CHILE: SANTIAGO ADOPTS EURO VI BUS STANDARD

OVERVIEW

As significant sources of carcinogenic fine and ultra-fine particles and also black carbon in most cities, soot-free bus fleets are crucial to cleaning up air quality and lowering climate warming emissions. In 2015 city buses around the world accounted for about 25% of black carbon from all passenger and commercial goods transport vehicles .

In Santiago, air pollution has been a a prime challenge for the last three decades and buses are the major source for particulate matter and NOx pollution in the city. From the beginning of the nineties the adoption of several actions, including cleaner fuels and emissions standards for new vehicles. These have produced a continuos improvement in the annual average $PM_{2.5}$ levels measured in Santiago's air. The 2012 annual average $PM_{2.5}$ levels were 65% lower than in 1989.

In early 2016 the Ministry of Environment of Chile announced that EURO VI or USEPA 2010 technology would be mandatory for every new bus purchased and operating in the Transantiago public transport system as of January 2019. This makes Santiago the first city to commit to soot-free technology for $PM_{2.5}$ and NO_x emission reductions. The Transantiago fleet consists of 6,500 buses; 82% are currently Euro III standard (3,000 of which are equipped with diesel particulate filters) while the remaining 18% have Euro V technology.

POLICY INNOVATION

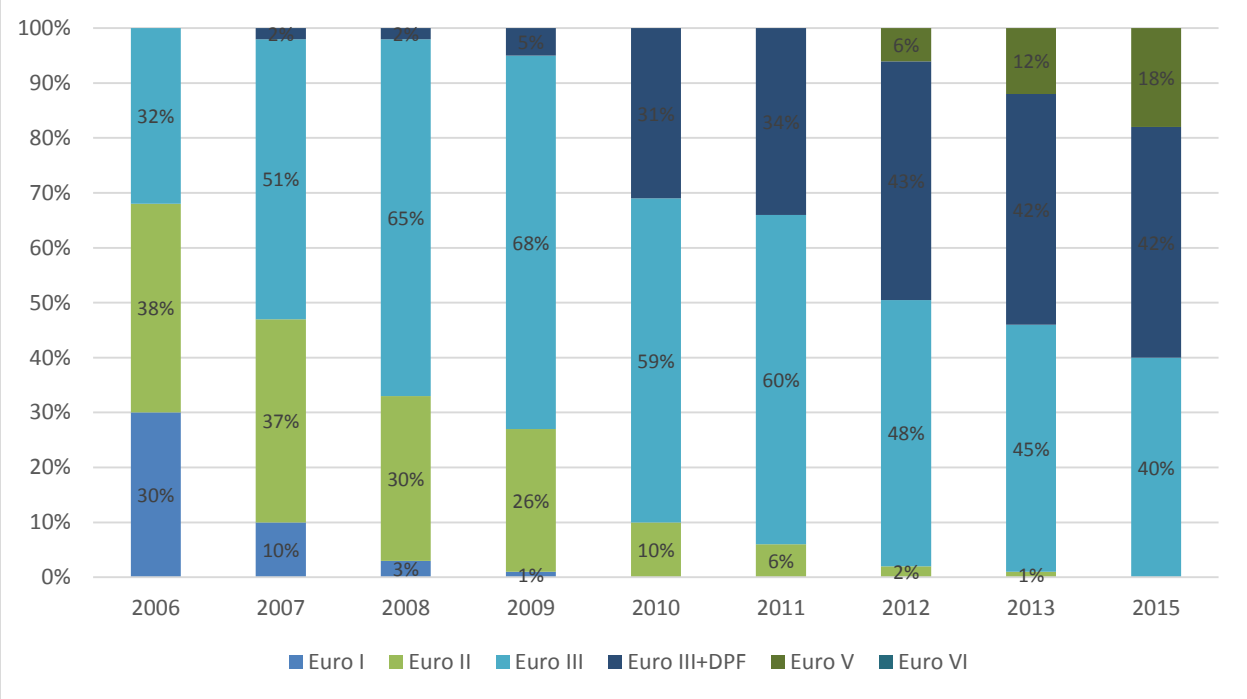
The adoption of ultra-clean bus standards is only the latest example of Chile's role as a regional and global leader in cleaner fuels and vehicles. Chile was the first country in Latin America to adopt ultra-low sulfur diesel and petrol fuel standards in 2009. The country has since led the way in the region in terms of cleaner fuels and vehicles, becoming the first Latin American country to adopt a joint CO_2 and pollutant tax in October 2014 that applies to light duty trucks and SUVs in addition to light duty vehicles.

