

For discussion
on 24 June 2013

**LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS**

External Lighting in Hong Kong

INTRODUCTION

At the Panel meeting in March 2011, Members were briefed on the proposed measures for tackling the issues arising from external lighting. The measures included the introduction of a set of Guidelines on Industry Best Practices for External Lighting Installations¹ to encourage voluntary action to minimize light nuisance and energy wastage, and the establishment of a Task Force to tackle the issues. This paper takes stock of the preliminary findings of the Task Force, and sets out the key issues that the Task Force will bring up for further deliberation during the upcoming stakeholders engagement process before it finalizes its recommendations for submission to the Government.

Task Force on External Lighting

2. The Task Force on External Lighting (the Task Force) was set up in August 2011 to advise the Government on the appropriate strategy and measures for tackling nuisance and energy wastage problems caused by external lighting, having regard to international experience and practices. The Task Force is led by Professor Lam Kin-che with members drawn from a wide cross section of the community, including professional bodies, relevant trades, the academic community and green groups. The membership and Terms of Reference of the Task Force are at **Annex A**.

3. The Task Force focuses on the following two issues:

- (a) ***light nuisance*** caused by external lighting to residents nearby, usually as a result of strong, sometimes flashy, light; long operating hours and proximity to light sensitive receivers, etc.; and
- (b) ***energy wastage*** due to excessive light intensity, use of inefficient lighting installations and long operating hours.

¹ The Guidelines were promulgated in January 2012.

4. The Task Force has studied the technical standards and parameters as well as implementation approaches adopted by overseas regulatory regimes in tackling the problems of energy wastage and nuisance caused by external lighting. In addition to document-based studies and discussion at meetings, the Task Force has visited locations in Hong Kong where external lighting has been the subject for complaints, including Causeway Bay, Wan Chai, Tsim Sha Tsui and Mongkok, etc, to assess the applicability of the parameters and standards to Hong Kong. Since 2009, the Environmental Protection Department has been receiving around 200 complaints against external lighting annually. The number of complaints received, broken down by districts, is at **Annex B**.

Technical Parameters: Overseas Experience and Applicability to Hong Kong

Lighting Environmental Zoning System

5. The Task Force observes that the regulatory regimes for external lighting adopted by overseas metropolises are basically underpinned by a lighting zoning system under which the limits on external lighting impact for each lighting zone are determined having regard to the level of human activities, land use properties and prevailing environmental brightness.

6. The International Commission on Illumination (CIE) ² recommends the use of four lighting zones to classify different areas according to their prevailing environmental brightness as shown in the following table –

Category	Examples
E1: Intrinsically dark	National parks, areas of outstanding natural beauty
E2: Low district brightness	Rural, small villages, or relatively dark urban locations
E3: Medium district brightness	Small town centres or urban locations
E4: High district brightness	Town/city centres with high level of night-time activity

² The CIE is an independent, non-profit-making international organization devoted to worldwide cooperation and the exchange of information on all matters relating to the science and art of light and lighting, color and vision and image technology. As it is one of the leading authorities on the subject of light and lighting, the Task Force has made extensive reference to the parameters and standards recommended by CIE standards.

It should be noted that the lighting zones under the CIE's system are loosely defined and that each category is described in general terms.

7. The Task Force has considered whether and how the various environmental lighting zones should be drawn up for Hong Kong, and found that due to the high density of buildings and co-existence of commercial and residential buildings, it might not be feasible to draw up a lighting zoning map in Hong Kong. Indeed, owing to the close proximity of buildings, units within the same building may have different ambient lighting environment, depending on its orientation. It would be difficult to come up with meaningful demarcation of lighting zones. Following thorough discussion and visits to districts where external lighting has been a subject of complaints, the Task Force believes that it might not be practicable to draw up lighting zoning map in Hong Kong.

Energy Wastage

8. Though external lighting is not a major energy consumer, the Task Force has explored the feasibility of minimizing energy wastage through the adoption of the relevant parameters used by overseas institutions. It has been noted that in some overseas cities, Lighting Power Density (LPD) or Wattage/m² has been used to measure energy efficiency for lighting of a vertical or horizontal area such as signs and building façade, and standards are drawn up on the basis of the ambient lighting levels of different lighting zones as defined with reference to the permitted developments in the respective zones (e.g. residential, agricultural, commercial, etc.).

9. The Task Force has considered the feasibility of applying the LPD requirements to regulate signs and building façade in Hong Kong, and found that this would be difficult due to the absence of internationally-recognised LPD standard for regulating energy consumption of external lighting installations. The application of LPD has also been constrained by the absence of different lighting zones based on which the maximum LPD standards for signs and building façade are drawn up. This notwithstanding, the Task Force considers that to minimize energy wastage, it would be useful to require all new external lighting installations and installations that are due for replacement to use energy efficient lamps.

