

**For discussion
25 March 2014**

**Legislative Council Panel on Transport
Public Lighting in Hong Kong**

PURPOSE

This paper introduces the public lighting system in Hong Kong, including the design standards, operation, maintenance, beautification and energy saving measures.

BACKGROUND

2. The Highways Department (“HyD”) is responsible for the design standards, operation and maintenance, as well as the majority of design and construction of the public lighting system in Hong Kong. Public lighting system is an auxiliary facility for road network, which needs to be continually enhanced and properly managed in order to provide the community with reliable, safe, comfortable and environmentally friendly public lighting.

3. Public lighting system includes carriageway lighting, footpath lighting, cycle track lighting, underpass lighting, highmast lighting, highbay lighting at public transport interchanges, footbridge and subway lighting, gantry sign and roadside directional sign lighting as well as traffic bollards, amounting to about 226,200 lights in total. The numbers and photographs of different types of these lighting facilities are at **Annex 1**.

DESIGN STANDARDS FOR PUBLIC LIGHTING SYSTEM

4. The design of the public lighting system in Hong Kong is based on the Public Lighting Design Manual (“Manual”) published by HyD, with

the illumination levels selected according to road classification (including function, traffic volume, traffic segregation), pedestrian volume and ambient brightness of the roads. The design standards stipulated in the current Manual are developed according to the most commonly adopted international road lighting standard, i.e. BS EN 13201:2003 “Road Lighting - Part 2 : Performance Requirements”, which is widely adopted in various European and Asian countries.

OPERATION OF PUBLIC LIGHTING SYSTEM

5. The switching on/off of road lighting is controlled by the photo-electric controllers (“PECs”) installed in roadside public lighting control cubicles (PLCC), a photograph of which is at **Annex 2**. Road lighting will be automatically switched on when the ambient brightness falls to 55 lux¹ and switched off when it rises to 83 lux. Under normal weather conditions, road lighting will operate from around 8 minutes after sunset to around 15 minutes before sunrise. Subway lighting and underpass lighting, however, operates nonstop around the clock.

6. The annual electricity consumption of the public lighting system in Hong Kong for year 2013 is about 130M units², incurring an annual electricity charge of about \$130M.

MAINTENANCE OF PUBLIC LIGHTING SYSTEM

7. To maintain a high service level of public lighting, HyD carries out preventive maintenance to upkeep the lighting effect and to prevent malfunctioning of the facilities. Night patrol is also arranged coupled with corrective maintenance for timely repair of damaged lighting installation.

¹ “Lux” is an international illumination unit. The illumination level of road lighting is generally about 10-30 lux.

² One unit of electricity equals to 1 kilowatt hours (kWh).

8. Preventive maintenance includes regular cleansing of lantern, replacement of lamp, inspection and testing of lighting facilities and adjustment of PECs; replacement of rusty lamp posts and aged cables, applying protective paint on lamp posts; and day patrolling to check for damages to public lighting facilities and to detect any abnormal switching on of such facilities during daytime.

9. In addition, HyD arranges maintenance contractors to conduct night patrol to check if the public lighting system is operating normally and to carry out corrective maintenance for timely repair of any faulty lighting facilities. According to the requirements of the latest maintenance contracts, the contractors have to arrive on site within 2 hours upon receipt of an urgent fault call and to complete minor adjustment or replacement of components on the spot within 3 hours. More complicated repairs to urgent faults are required to be completed within 12 hours. Urgent faults refer to incidents involving safety issues or serious implications to the public lighting system, including fire, falling of lamp posts, electricity leakage and multiple lamp failures. As for non-urgent faults, the contractors are required to complete the repairs within 24 hours upon receipt of a fault call.

BEAUTIFICATION OF ENVIRONMENT

10. To tally with streetscape enhancement works at tourist spots and on characteristic roads in districts, HyD has installed at these locations over 6,800 decorative lights of various styles to match and enhance the streetscape in the vicinity. Photographs of some aesthetic lights are at [Annex 3](#).

ENERGY SAVING

11. HyD has been exploring different means to reduce energy consumption of the public lighting system, including implementation and trial of the various measures mentioned in the ensuing paragraphs.

12. At present, high pressure sodium lamps of higher efficacy are widely adopted in road lighting system of Hong Kong, of which the low wattage³ ones have an efficacy of about 90 lumen⁴ per watt while the high wattage ones have an efficacy of 150 lumen per watt, all exceeding the efficacy of the household compact fluorescent lamps at about 60 lumen per watt. The adoption of these high pressure sodium lamps has resulted in an energy saving of about 30% as compared to the road lighting equipment used in the past.

