(ACE Paper 21/2003)
For Advice

A Proposal to Require Installation of Vapour Recovery System at Petrol Filling Stations

Purpose

This paper seeks Members' advice on a proposal to amend the Air Pollution Control (Petrol Filling Stations)(Vapour Recovery) Regulation (Cap. 311 sub.leg.) to require the installation of vapour recovery systems at petrol filling stations.

Background

2. Petrol contains volatile organic compounds (VOC) that evaporate inside the fuel tank of a vehicle. When a vehicle is refuelled at a petrol filling station, the VOC vapour will be displaced by the incoming petrol. Unless controlled, the VOC vapour will disperse into the atmosphere. The major harmful effects of VOC are as follows -

(a) VOC will enhance the formation of ozone and respirable suspended particulate (RSP) in the atmosphere. Under sunlight, VOC will react with oxides of nitrogen (NOx) to form ozone. Ozone is an air pollutant that can irritate the eye and the lung, and can cause breathing difficulties. RSP can be inhaled into the lung and can reduce human pulmonary function; and

(b) VOC vapour from petrol increases the potential health risk to the public, since it contains benzene which is a carcinogen. The smell of VOC can also be a nuisance to people in the vicinity of petrol filling stations.

3. In 1999, after consulting the Advisory Council on the Environment and the relevant parties, the Government introduced the Air Pollution Control (Petrol Filling Stations)(Vapour Recovery) Regulation (Cap. 311 sub.leg.) to require the control of VOC emissions during the unloading of petrol from petrol tankers into storage tanks at petrol filling stations. Owners of petrol filling stations have since installed a system at their petrol filling stations to recover VOC vapour during the unloading process.

4. In May 2000, the Government announced a programme of new measures to improve air quality, which includes, as a further step to reduce VOC emissions, requiring petrol filling stations to reduce emission of VOC vapour during refuelling of petrol vehicles. In December 2000, a Joint Study Team was set up between the Environmental Protection Department (EPD) and the major oil companies operating in Hong Kong to look into two options for petrol vapour recovery during the refuelling process: installation of a vapour recovery system on petrol vehicles (Onboard Refuelling Vapour Recovery (ORVR)) or at petrol filling stations.

5. Having examined the findings of the Joint Study, the Government considers the installation of a vapour recovery system at petrol filling stations more effective for the following reasons -

(a) right-hand drive petrol vehicles fitted with an ORVR system will not be widely available in the market in the foreseeable future and, since Hong Kong's motor vehicle market is small, it is unlikely that vehicle manufacturers would be interested in setting up a special production line to supply vehicles with an ORVR system to Hong Kong; and

(b) since an ORVR system forms part of the fuel delivery system and cannot be retrofitted on existing vehicles, we could only require newly registered vehicles to be equipped with an ORVR system. If we go down this route, we would have to rely on the natural retirement and replacement of our existing petrol vehicle fleet and it will take a long time to achieve our intended objective. Installation of vapour recovery system at petrol filling stations can be completed within a much shorter time.

6. Our proposal is therefore to pursue the installation of vapour recovery systems at petrol filling stations instead of requiring petrol vehicles to be equipped with an ORVR system. The details of our proposal are set out at the Annex.

7. When fully implemented, the proposal can reduce the emission of about 740 tonnes of VOC per year. Controlling emissions of petrol vapour at the point of vehicle refuelling will reduce VOC, including benzene, concentrations in and around petrol station forecourts. Also the typical petrol smell associated with the petrol filling stations will be greatly reduced to the benefit of motorists and those living and working nearby.

Economic Implications

8. It is estimated that for a typical petrol filling station with four petrol dispensers each with four petrol dispensing nozzles, the cost of installing a vapour recovery system will be around $400,000, the annual maintenance and operating cost will be around $80,000 and the annual certification cost will be around $20,000. With around 180 petrol filling stations in Hong Kong, the total installation cost to the trade will be around $72 million, and the annual maintenance, operating and certification costs will be around $18 million assuming no other changes to the operation of the petrol filling stations.