Light Nuisance

10. The Task Force notes that in some countries, "light nuisance" is defined as light emitted from premises so as to be prejudicial to health or nuisance; and that nuisance is, judged by the standard of a reasonable man,

an activity that amounts to an unreasonable interference with the use and enjoyment by the claimant of his/her land. Complaints against light nuisance are usually lodged by residents affected by lighting. There are no numeric or quantitative standards for measuring light nuisance, but reference may be made to technical parameters on obtrusive light formulated by institutions such as the CIE.

11. The CIE has recommended standards and parameters to control the effects of light nuisance from external lighting, such as light trespass, building façade and sign luminance, glare on residents, glare on road users and pedestrians. On top of these light nuisance parameters, the Task Force has also examined the parameters to assess the impact of sky glow. A diagram that illustrates different types of light nuisance is at Annex C. The Task Force considers that none of these parameters are appropriate in the local circumstances for the reasons set out at Annex D.

Switch-off Requirement

12. Having reviewed the parameters mentioned above, the Task Force concluded that the requirement to switch off external lighting after a preset time would be the most tenable option. It is relatively straight forward and is easier to implement. It should to a large extent mitigate the possible light nuisance problems and minimize energy wastage, and will unlikely affect the normal business operations if the preset time can tie in with their operational need.

13. The Task Force agree unanimously that positive actions have to be taken to minimise the problems associated with light nuisance and energy wastage, and the introduction of the switch-off requirement at preset time would be the most effective and practicable measure. However, before recommending this new measure, the Task Force would like to ascertain the enforceability of the switch-off requirement and to listen to stakeholders' views on the critical issues relating to the implementation of this requirement. These issues include:

- (a) the appropriate preset time;
- (b) scope of the switch-off requirement and exemptions to be granted; and
- (c) implementation approach.

Preset Time

14. As regards the specific time for switching off external lighting, there are two possible alternatives: (i) 11p.m. to 7a.m.; or (ii) midnight to 7a.m. Option (i) makes reference to the time adopted for regulating noise nuisance and will generally meet the expectation of a darker environment for sleep. Option (ii) has been proposed having regard to the need of some industries such as the entertainment, advertising and tourism sectors.

Scope and Exemptions

15. On the basis of the light nuisance complaints received, the Task Force proposes that the switch-off requirement be applied to lighting installations of decorative, promotional or advertising purposes that affect the outdoor environment regardless of whether the lighting installations are interior (e.g. advertising sign installed behind windows) or exterior. These may include shop signs, advertising signs, video walls and decorative lighting for facades and building features. The switch-off requirement should not apply to lighting necessary for security, safety or operational reasons, such as outdoor car parks, construction sites, buildings undergoing major retrofitting works, road/street number signs, street lights, and testing of external lighting that cannot be completed before the preset time due to requirements imposed by relevant government authorities, etc. Notwithstanding the above elaboration on the scope of the proposed switch-off requirement, the Task Force is aware that there is no easy and clear-cut definition for external lighting even along the above line. There could be grey areas, such as directional signs to shops that remain open after the preset time, signs showing the business hours or other information about the shops after business hours, etc.

16. As for exemption from the switch-off requirement, the Task Force observed that certain types of businesses such as entertainment facilities might remain open after the preset time, and hence their shop-front signs might be exempted from the switch-off requirement during their business hours. Shops on upper floors may consider erecting signs on the ground floor of the buildings to indicate that they are still open after the preset time. But their signboards on higher levels should not be exempted as they stand a high chance of causing persistent nuisance to the premises next to the signboards. The Task Force is also aware that light trespass effect caused by non-static signs is generally more prominent and irritating than that of static signs, and considers that exemption should not be granted for any non-static lighting for decorative, promotional or advertising purposes (e.g. flashing signs, video walls, etc.).

17. To provide flexibility during the festive holidays, the Task Force believes that exemptions should also be granted to decorative lightings (static and non-static) two nights/ early mornings before the respective statutory holidays of Christmas, New Year and Lunar New Year until the morning of the day following the holidays. For example, as the public holidays for Christmas in 2013 fall on 25 and 26 December, subject to the preset time, exemption from the switch-off requirement for decorative lightings should start from 11:00 pm (or mid-night) on 23 December until 7:00 am of 27 December.