In 2013 Chile adopted the first mandatory vehicle fuel economy and emissions labeling system in Latin America.

PROCESS

In 2004 Santiago introduced 50 ppm sulfur in diesel followed by 15 ppm in 2009. Euro III technology for buses was adopted in 2004 and the requirement of diesel particulate filters (DPFs) for every new bus in operation from 2009. This changeover was supported by UNEP, the US EPA and Swiss Cooperation Agency.

Due to severe pollution problems, many vehicle emission standards for the Santiago Metropolitan Region are more stringent and/or introduced earlier that those for the rest of the country. For example, Santiago has had a Euro 4 or US Tier 2, bin 8 standard for petrol vehicles since 2010, and Euro 5 or US Tier 2, bin 5 for diesel vehicles since 2011 and the city had used 15 ppm sulfur fuels since 2009 – three years before the rest of the country.



Santiago bus fleet technology 2006-2015

The 2012 - 2013 transition to a national 15ppm sulfur in fuels standard for diesel and petrol was supported by UNEP and linked to new standards for vehicles: Euro V for light diesel vehicles from 1st September 2012 and Euro V for medium diesel vehicles went in force from 1st September 2013 followed by Euro 4/Euro 5 for petrol engines from 2014.

From 2013 with continued UNEP and CCAC support, Centro Mario Molina Chile (CMMCh) promoted the adoption of more stringent standards for buses and trucks in Santiago, preparing an emission inventory

of heavy-duty vehicles in the city that was presented in July 2013 at the first regional CCAC Conference on Short-Lived Climate Pollutants held in Santiago.

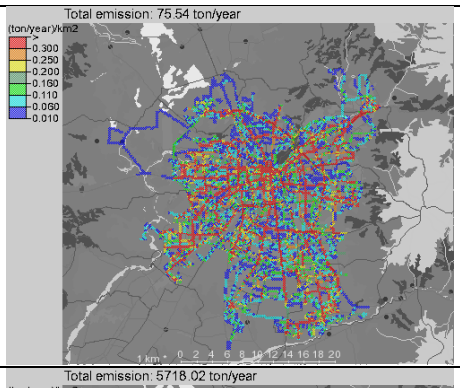
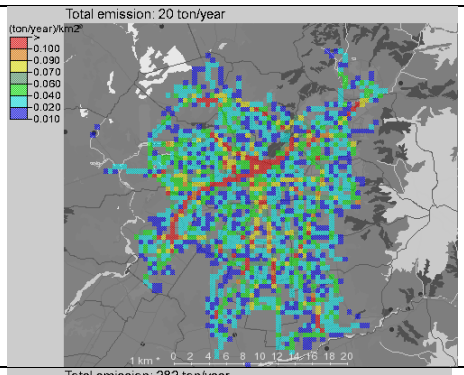
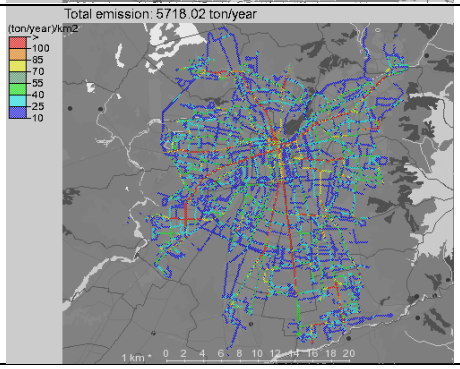
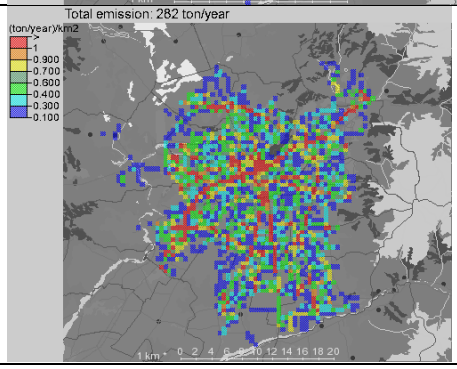
In 2014 CMMCh prepared the first proposal to revise the 2009 Santiago decontamination plan for the Ministry of Environment, including recommendations for black carbon reduction specific to soot-free buses. In June 2014 CMMCh published a study in the Journal of the Air & Waste Management Association entitled 'Particle size distribution and its relationship with BC in two urban and one rural site in Santiago de Chile'. The study found that the number of ultrafine particles in the studied areas of Santiago was 10 times higher compared to rural areas.