9. However, as the system will recover 95% of the petrol vapour, which will become reusable petrol rather than ending up released into the atmosphere and wasted, the cost of installing and running the vapour recovery system will be partly offset by the revenue gained through the petrol recovered. It is estimated that around 730 tonnes of petrol with a retail price of $11 million will be recovered per year by the retail petrol filling stations. Hence the net annual additional recurrent cost arising from the vapour

recovery systems should be significantly below the $18 million mentioned in paragraph 8 above.

10. The petrol turnover of retail petrol filling stations in Hong Kong in 2001 was about $6,000 million based on retail price. The installation cost and the net annual operating cost of these vapour recovery systems will therefore be about 1.2% and 0.2% of the petrol turnover of the operators and the impact on petrol price should be minimal.

Consultation

11. We have consulted the oil companies, individual operators of petrol filling stations, potential vapour recovery system suppliers, motor trade associations, green groups and other concerned parties in April and May 2003. They generally supported the proposal. The concerns/suggestions raised include the following -

(a) the proposal will have cost implication for the petrol filling stations and the cost incurred may need to be transferred to their customers;

(b) some oil companies are concerned that given the limited number of vapour recovery systems in the market that can meet the prescribed specifications, the cost to the oil companies might be higher than envisaged; and

(c) the length of the hose of the approved system may be shorter than the hoses currently used by most petrol filling stations in Hong Kong, thus imposing a constraint on the operation of these petrol filling stations.

12. Our responses to these concerns are as follows -

(a) the installation cost and the annual recurrent costs of these vapour recovery systems are only about 1.2% and 0.2% respectively of the annual petrol turnover in Hong Kong. The impact of the proposal on petrol price should be small particularly as we are proposing to give owners of existing petrol filling stations three years to complete the retrofitting works such that the cost implications could be spread over that period of time;

(b) we have made some minor changes to the original specifications of the vapour recovery systems and after the revisions, at least 12 products from nine manufacturers can comply with the revised specifications. There should be competition in the market supplying the systems; and

(c) our proposal is to require the vapour recovery systems to be certified by the California Air Resources Board (CARB) (or any other organizations with equivalent certification requirements as approved by the Environmental Protection Department). Such products have been used in California since 1982 and also are widely used overseas by various petrol filling stations. Although some petrol filling stations may need to make minor adjustments to

their operational practice, major operational problems are not anticipated.

13. Given the environmental benefits, the general public are expected to support the proposal.

Legislative Timeable

14. Subject to Members' views, we plan to present the proposal to the Panel on Environmental Affairs of the Legislative Council later this month and then finalise the proposal with a view to introducing the legislation into the Legislative Council in 2004.

Advice Sought

15. Members' advice is sought on the proposal to require the installation of vapour recovery systems at petrol filling stations under the Air Pollution Control (Petrol Filling Stations)(Vapour Recovery) Regulation as set out in this paper.

Environment, Transport and Works Bureau
July 2003

Annex

A Proposal to Require
Installation of Vapour Recovery System at Petrol Filling Stations

It is proposed that the Air Pollution Control (Petrol Filling Stations)(Vapour Recovery) Regulation should be amended to incorporate the proposals below.

Installation of Vapour Recovery System

2. All newly built petrol filling stations should be required to be equipped with a system that recovers petrol vapour during petrol vehicle refuelling with immediate effect after the proposed regulation comes into operation.

3. Owners of existing petrol filling stations will have three years from the coming into operation of the proposed regulation to retrofit their stations with the systems.

Vapour Recovery System Required

4. The vapour recovery system should include a vacuum pump which will recover petrol vapour during refuelling via the coaxial hose and return the recovered petrol vapour to the underground petrol storage tank. The system should be certified by the following organizations and issued with a relevant certification document -

(a) United States California Air Resources Board (CARB); or

(b) any other organizations with equivalent certification requirements as approved by the Environmental Protection Department (EPD).