18. There are questions as to whether signs showing hotel names displayed at the top of the buildings should be exempted from the switch-off requirement. The Task Force believes hotels may install lighting installations in the same way as shop-front signs or lighting installations on the ground floor to show that they are in operation after the preset time, if necessary. Given the small size of Hong Kong, there will be no practical need for the hotels to display signs on top of the buildings to show their locations as in overseas countries.

Implementation Approach

19. There are different options for implementing the switch-off requirement, ranging from the promulgation of voluntary guidelines; the introduction of a charter scheme whereby owners and the management of the external lighting installations pledge to switch off their lighting installations at preset time; and the introduction of legislation to mandate the switch-off requirement. These options are not mutually exclusive. There are suggestions that legislation should be introduced though a charter scheme can be implemented during lead time required for the legislative process. It has also been suggested that a charter scheme be implemented first and the need for legislation should be subject to the outcome of the charter scheme. In assessing the tenability of these options and developing appropriate regulatory models, we will need to give due consideration to the following factors:

- (a) nuisance caused by external lighting on some residents and gravity of the problems as perceived by the community at large;
- (b) apart from the environmental angles, the social and economic implications of different approaches in implementing the proposed switch-off requirement;
- (c) how to define in a clear and unambiguous manner the scope of

external lighting to be covered in the switch off requirement. The challenge may be greater if a mandatory approach is to be adopted, otherwise the enforceability of the legislative control will be compromised;

- (d) if a mandatory approach is preferred, the severity of the penalty against non-compliance taking into account the deterrent effect and the nature of the breach;
- (e) lead time for the legislative process;
- (f) regulatory costs, including enforcement costs; and
- (g) close monitoring and review of the effectiveness of any voluntary, charter or mandatory measure which may be introduced.

Stakeholders Engagement

20. The Task Force has concluded that the introduction of the switch-off requirement after the preset time, which is a simple and specific measure, is the appropriate way forward for Hong Kong. The switch-off requirement represents an appropriate balance between the need to preserve the spectacular night scene of Hong Kong on the one hand, and the need to minimize the adverse impact of external lighting on our daily lives on the other.

21. However, the Task Force is also keenly aware of the need to understand and assess the impact of regulation on the stakeholders and the public before making a firm recommendation on the preset time; the scope of regulation and exemptions; as well as the implementation approach. The Task Force will therefore conduct an engagement exercise within one to two months to consult stakeholders and the public on the three issues set out above. Upon the completion of the engagement exercise, the Task Force will analyse the views collected and develop specific recommendations on the way forward for submission to the Government.

Advice Sought

22. Members are invited to note the progress of work of the Task Force and give any advice that they may have on the way forward.

**Environment Bureau
June 2013**

Task Force on External Lighting

Membership

Chairman: Professor Lam Kin-che

Members: Dr Stefan Al
Mr Charles Nicholas Brooke
Mr Cary Chan
Dr Albert Chau Wai-lap
Ms Catherine Cheung
Ir Simon Chung Fuk-wai
Dr Chung Tse-ming
Mr Mason Hung
Mr Lam Kin-lai
Mr Edwin Lau
Mr Eric Lau Kim-wai
Mr Alfred Lee Tak-kong
Mr Andrew Lee Chun-lai
Dr Mak Siu-tong
Mr Ellis Wong Chuen
Mr Rex Wong Siu-han
Mr Bill Yeung
Mr Randy Yu

