

**立法會**  
**Legislative Council**

LC Paper No. CB(1)1269/12-13(02)

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**Panel on Environmental Affairs**

**Special meeting on 14 June 2013**

**Background brief on "Retrofitting franchised buses  
with selective catalytic reduction devices"  
prepared by the Legislative Council Secretariat**

**Purpose**

This paper sets out the background of retrofitting franchised buses with selective catalytic reduction ("SCR") devices.

**Background**

2. Roadside air quality poses great public health concern. The Government is committed to improving roadside air quality and has been introducing various control measures to reduce emission of air pollutants. According to the Government, franchised buses account for up to 40% of the traffic flow in busy corridors and about 67% of the existing franchised bus fleet are Euro II and III buses. Since aged buses and diesel commercial vehicles are a key source of roadside air pollution, all pre-Euro buses have been phased out and all Euro I buses are expected to retire by 2015.

Overseas experience

3. To reduce nitrogen oxides ("NO<sub>x</sub>") emissions, some places in Europe, such as London and Belgium, have retrofitted some of their Euro II and III buses with SCR devices which could reduce their NO<sub>x</sub> emissions by about 60%, thereby upgrading their NO<sub>x</sub> emission performance to that of Euro IV buses.

Trial of retrofitting franchised buses with selective catalytic reduction devices

4. In his 2010-2011 Policy Address, the Chief Executive proposed to retrofit the SCR devices on Euro II and III buses of franchised bus companies to reduce their NO<sub>x</sub> emissions.

5. In September 2011, the Government launched a trial scheme to engage major franchised bus companies to test out the technical feasibility and emission benefits of retrofitting local Euro II and III franchised buses with SCR devices. The trial would last for 12 months for assessing the full performance of SCRs. A task force comprising representatives from the franchised bus companies, overseas and local experts as well as relevant government departments was formed to examine related technical issues and oversee the trial.

6. Under the trial scheme, SCR devices have been retrofitted on four Euro II and two Euro III buses respectively. They came from three major bus models, namely Euro II Volvo Olympian, Euro II Dennis Trident and Euro III Dennis Trident. About 58% of the current Euro II and III franchised buses are of these three models. These buses have been put on normal bus routes comprising both urban and highway traffic conditions. The performance of the SCR devices in the following aspects is monitored –

- (a) the reduction in NO<sub>x</sub> emissions;
- (b) the backpressure on the bus engine;
- (c) the consumption rate of urea solution, which is required for the chemical conversion of NO<sub>x</sub> emissions into non-harmful nitrogen and water vapour; and
- (d) other implications, if any, on the operation and maintenance of the trial buses.

7. Up to end April 2012, the trial showed that SCR retrofit could reduce effectively the emissions of local franchised buses of the above three models while not increasing excessively the backpressure on bus engines. The design and construction of the SCR system was critical to its successful operation. Although some mechanical problems were identified, they were already rectified by the SCR devices suppliers. Details of the interim trial results up to 30 April 2012 are set out in LC Paper No. CB(1)2200/11-12(03).

8. Given the positive findings, the Government has sought support from the franchised bus companies to start preparation for launching a large-scale retrofit for Euro II and III buses with an aim to complete the retrofit by end 2015. Specifically, the Government has worked with the franchised bus companies and SCR devices suppliers to test out the devices on another six bus models. The Government has also invited other interested SCR devices suppliers to retrofit their products on selected bus models for trial before tendering for the proposed full-scale retrofit.

## **Deliberations by Members**

### Panel on Environmental Affairs

9. When the subject of SCR retrofit was discussed in the context of the introduction of pilot low emission zones for franchised buses at the joint meeting of the Panel on Environmental Affairs ("the EA Panel") and the Panel on Transport on 12 July 2010, members were generally in support of the retrofit and expressed concern about the implementation timetable.

### Subcommittee on Improving Air Quality

10. The Administration informed the Subcommittee on Improving Air Quality ("the Subcommittee"), which was established under the EA Panel in the previous term, of the interim findings of the trial of retrofitting Euro II and III buses with SCR devices at its meeting on 27 June 2012. Members were concerned about the cost of a full-scale retrofit. In response to members' enquiries, the Administration advised that the cost of the SCR trial being implemented for the six buses was about \$2.1 million. This covered the design, supply and installation of the SCR devices, as well as manpower support for conducting on-road emission tests and compilation of test reports.

11. For the proposed large-scale retrofit, the estimate was that it might include up to 3 700 Euro II and Euro III franchised buses and the estimated cost was around \$555 million. A more detailed cost estimate would be made upon the completion of the trial. The Government would fully subsidize the franchised bus companies the capital cost of retrofitting Euro II and Euro III buses with SCR devices while the franchised bus companies should be responsible for the subsequent operation, maintenance and repair (i.e. including the replacement of the worn-out catalyst) costs.