The CARB's standard requires, among other things, a vapour recovery efficiency of at least 95%.

Performance and Verification Tests by Owners

5. Upon completion of the installation work and before the vapour recovery system is put into operation, the owner should arrange to conduct a performance test and thereafter to conduct verification tests once every 12 months.

6. The tests should be conducted in accordance with the relevant certification document issued for the product. Depending on specific requirements in the relevant certification document for particular model types, the test may include, but not limited to, the following -

(a) Static Pressure Decay Test (CARB testing method TP-201.3);

(b) Air-to-Liquid Volume Ratio Test (CARB testing method TP-201.5); and

(c) any other tests as required by the relevant certification document;

or, any equivalent testing methods as approved by EPD.

The Static Pressure Decay Test should replace the current Pressure Decay Test serving similar purpose which is stated in Schedule 2 of the Air Pollution Control (Petrol Filling Stations)(Vapour Recovery) Regulation (Cap. 311 sub.leg.). This test should thus apply to both the proposed vapour recovery system for petrol vehicle refuelling and the existing vapour recovery system for unloading of petrol.

7. The tests should be conducted and certified to have complied with the relevant testing requirements by a competent examiner. The competent examiner should be a registered professional engineer in the disciplines of building services, gas, chemical, environmental, marine and naval architecture, or mechanical engineering under the Engineers Registration Ordinance (Cap. 409).

8. A copy of the certificate should be submitted to EPD for record. The original certificate should be displayed at a conspicuous location of the petrol filling station.

Tests by Authority

9. For the purpose of ascertaining that verification tests are properly conducted, the Authority may carry out further testing on the vapour recovery system or, if he is satisfied that the vapour recovery system is not functioning properly, may require the operator of the petrol filling station to conduct additional tests in between annual verification tests. Any defective systems or parts found defective as revealed by the tests should be stopped from operation until the defects have been rectified and certified by a competent examiner to have passed a verification test.

Operational Requirements

10. To ensure proper refuelling and to avoid excessive emission of petrol vapour, the owners have to observe the following operational requirements -

(a) refuelling should not be carried out if the vapour recovery system is not operating;

(b) continuing the refuelling after the automatic shut-off of the nozzle (topping-off) should be prohibited to avoid the possible excessive trapping of liquid petrol in the vapour line; and

(c) refuelling should be stopped as soon as practicable if there is any liquid petrol leakage during the petrol refuelling process.

Offences and Penalties

11. The level of penalty for non-compliance of the requirements under the proposed scheme should be similar to that under the current Air Pollution Control (Petrol Filling Stations)(Vapour Recovery) Regulation. Major offences with the proposed penalty are as follow -

	Proposed offence	Proposed maximum penalty
1.	Failure to provide a vapour recovery system set out in paras.2 and 3 above	a fine of $200,000 and to imprisonment for 6 months
2.	Failure to comply with the testing requirements for vapour recovery system set out in paras. 5 – 7 above	
3	Failure to carry out test as required by the Authority, or failure to stop operating a defective system, as set out in para. 9 above	
4.	Failure to comply with the requirement set out in para. 10 (a) concerning stop carrying out refuelling when the vapour recovery system is not in operation	
5.	Failure to comply with the display requirement for certificate set out in para.8 above	a fine at level 5 (i.e. $50,000).
6.	Failure to comply with paras. 10 (b) and 10(c) above concerning operation requirements during refuelling	a fine at level 5 (i.e. $50,000) on first conviction and to a fine at level 5 and to imprisonment for 3 months on a second or subsequent conviction

12. Owners (including the person in charge of a petrol filling station) of the petrol filling stations should be liable for the above violation, except for violating the operational requirements in paragraphs 10(b) and 10(c), for which the refuelling operator of the petrol filling station should be liable. It is also proposed that the competent examiner should be liable for any fraud found in the testing process and the penalty should be similar to that for offences under paragraphs 10(b) and 10(c).

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