Terms of Reference

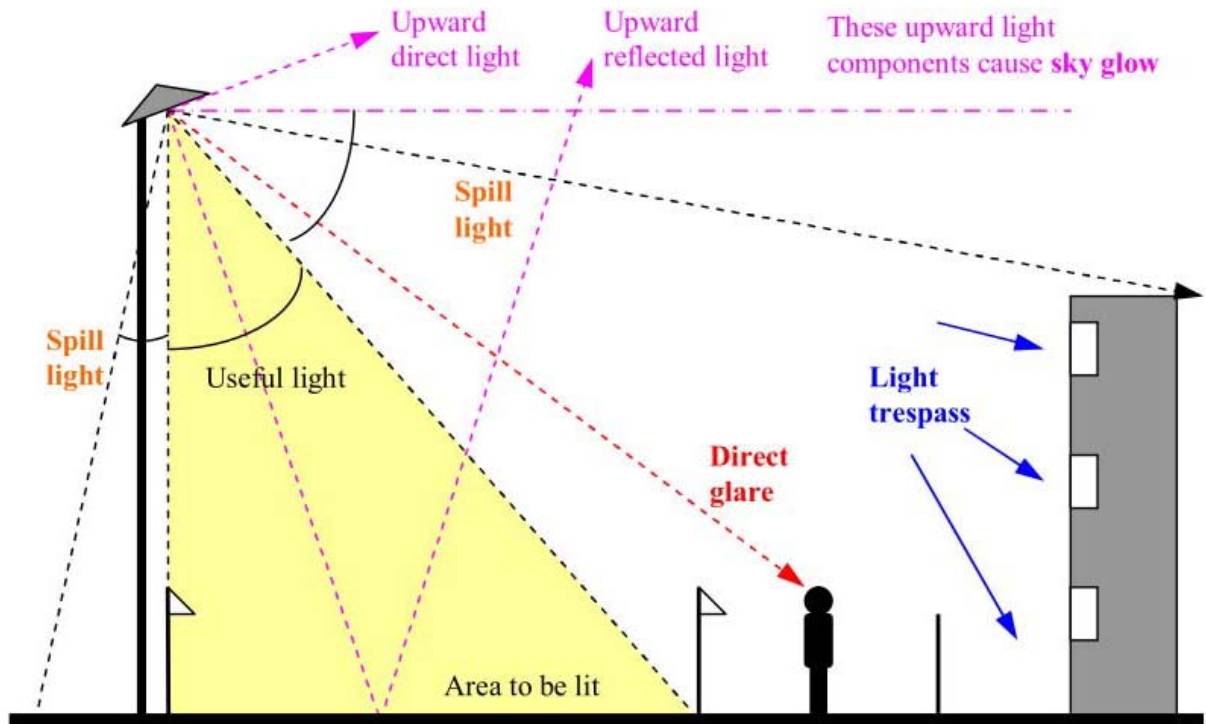
To enhance public awareness of and address concerns over external lighting, the Task Force is to advise the Government on -

- (a) the direction and focus of publicity and public education;*
- (b) the technical standards and related supplementary parameters for external lighting levels that should be developed for Hong Kong to suit local circumstances; and*
- (c) the appropriate strategy and measures for tackling nuisance and energy wastage problems caused by external lighting.*

Annex B**Breakdown of complaints against external lighting by districts**

District	2009	2010	2011	2012
Year				
Yau Tsim Mong	19	42	41	34
Wan Chai	44	22	42	30
Central & Western	20	25	20	23
Eastern	22	15	20	22
Southern	4	2	9	8
Sham Shui Po	13	17	4	9
Kowloon City	15	16	15	16
Wong Tai Sin	3	6	7	4
Kwun Tong	9	7	7	7
Tsuen Wan	5	5	13	2
Tuen Mun	2	4	8	13
Yuen Long	3	4	11	18
North	7	9	2	6
Tai Po	1	5	2	4
Sai Kung	29	14	6	4
Sha Tin	9	22	18	16
Kwai Tsing	5	9	4	7
Islands	3	2	5	2
Total	213	226	234	225

Illustration of Types of Light Nuisance



Task Force on External Lighting

Light nuisance parameters that are not recommended for Hong Kong

The CIE has recommended standards and parameters to control the effects of light nuisance from external lighting, including light trespass, building façade and sign luminance, glare on residents, as well as glare on road users and pedestrians. The Task Force on External Lighting has studied these parameters through the review of relevant documents and visits to locations in Hong Kong where external lighting has been the subject for complaints. The Task Force believes that these parameters are not appropriate in the local circumstances. The reasons are set out in the ensuing paragraphs.

(i) Light Trespass

2. Light trespass³ is the spill light entering the premises through the windows. It is measured on a vertical plane, such as window surface of dwelling. The Task Force observed during the site visit that, due to the high building density and close proximity of commercial and residential premises, the high level of light trespass caused by the ambient light is not uncommon. Moreover, light trespass in a particular premise can be caused by multiple light sources in the vicinity located at varying distances from the premise and cannot be attributed to a single light source. It may not always be practicable to identify the contributing lighting sources and apportion the amount of light received by a complainant among these sources in a fair and objective manner. The application of this parameter to Hong Kong is therefore not considered appropriate.

(ii) Building Façade and Sign Luminance

3. Building façade luminance and sign luminance⁴ are both emitter-based parameters used to assess the amount of light coming from the surface of building façade and signs. The Task Force observed during the site visit that the level of light emitted from a particular light source might not have a direct bearing on the level of light received in a particular premise, as light nuisance experienced by the light receptor would also depend on the distance between the light source and the light receptor.

³ Light trespass is the luminous flux per unit area at a point on a surface (unit: lux or lx).

⁴ Building façade luminance and sign luminance are the visual stimulus creating the sensation of brightness (unit: candela or cd /m²).