12. Some members of the Subcommittee had reservation about the proposed full-scale retrofit and requested the Administration to provide an analysis of the cost-effectiveness between subsidizing the franchised bus companies to advance the bus replacement programme<sup>1</sup> (say from the existing 18 years to 15 years) and the full-scale retrofit. These members were of the view that the Administration should, instead of retrofitting buses with SCR devices, explore other alternatives to improve the emission performance of the bus fleet. The Administration responded that when considering whether the bus replacement programme should be accelerated, it would take into account of the implications

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<sup>1</sup> The franchised bus companies are required to operate their franchised bus services with buses under the age of 18 years, and have been replacing their serving buses accordingly. This arrangement has taken account of the maintenance, operational and financial capability of the bus operators and their obligations to provide a proper and efficient service to the public. In accordance with this arrangement, it is estimated that over 3 000 buses will retire and be replaced between 2013 and 2017.

over cashflow and the related financial costs for franchised bus companies, delivery lead time and the potential impacts of bunching in orders might have on costs, operations and delivery schedules, etc.

### **Council questions**

13. Hon Jeffrey LAM, Hon LEE Wing-tat, Hon Tanya CHAN and Hon TANG Ka-piu raised questions relating to the retrofitting of SCR devices on franchised buses at the Council meetings on 14 April 2010, and 5 January, 14 and 21 December 2011, and 22 May 2013. Details of the Council questions are hyperlinked in **Appendix**.

### **Latest development**

14. The Administration has completed the trial of retrofitting Euro II and III buses with SCR devices, and proposes to report the findings of the trial to the EA Panel at its special meeting on 14 June 2013. Subject to the support of the EA Panel, the Administration intends to seek funding approval from the Finance Committee in early July 2013 for the proposed large-scale retrofit which is planned to be completed in 2015.

### **Relevant papers**

15. A list of relevant papers is set out in **Appendix**.

Council Business Division 1  
Legislative Council Secretariat  
11 June 2013

## Appendix

### List of relevant papers

Council/ Committee	Date of meeting	Paper
<p>Panel on Environmental Affairs and Panel on Transport</p>	<p>12 July 2010</p>	<p>Administration's paper on "Pilot Low Emission Zones for Franchised Buses" (LC Paper No. CB(1)2454/09-10(02)) <a href="http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/eatp0712cb1-2454-2-e.pdf">http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/eatp0712cb1-2454-2-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. (CB(1)714/10-11)) <a href="http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/eatp20100712.pdf">http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/eatp20100712.pdf</a></p>
<p>Subcommittee on Improving Air Quality</p>	<p>27 June 2012</p>	<p>Administration's paper on "Interim Findings on the Trial of Retrofitting Franchised Buses with Selective Catalytic Reduction Devices" (LC Paper No. CB(1)2200/11-12(03)) <a href="http://www.legco.gov.hk/yr11-12/english/panels/ea/ea_iaq/papers/ea_iaq0627cb1-2200-3-e.pdf">http://www.legco.gov.hk/yr11-12/english/panels/ea/ea_iaq/papers/ea_iaq0627cb1-2200-3-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(1)2400/11-12) <a href="http://www.legco.gov.hk/yr11-12/english/panels/ea/ea_iaq/minutes/iaq20120627.pdf">http://www.legco.gov.hk/yr11-12/english/panels/ea/ea_iaq/minutes/iaq20120627.pdf</a></p> <p>Administration's response to the follow-up actions (items (2), (4) to (7)) arising from the discussion at the meeting on 27 June 2012 (LC Paper No. CB(1)2342/11-12(03)) <a href="http://www.legco.gov.hk/yr11-12/english/panels/ea/ea_iaq/papers/ea_iaq0627cb1-2342-3-e.pdf">http://www.legco.gov.hk/yr11-12/english/panels/ea/ea_iaq/papers/ea_iaq0627cb1-2342-3-e.pdf</a></p>

Hyperlinks to relevant Council Questions:

<b>Date</b>	<b>Council Question</b>
14 April 2010	Council question raised by Hon Jeffrey LAM <a href="http://www.info.gov.hk/gia/general/201004/14/P201004140121.htm">http://www.info.gov.hk/gia/general/201004/14/P201004140121.htm</a>
5 January 2011	Council question raised by Hon LEE Wing-tat <a href="http://www.info.gov.hk/gia/general/201101/05/P201101050149.htm">http://www.info.gov.hk/gia/general/201101/05/P201101050149.htm</a>
14 December 2011	Council question raised by Hon Jeffrey LAM <a href="http://www.info.gov.hk/gia/general/201112/14/P201112140163.htm">http://www.info.gov.hk/gia/general/201112/14/P201112140163.htm</a>
21 December 2011	Council question raised by Hon Tanya CHAN <a href="http://www.info.gov.hk/gia/general/201112/21/P201112210348.htm">http://www.info.gov.hk/gia/general/201112/21/P201112210348.htm</a>
22 May 2013	Council question raised by Hon TANG Ka-piu <a href="http://www.info.gov.hk/gia/general/201305/22/P201305220600.htm">http://www.info.gov.hk/gia/general/201305/22/P201305220600.htm</a>