In July 2014 Nobel Prize Laureate Professor Mario Molina met with the President of Chile and the Minister of Environment to present their recommendations for the new phase of the Decontamination Plan for Santiago, including Euro VI standards for new buses

Nobel Laureate Mario Molina meets with President Bachelet of Chile

In May 2015 CMMCh worked with the Chief of the Division of Operation and Standards in the Ministry of Transport to define methodologies to characterize bus technologies in terms of emissions and fuel consumption in Santiago. At that time, the Minister of Transport was negotiating an increase of subsidies for the Santiago public transport system. CMMCh provided a technical recommendation based on best international experience; the Ministry provided bus testing at the national laboratory based on the recommended methodologies.

	Base year (2012)	Euro VI scenario*

PM emission (Ton/year)		
NOx emission (Ton/year)		

Modeling of before-and-after bus technology impact on PM and NOx emissions in Santiago with Euro III and Euro VI technology for standard buses (15-18 ton)

In January 2016 the Ministry of Environment of Chile presented the draft of the new Decontamination Plan for Santiago, including a Euro VI requirement for every new bus in the Santiago public transport system from January 2017. This draft was up for public consultations for 60 days. With CCAC support, CMMCh assisted the Ministry of Transport and Ministry of Environment in evaluating the marginal investment costs of Euro VI technology.

In April 2016 Santiago hosted a regional meeting on low sulfur fuels and clean buses, supported by the CCAC and UNEP. CMMCh developed a regional emission standard harmonized draft proposal that included a recommendation to adopt Euro VI bus technology standards as a priority action for public transport. Representatives from Brazil, Argentina, Chile, Colombia, Costa Rica, Dominican Republic attended.

RESULT

The final version of the Decontamination Plan for Santiago was presented by the Minister of Environment and the Governor of Santiago Metropolitan Region in October 2016 and new buses purchased by Transantiago are required to meet Euro VI standards from January 2017.

Santiago's commitment is a strong signal to bus manufacturers both regionally and internationally that there is growing demand for cleaner bus technology in cities for better air quality and emission reductions.

References:

The Global Strategy to Introduce Low Sulfur Fuels and Cleaner Diesel Vehicles. http://ccacoalition.org/ar/content/global-sulfur-strategy

"Autoridades de Transportes presentan primer bus de Transantiago con tecnología de emisiones EURO VI." Transantiago. 8 January 2016. http://www.transantiago.cl/noticias/autoridades-de-transportes-presentan-primer-bus-de-transantiago-con-tecnologia-de-emisiones-euro-vi;jsessionid=okND0Nbk2AHhBxMkG-hH8pU2

Decontamination Plan of Santiago. Accessed 21 December 2016. http://santiagorespira.gob.cl/pdf/Anteproyecto_del_Plan_de_Prevencion_y_Descontaminacion_atmosferica_para_la_Region_Metropolitana_de_Santiago.pdf

Fuel Economy State of the World 2016. The Global Fuel Economy Initiative. https://www.globalfueleconomy.org/media/203446/gfei-state-of-the-world-report-2016.pdf

Gramsch, E. et. Al. "Particle size distribution and its relationship to black carbon in two urban and one rural site in Santiago de Chile." Journal of the Air and Water Management Association. Vol. 64 , Iss. 7, 2014. http://www.tandfonline.com/eprint/cJcq8p3P5zwswG95UGF6/full#.U62KKZR5N8p

"Santiago Respira: El nuevo Plan de descontaminación Atmosférica de Santiago." The Government of Chile. 4 January 2016. http://www.gob.cl/2016/01/05/santiago-respira-el-nuevo-plan-de-descontaminacion-atmosferica-de-santiago/