4. Given that the amount of light emitted from building façade or sign luminance is not the only or the most important factor affecting the level of light nuisance experienced by the light receiver, the Task Force believes that the application of such parameters may not be appropriate.

(iii) Glare

On Residents

5. Glare on residents⁵ is caused by the direct view of bright luminaires causing annoyance, distraction or discomfort. During the site visit, Task Force members noted the majority of light sources measured on site during the site visit do not have glare values exceeding the limits prescribed by the CIE. Even if the glare value of a light source exceeds the prescribed limit, the light nuisance as perceived by the receiver may not be too substantial if he/she does not stare at the light source directly. In fact, the perceived discomfort of glare is affected by the viewing angle rather than the actual value of glare of the light source. It can also be affected by the sensitivity of the light receivers. In view of the difficulty in ensuring regulatory certainty, the Task Force believes that it would not be advisable to adopt this parameter as defined from the light receiver's point of view.

On Road Users and Pedestrians

6. Glare on road users is used to measure disability glare caused by the direct view of a road user to bright light sources from normal viewing directions causing annoyance, distraction or discomfort.

7. The impact of light nuisance on road users such as drivers of vehicles, cyclists and pedestrians are being regulated by the relevant statutory requirements in Hong Kong, though they were introduced from the perspective of road safety instead of light nuisance. The Advertisements Regulation (Cap.132B) provides the Police with the power to stop any person from erecting in any premises any sign which interferes with road traffic, and to order the removal of any sign erected (occluding or otherwise) if it causes interference to road traffic. In view of the availability of relevant statutory regulations, additional measures to tackle glare on road users should not be necessary.

8. As regards glare on pedestrians, the CIE has developed a

⁵ Glare on residents is the luminous intensity emitted by luminaires in directions towards residents (unit: candela or cd).

parameter to assess glare which results in discomfort but without impairing the vision of objects and details. However, the CIE has admitted that they have little practical experience in applying this new approach. Given that major developed countries have not adopted any parameter, including the CIE's proposed parameter, to assess discomfort glare, the Task Force believes that there is no firm basis for regulating glare on pedestrians at this stage.

(iv) Sky Glow

9. Sky glow is the brightening of the night sky caused by artificial lighting and natural atmospheric and celestial factors⁶. Light emitted from external lighting installations, including light projected directly upwards and light reflected from the ground, can contribute to sky glow. Sky glow increases the brightness of the dark areas of the sky, and reduces the contrast of stars or other celestial objects against the dark sky background and affects astronomers' ability to view celestial objects.

10. The Task Force has found that given the high building density and the intermingling of commercial and residential activities in Hong Kong, the total amount of spill light that goes into the sky can be caused by multiple light sources at varying distance. The presence of multiple light sources brings about the problem of apportionment of responsibilities and enforcement difficulties. Hence, it would not be practicable to apply this parameter to Hong Kong.

11. The Task Force has explored the adoption of the upward light ratio (ULR) as a mandatory requirement. ULR is a parameter recommended by the CIE to set the proportion of the light of a luminaire and/or installation that is emitted at and above the horizontal plane when the luminaire(s) is mounted in its installed position. It is used to regulate the amount of light directed above the horizontal plane into the sky blocking out stars. Sky glow can be regulated by setting different ULR levels for different environmental zones. However, it will not be practicable for Hong Kong to adopt the zoning concept or to define the appropriate luminance level given the close proximity of buildings in Hong Kong. It appears that this parameter is not particularly relevant to the investigation of light nuisance complaints in Hong Kong.

12. In fact, the issue of sky glow, apart from the nuisance angle, is

⁶ The natural component of sky glow has five sources, including sunlight reflected off the moon and earth, faint air glow in the upper atmosphere, sunlight reflected off interplanetary dust, starlight scattered in the atmosphere, and background light from faint, unresolved stars, etc.

more relevant to astronomical observation which usually takes place in intrinsically dark places instead of densely populated areas. In the local context, the Task Force observed that, given the high building density and the intermingling of commercial and residential activities in Hong Kong, it would be difficult to regulate sky glow as the spill light that goes into the sky could be caused by multiple light sources. The Task Force is also aware that the measurement of night sky brightness can be affected by factors other than the intensity of artificial lighting such as atmospheric condition, e.g. the amount of cloud. Despite the enforcement difficulties, the Task Force has explored the possibility of regulating sky glow with reference to overseas regulatory experience. The findings indicated that the regulation of sky glow is not common in other metropolises. For places where sky glow is regulated, there are different limits set for different environmental zones. In view of the difficulty in dividing Hong Kong into different lighting zones, the Task Force believes that it would be difficult to apply the sky glow parameter to Hong Kong.