta region (PRD). A Chinese-language copy of the plan is available at [http://www.gov.cn/zwgk/2013-09/12/content\\_2486773.htm](http://www.gov.cn/zwgk/2013-09/12/content_2486773.htm)
- 4 Pearl River Delta region is a sub-region of Guangdong province. It is composed by 9 cities: Guangzhou, Shenzhen, Foshan, Dongguan, Zhongshan, Zhuhai, Huizhou, Jiangmen and Zhaoqin. The densely populated PRD area is the economic center of Guangdong .
- 5 The city air quality report in Guangdong province (quarter 4, 2014), [http://www.gdep.gov.cn/news/xwfb/201501/t20150123\\_198565.html](http://www.gdep.gov.cn/news/xwfb/201501/t20150123_198565.html)

China’s most densely populated provinces, face increased risk of premature death from lung cancer and cardiopulmonary disease, and acute respiratory infection caused by exposure to primary and secondary PM emissions from vehicles in urban areas. Cleaning up the vehicle fleet is critical to improving air quality in Guangdong.

## KEY DIFFERENCES BETWEEN CHINA 4/IV AND CHINA 5/V

The emission limits of China 5/V standards are more stringent than China 4/IV, especially for diesel light-duty vehicles (LDVs). The new standard for the first time sets particular matter (PM) emission limits for gasoline LDVs, and particular number (PN) limits for diesel LDVs. Detailed emission limits and reduction from China 4/IV are shown in table 1 below.

The China 5/V emission limits are not identical to the Euro 5/V limits—are in fact more stringent in some respects. The PM limits for both gasoline and diesel LDVs are 10% lower than the Euro 5 emission standards (0.005g/km for Euro 5). Meanwhile, supplemental World Harmonized Transient Cycle (WHTC) testing is required for all urban China V heavy-duty vehicles (HDVs).<sup>6</sup> This is designed to prevent excess NO<sub>x</sub> emissions from vehicles operating in low-load or low-speed applications, which is not required in Europe until Euro VI.

**Table 1.** Emission limits for China 5/V vehicle emission standards, and reduction from China 4/IV

		NO <sub>x</sub>	PM	CO	HC	PN (#/km)
<b>Gasoline LDV</b>	Emission limits (g/km)	0.06	0.0045	1.00	0.10	-
	Reduction from China 4	25%	N/A	0%	0%	-
<b>Diesel LDV</b>	Emission limits (g/km)	0.18	0.0045	0.50	-	6.0*10 <sup>11</sup>
	Reduction from China 4	28%	82%	0%	-	N/A
<b>Heavy-duty engine</b>	Emission limits (g/kWh)	2.00	0.02	0.46	1.50	-
	Reduction from China IV	43%	0%	0%	0%	0%

## TIMELINE

The China 5 LDV emission standards must be in place in the Pearl River Delta region no later than December 31, 2015, and in the rest of the province no later than June 30, 2016. China V HDV emission standards will phase in with the same schedule for public heavy-duty vehicle fleets (buses, sanitation and postal trucks, and other civil vehicle fleets). As shown in table 2, the timeline closely follows Beijing’s and Shanghai’s schedules. This is about 1.5 to 2 years earlier than the national timeline.

<sup>6</sup> “Supplemental WHTC testing for Euro IV/V heavy-duty vehicles in China,” ICCT policy update, February 2014, [www.theicct.org/sites/default/files/publications/ICCTupdate\\_ChinaWHTC\\_feb2014.pdf](http://www.theicct.org/sites/default/files/publications/ICCTupdate_ChinaWHTC_feb2014.pdf)

**Table 2.** China 5/V and 10 ppm fuel implementation timeline

	China 5 LDV	China V HDV*	10ppm Gasoline	10ppm Diesel
<b>PRD</b>	31 Dec, 2015	31 Dec, 2015	1 Jul, 2014	1 Apr, 2015
<b>Rest of Guangdong</b>	30 Jun, 2016	30 Jun, 2016	1 Oct, 2014	1 Jul, 2015
<b>China nationwide</b>	1 Jan, 2018	1 Jan, 2018	31 Dec, 2017	31 Dec, 2017
<b>Beijing</b>	1 Feb, 2013	1 Feb, 2013	1 Aug, 2013	1 Aug, 2012
<b>Shanghai</b>	1 May, 2014	1 May 2014	1 Sep, 2013	1 Sep, 2013

\* The early adoption timeline for China V HDV in PRD, rest of Guangdong, Beijing and Shanghai refers to the timeline for public heavy-duty vehicle fleets.