13. HyD has been monitoring new energy efficient road lighting products in the market. For example, a low wattage white light, namely, the Ceramic Discharge Metal Halide (“CDM”) lamps launched in recent years have efficacy comparable to high pressure sodium lamps, but with wider spectrum and hence better colour rendering⁵. Given their better colour rendering, energy saving can be achieved if CDM lamps with wattage lower than the existing high pressure sodium lamps are used at appropriate locations, without compromising the satisfaction of road users to the illumination at the road sections concerned. These low wattage CDM lamps can generally be used on subsidiary roads such as local distributors, cycle tracks, footpaths, open car parks and rear lanes. Currently, HyD has installed about 2,650 CDM lamps on some subsidiary roads and is planning to install more such lamps in different districts and on different types of subsidiary roads to test their performance and acceptance by the public.

14. HyD has also been monitoring the development of Light Emitting Diode (“LED”) road lighting technology, and has selected certified LED road lights that satisfy the required design standards for trial use to observe their actual performance. At present, the majority of LED road lights

³ High pressure sodium lamps used for public lighting are of power ranging from 50 to 600 watts, depending on the illumination needs.

⁴ “Lumen” is an international unit for measuring luminous flux, and is a luminous power related to the sensitivity of the human eye. One lumen of light per square metre equals to 1 lux of illumination. A candle emits about 12.6 lumen while a 100-watt incandescent lamp (i.e. the tungsten filament lamp commonly used in households) emits about 1,300 lumen.

⁵ Better colour rendering means that a person or an object appears richer in colour and less loss in colour fidelity when illuminated by a light source with wider spectrum.

available in the market are of low to medium wattage white light ones but with diverse qualities. The efficacy of these low to medium wattage LED lights are similar to high pressure sodium lights. Given their better colour rendering, LED lights with wattage lower than existing high pressure sodium lamps can be used to enhance energy saving. However, the cost-effectiveness of LED lights is low. Take the medium power LED light as an example, the current unit price of about \$14,000 costs about 10 times higher than the high pressure sodium light. Moreover, if a good quality medium wattage LED light is used for replacing a high pressure sodium lamp, the electricity cost saving is only about \$ 200 per annum. The cost-effectiveness is far lower than that of the high pressure sodium lights being used, and also lower than that of CDM lights. As such, the time is not yet ripe to adopt LED road lighting. Notwithstanding that, HyD will continue to monitor the development of this technology.

15. Apart from adopting high efficiency lights, HyD has worked hard in regulating the lighting level with a view to saving energy and avoiding imposing excessive illumination on nearby residents. HyD had reviewed that there were about 20,000 road lights⁶ operated with light bulbs of wattage higher than necessary due to unavailability of light bulbs of appropriate wattages, indicating room for downward adjustment to the lamp luminosity for further energy saving. Starting from 2006, HyD has progressively installed dimmable electronic ballasts for these lamps to reduce the current for a lower light output. We anticipate that these lamps will all be installed with electronic ballasts by end 2014, resulting in an annual saving of about 20% in electricity consumption.

⁶ The wattage of a light bulb increases with discrete steps. When the luminosity required at a road section falls between two successive wattage steps, HyD will use a light bulb of higher wattage to ensure sufficient lighting, resulting in higher-than-necessary wattage in some lamps. In order to reduce unnecessary electricity consumption, HyD makes use of electronic ballasts to dim the luminosity of such lamps to the level actually required. However, electronic ballasts are susceptible to lightning damage. In order to reduce lamp outage, electronic ballasts are not suitable for use in lamps installed on open sections of expressways.

CONTINUED OPTIMISATION

16. To cope with the development needs of our society, HyD will continue to optimise the design standards for the public lighting system and the related operation and maintenance work for improving the service level and enhancing energy saving, in order to continue to provide the community with reliable, safe, comfortable and environmentally friendly public lighting.

Highways Department
March 2014

Numbers and Photographs of Public Lighting Facilities

Type	Approximate Quantity (No.)
Carriageway lighting, footpath lighting and cycle track lighting	141,400
Underpass lighting	17,700
Highmast lighting	1,400
Highbay lighting at public transport interchanges	8,500
Tram shelters, footbridge and subway lighting	44,700
Gantry sign and roadside directional sign lighting	1,700
Traffic bollards	10,800
Total	226,200



Carriageway lighting



Footpath lighting



Cycle track lighting



Underpass lighting



Highmast lighting



Highbay lighting at public transport interchanges



Footbridge lighting



Subway lighting



Tram shelter lighting



Gantry sign lighting



Traffic Bollard

Roadside public lighting control cubicle (PLCC)



PLCC

Examples of Aesthetic Lighting



Ap Lei Chau



Causeway Bay



Shatin



Tsim Sha Tsui