This timeline is postponed from the original schedule, as a compromise response to pressure from car dealers.<sup>7</sup> The LDV China 5 implementation was first scheduled on March 1, 2015 for the PRD region, and July 1, 2015 for the rest of the province, based on the announcement on February 15, 2015. This announcement will influence not only the registration of new vehicles but also the transfer of second-hand vehicles within Guangdong. According to the Regulations of Guangdong Automobile Emission Prevention and Control (revised in 2010), if a vehicle is transferred from one city to another, the vehicle must meet the latest emission standards of the city it is transferred to. That means that used vehicles registered at China 4/IV or below can no longer be transferred even between PRD cities once the standards take effect. The restriction can effectively prevent car dealers gaming the system by selling used vehicles with lower emission standards back to the cities where higher emission standards are required.

However, the initial schedule gave car dealers, especially those located in the PRD area, little time to turn the existing China 4/IV vehicles over. Under pressure from the car dealers, a postponed timeline, with another 9 to 12 month flexibility, was announced by Guangdong EPD in late March. This new schedule applies to heavy-duty public fleets as well. Meanwhile, municipal governments are still encouraged to adopt China 5/V earlier.

## EXPECTED IMPACTS

By taking full advantage of the previously announced timeline for ultra-low-sulfur fuel in Guangdong province,<sup>8</sup> early adoption of China 5/V can yield significant emission reductions for all pollutants, including both NO<sub>x</sub> and PM<sub>2.5</sub>. A 2014 ICCT cost-benefit analysis<sup>9</sup> found that the NO<sub>x</sub> reduction could total over 40 thousand metric tons after full implementation, and premature mortality caused by human exposure to ambient PM<sub>2.5</sub> could decline by 20%. Because a significant proportion of the benefits would come from the HDV segment, it is important that the timeline for full HDV adoption be established as soon as possible.

7 The discussion on the early adoption of China 5/V vehicle emission standards in Guangdong province—the cancellation of transfer restriction, [http://www.pcauto.com.cn/drivers/570/5709200\\_all.html](http://www.pcauto.com.cn/drivers/570/5709200_all.html)

8 The announcement of China V fuel implementation in Guangdong province, [http://zwgk.gd.gov.cn/006939748/201405/t20140529\\_529875.html](http://zwgk.gd.gov.cn/006939748/201405/t20140529_529875.html)

9 Zhenying Shao, David Vance Wagner, Zifei Yang, “Costs and benefits of China 5/V and 6/VI standards in Guangdong Province,” <http://www.theicct.org/costs-and-benefits-china-5v-and-6vi-standards-guangdong-province> (Chinese-language version available at [www.theicct.org/costs-and-benefits-china-5v-and-6vi-standards-guangdong-province-cn](http://www.theicct.org/costs-and-benefits-china-5v-and-6vi-standards-guangdong-province-cn)). This analysis was prepared for the Ministry of Environmental Protection’s (MEP) Vehicle Emission Control Center (VECC) and Guangdong Environmental Protection Department (EPD) to support Guangdong’s application for the early adoption of China 5/V standards.

Our analysis showed that the overall value of benefits, including improvements in public health from reduced air-pollution exposure and lower climate-pollutant emissions, will outweigh the total costs of the standards by 1.4 billion RMB in 2015 alone.<sup>10</sup>

## NEXT STEPS

Although China 5/V emissions standards do produce health and air quality benefits as compared to China 4/IV, many concerns remain regarding the in-use efficacy of both China 4/IV and 5/V engines and vehicles. High in-use emissions from these vehicles have been seen in Europe, where Euro 4/IV and 5/V vehicles have been on the road for some time (the Euro and China standards are very similar).<sup>11</sup> Recent studies show that Euro 6/VI standards (the current standard for new vehicles and engines in Europe) result in significant emission reduction from on-road vehicles. Guangdong province would obtain additional benefits from adopting the more stringent vehicle emission standards (Euro 6/VI equivalent) as soon as those standards are available in China. Our analysis indicates that implementing the Euro 6/VI equivalent standards in Guangdong will be cost-effective, consistent with experience in and estimates for other regions around the world that have adopted advanced tailpipe emission standards.<sup>12</sup>

10 These estimates should be considered conservative, since the health impacts estimates only considered premature mortalities from primary PM<sub>2.5</sub> emissions and did not model morbidities or exposure to secondary PM or other pollutants, including ozone.

11 HDVs conforming to Euro IV and V standards frequently show poor real-world NO<sub>x</sub> emissions performance. See "Comparison of real-world off-cycle NO<sub>x</sub> emissions control in Euro IV, V, and VI," ICCT Briefing Paper (2015), [www.theicct.org/comparing-real-world-nox-euro-iv-v-vi-mar2015](http://www.theicct.org/comparing-real-world-nox-euro-iv-v-vi-mar2015)

12 Shao, Wagner, and Yang, "Costs and benefits of China 5/V and 6/VI standards in Guangdong Province."